From: Hoc, PMT12
Sent: Wednesday, March 23, 2011 5:34 PM
To: PMT03 Hoc
Subject: FW: Hi-

From: Milligan, Patricia
Sent: Wednesday, March 23, 2011 5:32 PM
To: Hoc, PMT12
Subject: FW: Hi-

From: Gorman, Susan (CDC/OPHPR/DSNS) [mailto:spg4@cdc.gov]
Sent: Tuesday, February 01, 2011 5:38 PM
To: Milligan, Patricia; Manning, Ronald (HHS/ASPR/BARDA)
Cc: Young, Wayne (HHS/ASPR/BARDA)
Subject: RE: Hi-

Trish, I double checked, and all of our liquid KI expires by May 2012. **After that, we will not carry liquid KI any longer**. I will ask our leadership if they would approve a shipment to them, although it won't buy them much time as far as dating...once I get the answer to that, we can find out if they are still interested.

Sue

Susan E. Gorman, Pharm.D., M.S., DABAT, FAACT
Associate Director for Science
Division of Strategic National Stockpile
Centers for Disease Control and Prevention

From: Milligan, Patricia [mailto:Patricia.Milligan@nrc.gov]
Sent: Tuesday, February 01, 2011 3:33 PM
To: Gorman, Susan (CDC/OPHPR/DSNS); Manning, Ronald (HHS/ASPR/BARDA)
Cc: Young, Wayne (HHS/ASPR/BARDA)
Subject: RE: Hi-

Hi Sue
They need 200 bottles and their supply expires in 2011. I am not so sure they'd be happy with a short extension. See her attached email. Give me a call if you want to talk about this..

Trish

From: Gorman, Susan (CDC/OPHPR/DSNS) [mailto:spg4@cdc.gov]
Sent: Tuesday, February 01, 2011 3:16 PM
To: Manning, Ronald (HHS/ASPR/BARDA); Milligan, Patricia
Cc: Young, Wayne (HHS/ASPR/BARDA)
Subject: RE: Hi-

BOBB / 151

We still have some of the liquid KI and may be able to process a request for it however it does not have long dating on it – do you have any details – i.e. how many bottles/where etc? I can find out if leadership is willing to make a shipment before you let the requestor know. Also, as you know, once the product in SNS expires, it will not be replaced.

Sue

Susan E. Gorman, Pharm.D., M.S., DABAT, FAACT
Associate Director for Science
Division of Strategic National Stockpile
Centers for Disease Control and Prevention

From: Manning, Ronald (HHS/ASPR/BARDA)
Sent: Tuesday, February 01, 2011 3:10 PM
To: Milligan, Patricia
Cc: Gorman, Susan (CDC/OPHPR/DSNS); Young, Wayne (HHS/ASPR/BARDA); Manning, Ronald (HHS/ASPR/BARDA)
Subject: RE: Hi-

Hi Trish –

I am copying Sue Gorman at CDC/SNS on this email. Sue can give you the most accurate answer. I am also copying Wayne Young, who is the BARDA project officer on this contract.

Regards,
Ron

From: Milligan, Patricia [mailto:Patricia.Milligan@nrc.gov]
Sent: Tuesday, February 01, 2011 12:44 PM
To: Manning, Ronald (HHS/ASPR/BARDA)
Subject: Hi-

Hi Ron
Happy new year!!! I hope all is well with you and that you are enjoying this lovely DC weather! I had a question regarding liquid KI replenishment from a community that rec'd liquid KI when it was offered by HHS. Will HHS be resupplying the liquid KI to the communities or was it a one time distribution? Can I have her contact you for information? NRC is only distributing tablets and not liquid.

Thanks

Trish

Patricia A. Milligan, CHP, RPh
Sr. Technical Advisor - Preparedness & Response
Office of Nuclear Security and Incident Response
U.S. Nuclear Regulatory Commission
MS T3 B46M
Washington DC 20555
301-415-2223
patricia.milligan@nrc.gov

From: Hayden, Elizabeth
To: Burnell, Scott
Subject: RE: new hires
Date: Wednesday, March 23, 2011 9:13:00 AM

Oh brother. Are you pursuing this answer?

Beth Hayden
Senior Advisor
Office of Public Affairs
U.S. Nuclear Regulatory Commission
--- Protecting People and the Environment
301-415-8202
elizabeth.hayden@nrc.gov

-----Original Message-----
From: Burnell, Scott
Sent: Wednesday, March 23, 2011 9:10 AM
To: JIM EFSTATHIOU JR., BLOOMBERG/ NEWSROOM:
Cc: Hayden, Elizabeth
Subject: RE: new hires

Hello Jim;

I don't believe we slice our HR data that thinly in terms of "where are they from/where did they go," but I'll see what sorts of statistics we can provide. What's your deadline? Thanks.

Scott Burnell
Public Affairs Officer
Nuclear Regulatory Commission

rel

-----Original Message-----
From: JIM EFSTATHIOU JR., BLOOMBERG/ NEWSROOM: [mailto:jefstathiou@bloomberg.net]
Sent: Wednesday, March 23, 2011 8:58 AM
To: Burnell, Scott
Subject: new hires

Scott,
I'm trying to get some information on the background of employees at the NRC. Can you tell me how many came from industry, academia or elsewhere? Also, can you tell me how many people the agency has hired in the past few years to process new license applications, and their backgrounds? And finally, is there any way to say how many former NRC employees moved to industry jobs?

Thanks in advance for your help.

Jim

Jim Efstathiou Jr.
Bloomberg News
731 Lexington Ave.
New York, N.Y. 10022

Tel: 212 617 1647
Cell: 202 413 8189 rel
E-mail: jefstathiou@bloomberg.net

BBBB/152

From: LIA07 Hoc
Subject: 1800 EDT (March 23, 2011) USNRC Earthquake/Tsunami Status Update
Date: Wednesday, March 23, 2011 6:01:56 PM
Attachments: USNRC Earthquake-Tsunami Update.032311.1800EDT.pdf

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Hoc

Attached, please find an 1800 EDT (March 23, 2011) status update from the US Nuclear Regulatory Commission's Emergency Operations Center regarding the impacts of the earthquake/tsunami.

Please note that this information is "Official Use Only" and is only being shared within the federal family.

Please call the Headquarters Operations Officer at 301-816-5100 with questions.

-Sara

Sara K. Mroz
Communications and Outreach
Office of Nuclear Security and Incident Response
US Nuclear Regulatory Commission
Sara.Mroz@nrc.gov
LIA07.HOC@nrc.gov (Operations Center)

BBBB / 153

From: LIA07 Hoc
Subject: 0700 EDT (March 23, 2011) USNRC Earthquake/Tsunami Status Update Corrected Document
Date: Wednesday, March 23, 2011 7:02:17 AM
Attachments: NRC Status Update 3.23.11--0700 EDT.pdf

Please find attached a 0700 EDT (March 23, 2011) status update from the US Nuclear Regulatory Commission's Emergency Operations Center regarding the impacts of the earthquake/tsunami.

HOC

This update corrects some information sources, the PMT update, and the International Response

Please note that this information is "Official Use Only" and is only being shared within the federal family.

Please call the Headquarters Operations Officer at 301-816-5100 with questions.

-Jim

Jim Anderson
Office of Nuclear Security and Incident Response
US Nuclear Regulatory Commission
James.anderson@nrc.gov
LIA07.HOC@nrc.gov (Operations Center)

BBBB/154

From: Hoc, PMT12
Sent: Thursday, March 24, 2011 6:50 PM
To: ET07 Hoc
Subject: RE: FYI - Customs and Border Patrol protocols for screening people coming from Japan

Is this for information or is this to supplement the review we are doing for the White House to supplement CBP protocol?

From: ET07 Hoc
Sent: Thursday, March 24, 2011 6:42 PM
To: Hoc, PMT12
Subject: FW: FYI - Customs and Border Patrol protocols for screening people coming from Japan

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From: LIA06 Hoc
Sent: Thursday, March 24, 2011 6:15 PM
To: ET01 Hoc; ET05 Hoc; ET07 Hoc; ET02 Hoc; ET06 Hoc
Subject: FW: FYI - Customs and Border Patrol protocols for screening people coming from Japan

FYI

Liaison Team Director
U.S. Nuclear Regulatory Commission
Operations Center

From: Virgilio, Rosetta
Sent: Thursday, March 24, 2011 6:13 PM
To: LIA04 Hoc; OST05 Hoc; LIA06 Hoc; LIA08 Hoc; Barker, Allan; Maier, Bill; Tifft, Doug; Woodruff, Gena; Logaras, Harral; McNamara, Nancy; Trojanowski, Robert; /o=USNRC/ou=First Administrative Group/cn=Recipients/cn=6bd3eb76-62865841-d1d223b9-1e5f5439; Browder, Rachel; Erickson, Randy; Janda, Donna; Lynch, James; Orendi, Monica
Cc: Turtil, Richard; Piccone, Josephine; Jackson, Deborah
Subject: FW: FYI - Customs and Border Patrol protocols for screening people coming from Japan

THE INFO BELOW AND ATTACHED ARE FYI ONLY - NOT FOR DISSEMINATION, PER CRCPD

Note the documents were transmitted to State health officials, public health preparedness directors, and environmental health directors to verify contact info. A CRCPD working group is also working on associated talking points.

From: Cuadrado, Leira
Sent: Thursday, March 24, 2011 4:33 PM
To: Virgilio, Rosetta
Subject: FW: FYI - Customs and Border Patrol protocols for screening people coming from Japan

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From: Ruth McBurney [mailto:rmcburney@crcpd.org]
Sent: Thursday, March 24, 2011 4:08 PM
To: Cuadrado, Leira; Lewis, Robert
Subject: FW: FYI - Customs and Border Patrol protocols for screening people coming from Japan

BBBB/155

Here is the information that went out earlier today to the radiation control programs. We have a work group working on follow-up talking points on how contaminated persons, clothing and luggage are to be handled by radiation control programs.

We will also copy you with these when they are developed.

Ruth

From: Ruth McBurney
Sent: Thursday, March 24, 2011 12:33 PM
Cc: 'Adela Salame-Alfie'
Subject: FYI - Customs and Border Patrol protocols for screening people coming from Japan

Dear Director and Associate Members,

Attached you will find the suite of documents that make up the Traveler Plan Protocol and Procedures for screening travelers leaving Japan for possible radioactive contamination. These documents were prepared by an interagency workgroup to make sure it was appropriate and addresses many concerns.

We realize that some of you may need additional guidance on how to handle people arriving with contamination greater than 20 x background. At the same time, we are aware that each state may handle things differently. Please reach out to Adela or me if you need further assistance.

Please verify the contact information for your state and notify CRCPD as soon as possible of any changes. These documents will be made available on the secure side of the website for Director and Associate Members.

Included with this email is a document that lists the airports receiving direct flights from Japan. While every jurisdiction should be prepared to manage these cases, clearly the 14 states/territories that receive direct flights from Japan would be more directly impacted.

Please be aware that these documents have been transmitted to state health officials, public health preparedness directors, and environmental health directors.

Please share with those within your agency/public health system who have a need to know but, for now, this probably should not be widely or publicly distributed/posted.

Ruth E. McBurney
Executive Director
CRCPD
502-227-4543, ext. 0

WITH HOC

From: LIA07 Hoc
To: Borchardt, Bill; Bradford, Anna; Cohen, Shari; Cooper, LaToya; Dyer, Jim; Flory, Shirley; Gibbs, Catina; Haney, Catherine; Hudson, Sharon; Jaczko, Gregory; Johnson, Michael; Leeds, Eric; Loyd, Susan; Pace, Patti; Schwarz, Sherry; Sheron, Brian; Speiser, Herald; Sprogeris, Patricia; Taylor, Renee; Virgilio, Martin; Walls, Lorena; Weber, Michael
Subject: Update for Go Books - 1800 EDT, March 24, 2011
Date: Thursday, March 24, 2011 6:21:25 PM
Attachments: Talking Points 13.pdf
QA Price-Anderson Act 3-24-2011.pdf
TEPCO Press Release 145.pdf
TEPCO Press Release 133.pdf
TEPCO Press Release 134.pdf
TEPCO Press Release 135.pdf
TEPCO Press Release 136.pdf
TEPCO Press Release 137.pdf
TEPCO Press Release 138.pdf
TEPCO Press Release 139.pdf
TEPCO Press Release 140.pdf
TEPCO Press Release 141.pdf
TEPCO Press Release 142.pdf
TEPCO Press Release 143.pdf
TEPCO Press Release 144.pdf
ET Chronology 3-24-11 1800.pdf
USNRC Earthquake-Tsunami Update.032411.1800EDT.pdf
March 24 1515EDT one pager (3).docx

Please find attached updated information for the "Go Books".

The updates include:

- The 1800 EDT, 03/24/11 Status Update
- The latest ET Chronology
- The latest TEPCO Press Releases (Numbers 133-145)
- NRC Talking Points (Talking Points 13 and Q&A Price-Anderson Act)
- "One Pager" (1515 EDT, 03/24/11)

Please let me know if you have any questions or concerns.

-Sara

Sara Mroz
Communications and Outreach
Office of Nuclear Security and Incident Response
US Nuclear Regulatory Commission
Sara.Mroz@nrc.gov
LIA07.HOC@nrc.gov (Operations Center)

From: OST04 Hoc
Sent: Thursday, March 24, 2011 6:11 PM
To: LIA07 Hoc
Subject: Status Update Attachments 18:00 EDT 3-23-2011

Information for the following Tabs

Talking Points (Talking points 13 & QA Price-Anderson Act)

BBBB/156

ET Chronology
NRC Press Release – No new Updates (Last update 3/23)
TEPCO Press Release (Numbers 133-145)

OPA

TALKING POINTS

JAPAN NUCLEAR SITUATION

As of 3/24/2011 3:30 PM

Updates in Red

CONTENTS

PART 1: THE SAFETY OF U.S. NUCLEAR POWER PLANTS

- The NRC is always looking to learn information that can be applied to U.S. reactors and we will analyze the information that comes from this incident. President Obama has asked the agency to conduct a comprehensive review of the safety of U.S. nuclear plants; the agency will do so.

- The NRC issued an Information Notice on March 18 to all of its operating nuclear power plants describing the effects of the March 11 earthquake and tsunami on Japanese nuclear power plants. The purpose of the Information Notice is to inform the plants of the most recent information available to the NRC. The NRC expects U.S. nuclear power plants will review the entire notice to determine how it applies to their facilities and consider actions, as appropriate.

- U.S. nuclear power plants are built to withstand environmental hazards, including earthquakes. Even those plants that are located outside of areas with extensive seismic activity are designed for safety in the event of such a natural disaster.

- The NRC requires that safety-significant structures, systems, and components be designed to take into account the most severe natural phenomena historically reported for the site and surrounding area. The NRC then adds a margin for error to account for the limitations on historical data. In other words, U.S. nuclear power plants are designed to be safe based on historical data to predict the area's maximum credible earthquake.

- In response to MSNBC.com report ranking US NPPs according to vulnerability to earthquakes: The NRC does not rank nuclear power plants according to their vulnerability to earthquakes. This "ranking" was developed by an MSNBC reporter using partial information and an even more partial understanding of how we evaluate plants for seismic risk. Each plant is evaluated individually according to the geology of its site, not by a "one-size-fits-all" model - therefore such rankings or comparisons are highly misleading.

- In the 1980s and 1990s, the NRC required several changes to the BWR Mark I containments at U.S. plants to ensure they could continue to deal with severe events. The first issue involved the design's large circular tube, or "torus," which holds enough water to safely condense the large volumes of steam that could be released during a severe event. The NRC became aware in the mid-late 1970s that designers might have underestimated the forces the torus would have to withstand during an event. The NRC laid out an appropriate generic approach to resolving the issue in August 1982, and individual reactors carried out their plant-specific torus reinforcement efforts.

- The second issue involved the potential for containment failure following an extended loss of decay heat removal capability. Under the Mark I Containment Performance Improvement program that ran from the late 1980s into the early 1990s, all Mark I BWRs operating at that time installed hardened vent systems to provide an additional decay heat removal capability to protect against containment overpressure failure. The containment vent system could also be used to control hydrogen concentrations in containment. Two units, Browns Ferry 1 and 3, were in extended shutdown at that time, and hardened vents were installed before those reactors restarted. In addition most plants provided an alternate water injection capability that is independent of normal and emergency power supplies and enhanced the reliability of the automatic depressurization system to reduce the likelihood of a challenge to containment. Furthermore, in 2003, the Commission issued the "Hydrogen Rule" (10CFR50.44) that required all BWR Mark I plants to operate in an inert atmosphere to preclude the possibility of a hydrogen explosions in containment.

- The NRC recommendation related to a 50-mile evacuation zone for Americans near the affected nuclear power plants in Japan is consistent with the same kind of approach that would be used in the United States should a comparable, although extremely unlikely, event take place here.

- In November 1976, a federal task force was formed to look at salient emergency planning issues for U.S. nuclear power plants. Out of that comprehensive evaluation came a recommendation that a 10-mile-radius EPZ would assure that "prompt and effective actions can be taken to protect the public in the event of an accident" at a plant. This was based on research showing the most significant impacts of an accident would be expected in the immediate vicinity of a plant and therefore any initial protective actions, such as evacuations or sheltering in place, should be focused there. That does not mean the protective actions could not expand beyond the 10-mile radius. Rather, emergency planners have always known such actions could be necessary if the situation warranted it. (See NUREG 0654/FEMA-REP-1.)

- Following the events of Sept. 11, 2001, NRC required all nuclear plant licensees to take additional steps to protect public health and safety in the event of a large fire or explosion. In accordance with NRC regulations, all nuclear power plants are required to maintain or restore cooling for the reactor core, containment building, and spent fuel pool under the circumstances associated with a large fire or explosion. These requirements include using existing or readily available equipment and personnel, having strategies for firefighting, operations to minimize fuel damage, and actions to minimize radiological release to the environment. In general, mitigative strategies are plans, procedures, and pre-staged equipment whose intent is to minimize the effects of adverse events. If needed, these mitigative strategies could also be used during natural phenomena such as earthquakes, tornadoes, floods, and tsunami.

PART 2: MONITORING RADIATION IN THE UNITED STATES

- The NRC is working closely with our federal partners to monitor radiation releases from the Japanese nuclear power plants. Given the results of the monitoring and distance between Japan and Hawaii, Alaska, U.S. Pacific Territories and the U.S. West Coast, the NRC expects the U.S. to avoid any harmful levels of radioactivity. Reports of radiation being detected in the United States are all far below levels that would present a health risk. Additional questions regarding monitoring of the radioactive release should be referred to DOE at 202 586 4940.

- We are aware that minute amounts of radioactive elements have been detected at the very sensitive monitoring equipment at a number of privately owned nuclear plants. The US Government is looking at the best vehicle for reporting to the public this and any other data gathered by government. Nothing detected so far comes anywhere near a level that might concern us. We remain convinced there will be no health impact on the United States.

- The Department of Energy has been designated the lead agency for communicating information to the states regarding monitoring of radiation heading toward or over the United States. The DOE's Lawrence Livermore National Laboratory (National Atmospheric Release Assessment Center) is monitoring weather patterns over the Pacific Ocean. The Environmental Protection Agency maintains air monitoring stations throughout the country and has reinforced its monitoring effort. DOE will provide aerial monitoring. Questions about this effort should be directed to DOE at 202 586 4940.

- The Environmental Protection Agency has increased its radiation monitoring in the western U.S. Data from the EPA's RadNet is available on the EPA's website.

- [Only if specifically asked] The NRC is aware that Diablo Canyon nuclear power plant in California, among others, have detected a very low level of radiation. The site believes that the source of the radiation is likely the Fukushimi Daiichi nuclear power plant in Japan. The amounts detected are barely detectable on the instruments and pose no danger to public health and safety. The NRC continues to believe, based on all available information, that no harmful levels of radiation will reach U.S. territory. This information has been shared with the U.S. Department of Energy and the U.S. Environmental Protection Agency. Additional questions regarding monitoring of the radioactive release should be referred to DOE at 202 586 4940.

- In accordance with established protocols, U.S. Customs and Border Protection (CBP) employs several types of radiation detection equipment in its operations at both air and sea ports, and uses this equipment, along with specific operational protocols, to resolve any security or safety risks that are identified with inbound travelers and cargo. Out of an abundance of caution, CBP has issued field guidance reiterating its operational protocols and directing field personnel to specifically monitor maritime and air traffic from Japan. CBP will continue to evaluate the potential risks posed by radiation contamination on inbound travelers and cargo and will adjust its detection and response protocols, in coordination with its interagency partners, as developments warrant.

PART 3: THE SITUATION IN JAPAN

- As of Sunday, March 20, 2011, the NRC continues to monitor the nuclear crisis in Japan stemming from the March 11 earthquake and tsunami. NRC's top priorities are the continued assessment of radiological conditions, dose predictions, and protective action recommendations. This effort focuses primarily on conditions in Japan around the vicinity of the Fukushima Daiichi nuclear power plant. The NRC is also working with DOE to model the flow of radiation across the Pacific Ocean toward the United States.

- A team of ~~10~~ NRC experts continues to assist Japanese efforts in Tokyo as part of a USAID-sponsored assistance effort. [If asked: One team member fell ill and returned to the US. Numbers in the team and names change; please check if asked.]

- The Commission was briefed by the NRC staff on the situation in Japan at a public meeting on Monday, March 21, 2011. A transcript for the public commission meeting held yesterday has been posted. The meeting included an overview of NRC actions related to the Japanese emergency and the possible short- and long-term activities for the NRC. The transcript can be found here: http://www.nrc.gov/reading-rm/doc-collections/commission/recent/2011/. And the slides from the meeting are located at: http://www.nrc.gov/reading-rm/doc-collections/commission/slides/2011/20110321/staff-slides-03212011-meeting-rev1.pdf.

- Chairman Jaczko gave opening remarks at the meeting. He said, in part, "We have a responsibility to the American people to undertake a systematic and methodical review of the safety of our own domestic nuclear facilities, in light of the natural disaster and the resulting nuclear emergency in Japan. Beginning to examine all available information is an essential part of our effort to analyze the event and understand its impact on Japan and implications for the United States. Our focus is always on keeping plants and radioactive materials in this country safe and secure."

A copy of his full opening remarks can be found here: http://www.nrc.gov/reading-rm/doc-collections/news/2011/11-054.pdf

- Based on calculations performed by NRC experts, we continue to believe that it is appropriate for U.S. residents within 50 miles of the Fukushima reactors to evacuate. Our recommendation is based on NRC guidelines for public safety that would be used in the United States under similar circumstances.

- The 10-mile EPZ reflects the area where projected doses from design basis accidents at nuclear power plants would not exceed the EPA's protective action guidelines, and we are confident that it would be adequate even for severe accidents. However, the 10-mile zone was always considered a base for emergency response that could be expanded if the situation warranted. The situation in Japan, with four reactors experiencing exceptional difficulties simultaneously, creates the need to expand the EPZ beyond the normal 10-mile radius, based on our limited data and conservative assumptions.

  - The NRC is closely monitoring information about the spent fuel pools as well as radiation levels at the Japanese nuclear power plants. Given the totality of the situation, the NRC's recommendation for U.S. residents within 50 miles of the Fukushima reactors to evacuate remains unchanged. That recommendation was based on actual radiation levels in the nuclear complex.

  - The Japanese government has formally asked for U.S. assistance in responding to nuclear power plant cooling issues triggered by an earthquake and tsunami on March 11.

  - The NRC is coordinating its actions with other federal agencies as part of the U.S. government response. The NRC's headquarters Operations Center was activated at the beginning of the event and has been monitoring the situation on a 24-hour basis ever since.

Frequently Asked Questions

1. What is the Price-Anderson Act?

In 1957, a federal law called the Price-Anderson Act was established to ensure that adequate money would be available to pay insurance claims following an accident at a commercial nuclear power plant. That law is still in place to protect those that live around nuclear power plants.

2. My insurance agent said that my homeowner's insurance does not cover nuclear accidents. Does Price-Anderson protect me?

Your homeowner's insurance policy does not cover nuclear accidents because Price-Anderson covers claims related to nuclear accidents. By law, owners of nuclear power plants are required to purchase $375 million of offsite liability insurance for each reactor at the plant. If a nuclear accident causes damages of more than $375 million, the insurance is supplemented by additional coverage that is shared by every nuclear power plant in the country. There are currently 104 reactors licensed to operate in the United States, so this secondary pool of money contains about $12.6 billion. If all of this secondary money is used, Congress would determine whether to provide additional disaster relief.

3. The Price-Anderson Act is a federal law? Why does the government spend my tax dollars on providing nuclear insurance to big energy companies?

The Price-Anderson Act is a federal law, but your tax dollars do not pay for the insurance it requires owners of nuclear power plants to purchase. The extra insurance protection required for large commercial nuclear power companies is purchased at no cost to the public or the federal government.

4. My insurance company is a nationally known, reputable business that I trust. What insurance company does the nuclear plant use – a good one or the cheapest one they can find?

All U.S. nuclear power plant owners purchase their Price-Anderson insurance from American Nuclear Insurers (ANI), which is made of several large and reputable insurance companies. About half of the ANI companies are foreign insurance businesses. On average, a nuclear power plant owner pays about $400,000 per year for Price-Anderson insurance at a single-unit reactor site. For power plants with more than one reactor, the total annual insurance cost is typically discounted, similar to automobile insurance for households with more than one car.

5. More than a million people live within 50 miles of Plant X. How is a $375 million insurance policy supposed to cover all of us?

The Price-Anderson Act is a federal law that requires owners of nuclear power plants to purchase $375 million of offsite liability insurance for each reactor at the plant. If a nuclear accident causes damages of more than $375 million, the insurance is supplemented by additional coverage that is shared by every nuclear power plant in the country. There are currently 104 reactors licensed to operate in the United States, so this secondary pool of money contains about $12.6 billion. If all of this secondary money is used, Congress would determine whether to provide additional disaster relief.

6. Why does the NRC let a private insurance company determine the amount of insurance coverage? Why does this private company control public protection?

The intent of the Price-Anderson Act was to allow the government to regulate the safety of nuclear power while allowing the private insurance industry to provide financial protection. The NRC is the government agency that is responsible for ensuring that nuclear power plants are designed and operated in a way that protects public health and safety. The NRC is confident that the amount of insurance coverage determined by the private insurance company is adequate to provide financial compensation in the event of a nuclear accident.

7. The accidents in Japan affected the reactors and the spent fuel pools. Does the Price-Anderson Act cover all nuclear plant accidents or just some of them?

The Price-Anderson Act covers all property and liability claims resulting from nuclear accidents at commercial nuclear power plants. This includes any incident related to the reactor or the spent fuel pool. Price-Andersen also covers claims related to transporting nuclear fuel and nuclear waste in and out of the plant.

8. I'll have to find another place to stay if I have to evacuate my home during a nuclear accident. I can't afford to pay for a hotel or apartment for several months while the government tries to clean things up. How am I supposed to pay for that?

Insurance under the Price-Anderson Act covers bodily injury, sickness, disease or resulting death, property damage and loss, and reasonable living expenses for people who are evacuated from a nuclear accident. The Stafford Act is another federal law that provides disaster relief to state and local governments. If a nuclear accident is declared an emergency or major disaster by the President, the Stafford Act will also be available to provide assistance to accident victims. The Stafford Act allows the federal and state governments to share costs of temporary housing for up to 18 months. It also provides additional money for home repair and temporary mortgage or rental payments. Distribution of Stafford Act funding is done through the Federal Emergency Management Agency. Together, the Price-Anderson and Stafford Acts provide money for a variety of expenses following a nuclear accident.

9. Has Price-Anderson ever been used?

Only once. During the 1979 accident at the Three Mile Island Nuclear Power Plant, the Price-Anderson Act provided liability insurance to the public. The day after the accident, insurance company representatives established a local claims office in Pennsylvania. Advertisements were placed in local newspapers to inform residents of claims procedures. The insurance paid for the living expenses of families who decided to evacuate, although evacuation was not immediately ordered. When Pennsylvania's governor recommended the evacuation of pregnant women and families with young children who lived near the plant, the insurance paid for those evacuation expenses, too. In 1979, more than 3000 people received nearly $1.2 million in evacuation claims. More than 600 people were also reimbursed for lost wages as a result of the accident. In the months after the accident, numerous lawsuits were filed alleging various injuries and property damages. To date, the Price-Anderson insurance has paid about $71 million in claims and litigation costs associated with the Three Mile Island accident. All payments were made from the primary insurance coverage. Money from the secondary layer of insurance was not needed.

10. When does the Price-Anderson Act expire?

In 2005, the Price-Anderson Act was extended through December 31, 2025.

Search

Press Releases

Press Release (Mar 24,2011)
Detection of trace amounts of radioactive iodine around an exhaust stack and others of Kashiwazaki-Kariwa Nuclear Power Station

TEPCO has measured exhaust air from an exhaust stack and vent of each building of Kashiwazaki-Kariwa nuclear power station with a filter for a week, and detected iodine 131 up to 2.4 X 10^{-8} (becquerel/cm^3) at the exhaust stacks of all buildings, the exhaust vents of service buildings and auxiliary buildings (Arahama-side) of Unit 3, 5 and 6.

It slightly exceeded the upper limit (please refer to the attachment for more information).

Therefore, TEPCO checked operation conditions and works of all units, readings of high sensitivity off gas monitor*1, a periodical analysis result of iodine 131 contained in reactor water of Unit 1, 5, 6 and 7 in operation. However, any abnormality was detected.

It is presumed that iodine 131 released into the atmosphere from Fukushima Daiichi Nuclear Power Station was collected and detected in Kahiwazaki-Kariwa Nuclear Power Station, since iodine 131 was detected in radioactivity measurement of the exhaust air of some units and no abnormality of iodine 131 in nuclear water was detected.

Readings of monitoring posts and dust radiation monitors are within the normal range and have little environmental impact.The monitoring posts are located at boundary of the station and measure an ambient dose rate. The dust radiation monitors*2 are located beside the monitoring posts.

Attachment: :measurement result of iodine 131 in Kashiwazaki-Kariwa Nuclear Power Station

*1: High sensitivity off gas monitor
Measurement equipment installed in an off-gas treatment system to detect minimal leakage of radioactive materials from fuel rods to the nuclear water early

*2: Dust radiation monitor
Measurement equipment to monitor radioactivity contained in dust which is collected around boundary of the nuclear power station. Three dust radiation monitors are installed beside the monitoring posts.

attachment1:measurement result of iodine 131 in Kashiwazaki-Kariwa Nuclear Power Station
attachment2:Detection of trace amounts of radioactive iodine around an exhaust stack and others of Kashiwazaki-Kariwa Nuclear Power

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Press Releases

Press Release (Mar 24,2011)
Plant Status of Fukushima Daini Nuclear Power Station (as of 9:00 am March 24th)

[No update from the last release issued at 9:00 pm, March 23rd]

Unit Status

1
- Reactor cold shutdown, stable water level, offsite power is available.
- No cooling water is leaked to the reactor containment vessel.
- Maintain average water temperature at 100°C in the pressure restraint.

2
- Reactor cold shutdown, stable water level, offsite power is available.
- No cooling water is leaked to the reactor containment vessel.
- Maintain average water temperature at 100°C in the pressure restraint.

3
- Reactor cold shutdown, stable water level, offsite power is available.
- No cooling water is leaked to the reactor containment vessel.
- Maintain average water temperature at 100°C in the pressure restraint.

4
- Reactor cold shutdown, stable water level, offsite power is available.
- No cooling water is leaked to the reactor containment vessel.
- Maintain average water temperature at 100°C in the pressure restraint.

Other N.A

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Press Releases

Press Release (Mar 24,2011)
Status of TEPCO's Facilities and its services after Tohoku-Taiheiyou-Oki Earthquake (as of 9:00AM)

Due to the Tohoku-Taiheiyou-Oki Earthquake which occurred on March 11th 2011, TEPCO's facilities including our nuclear power stations have been severely damaged. We deeply apologize for the anxiety and inconvenience caused.

Below is the status of TEPCO's major facilities.
*new items are underlined

[Nuclear Power Station]
Fukushima Daiichi Nuclear Power Station:
Units 1 to 3: shutdown due to earthquake
(Units 4 to 6: outage due to regular inspection)

* The national government has instructed to evacuate for those local residents within 20km radius of the site periphery and to remain indoors for those local residents between 20km and 30km radius of the site periphery.

* Off-site power was connected to Unit 1 to 6.

* Unit 1
The explosive sound and white smoke was confirmed near Unit 1 when the big quake occurred at 3:36pm, March 12th.
We have started injection of sea water at 8:20 pm, March 12th, and then boric acid which absorbs neutron into the reactor afterwards.

At approximately 2:30 am, March 23rd, we have started the injection of sea water into the reactor from feed water system.

* Unit 2
At 1:25 pm, March 14th, since the Reactor Core Isolation Cooling System has failed, it was determined that a specific incident stipulated in Clause 1, Article 15 of Act on Special Measures Concerning Nuclear Emergency Preparedness occurred (failure of reactor cooling function).
At 5:17 pm, March 14th, while the water level in the reactor reached the top of the fuel rod, we have restarted the water injection with the valve operation.

At approximately 6:14 am, March 15th, the abnormal sound was confirmed near the suppression chamber and the pressure inside the chamber decreased afterwards. It was determined that there is a possibility that something happened in the suppression chamber. While sea water injection to the reactor continued, TEPCO employees and workers from other companies not in charge of injection work started tentative evacuation to a safe location. Sea water injection to the reactor continued.

On March 18th, power was delivered up to substation for backup power through offsite transmission line. We completed laying cable further to unit receiving facility in the building, and at 3:46 pm, March 20th the load-side power panel of the receiving facility started to be energized.

From 3: 05 pm to 5: 20 pm on March 20th, 40 tons of seawater was injected into Unit 2 by TEPCO employees.

At 6:20 on March 21st, white smoke was confirmed arising from the top of the reactor building. As of 7:11 am on March 22nd, smoke decreased to the level where we can hardly confirm.

From around 4 pm to 5 pm on March 22nd, approximately 18 tons of sea water was injected into the spent fuel pool by TEPCO employees.

* Unit 3
At 6:50 am, March 14th, while water injection to the reactor was under operation, the pressure in the reactor containment vessel increased to 530 kPa. As a result, at 7:44 am, it was determined that a specific incident stipulated in article 15, clause 1 occurred (abnormal increase of the pressure of reactor containment vessel). Afterwards, the pressure has gradually decreased (as of 9:05 am, 490 kPa).
At approximately 11:01 am, March 14th, an explosion followed by white smoke occurred near Unit 3. 4 TEPCO employees and 3 workers from other companies (all of them are conscious) have sustained injuries and they were already taken to the hospital by ambulances.
As the temperature of water in the spent fuel pool rose, spraying water by helicopters with the support of the Self Defense Force was considered, however the operation on March 16th was cancelled.

At 6:15 am, March 17th, the pressure of the Suppression Chamber temporarily increased, but currently it is stable in a certain range. On March 20th, we were preparing to implement a measurement to reduce the pressure of the reactor containment vessel (partial discharge of air containing radioactive material to outside) in order to fully secure safety. However, at present, it is not a situation to take a measure immediately to discharge air containing radioactive material to outside. We will continue to monitor the status of the pressure of the reactor containment vessel. Monitoring will be continued.
In order to cool spent fuel pool, water was sprayed by helicopters on March 17th with the cooperation of Self-Defense Forces.

At approximately past 7:00 pm, March 17th, Self-Defense Forces and the police had started spraying water by water cannon trucks upon our request for the cooperation. At 8:09 pm, March 17th, they had finished the operation.

At 2:00 pm, March 18th, spraying water by fire engines was started with the cooperation of Self-Defense Forces and the United States Armed Forces. At 2:45 pm, March 18th, they had finished the operation.

At approximately 0:30 am, March 19th, spraying water was started with the cooperation of Fire Rescue Task Forces of Tokyo Fire Department started spraying water. At approximately 1:10 am, March 19th, they finished the operation. They resumed spraying water at 2:10 pm. At approximately 3:40 am, March 20th, they finished the operation.

At approximately 9:30 pm, March 20th, spraying water was started with the cooperation of Fire Rescue Task Forces of Tokyo Fire Department. At approximately 3:58 am, March 21th, they finished the operation.

At approximately 3:55 pm, March 21st, light gray smoke was confirmed arising from the southeast side of the 5th floor roof of the Unit 3 building, and the situation was reported to the fire department at approximately 4:21 pm. The parameters of reactor pressure vessel, reactor containment vessel, and monitored environmental data remained at the same level. However, employees working around Unit 3 evacuated to a safe location. It is observed the smoke has been decreasing. On March 22nd, the color of smoke changed to somewhat white and it is slowly dissipating.

At approximately 3:10 pm on March 22nd, water discharge into Unit 3 by Tokyo Fire Department's Hyper Rescue and Osaka City Fire Department was conducted and completed at approximately 4:00 PM on the same day.
At approximately 10:45 pm on March 22nd, lights in the main operation room were restored.
At 11:00 am on March 23rd, the injection of sea water to spent fuel pool was conducted, and finished approximately at 1:20 pm on the same day.

At 4:20 pm on March 23rd, light gray smoke was observed belching from Unit 3 building. The situation was reported to the fire department at 4:25 pm on March 23rd.
The parameters of the reactor, the reactor containment vessel of Unit 3, and monitored figures around the site's immediate surroundings remained stable without significant change. To be safe, workers in the main control room of Unit 3 and around Unit 3 evacuated to a safe location.
At approximately 11:30 pm on March 23rd and 4:50 am on March 24th, TEPCO employees confirmed the smoke has disappeared. Accordingly, workers evacuation was lifted.

At approximately 5:35 am on March 24th, sea water injection through Fuel Pool Cooling and Filtering System was initiated.

* Unit 4
At approximately 6:00 am, March 15th, an explosive sound was heard and the damage in the 5th floor roof of Unit 4 reactor building was confirmed. At 9:38 am, the fire near the north-west part of 4th floor of Unit 4 reactor building was confirmed. At approximately 11:00 am, TEPCO employees confirmed that the fire was off.

At approximately 5:45 am on March 16th, a TEPCO employee discovered a fire at the northwest corner of the Nuclear Reactor Building. TEPCO immediately reported this incident to the fire department and the local government and proceeded with the extinction of fire.
At approximately 6:15 am, TEPCO staff confirmed at the site that there are no signs of fire.

At approximately 8:21 am on March 20th, spraying water by fire engines was started with the cooperation of Self-Defense Forces and they finished the operation at approximately 9:40 am. At approximately 6:45 pm spraying water was started by Self-Defenses' water cannon trucks and finished at approximately 7:45 pm.

At approximately 6:30 am, March 21st, spraying water by fire engines was started with the cooperation of Self-Defense Forces and the United States Armed Forces. At approximately 8:40 am, March 21, they had finished the operation.
On March 21st, cabling has been completed from temporary substation to the main power center.

From approximately 5:20 pm on March 22nd, water discharge from the concrete pumping vehicle was conducted and ended at approximately 8:30 pm on the same day.

From approximately 10:00 am on March 23rd, water discharge from the concrete pumping vehicle was conducted and ended at approximately 1:00 pm on the same day.

* Unit 5 and 6
At 5 am on March 19th, we started the Residual Heat Removal System Pump (C) of Unit 5 in order to cool the spent fuel pool. At 10:14 pm, we started the Residual Heat Removal System Pump (B) of Unit 6 in order to cool the spent fuel pool.

Unit 5 has been in reactor cold shutdown since 2:30 pm on March 20th. Unit 6 has been in reactor cold shutdown since 7:27 pm on March 20th.

At Units 5 and 6, in order to prevent hydrogen gas from accumulating within the buildings, we have made three holes on the roof of the reactor building for each unit

At approximately 5:24 pm on March 23rd, the temporary Residual Heat Removal System Seawater Pump automatically stopped when its power source was switched. We plan to repair the pump while maintaining the appropriate the water level and the temperature in the reactor.

* On March 18th, regarding the spent fuel in the common spent fuel pool, we have confirmed that the water level of the pool is secured. A detailed inspection is under preparation.
  * common spent fuel pool: a spent fuel pool for common use set in a separate building in a plant site in order to preserve spent fuel which are transferred from the spent fuel pool in each Unit building.

* On March 17th, we patrolled buildings for dry casks and found no signs of abnormal situation for the casks by visual observation. A detailed inspection is under preparation.
  * dry cask: a measure to store spent fuel in a dry storage casks in storages. Fukushima Daiichi Nuclear Power Station started to utilize the measure from August 1995.

* In total 12 fire engines are lent for spraying water to the spent fuel pools and water injection to the nuclear reactors by various regional fire departments* as well as Tokyo Fire Department.

* On March 21st and 23rd, we detected cobalt, iodine and cesium from the seawater around discharge canal of Unit 1, 2, 3 and 4.

* On March 20th and 22nd, we detected iodine, cesium and tellurium in the air collected at the site of Fukushima Daiichi Nuclear Power Station.

* We will continuously endeavor to securing safety, and monitoring of the surrounding environment.

Fukushima Daini Nuclear Power Station:
Units 1 to 4: shutdown due to earthquake
* The national government has instructed evacuation for those local residents within 10km radius of the periphery.

* In order to achieve cold shutdown, reactor cooling function was restored and cooling of reactors was conducted. As a result, all reactors achieved cold shutdown: Unit 1 at 5:00 pm, March 14th, Unit 2 at 6:00 pm, March 14th, Unit 3 at 0:15 pm, March 12th, Unit 4 at 7:15 am, March 16th.

* Since March 12th, we had been preparing measures for reducing the pressure of reactor containment vessels (partial discharge of air containing radioactive materials to outside), but on March 17th, we released such preparation in all Units.

* (Unit 1)
As it is confirmed that the temperature of the Emergency Equipment Cooling Water System *1 has increased, at 3:20 pm, March 15th, we stopped the Residual Heat Removal System (B) for the inspection. Subsequently, failure was detected in the power supply facility associated with the pumps of the Emergency Equipment Cooling Water System. At 4:25 pm, March 15th, after replacing the power facility, the pumps and the Residual Heat Removal System (B) have been reactivated.

* (Unit 4)
As it is confirmed that the pressure at the outlet of the pumps of the Emergency Equipment Cooling Water System*1 has been decreased, at 8:05 pm, March 15th, we stopped the Residual Heat Removal System (B) for the inspection. Subsequently, failure was detected in the power supply facility associated with the pumps of the Emergency Equipment Cooling Water System. At 9:25 pm, March 15th, after replacing the relevant facility, the pumps and the Residual Heat Removal System (B) have been reactivated.

*1:emergency water system in which cooling water (pure water) circulates which exchanged the heat with sea water in order to cool down bearing pumps and/or heat exchangers etc.

Kashiwazaki Kariwa Nuclear Power Station:
Units 1, 5, 6, 7: normal operation
(Units 2 to 4: outage due to regular inspection)

[Thermal Power Station]
Hirono Thermal Power Station Units 2 and 4: shutdown due to earthquake
Hitachinaka Thermal Power Station Unit 1: shutdown due to earthquake
Kashima Thermal Power Station Units 2, 3, 5, 6: shutdown due to earthquake
Higashi-Ohgishima Thermal Power Station Unit 1: currently being restarted

[Hydro Power Station]
* All the stations have been restored.
(Facilities damaged by the earthquake are now properly under consideration)

[Transmission System, etc.]
All substation failed due to the earthquake have been restored.

[Blackout in TEPCO's Service Area]
All the blackouts are resolved.

[Supply and Demand Status within TEPCO's Service Area to Secure Stable Power Supply]
Backup supply from Shinshinano Conversion Station: 600MW
Backup supply from Sakuma Conversion Station: 300MW
Backup supply from Higashi Shimizu Conversion Station: 100MW
Backup supply from Hokkaido-Honshu Interconnection Facilities: 600MW

Considering the critical balance of our power supply capacity and expected power demand forward, in order to avoid unexpected blackout, TEPCO has been implementing rolling blackout (planned blackout alternates from one area to another) since Mar 14th. We will make our utmost to secure the stable power supply as early as possible.
For customers who will be subject to rolling blackout, please be prepared for the announced blackout periods. Also for customers who are not subject to blackouts, TEPCO appreciates your continuous cooperation in reducing electricity usage by avoiding using unnecessary lighting and electrical equipment.

[Others]
Please do NOT touch cut-off electric wires.
In order to prevent fire, please make sure to switch off the electric appliances such as hair drier and to shut down the breaker of distribution board when you leave your house.
For the customer who has in-house power generation, please secure fuel for generator.

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Press Releases

Press Release (Mar 24,2011)
Plant Status of Fukushima Daiichi Nuclear Power Station (as of 11:30 AM Mar 24th)

*new items are underlined

All 6 units of Fukushima Daiichi Nuclear Power Station have been shut down.

Unit 1(Shut down)
-Reactor has been shut down. However, the explosive sound and white smoke were confirmed after the big quake occurred at 3:36 pm Mar 12th. It was assumed to be hydrogen explosion.
-At approximately 2:30 am on March 23rd, seawater was started to be injected to the nuclear reactor through the feed water system.
-At approximately 10:50 am on March 24th, white fog-like steam arising from the roof part of the reactor building was observed.
-At approximately 11:30 am on March 24th, lights in the main control room was restored.
-We have been injecting sea water into the reactor pressure vessel.

Unit 2(Shut down)
-Reactor has been shut down and the level of reactor coolant had dropped and the reactor pressure had increased because the Reactor Core Isolation Cooling System stopped. Measures were taken to lower the pressure within the Reactor Containment Vessel and to inject sea water into the Reactor while carefully confirming safety. The level of reactor coolant and the pressure of the Reactor resumed.
-At approximately 6:00 am on March 15th, an abnormal noise began emanating from nearby Pressure Suppression Chamber and the pressure within this chamber decreased.
-At 6:20 pm on March 21st, white smoke was confirmed arising from the top of the reactor building. As of 7:11 am on March 22nd, smoke decreased to the level where we can hardly confirm
-We have been injecting sea water into the reactor pressure vessel.

Unit 3(Shut down)
-Reactor has been shut down. However, the explosive sound and white smoke were confirmed at 11:01am Mar 14th. It was assumed to be hydrogen explosion.
-At 8:30am on March 16th, fog like steam was confirmed arising from the reactor building.
-At approximately 6:15 am on March 17th the pressure of the Suppression Chamber has temporarily increased. We were preparing to implement a measurement to reduce the pressure of the reactor containment vessel (partial discharge of air containing radioactive material to outside) in order to fully secure safety. However, at present, it is not a situation to take a measure immediately to discharge air containing radioactive material to outside now. We will continue to monitor the status of the pressure of the reactor containment vessel.
-At approximately 4:00 pm, March 21st, light gray smoke was confirmed arising from the floor roof of the Unit 3 building. On March 22nd, the color of smoke changed to somewhat white and it is slowly dissipating.
-At approximately 10:45 pm on March 22nd, the light in the main control room was turned on.
-At around 4:20 pm on March 23rd, our staff confirmed light black smoke belching from the Unit 3 building. At approximately 11:30 pm on March 23rd and 4:50 am on March 24th, our employee found no signs of smoke.
-We have been injecting sea water into the reactor pressure vessel.

Unit 4 (outage due to regular inspection)
-Reactor has been shut down. However, at approximately 6 am on March 15th. We have confirmed the explosive sound and the sustained damage around the 5th floor rooftop area of the Nuclear Reactor Building.
-On March 15th and 16th, we respectively confirmed the outbreak of fire at

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Press Releases

Press Release (Mar 24,2011)
Status of TEPCO's Facilities and its services after Tohoku-Taiheiyou-Oki Earthquake (as of 14:30PM)

Due to the Tohoku-Taiheiyou-Oki Earthquake which occurred on March 11th 2011, TEPCO's facilities including our nuclear power stations have been severely damaged. We deeply apologize for the anxiety and inconvenience caused.

Below is the status of TEPCO's major facilities.
*new items are underlined

[Nuclear Power Station]
Fukushima Daiichi Nuclear Power Station:
Units 1 to 3: shutdown due to earthquake
(Units 4 to 6: outage due to regular inspection)

* The national government has instructed to evacuate for those local residents within 20km radius of the site periphery and to remain indoors for those local residents between 20km and 30km radius of the site periphery.

* Off-site power was connected to Unit 1 to 6.

* Unit 1
The explosive sound and white smoke was confirmed near Unit 1 when the big quake occurred at 3:36pm, March 12th.
We have started injection of sea water at 8:20 pm, March 12th, and then boric acid which absorbs neutron into the reactor afterwards.

At approximately 2:30 am, March 23rd, we have started the injection of sea water into the reactor from feed water system.

At approximately 11:30 am, March 24th, lights in the main control room were restored.

* Unit 2
At 1:25 pm, March 14th, since the Reactor Core Isolation Cooling System has failed, it was determined that a specific incident stipulated in Clause 1, Article 15 of Act on Special Measures Concerning Nuclear Emergency Preparedness occurred (failure of reactor cooling function).
At 5:17 pm, March 14th, while the water level in the reactor reached the top of the fuel rod, we have restarted the water injection with the valve operation.

At approximately 6:14 am, March 15th, the abnormal sound was confirmed near the suppression chamber and the pressure inside the chamber decreased afterwards. It was determined that there is a possibility that something happened in the suppression chamber. While sea water injection to the reactor continued, TEPCO employees and workers from other companies not in charge of injection work started tentative evacuation to a safe location. Sea water injection to the reactor continued.

On March 18th, power was delivered up to substation for backup power through offsite transmission line. We completed laying cable further to unit receiving facility in the building, and at 3:46 pm, March 20th the load-side power panel of the receiving facility started to be energized.

From 3:05 pm to 5:20 pm on March 20th, 40 tons of seawater was injected into Unit 2 by TEPCO employees.

At 6:20 on March 21st, white smoke was confirmed arising from the top of the reactor building. As of 7:11 am on March 22nd, smoke decreased to the level where we can hardly confirm.

From around 4 pm to 5 pm on March 22nd, approximately 18 tons of sea water was injected into the spent fuel pool by TEPCO employees.

* Unit 3
At 6:50 am, March 14th, while water injection to the reactor was under operation, the pressure in the reactor containment vessel increased to 530 kPa. As a result, at 7:44 am, it was determined that a specific incident stipulated in article 15, clause 1 occurred (abnormal increase of the pressure of reactor containment vessel). Afterwards, the pressure has gradually decreased (as of 9:05 am, 490 kPa).
At approximately 11:01 am, March 14th, an explosion followed by white smoke occurred near Unit 3. 4 TEPCO employees and 3 workers from other companies (all of them are conscious) have sustained injuries and they were already taken to the hospital by ambulances.
As the temperature of water in the spent fuel pool rose, spraying water by helicopters with the support of the Self Defense Force was considered, however the operation on March 16th was cancelled.

At 6:15 am, March 17th, the pressure of the Suppression Chamber temporarily increased, but currently it is stable in a certain range.
On March 20th, we were preparing to implement a measurement to reduce the pressure of the reactor containment vessel (partial discharge of air containing radioactive material to outside) in order to fully secure safety. However, at present, it is not a situation to take a measure immediately to discharge air containing radioactive material to outside.
We will continue to monitor the status of the pressure of the reactor

containment vessel. Monitoring will be continued.
In order to cool spent fuel pool, water was sprayed by helicopters on March 17th with the cooperation of Self-Defense Forces.
At approximately past 7:00 pm, March 17th, Self-Defense Forces and the police had started spraying water by water cannon trucks upon our request for the cooperation. At 8:09 pm, March 17th, they had finished the operation.

At 2:00 pm, March 18th, spraying water by fire engines was started with the cooperation of Self-Defense Forces and the United States Armed Forces. At 2:45 pm, March 18th, they had finished the operation.

At approximately 0:30 am, March 19th, spraying water was started with the cooperation of Fire Rescue Task Forces of Tokyo Fire Department started spraying water. At approximately 1:10 am, March 19th, they finished the operation. They resumed spraying water at 2:10 pm. At approximately 3:40 am, March 20th, they finished the operation.

At approximately 9:30 pm, March 20th, spraying water was started with the cooperation of Fire Rescue Task Forces of Tokyo Fire Department. At approximately 3:58 am, March 21th, they finished the operation.

At approximately 3:55 pm, March 21st, light gray smoke was confirmed arising from the southeast side of the 5th floor roof of the Unit 3 building, and the situation was reported to the fire department at approximately 4:21 pm. The parameters of reactor pressure vessel, reactor containment vessel, and monitored environmental data remained at the same level. However, employees working around Unit 3 evacuated to a safe location. It is observed the smoke has been decreasing. On March 22nd, the color of smoke changed to somewhat white and it is slowly dissipating.

At approximately 3:10 pm on March 22nd, water discharge into Unit 3 by Tokyo Fire Department's Hyper Rescue and Osaka City Fire Department was conducted and completed at approximately 4:00 PM on the same day.
At approximately 10:45 pm on March 22nd, lights in the main operation room were restored.
At 11:00 am on March 23rd, the injection of sea water to spent fuel pool was conducted, and finished approximately at 1:20 pm on the same day.

At 4:20 pm on March 23rd, light gray smoke was observed belching from Unit 3 building. The situation was reported to the fire department at 4:25 pm on March 23rd.
The parameters of the reactor, the reactor containment vessel of Unit 3, and monitored figures around the site's immediate surroundings remained stable without significant change. To be safe, workers in the main control room of Unit 3 and around Unit 3 evacuated to a safe location.
At approximately 11:30 pm on March 23rd and 4:50 am on March 24th, TEPCO employees confirmed the smoke has disappeared. Accordingly, workers evacuation was lifted.

At approximately 5:35 am on March 24th, sea water injection through Fuel Pool Cooling and Filtering System was initiated.
On March 24th, it was confirmed that 3 workers from other companies who was in charge of cable laying work in the 1st floor and the underground floor of turbine building were exposed to the radiation dose of more than 170 mSv. 2 out of 3 are being transferred to the hospital as it was confirmed that their leg skin were contaminated.

* Unit 4
At approximately 6:00 am, March 15th, an explosive sound was heard and the damage in the 5th floor roof of Unit 4 reactor building was confirmed. At 9:38 am, the fire near the north-west part of 4th floor of Unit 4 reactor building was confirmed. At approximately 11:00 am, TEPCO employees confirmed that the fire was off.

At approximately 5:45 am on March 16th, a TEPCO employee discovered a fire at the northwest corner of the Nuclear Reactor Building. TEPCO immediately reported this incident to the fire department and the local government and proceeded with the extinction of fire.
At approximately 6:15 am, TEPCO staff confirmed at the site that there are no signs of fire.

At approximately 8:21 am on March 20th, spraying water by fire engines was started with the cooperation of Self-Defense Forces and they finished the operation at approximately 9:40 am. At approximately 6:45 pm spraying water was started by Self-Defenses' water cannon trucks and finished at approximately 7:45 pm.

At approximately 6:30 am, March 21st, spraying water by fire engines was started with the cooperation of Self-Defense Forces and the United States Armed Forces. At approximately 8:40 am, March 21, they had finished the operation.
On March 21st, cabling has been completed from temporary substation to the main power center.

From approximately 5:20 pm on March 22nd, water discharge from the concrete pumping vehicle was conducted and ended at approximately 8:30 pm on the same day.

From approximately 10:00 am on March 23rd, water discharge from the concrete pumping vehicle was conducted and ended at approximately 1:00 pm on the same day.

* Unit 5 and 6
At 5 am on March 19th, we started the Residual Heat Removal System Pump (C) of Unit 5 in order to cool the spent fuel pool. At 10:14 pm, we started the Residual Heat Removal System Pump (B) of Unit 6 in order to cool the spent fuel pool.

Unit 5 has been in reactor cold shutdown since 2:30 pm on March 20th. Unit 6 has been in reactor cold shutdown since 7:27 pm on March 20th.

At Units 5 and 6, in order to prevent hydrogen gas from accumulating within the buildings, we have made three holes on the roof of the reactor building for each unit

At approximately 5:24 pm on March 23rd, the temporary Residual Heat Removal System Seawater Pump automatically stopped when its power source was switched. We plan to repair the pump while maintaining the appropriate the water level and the temperature in the reactor. Repair work is being conducted.

* On March 18th, regarding the spent fuel in the common spent fuel pool, we have confirmed that the water level of the pool is secured. A detailed inspection is under preparation.
  * common spent fuel pool: a spent fuel pool for common use set in a

separate building in a plant site in order to preserve spent fuel which are transferred from the spent fuel pool in each Unit building.

* On March 17th, we patrolled buildings for dry casks and found no signs of abnormal situation for the casks by visual observation. A detailed inspection is under preparation.
  * dry cask: a measure to store spent fuel in a dry storage casks in storages. Fukushima Daiichi Nuclear Power Station started to utilize the measure from August 1995.

* In total 12 fire engines are lent for spraying water to the spent fuel pools and water injection to the nuclear reactors by various regional fire departments* as well as Tokyo Fire Department.

* On March 21st and 23rd, we detected cobalt, iodine and cesium from the seawater around discharge canal of Unit 1, 2, 3 and 4.

* On March 20th,21st and 23rd, we detected iodine, cesium and tellurium in the air collected at the site of Fukushima Daiichi Nuclear Power Station.

* We will continuously endeavor to securing safety, and monitoring of the surrounding environment.

Fukushima Daini Nuclear Power Station:
Units 1 to 4: shutdown due to earthquake
* The national government has instructed evacuation for those local residents within 10km radius of the periphery.

* In order to achieve cold shutdown, reactor cooling function was restored and cooling of reactors was conducted. As a result, all reactors achieved cold shutdown: Unit 1 at 5:00 pm, March 14th, Unit 2 at 6:00 pm, March 14th, Unit 3 at 0:15 pm, March 12th, Unit 4 at 7:15 am, March 16th.

* Since March 12th, we had been preparing measures for reducing the pressure of reactor containment vessels (partial discharge of air containing radioactive materials to outside), but on March 17th, we released such preparation in all Units.

* (Unit 1)
As it is confirmed that the temperature of the Emergency Equipment Cooling Water System *1 has increased, at 3:20 pm, March 15th, we stopped the Residual Heat Removal System (B) for the inspection. Subsequently, failure was detected in the power supply facility associated with the pumps of the Emergency Equipment Cooling Water System. At 4:25 pm, March 15th, after replacing the power facility, the pumps and the Residual Heat Removal System (B) have been reactivated.

* (Unit 4)
As it is confirmed that the pressure at the outlet of the pumps of the Emergency Equipment Cooling Water System*1 has been decreased, at 8:05 pm, March 15th, we stopped the Residual Heat Removal System (B) for the inspection. Subsequently, failure was detected in the power supply facility associated with the pumps of the Emergency Equipment Cooling Water System. At 9:25 pm, March 15th, after replacing the relevant facility, the pumps and the Residual Heat Removal System (B) have been reactivated.

*1:emergency water system in which cooling water (pure water) circulates which exchanged the heat with sea water in order to cool down bearing pumps and/or heat exchangers etc.

Kashiwazaki Kariwa Nuclear Power Station:
Units 1, 5, 6, 7: normal operation
(Units 2 to 4: outage due to regular inspection)

[Thermal Power Station]
Hirono Thermal Power Station Units 2 and 4: shutdown due to earthquake
Hitachinaka Thermal Power Station Unit 1: shutdown due to earthquake
Kashima Thermal Power Station Units 2, 3, 5, 6: shutdown due to earthquake
Higashi-Ohgishima Thermal Power Station Unit 1: restarted generation at 13:42 PM on March 24th

[Hydro Power Station]
* All the stations have been restored.
(Facilities damaged by the earthquake are now properly under consideration)

[Transmission System, etc.]
All substation failed due to the earthquake have been restored.

[Blackout in TEPCO's Service Area]
All the blackouts are resolved.

[Supply and Demand Status within TEPCO's Service Area to Secure Stable Power Supply]
Backup supply from Shinshinano Conversion Station: 600MW
Backup supply from Sakuma Conversion Station: 300MW
Backup supply from Higashi Shimizu Conversion Station: 100MW
Backup supply from Hokkaido-Honshu Interconnection Facilities: 600MW

Considering the critical balance of our power supply capacity and expected power demand forward, in order to avoid unexpected blackout, TEPCO has been implementing rolling blackout (planned blackout alternates from one area to another) since Mar 14th. We will make our utmost to secure the stable power supply as early as possible.
For customers who will be subject to rolling blackout, please be prepared for the announced blackout periods. Also for customers who are not subject to blackouts, TEPCO appreciates your continuous cooperation in reducing electricity usage by avoiding using unnecessary lighting and electrical equipment.

[Others]
Please do NOT touch cut-off electric wires.
In order to prevent fire, please make sure to switch off the electric appliances such as hair drier and to shut down the breaker of distribution board when you leave your house.
For the customer who has in-house power generation, please secure fuel for generator.

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Press Releases

Press Release (Mar 24,2011)
Plant Status of Fukushima Daini Nuclear Power Station (as of 15:00 pm March 24th)

[No update from the last release issued at 9:00 am, March 24th]

```
Unit  Status
1     · Reactor cold shutdown, stable water level, offsite power is
        available.
      · No cooling water is leaked to the reactor containment vessel.
      · Maintain average water temperature at 100°C in the pressure
        restraint.
2     · Reactor cold shutdown, stable water level, offsite power is
        available.
      · No cooling water is leaked to the reactor containment vessel.
      · Maintain average water temperature at 100°C in the pressure
        restraint.
3     · Reactor cold shutdown, stable water level, offsite power is
        available.
      · No cooling water is leaked to the reactor containment vessel.
      · Maintain average water temperature at 100°C in the pressure
        restraint.
4     · Reactor cold shutdown, stable water level, offsite power is
        available.
      · No cooling water is leaked to the reactor containment vessel.
      · Maintain average water temperature at 100°C in the pressure
        restraint.
Other N.A.
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Press Releases

Press Release (Mar 24,2011)
The results of nuclide analyses of radioactive materials in the air at the site of Fukushima Daiichi Nuclear Power Station (3rd release)

On March 22nd 2011, as part of monitoring activity of the surrounding environment, we conducted nuclide analysis of radioactive materials contained in the air which were collected on March 20th and 21st 2011 at the site of Fukushima Daiichi Nuclear Power Station, which was damaged by Tohoku-Chihou-Taiheiyo-Oki Earthquake. As a result, radioactive materials were detected as shown in the attachment. Therefore, we summarized the results and reported them to Nuclear and Industry Safety Agency as well as to the government of Fukushima Prefecture today. (previously announced)

On March 23rd, 2011, we conducted nuclide analysis of radioactive materials contained in the air which were collected on March 23rd, 2011 at the site of Fukushima Daiichi Nuclear Power Station. As a result, radioactive materials were detected as shown in the attachment. Therefore, we summarized the results and reported them to Nuclear and Industry Safety Agency as well as to the government of Fukushima Prefecture today.

We will continue the sampling survey same as this one.

attachment1:The result of the nuclide analysis of radioactive materials in the air at the site of Fukushima Daiichi Nuclear Power Station (PDF 12.1KB)
attachment2:The result of the nuclide analysis of radioactive materials in the air at the site of Fukushima Daini Nuclear Power Station (PDF 13.1KB)
attachment3:Nuclide analysis of radioactive materials in the air Fukushima Daiichi Nuclear Power Station(Main Gate) (PDF 32.1KB)
attachment4:Nuclide analysis of radioactive materials in the air Fukushima Daini Nuclear Power Station(MP-1) (PDF 33.7KB)

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Press Releases

Press Release (Mar 24,2011)
Plant Status of Fukushima Daiichi Nuclear Power Station (as of 14:00 PM Mar 24th)

*new items are underlined

All 6 units of Fukushima Daiichi Nuclear Power Station have been shut down.

Unit 1(Shut down)
- Reactor has been shut down. However, the explosive sound and white smoke were confirmed after the big quake occurred at 3:36 pm Mar 12th. It was assumed to be hydrogen explosion.
- At approximately 2:30 am on March 23rd, seawater was started to be injected to the nuclear reactor through the feed water system.
- At approximately 10:50 am on March 24th, white fog-like steam arising from the roof part of the reactor building was observed.
- At approximately 11:30 am on March 24th, lights in the main control room was restored.
- We have been injecting sea water into the reactor pressure vessel.

Unit 2(Shut down)
- Reactor has been shut down and the level of reactor coolant had dropped and the reactor pressure had increased because the Reactor Core Isolation Cooling System stopped. Measures were taken to lower the pressure within the Reactor Containment Vessel and to inject sea water into the Reactor while carefully confirming safety. The level of reactor coolant and the pressure of the Reactor resumed.
- At approximately 6:00 am on March 15th, an abnormal noise began emanating from nearby Pressure Suppression Chamber and the pressure within this chamber decreased.
- At 6:20 pm on March 21st, white smoke was confirmed arising from the top of the reactor building. As of 7:11 am on March 22nd, smoke decreased to the level where we can hardly confirm
- We have been injecting sea water into the reactor pressure vessel.

Unit 3(Shut down)
- Reactor has been shut down. However, the explosive sound and white smoke were confirmed at 11:01am Mar 14th. It was assumed to be hydrogen explosion.
- At 8:30am on March 16th, fog like steam was confirmed arising from the reactor building.
- At approximately 6:15 am on March 17th the pressure of the Suppression Chamber has temporarily increased. We were preparing to implement a measurement to reduce the pressure of the reactor containment vessel (partial discharge of air containing radioactive material to outside) in order to fully secure safety. However, at present, it is not a situation to take a measure immediately to discharge air containing radioactive material to outside now. We will continue to monitor the status of the pressure of the reactor containment vessel.
- At approximately 4:00 pm, March 21st, light gray smoke was confirmed arising from the floor roof of the Unit 3 building. On March 22nd, the color of smoke changed to somewhat white and it is slowly dissipating.
- At approximately 10:45 pm on March 22nd, the light in the main control room was turned on.
- At around 4:20 pm on March 23rd, our staff confirmed light black smoke belching from the Unit 3 building. At approximately 11:30 pm on March 23rd and 4:50 am on March 24th, our employee found no signs of smoke.
- We have been injecting sea water into the reactor pressure vessel.

Unit 4(outage due to regular inspection)
- Reactor has been shut down. However, at approximately 6 am on March 15th. We have confirmed the explosive sound and the sustained damage around the 5th floor rooftop area of the Nuclear Reactor Building.
- On March 15th and 16th, we respectively confirmed the outbreak of fire at the 4th floor of the northwestern part of the Nuclear Reactor Building. We immediately reported this matter to the fire department and the related authorities. TEPCO employees confirmed that each fire had already died down by itself.
- At this moment, we do not consider any reactor coolant leakage inside the reactor containment vessel happened.

Unit 5(outage due to regular inspection)
- Reactor has been shut down and the sufficient level of reactor coolant to ensure safety is maintained.
- At 5 am, March 19th, we started the Residual Heat Removal System Pump (C) in order to cool the spent fuel pool.
- At this moment, we do not consider any reactor coolant leakage inside the reactor containment vessel happened.
- At 2:30 pm, March 20th, the reactor achieved reactor cold shutdown. At around 5:24 pm on March 23rd, when we switched the temporary Residual Heat Removal System Seawater Pump, it automatically stopped. We will repair the pump and maintain the reactor water level and the temperature in the reactor properly. Repair work is being conducted.

Unit 6(outage due to regular inspection)
- Reactor has been shut down and the sufficient level of reactor coolant to ensure safety is maintained.

- We are working on receiving external power supply to Units 5 and 6. We completed the repair work on the emergency diesel generator (A).
- At 10:14 pm, March 19th, we started the Residual Heat Removal System Pump (B) of Unit 6 in order to cool the spent fuel pool.
- At this moment, we do not consider any reactor coolant leakage inside the reactor containment vessel happened.
- At 7:27 pm, March 20th, the reactor achieved reactor cold shutdown.

Today's work for cooling the spent fuel pools

- At approximately 5:35 am, we started injecting seawater into the fuel spent pool of Unit 3, using Fuel Pool Cooling and Filtering(clean up) system (FPC).
- We are considering further spraying at other units and others subject to the conditions of spent fuel pools.

Casualty

- 2 workers of cooperative firm were injured at the occurrence of the earthquake, and were transported to the hospital on March 11th.
- 4 workers were injured and transported to the hospital after explosive sound and white smoke were confirmed around the Unit 1on March 11th.
- Presence of 2 TEPCO employees at the site is not confirmed on March 11th.
- 1 TEPCO employee who was not able to stand by his own holding left chest with his hand, was transported to the hospital by an ambulance on March 12th.
- 1 subcontract worker at the key earthquake-proof building was unconscious and transported to the hospital by an ambulance on March 12th.
- The radiation exposure of 1 TEPCO employee, who was working inside the reactor building, exceeded 100mSv and he was transported to the hospital on March 12th.
- 2 TEPCO employees felt bad during their operation in the central control rooms of Unit 1 and 2 while wearing full masks, and were transferred to Fukushima Daini Nuclear Power Station for consultation with a medical advisor on March 13th.
- 11 workers were injured and transported to Fukushima Daini Nuclear Power Station etc. after explosive sound and white smoke were confirmed around the Unit 3. One of the workers was transported to the FUKUSHIMA Medical University Hospital on March 14th.
- At approximately 10 pm on March 22nd, 1 worker who had been working on setting up a temporary power panel in the common pool was injured and transported to Fukushima Daini Nuclear Power Station where the industrial doctor is.
- At approximately 1 am on March 23rd, 1 worker who had been working on transporting a temporary power panel in the common pool was injured and transported to Fukushima Daini Nuclear Power Station where the industrial doctor is.
- On March 24th, it was confirmed that 3 workers from other companies who were in charge of cable laying work in the 1st floor and the underground floor of turbine building were exposed to the radiation dose of more than 170 mSv. 2 out of 3 are being transferred to the hospital as it was confirmed that their leg skin were contaminated.

Others

- We measured radioactive materials (iodine etc.) inside of the nuclear power station area (outdoor) by monitoring car and confirmed that radioactive materials level is getting higher than ordinary level. As listed below, we have determined that specific incidents stipulated in article 15, clause 1 of Act on Special Measures Concerning Nuclear Emergency Preparedness (Abnormal increase in radiation dose measured at site boundary) have occurred.
  - ·Determined at 4:17 pm Mar 12th (Around Monitoring Post 4)
  - ·Determined at 8:56 am Mar 13th (Around Monitoring Post 4)
  - ·Determined at 2:15 pm Mar 13th (Around Monitoring Post 4)
  - ·Determined at 3:50 am Mar 14th (Around Monitoring Post 6)
  - ·Determined at 4:15 am Mar 14th (Around Monitoring Post 2)
  - ·Determined at 9:27 am Mar 14th (Around Monitoring Post 3)
  - ·Determined at 9:37 pm Mar 14th (Around main entrance)
  - ·Determined at 6:51 am Mar 15th (Around main entrance)
  - ·Determined at 8:11 am Mar 15th (Around main entrance)
  - ·Determined at 4:17 pm Mar 15th (Around main entrance)
  - ·Determined at 11:05 pm Mar 15th (Around main entrance)
  - ·Determined at 8:58 am Mar 19th (Around MP5)

From now on, if the measured figure fluctuates and goes above and below 500 micro Sv/h, we deem that as the continuous same event and will not regard that as a new specific incidents stipulated in article 15, clause 1 of the Act on Special Measures Concerning Nuclear Emergency Preparedness (Abnormal increase in radiation dose measured at site boundary) has occurred. In the interim, if we measure a manifestly abnormal figure and it is evident that the event is not the continuous same event, we will determine and notify.

- The national government has instructed evacuation for those local residents within 20km radius of the periphery and evacuation to inside for those residents from 20km to 30km radius of the periphery, because it's possible that radioactive materials are discharged.
- At approximately 10am on March 15th, we observed 400mSv/h at the inland side of the Unit 3 reactor building and 100mSv/h at the inland side of the Unit 4 reactor building.
- We checked the status of spent fuel in the common pool, and confirmed that the water level secured. We are planning to conduct a detailed inspection.
- We found no signs of abnormal situation for the casks by visual observation during the patrol activity. A detailed inspection is under preparation.
- At Units 5 and 6, in order to prevent hydrogen gas from accumulating within the buildings, we have made three holes on the roof of the reactor building for each unit.
- In total 12 fire engines are lent for the water spraying to the spent fuel pools and water injection to the nuclear reactors by various regional fire departments* as well as Tokyo Fire Department. Also, instruction regarding the setting and operation of large scale decontamination system was provided by Niigata City Fire Headquarter and Hamamatsu City Fire Headquarter.

*: Koriyama Fire Department, Iwaki Fire Brigade Headquarters, Fire Headquarters of Sukagawa District Wide Area Fire-fighting Association, Yonezawa City Fire Headquarters, Utsunomiya City Fire Headquarters, Fire Headquarters of Aizu-Wakamatsu wide area municipal association, Saitama City Fire Bureau, and Niigata City Fire Bureau.

- On March 21st and 22nd, we detected cobalt, iodine and cesium from the seawater around discharge canal of Units 1, 2, 3 and 4.
- We detected iodine, cesium and tellurium in the air collected at the site of Fukushima Daiichi Nuclear Power Station on March 20th, 21st and 22nd.
- Until March 22nd, Units 1 through 6 were started to be energized from

the external power source.

- We will continue to take all measures to ensure the safety and to continue monitoring the surrounding environment around the Power Station.

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Press Releases

Press Release (Mar 24,2011)
Implementation Plan of Rolling Blackouts on and after March 25, 2011

Due to the power supply-demand balance, TEPCO has been implementing rolling blackout since Monday, March 14. We sincerely regret causing anxiety and inconvenience to our customers and the society. We appreciate your cooperation in conserving electricity consumption.
For customers who will be subject to rolling blackouts, please be prepared for the announced blackout periods. Also, for the customers who are not subject to blackouts, we would appreciate your continuous cooperation in reducing electricity usage by turning off unnecessary lightings and electrical appliances.
We would like to inform the implementation plan of rolling blackouts on and after March 25, 2011 as follows.

○Implementation plan of rolling blackout on March 25 (Fri.)
Considering today's electricity supply-demand and tomorrow's weather, regional group and time periods for the planned blackout are as follows.

Group 3 6:20-10:00
Group 4 9:20-13:00
Group 5 12:20-16:00
Group 3 13:50-17:30
Group 1 15:20-19:00
Group 4 16:50-20:30
···Rolling blackout will not be implemented.
Group 2 18:20-22:00
···The necessity of the rolling blackouts will be judged depending on the supply-demand balance, and will be informed by 2 hours before the start of blackouts.

- The actual blackout period for each group is planned to be maximum of 3 hours during the relevant scheduled time period.
- Starting and ending time of blackout periods may slightly differ.
- Depending on the supply-demand balance of the day, planned blackouts may not be carried out. In case the electricity supply-demand balance becomes tighter than expected, we will reconsider the rolling blackout plan and inform you accordingly before we implement the revised plan.
- A blackout may occur in the adjacent areas where the planned blackouts are carried out.

○Implementation plan of rolling blackouts from Saturday, March 26 to Thursday, March 31
Please refer to the "exhibit" for detailed plan.
- The actual blackout period for each group is planned to be maximum of about 3 hours during the relevant scheduled time period.
- Starting and ending time of blackout periods will slightly differ day by day.
- Depending on the supply-demand balance hereafter, planned blackouts may not be carried out. Moreover, in case the electricity supply-demand balance becomes tighter than expected, we will reconsider the rolling blackout plan and inform you accordingly before we implement the revised plan.
- A blackout may occur in the adjacent areas where the planned blackouts are carried out.

[Others]
- In order to prevent fires, please make sure to switch off electric appliances such as hair driers when you leaving home.
- Please carefully pay attention to the traffic at the crossings in case the traffic lights are suddenly turned off.
- As for the building and apartment, please be aware that equipment and facility such as elevator, automatic door, automatic lock, and multilevel parking lot will not function. In particular, please avoid using elevators not to be trapped during the blackout.

<Reference>
○Prediction of demand and supply on March 24
Estimated Demand 38,500 MW (18:00-19:00)
Supply Capacity 38,500 MW

○Prediction of demand and supply on March 25
Estimated Demand 38,500 MW (18:00-19:00)
Supply Capacity 38,500 MW

*Prediction of demand
According to the weather forecast, the temperature will be higher than that of today. However, estimated temperature in the evening will be lower due to rain, so we assume estimated peak demand on March 25 will be 38,500MW,which is same as today.
*Estimated demand and supply capacity may change depending on the situation of the day.

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Press Releases

Press Release (Mar 24,2011)
Status of the Inspection and Restoration Works Performed after the Niigata-Chuetsu-Oki Earthquake (as of March 24)

We are announcing the status of major inspections and restoration works and nonconformances at TEPCO's Kashiwazaki-Kariwa Nuclear Power Station after the Niigata-Chuetsu-Oki Earthquake.
Please be advised that we have been temporarily suspending a part of the restoration works since March 11, 2011, as we have been fully dedicated to the support and cooperation to Fukushima Daiichi Nuclear Power Station and Fukushima Daini Nuclear Power Station which were damaged by the Tohoku-Chihou-Taiheiyo-Oki Earthquake. We resume restoration works of Kashiwazaki-Kariwa Nuclear Power Station from March 22, 2011 accordingly.

Inspection/ Restoration Status

◇ Inspection and restoration completed between March 18 to March 24, 2011
(Completed on the following date)

- No notable activity during this week.

◇ Inspection and restoration to be commenced between March 25 to March 31, 2011
(To be commenced on the following date)

- No notable activity during this week.

◇ Work Schedule of Major Inspection and Restoration from March 30 to April 16, 2011

- Work Schedule of the Main Inspection/ Restoration of the Kashiwazaki-Kariwa Nuclear Power Station in Response to the Niigata-Chuetsu-Oki Earthquake (during 4 Weeks) ...Appendix

(Reference)
Nonconformances Found in the Inspection and Restoration Works Performed after the Niigata-Chuetsu-Oki Earthquake

Based on the "Public Announcement Regarding Nonconformance Found in the Inspection and Restoration Works Performed after the Niigata-Chuetsu-Oki Earthquake," the Tokyo Electric Power Company, Incorporated (TEPCO) provides this announcement containing incidents information reported from March 17 to March 23, 2011.

◇ Incidents Information (relating to the Chuetsu-Oki Earthquake)

From March 17 to March 23, 2011 (Total figure from August 10, 2007)		Number of Incidents by Announcement Category (Total figure from August 10, 2007)	
No. of Reported Events	0 (10)	I	0 (0)
		II	0 (0)
		III	0 (10)

<Reports from March 17 to March 23, 2011>

Announcement Category	Date of Detection	Title of Report	Status
I	-	-	-
II	-	-	-
III	-	-	-

◇ Other Findings

- No notable activity during this week.

Appendix: Work Schedule of the Main Inspection/ Restoration of the Kashiwazaki-Kariwa Nuclear Power Station in Response to the Niigata-Chuetsu-Oki Earthquake (during 4 Weeks) (PDF 15.9KB)

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Press Release (Mar 24,2011)
Plant Status of Fukushima Daiichi Nuclear Power Station (as of 6:00 PM Mar 24th)

*new items are underlined

All 6 units of Fukushima Daiichi Nuclear Power Station have been shut down.

Unit 1(Shut down)
-Reactor has been shut down. However, the explosive sound and white smoke were confirmed after the big quake occurred at 3:36 pm Mar 12th. It was assumed to be hydrogen explosion.
-At approximately 2:30 am on March 23rd, seawater was started to be injected to the nuclear reactor through the feed water system.
-At approximately 10:50 am on March 24th, white fog-like steam arising from the roof part of the reactor building was observed.
-At approximately 11:30 am on March 24th, lights in the main control room was restored.
-We have been injecting sea water into the reactor pressure vessel.

Unit 2(Shut down)
-At approximately 6:00 am on March 15th, an abnormal noise began emanating from nearby Pressure Suppression Chamber and the pressure within this chamber decreased.
-At 6:20 pm on March 21st, white smoke was confirmed arising from the top of the reactor building. As of 7:11 am on March 22nd, smoke decreased to the level where we can hardly confirm
-We have been injecting sea water into the reactor pressure vessel.

Unit 3(Shut down)
-Reactor has been shut down. However, the explosive sound and white smoke were confirmed at 11:01am Mar 14th. It was assumed to be hydrogen explosion.
-At 8:30am on March 16th, fog like steam was confirmed arising from the reactor building.
-At approximately 6:15 am on March 17th the pressure of the Suppression Chamber has temporarily increased. We were preparing to implement a measurement to reduce the pressure of the reactor containment vessel (partial discharge of air containing radioactive material to outside) in order to fully secure safety. However, at present, it is not a situation to take a measure immediately to discharge air containing radioactive material to outside now. We will continue to monitor the status of the pressure of the reactor containment vessel.
-At approximately 4:00 pm, March 21st, light gray smoke was confirmed arising from the floor roof of the Unit 3 building. On March 22nd, the color of smoke changed to somewhat white and it is slowly dissipating.
-At approximately 10:45 pm on March 22nd, the light in the main control room was turned on.
-At around 4:20 pm on March 23rd, our staff confirmed light black smoke belching from the Unit 3 building. At approximately 11:30 pm on March 23rd and 4:50 am on March 24th, our employee found no signs of smoke.
-We have been injecting sea water into the reactor pressure vessel.

Unit 4 (outage due to regular inspection)
-Reactor has been shut down. However, at approximately 6 am on March 15th. We have confirmed the explosive sound and the sustained damage around the 5th floor rooftop area of the Nuclear Reactor Building.
-On March 15th and 16th, we respectively confirmed the outbreak of fire at the 4th floor of the northwestern part of the Nuclear Reactor Building. We immediately reported this matter to the fire department and the related authorities. TEPCO employees confirmed that each fire had already died down by itself.
-At this moment, we do not consider any reactor coolant leakage inside the reactor containment vessel happened.

Unit 5 (outage due to regular inspection)
-Reactor has been shut down and the sufficient level of reactor coolant to ensure safety is maintained.
-At 5 am, March 19th, we started the Residual Heat Removal System Pump (C) in order to cool the spent fuel pool.
-At this moment, we do not consider any reactor coolant leakage inside the reactor containment vessel happened.
-At 2:30 pm, March 20th, the reactor achieved reactor cold shutdown. At around 5:24 pm on March 23rd, when we switched the temporary Residual Heat Removal System Seawater Pump, it has stopped automatically. <u>At around 4:14 pm, March 14th, we started replaced pump and at around 4:35 pm, cooling of reactor has restarted.</u>

Unit 6 (outage due to regular inspection)
-Reactor has been shut down and the sufficient level of reactor coolant to ensure safety is maintained.
-We are working on receiving external power supply to Units 5 and 6. We completed the repair work on the emergency diesel generator (A).
-At 10:14 pm, March 19th, we started the Residual Heat Removal System Pump (B) of Unit 6 in order to cool the spent fuel pool.
-At this moment, we do not consider any reactor coolant leakage inside the reactor containment vessel happened.
-At 7:27 pm, March 20th, the reactor achieved reactor cold shutdown.

Today's work for cooling the spent fuel pools
-At approximately 5:35 am, we started injecting seawater into the fuel

spent pool of Unit 3, using Fuel Pool Cooling and Filtering(clean up) system (FPC) and finished at 4:05 pm.
-At around 2:35 pm, spraying to unit 4 by concrete pump track and finished at around 5:30 pm.
-We are considering further spraying at other units and others subject to the conditions of spent fuel pools.

Casualty
-2 workers of cooperative firm were injured at the occurrence of the earthquake, and were transported to the hospital on March 11th.
-4 workers were injured and transported to the hospital after explosive sound and white smoke were confirmed around the Unit 1on March 11th.
-Presence of 2 TEPCO employees at the site is not confirmed on March 11th.
-1 TEPCO employee who was not able to stand by his own holding left chest with his hand, was transported to the hospital by an ambulance on March 12th.
-1 subcontract worker at the key earthquake-proof building was unconscious and transported to the hospital by an ambulance on March 12th.
-The radiation exposure of 1 TEPCO employee, who was working inside the reactor building, exceeded 100mSv and he was transported to the hospital on March 12th.
-2 TEPCO employees felt bad during their operation in the central control rooms of Unit 1 and 2 while wearing full masks, and were transferred to Fukushima Daini Nuclear Power Station for consultation with a medical advisor on March 13th.
-11 workers were injured and transported to Fukushima Daini Nuclear Power Station etc. after explosive sound and white smoke were confirmed around the Unit 3. One of the workers was transported to the FUKUSHIMA Medical University Hospital on March 14th.
-At approximately 10 pm on March 22nd, 1 worker who had been working on setting up a temporary power panel in the common pool was injured and transported to Fukushima Daini Nuclear Power Station where the industrial doctor is.
-At approximately 1 am on March 23rd, 1 worker who had been working on transporting a temporary power panel in the common pool was injured and transported to Fukushima Daini Nuclear Power Station where the industrial doctor is.
-On March 24th, it was confirmed that 3 workers from other companies who were in charge of cable laying work in the 1st floor and the underground floor of turbine building were exposed to the radiation dose of more than 170 mSv. 2 out of 3 are being transferred to the hospital as it was confirmed that their leg skin were contaminated. They were transferred to FUKUSHIMA Medical University Hospital.

Others
-We measured radioactive materials (iodine etc.) inside of the nuclear power station area (outdoor) by monitoring car and confirmed that radioactive materials level is getting higher than ordinary level. As listed below, we have determined that specific incidents stipulated in article 15, clause 1 of Act on Special Measures Concerning Nuclear Emergency Preparedness (Abnormal increase in radiation dose measured at site boundary) have occurred.
·Determined at 4:17 pm Mar 12th (Around Monitoring Post 4)
·Determined at 8:56 am Mar 13th (Around Monitoring Post 4)
·Determined at 2:15 pm Mar 13th (Around Monitoring Post 4)
·Determined at 3:50 am Mar 14th (Around Monitoring Post 6)
·Determined at 4:15 am Mar 14th (Around Monitoring Post 2)
·Determined at 9:27 am Mar 14th (Around Monitoring Post 3)
·Determined at 9:37 pm Mar 14th (Around main entrance)
·Determined at 6:51 am Mar 15th (Around main entrance)
·Determined at 8:11 am Mar 15th (Around main entrance)
·Determined at 4:17 pm Mar 15th (Around main entrance)
·Determined at 11:05 pm Mar 15th (Around main entrance)
·Determined at 8:58 am Mar 19th (Around MP5)
From now on, if the measured figure fluctuates and goes above and below 500 micro Sv/h, we deem that as the continuous same event and will not regard that as a new specific incidents stipulated in article 15, clause 1 of the Act on Special Measures Concerning Nuclear Emergency Preparedness (Abnormal increase in radiation dose measured at site boundary) has occurred. In the interim, if we measure a manifestly abnormal figure and it is evident that the event is not the continuous same event, we will determine and notify.

-The national government has instructed evacuation for those local residents within 20km radius of the periphery and evacuation to inside for those residents from 20km to 30km radius of the periphery, because it"s possible that radioactive materials are discharged.
-At approximately 10am on March 15th, we observed 400mSv/h at the inland side of the Unit 3 reactor building and 100mSv/h at the inland side of the Unit 4 reactor building.
-At around 10:37 am March 21st, water spraying to common spent fuel pool and finished at 3:30 pm (conducted by TEPCO).
-At 3:37 pm, March 24th, electricity supply to common spent fuel pool has started from external power.
-We found no signs of abnormal situation for the casks by visual observation during the patrol activity. A detailed inspection is under preparation.
-At Units 5 and 6, in order to prevent hydrogen gas from accumulating within the buildings, we have made three holes on the roof of the reactor building for each unit.
-In total 12 fire engines are lent for the water spraying to the spent fuel pools and water injection to the nuclear reactors by various regional fire departments* as well as Tokyo Fire Department. Also, instruction regarding the setting and operation of large scale decontamination system was provided by Niigata City Fire Headquarter and Hamamatsu City Fire Headquarter.
*: Koriyama Fire Department, Iwaki Fire Brigade Headquarters, Fire Headquarters of Sukagawa District Wide Area Fire-fighting Association, Yonezawa City Fire Headquarters, Utsunomiya City Fire Headquarters, Fire Headquarters of Aizu-Wakamatsu wide area municipal association, Saitama City Fire Bureau, and Niigata City Fire Bureau.
-Until March 22nd, Units 1 through 6 were started to be energized from the external power source.
-We will continue to take all measures to ensure the safety and to continue monitoring the surrounding environment around the Power Station.

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Press Release (Mar 24,2011)
Plant Status of Fukushima Daini Nuclear Power Station (as of 9:00 pm March 24th)

[No update from the last release issued at 3:00 pm, March 24th]

Unit	Status
1	· Reactor cold shutdown, stable water level, offsite power is available. · No cooling water is leaked to the reactor containment vessel. · Maintain average water temperature at 100°C in the pressure restraint.
2	· Reactor cold shutdown, stable water level, offsite power is available. · No cooling water is leaked to the reactor containment vessel. · Maintain average water temperature at 100°C in the pressure restraint.
3	· Reactor cold shutdown, stable water level, offsite power is available. · No cooling water is leaked to the reactor containment vessel. · Maintain average water temperature at 100°C in the pressure restraint.
4	· Reactor cold shutdown, stable water level, offsite power is available. · No cooling water is leaked to the reactor containment vessel. · Maintain average water temperature at 100°C in the pressure restraint.
Other	N.A.

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Press Releases

Press Release (Mar 24,2011)
Plant Status of Fukushima Daini Nuclear Power Station (as of 9:00 pm March 24th)

[No update from the last release issued at 3:00 pm, March 24th]

Unit Status
1 · Reactor cold shutdown, stable water level, offsite power is available.
· No cooling water is leaked to the reactor containment vessel.
· Maintain average water temperature at 100°C in the pressure restraint.
2 · Reactor cold shutdown, stable water level, offsite power is available.
· No cooling water is leaked to the reactor containment vessel.
· Maintain average water temperature at 100°C in the pressure restraint.
3 · Reactor cold shutdown, stable water level, offsite power is available.
· No cooling water is leaked to the reactor containment vessel.
· Maintain average water temperature at 100°C in the pressure restraint.
4 · Reactor cold shutdown, stable water level, offsite power is available.
· No cooling water is leaked to the reactor containment vessel.
· Maintain average water temperature at 100°C in the pressure restraint.
Other N.A.

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Press Releases

Press Release (Mar 24,2011)
Plant Status of Fukushima Daini Nuclear Power Station (as of 9:00 pm March 24th)

[No update from the last release issued at 3:00 pm, March 24th]

Unit	Status
1	· Reactor cold shutdown, stable water level, offsite power is available. · No cooling water is leaked to the reactor containment vessel. · Maintain average water temperature at 100°C in the pressure restraint.
2	· Reactor cold shutdown, stable water level, offsite power is available. · No cooling water is leaked to the reactor containment vessel. · Maintain average water temperature at 100°C in the pressure restraint.
3	· Reactor cold shutdown, stable water level, offsite power is available. · No cooling water is leaked to the reactor containment vessel. · Maintain average water temperature at 100°C in the pressure restraint.
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Other	N.A.

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Press Releases

Press Release (Mar 24,2011)
Plant Status of Fukushima Daini Nuclear Power Station (as of 9:00 pm March 24th)

[No update from the last release issued at 3:00 pm, March 24th]

Unit	Status
1	· Reactor cold shutdown, stable water level, offsite power is available. · No cooling water is leaked to the reactor containment vessel. · Maintain average water temperature at 100°C in the pressure restraint.
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Other	N.A.

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Press Releases

Press Release (Mar 24,2011)
Plant Status of Fukushima Daini Nuclear Power Station (as of 9:00 pm March 24th)

[No update from the last release issued at 3:00 pm, March 24th]

Unit Status
1 · Reactor cold shutdown, stable water level, offsite power is available.
· No cooling water is leaked to the reactor containment vessel.
· Maintain average water temperature at 100°C in the pressure restraint.
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Other N.A.

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Press Releases

Press Release (Mar 24,2011)
Plant Status of Fukushima Daini Nuclear Power Station (as of 9:00 pm March 24th)

[No update from the last release issued at 3:00 pm, March 24th]

Unit Status
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Other N.A.

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From: OST05 Hoc
Sent: Thursday, March 24, 2011 1:51 PM
To: LIA04 Hoc
Subject: FW: Response to EPA drinking water limits question

FYI

From: Hoc, PMT12
Sent: Thursday, March 24, 2011 1:49 PM
To: OST05 Hoc
Subject: RE: Response to EPA drinking water limits question

This has been completed.

From: OST05 Hoc
Sent: Thursday, March 24, 2011 12:53 PM
To: PMT03 Hoc; Hoc, PMT12
Cc: OST05 Hoc; LIA04 Hoc
Subject: FW: Response to EPA drinking water limits question

PMT- forwarding this to PMT for response.

Thank you,
-Maria Arribas-Colon

From: Henderson, Pamela
Sent: Thursday, March 24, 2011 10:19 AM
To: OST05 Hoc
Cc: McNamara, Nancy; LIA04 Hoc; LIA03 Hoc; PMT03 Hoc; Hoc, PMT12; Tifft, Doug
Subject: RE: Response to EPA drinking water limits question

Maria,

I believe that RASCAL would utilize NRC limits?

From the EPA website.... EPA bases drinking water limits on a dose of 4 mrem/year to total body or any critical organ. For I-131 the limit is 3 pCi/liter. For Cs-137 the limit is 200 pCi/liter.

From: OST05 Hoc
Sent: Thursday, March 24, 2011 10:12 AM
To: Tifft, Doug; Henderson, Pamela
Cc: McNamara, Nancy; OST05 Hoc; LIA04 Hoc; LIA03 Hoc
Subject: RE: Response to EPA drinking water limits question

Good morning Doug,

I just verified the numbers and the units with RASCAL folks in PMT, and it was confirmed that they are correct.

If you have any additional question on this, please contact PMT at (301) 816-5499.

BBBB / 157

Thank you,
-Maria Arribas-Colon

From: Tifft, Doug
Sent: Thursday, March 24, 2011 7:59 AM
To: OST05 Hoc; LIA04 Hoc
Cc: Henderson, Pamela; McNamara, Nancy
Subject: RE: Response to EPA drinking water limits question

This doesn't sound right. I expected the units to be in pCi/L. And I'd also expect that the limits for one year olds would be lower than the limits for adults.

Would you mind double checking with your EPA contact what the EPA drinking water limit is for I-131 and Cs-137?

I've also got the question in to one of my Regional EPA contacts.

Thanks,
-Doug

From: OST05 Hoc
Sent: Wednesday, March 23, 2011 7:45 PM
To: Henderson, Pamela; Barker, Allan; Browder, Rachel; Erickson, Randy; Logaras, Harral; Maier, Bill; McNamara, Nancy; Tifft, Doug; Trojanowski, Robert; Woodruff, Gena
Cc: OST05 Hoc; LIA04 Hoc; Easson, Stuart; Flannery, Cindy; Lukes, Kim; Maupin, Cardelia; Noonan, Amanda; Rautzen, William; Rivera, Alison; Ryan, Michelle; Turtil, Richard; Virgilio, Rosetta
Subject: Response to EPA drinking water limits question

Doug/ Pam,

This email is in response to your question on the EPA drinking water standards limits for Iodine-131 and Cesium-137. See below.

Iodine-131
One year old: 167 Bq/Kg
Adult: 2420 Bq/Kg

Cesium-137
One year old: 2990 Bq/Kg
Adult: 1360 Bq/Kg

Thank you,
-Maria Arribas-Colon

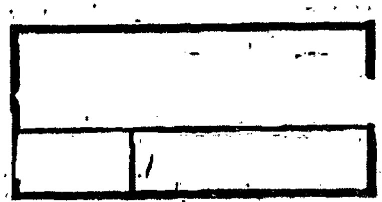
2011/3/19 23:[illegible]

福島第二(2F)(事業者のモニタリングポスト)

3月19日 モニタリングポスト	18:20	18:30	18:40	18:50	19:00	19:10	19:20	19:30	19:40	19:50	20:00
MP1(μSv/h)	16.723	16.720	16.743	16.803	16.773	16.747	16.740	16.730	16.707	16.710	16.657
MP2(μSv/h)	10.193	10.157	10.167	10.163	10.167	10.153	10.143	10.133	10.107	10.090	10.083
MP3(μSv/h)	16.963	16.890	16.880	16.890	16.980	16.853	16.887	16.797	16.797	16.807	16.820
MP4(μSv/h)	11.643	11.650	11.637	11.593	11.617	11.620	11.607	11.590	11.547	11.557	11.650
MP5(μSv/h)	11.527	11.567	11.580	11.507	11.553	11.513	11.507	11.467	11.467	11.467	11.467
MP6(μSv/h)	12.960	12.967	12.937	12.930	12.887	12.917	12.863	12.933	12.883	12.920	12.887
MP7(μSv/h)	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測
風向	西	西北西	北西	西北西	西	西北西	西北西	西北西	西北西	西北西	西北西
風速(m/s)	2.6	3.5	1.8	2.5	3.7	2.7	5.3	6.5	5.5	4.7	2.6

3月19日 モニタリングポスト	20:10	20:20	20:30	20:40	20:50	21:00	21:10	21:20	21:30	21:40	21:50
MP1(μSv/h)	16.710	16.623	16.613	16.610	16.690	16.583	16.550	16.547	16.583	16.510	16.557
MP2(μSv/h)	10.103	10.083	10.097	10.077	10.077	10.080	10.037	10.000	10.730	9.990	10.027
MP3(μSv/h)	16.800	16.817	16.763	16.760	16.727	16.737	16.703	16.707	16.710	16.713	16.650
MP4(μSv/h)	11.560	11.503	11.523	11.513	11.497	11.480	11.497	11.477	11.440	11.493	11.507
MP5(μSv/h)	11.467	11.373	11.467	11.387	11.467	11.467	11.367	11.380	11.367	11.367	11.367
MP6(μSv/h)	12.867	12.867	12.810	12.837	12.827	12.787	12.807	12.800	12.770	12.793	12.787
MP7(μSv/h)	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測
風向	西北西	北北西	北北西	北	南	南	南南西	西南西	西南西	西南西	西
風速(m/s)	1.4	1.6	1.8	0.9	3.2	1.9	1.8	3.4	5.1	8.8	10.8

3月19日 モニタリングポスト	22:00	22:10	22:20	22:30
MP1(μSv/h)	16.517	16.483	16.470	16.470
MP2(μSv/h)	10.017	10.003	9.997	9.973
MP3(μSv/h)	16.657	16.657	16.603	16.663
MP4(μSv/h)	11.457	11.457	11.447	11.443
MP5(μSv/h)	11.367	11.373	11.367	11.313
MP6(μSv/h)	12.747	12.730	12.743	12.730
MP7(μSv/h)	欠測	欠測	欠測	欠測
風向	西北西	西	西南西	西
風速(m/s)	11.9	10.8	5.7	4.8



ソエンバン→東京2F

実有 ← ERC 放射線班

福島第二(2F)(事業者のモニタリングポスト)

3月19日																						
モニタリングポスト	7:20	7:30	7:40	7:50	8:00	8:10	8:20	8:30	8:40	8:50	9:00	9:10	9:20	9:30	9:40	9:50	10:00	10:10	10:20	10:30	10:40	10:50
MP1(μSv/h)	17.4	17.4	17.3	17.3	17.3	17.3	17.3	17.3	17.2	17.2	17.2	17.1	17.0	17.1	17.1	17.1	17.0	16.9	17.0	16.9	16.9	16.9
MP2(μSv/h)	10.6	10.5	10.6	10.5	10.5	10.5	10.5	10.4	10.4	10.4	10.3	10.3	10.3	10.2	10.3	10.2	10.2	10.2	10.2	10.2	10.1	18.1
MP3(μSv/h)	17.7	17.7	17.7	17.7	17.7	17.6	17.7	17.6	17.7	17.6	17.6	17.5	17.4	17.4	17.5	17.4	17.4	17.4	17.4	17.3	17.3	17.3
MP4(μSv/h)	12.4	12.4	12.3	12.3	12.3	12.3	12.3	12.3	12.2	12.2	12.2	12.2	12.2	12.2	12.1	12.1	12.1	12.1	12.1	12.0	12.0	12.0
MP5(μSv/h)	11.0	11.0	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.9	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8
MP6(μSv/h)	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測
MP7(μSv/h)	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測
風向	南南西	南	南南西	南南西	南	南西	西	南西	南	南	南南東	南	南	南	南	南	南	南	南	南南東	南東	南東
風速(m/s)	4.2	4.0	3.9	4.4	5.5	5.8	1.7	2.9	2.5	1.7	3.5	4.1	4.3	6.3	6.4	7.7	6.8	7.1	7.8	8.1	4.6	5.0

3月19日																						
モニタリングポスト	11:00	11:10	11:20	11:30	11:40	11:50	12:00	12:10	12:20	12:30	12:40	12:50	13:00	13:10	13:20	13:30	13:40	13:50	14:00	14:10	14:20	14:30
MP1(μSv/h)	16.9	16.9	16.9	16.9	16.8	16.9	16.8	16.8	16.8	16.8	16.8	16.8	16.8	16.8	16.8	16.8	16.8	16.8	16.7	16.8	16.7	16.7
MP2(μSv/h)	10.6	10.6	10.6	10.6	10.6	10.6	10.6	10.6	10.5	10.5	10.5	10.4	10.5	10.5	10.4	10.4	10.4	10.4	10.4	10.2	10.3	10.3
MP3(μSv/h)	17.3	17.2	17.2	17.1	17.1	17.1	17.1	17.0	17.0	17.1	17.0	17.0	17.0	17.0	17.0	17.0	16.9	16.9	17.0	17.0	16.9	16.9
MP4(μSv/h)	12.0	12.0	12.0	11.9	11.9	11.9	11.8	11.8	11.8	11.8	11.8	11.8	11.8	11.8	11.8	11.7	11.8	11.7	11.7	11.7	11.7	11.7
MP5(μSv/h)	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.7	10.7	10.8	10.7	10.7	10.7	10.6
MP6(μSv/h)	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測
MP7(μSv/h)	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測
風向	南南東	南南東	南南東	南東	南南東	南南東	南南東	南南東	南南東	南南東	南南西	西	西	西	西	西北西	西北西	西	西	西	西	西
風速(m/s)	7.5	8.0	8.3	6.3	7.4	8.3	8.2	9.4	6.3	5.6	5.0	8.9	11.2	10.2	11.9	11.0	7.2	6.0	7.1	5.8	8.6	5.4

3月10日																						
モニタリングポスト	14:40	14:50	15:00	15:10	15:20	15:30	15:40	15:50	16:00	16:10	16:20	16:30	16:40	16:50	17:00	17:10	17:20	17:30	17:40	17:50	18:00	18:10
MP1(μSv/h)	16.7	16.7	16.7	16.7	16.7	16.7	16.7	16.6	16.6	16.5	16.5	16.5	16.5	16.5	16.4	16.913	16.867	16.840	16.890	16.820	16.800	16.827
MP2(μSv/h)	10.3	10.2	10.3	10.3	10.3	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.2	10.220	10.190	10.220	10.180	10.210	10.207	10.160
MP3(μSv/h)	16.9	16.9	16.9	16.9	16.9	16.9	16.9	16.9	16.9	16.9	16.8	16.8	16.9	16.8	16.8	17.027	17.067	17.003	17.040	17.027	17.007	16.997
MP4(μSv/h)	11.7	11.7	11.7	11.7	11.6	11.6	11.6	11.6	11.5	11.6	11.6	11.5	11.6	11.5	11.5	11.633	11.640	11.683	11.680	11.647	11.660	11.663
MP5(μSv/h)	10.6	10.6	10.6	10.6	10.6	10.6	10.5	10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.3	11.567	11.560	11.567	11.567	11.567	11.567	11.567
MP6(μSv/h)	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	13.020	12.997	13.003	12.970	12.960	12.980	12.967
MP7(μSv/h)	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測
風向	西	西	西北西	西	西北西	西	西	西	西	西	西	西	西	西	西	西	西	西	西	西	西	西北西
風速(m/s)	8.6	10.6	8.3	8.1	4.1	6.9	5.0	2.8	3.3	6.2	7.7	9.7	10.7	7.7	7.9	8.0	5.5	6.8	2.7	5.4	6.1	3.0

福島第二(2F)(事業者のモニタリングポスト)

3月18日												
モニタリングポスト	22:00	22:10	22:20	22:30	22:40	22:50	23:00	23:10	23:20	23:30	23:40	23:50
MP1(μSv/h)	18.5	18.5	18.5	18.4	18.4	18.4	18.3	18.3	18.3	18.3	18.2	18.2
MP2(μSv/h)	11.2	11.2	11.1	11.2	11.1	11.1	11.2	11.1	11.1	11.1	11.1	11.1
MP3(μSv/h)	18.8	18.8	18.8	18.8	18.7	18.7	18.7	18.7	18.7	18.7	18.7	18.8
MP4(μSv/h)	13.0	13.0	13.0	13.0	13.0	13.0	13.0	13.0	12.9	13.0	12.9	12.9
MP5(μSv/h)	11.8	11.9	11.6	11.6	11.8	11.9	11.9	11.7	11.7	11.7	11.7	11.7
MP6(μSv/h)	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測
MP7(μSv/h)	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測
風向	西	西	西	西	西南西	南西	西南西	南西	南西	南西	南西	南
風速(m/s)	5.0	5.0	3.9	4.5	3.9	2.5	2.6	2.3	2.0	2.6	1.7	1.4

3月19日																						
モニタリングポスト	0:00	0:10	0:20	0:30	0:40	0:50	1:00	1:10	1:20	1:30	1:40	1:50	2:00	2:10	2:20	2:30	2:40	2:50	3:00	3:10	3:20	3:30
MP1(μSv/h)	18.2	18.2	18.2	18.2	18.1	18.1	18.1	18.1	18.1	18.1	18.0	18.0	17.9	18.0	18.0	17.9	17.8	17.9	17.8	17.8	17.9	17.8
MP2(μSv/h)	11.1	10.9	11.0	11.0	11.0	10.8	10.9	10.9	10.9	10.8	10.9	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8
MP3(μSv/h)	18.7	18.7	18.6	18.6	18.5	18.5	18.5	18.5	18.5	18.4	18.4	18.4	18.4	18.4	18.3	18.4	18.3	18.9	18.3	18.2	18.3	18.2
MP4(μSv/h)	12.9	12.9	12.9	12.9	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.7	12.8	12.7	12.7	12.7	12.7	12.7	12.7	12.7
MP5(μSv/h)	11.7	11.7	11.7	11.6	11.7	11.7	11.7	11.7	11.6	11.6	11.6	11.6	11.6	11.6	11.6	11.5	11.6	11.6	11.5	11.5	11.5	11.5
MP6(μSv/h)	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測
MP7(μSv/h)	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測
風向	南西	南西	南西	南	南	南	南	南	南南西	南	南南西	南南西	南	南	南	南	南	南	南	南	南	南
風速(m/s)	0.3	1.6	1.4	0.6	0.6	1.2	1.5	3.5	3.6	3.6	6.4	5.1	5.8	6.5	6.6	5.8	5.6	4.9	4.4	3.6	4.1	5.8

3月19日																						
モニタリングポスト	3:40	3:50	4:00	4:10	4:20	4:30	4:40	4:50	5:00	5:10	5:20	5:30	5:40	5:50	6:00	6:10	6:20	6:30	6:40	6:50	7:00	7:10
MP1(μSv/h)	17.8	17.7	17.7	17.7	17.6	17.0	17.7	17.6	17.8	17.6	17.6	17.6	17.6	17.6	17.5	17.5	17.5	17.5	17.5	17.5	17.4	17.4
MP2(μSv/h)	10.7	10.7	10.7	10.7	10.7	10.7	10.7	10.7	10.7	10.7	10.7	10.7	10.7	10.7	10.7	10.6	10.7	10.6	10.6	10.7	10.6	10.6
MP3(μSv/h)	18.2	18.2	18.2	18.1	18.0	18.0	18.0	17.9	18.0	17.9	17.9	17.9	17.8	17.9	17.8	17.8	17.8	17.8	17.8	17.7	17.7	17.8
MP4(μSv/h)	12.7	12.6	12.6	12.6	12.6	12.6	12.6	12.6	12.5	12.6	12.6	12.5	12.5	12.5	12.5	12.5	12.4	12.4	12.4	12.4	12.4	12.4
MP5(μSv/h)	11.4	11.5	11.4	11.4	11.6	11.4	11.4	11.4	11.4	11.3	11.3	11.3	11.2	11.2	11.2	11.1	11.1	11.1	11.2	11.1	11.0	11.0
MP6(μSv/h)	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測
MP7(μSv/h)	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測
風向	南南西	南	南	南	南南西	南	南	南	南	南南西	南南西	南西	南西	南南西	南	南南西	南	南	南	南	南南西	南南西
風速(m/s)	4.9	3.3	3.8	4.0	5.9	5.6	3.6	6.1	5.2	5.9	5.0	7.2	8.3	6.6	6.1	6.1	6.2	7.7	6.4	6.5	6.0	5.7

福島第二(2F)(事業者のモニタリングポスト)

3月18日 モニタリングポスト	11:00	11:10	11:20	11:30	11:40	11:50	12:00	12:10	12:20	12:30	12:40	12:50	13:00	13:10	13:20	13:30	13:40	13:50	14:00	14:10	14:20	14:30
MP1(μSv/h)	19.4	19.4	19.4	19.3	19.3	19.3	19.3	19.2	19.2	19.2	19.2	19.2	19.4	19.3	19.4	19.6	19.6	18.8	19.3	19.3	19.2	19.2
MP2(μSv/h)	11.7	11.7	11.7	11.7	11.7	11.7	11.6	11.6	11.6	11.6	11.6	11.6	11.7	11.7	11.9	11.8	12.0	12.2	11.7	11.7	11.6	11.6
MP3(μSv/h)	19.8	19.8	19.8	19.8	19.6	19.7	19.7	19.5	19.6	19.5	19.6	19.5	19.6	19.5	19.8	19.8	20.0	19.9	19.7	19.6	19.6	19.5
MP4(μSv/h)	13.8	13.8	13.7	13.8	13.8	13.7	13.7	13.7	13.7	13.7	13.6	13.6	13.7	13.7	13.8	13.8	14.1	14.1	13.8	13.8	13.8	13.7
MP5(μSv/h)	12.4	12.4	12.3	12.4	12.3	12.3	12.2	12.2	12.2	12.2	12.2	12.2	12.3	12.2	12.5	12.5	12.5	12.5	12.5	12.3	12.3	12.3
MP6(μSv/h)	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測
MP7(μSv/h)	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測
風向	北西	西	南西	南南東	南南東	南	南南東	南東	南東	南東	南南東	南東	南東	南東	南東	南東	南東	南東	東南東	東南東	東	東
風速(m/s)	2.7	1.9	2.1	5.4	5.6	5.7	5.8	5.4	5.1	5.7	4.9	3.8	3.6	4.4	3.0	4.1	3.6	1.9	3.7	4.2	4.3	4.5

3月18日 モニタリングポスト	14:40	14:50	15:00	15:10	15:20	15:30	15:40	15:50	16:00	16:10	16:20	16:30	16:40	16:50	17:00	17:10	17:20	17:30	17:40	17:50	18:00	18:10
MP1(μSv/h)	19.1	19.1	19.1	19.1	19.1	19.1	19.1	19.1	19.0	19.0	18.9	18.9	18.9	18.8	18.8	18.7	18.7	18.7	18.7	18.7	18.7	18.7
MP2(μSv/h)	11.6	11.6	11.6	11.6	11.6	11.6	11.5	11.5	11.4	11.4	11.4	11.4	11.4	11.4	11.4	11.3	11.3	11.3	11.3	11.3	11.3	11.3
MP3(μSv/h)	19.5	19.5	19.5	19.5	19.4	19.4	19.4	19.3	19.3	19.3	19.3	19.2	19.3	19.2	19.2	19.2	19.2	19.1	19.1	19.0	19.1	19.1
MP4(μSv/h)	13.7	13.7	13.7	13.7	13.7	13.6	13.8	13.5	13.5	13.4	13.4	13.4	13.4	13.4	18.4	13.4	13.3	13.4	13.3	13.3	13.4	13.3
MP5(μSv/h)	12.2	12.2	12.3	12.2	12.2	12.0	12.0	12.0	12.0	12.0	12.0	11.9	11.9	11.9	11.9	11.9	11.9	11.9	11.9	11.9	11.9	11.8
MP6(μSv/h)	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測
MP7(μSv/h)	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測
風向	東南東	南東	東南東	東南東	南東	南東	南南東	南	南東	東南東	南	南南東	南南東	南	南南東	南南東	南南東	南	南	南	南	南
風速(m/s)	3.3	3.1	2.9	2.8	3.3	2.5	3.0	1.7	2.2	0.6	2.2	2.4	1.4	2.3	3.9	2.4	2.0	2.0	1.7	3.3	2.5	2.2

3月18日 モニタリングポスト	18:20	18:30	18:40	18:50	19:00	19:10	19:20	19:30	19:40	19:50	20:00	20:10	20:20	20:30	20:40	20:50	21:00	21:10	21:20	21:30	21:40	21:50
MP1(μSv/h)	18.7	18.7	18.7	18.7	18.7	18.7	18.6	18.6	18.6	18.7	18.6	18.6	18.6	18.6	18.6	18.6	18.6	18.6	18.5	18.5	18.5	18.5
MP2(μSv/h)	11.3	11.3	11.3	11.3	11.3	11.3	11.3	11.3	11.3	11.3	11.3	11.3	11.3	11.2	11.3	11.2	11.2	11.2	11.2	11.2	11.2	11.2
MP3(μSv/h)	19.0	18.9	19.0	18.9	19.0	19.0	18.9	18.9	18.8	18.9	18.9	18.9	18.8	18.9	18.8	18.9	18.8	18.8	18.8	18.8	18.8	18.9
MP4(μSv/h)	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.2	13.3	13.2	13.2	13.2	13.2	13.2	13.2	13.2	13.1	13.1	13.1	13.1	13.1
MP5(μSv/h)	11.9	11.8	11.9	11.9	11.9	11.8	11.8	11.8	11.8	11.8	11.8	11.8	11.8	11.8	11.8	11.8	11.8	11.8	11.8	11.8	11.7	11.8
MP6(μSv/h)	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測
MP7(μSv/h)	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測
風向	南	南	南	南	南	南	南西	南	南	南南西	南南西	南西	南西	西南西	南西	南西	西南西	西南西	西南西	西南西	西南西	西
風速(m/s)	2.2	2.2	1.6	4.2	4.5	3.6	4.3	3.1	2.2	3.8	3.7	5.0	5.8	1.7	3.2	2.5	5.1	5.6	5.8	6.1	5.9	5.6

福島第二(2F)(事業者のモニタリングポスト)

3月18日

モニタリングポスト	0:00	0:10	0:20	0:30	0:40	0:50	1:00	1:10	1:20	1:30	1:40	1:50	2:00	2:10	2:20	2:30	2:40	2:50	3:00	3:10	3:20	3:30
MP1(μSv/h)	20.8	20.8	20.7	20.7	20.7	20.7	20.7	20.7	20.6	20.6	20.6	20.6	20.6	20.7	20.5	20.5	20.5	20.5	20.4	20.5	20.4	20.4
MP2(μSv/h)	点検中	点検中	点検中	点検中	点検中	点検中	点検中	点検中	点検中	点検中	点検中	点検中	点検中	点検中	点検中	点検中	点検中	点検中	点検中	点検中	点検中	点検中
MP3(μSv/h)	21.3	21.3	21.3	21.3	21.2	21.1	21.0	21.1	21.1	21.1	21.0	21.0	20.9	21.0	20.9	20.9	20.9	20.9	20.9	20.9	20.9	20.9
MP4(μSv/h)	14.8	14.8	14.8	14.8	14.7	14.7	14.7	14.6	14.6	14.7	14.6	14.6	14.6	14.6	14.6	14.6	14.6	14.6	14.6	14.5	14.6	14.6
MP5(μSv/h)	13.4	13.4	13.4	13.4	13.4	13.4	13.4	13.4	13.4	13.4	13.4	13.4	13.4	13.4	13.4	13.4	13.4	13.4	13.4	13.4	13.4	13.4
MP6(μSv/h)	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測
MP7(μSv/h)	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測
風向	西北西	西北西	西	西	西	西北西	北西	北西	北西	北西	北西	北西	北西	西北西	北西	北西	北北西	北北西	北	北	北	北西
風速(m/s)	5.2	8.1	8.0	7.7	6.8	7.0	7.3	6.1	5.6	6.4	6.5	6.7	7.7	7.2	6.0	5.2	5.1	2.3	3.4	3.9	3.9	3.1

3月18日

モニタリングポスト	3:40	3:50	4:00	4:10	4:20	4:30	4:40	4:50	5:00	5:10	5:20	5:30	5:40	5:50	6:00	6:10	6:20	6:30	6:40	6:50	7:00	7:10
MP1(μSv/h)	20.3	20.3	20.4	20.3	20.3	20.3	20.3	20.2	20.3	20.2	20.2	20.2	20.2	20.2	20.2	20.2	20.1	20.1	20.1	20.1	20.0	20.1
MP2(μSv/h)	点検中	点検中	点検中	点検中	点検中	点検中	点検中	点検中	点検中	点検中	点検中	点検中	点検中	点検中	点検中	点検中	点検中	点検中	点検中	点検中	点検中	点検中
MP3(μSv/h)	20.9	20.9	20.8	20.8	20.8	20.8	20.8	20.7	20.7	20.7	20.5	20.5	20.6	20.5	20.5	20.5	20.5	20.5	20.4	20.4	20.4	20.4
MP4(μSv/h)	14.6	14.6	14.5	14.5	14.5	14.5	14.5	14.4	14.5	14.5	14.4	14.5	14.4	14.3	14.3	14.3	14.3	14.3	14.3	14.2	14.2	14.2
MP5(μSv/h)	13.4	13.4	13.4	13.4	13.4	13.4	13.4	13.4	13.4	13.4	13.4	13.4	13.3	13.3	13.0	13.0	12.9	12.8	12.6	12.7	12.5	12.5
MP6(μSv/h)	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測
MP7(μSv/h)	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測
風向	北北西	北西	北西	北西	北北西	北	北	北	北	北	北	北	北	北西	西	北北西	北北西	西北西	北西	北西	北西	北北西
風速(m/s)	3.0	3.1	2.8	2.6	4.2	5.4	5.0	4.5	2.9	3.0	3.4	2.0	1.8	1.1	1.4	2.8	3.6	2.8	5.9	6.6	5.0	2.8

3月18日

モニタリングポスト	7:20	7:30	7:40	7:50	8:00	8:10	8:20	8:30	8:40	8:50	9:00	9:10	9:20	9:30	9:40	9:50	10:00	10:10	10:20	10:30	10:40	10:50
MP1(μSv/h)	20.1	20.0	20.0	20.0	20.0	19.8	19.8	19.8	19.7	19.8	19.8	19.7	19.7	19.7	19.7	19.7	19.7	19.6	19.5	19.5	19.5	19.4
MP2(μSv/h)	点検中	点検中	点検中	点検中	点検中	点検中	点検中	点検中	点検中	点検中	点検中	11.9	11.9	11.9	11.9	11.8	11.8	11.8	11.7	11.7	11.8	11.7
MP3(μSv/h)	20.3	20.4	20.4	20.3	20.3	20.3	20.2	20.3	20.1	20.2	20.1	20.1	20.1	20.0	20.0	20.0	19.9	19.9	19.9	19.9	19.9	19.8
MP4(μSv/h)	14.2	14.2	14.2	14.2	14.1	14.1	14.2	14.1	14.1	14.1	14.0	14.0	14.0	13.9	13.9	13.9	13.9	13.9	13.9	13.8	13.8	13.8
MP5(μSv/h)	12.6	12.5	12.5	12.5	12.6	12.5	12.5	12.5	12.5	12.6	12.5	12.5	12.5	12.6	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.4
MP6(μSv/h)	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測
MP7(μSv/h)	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測	欠測
風向	北西	北西	北	西北西	北北西	北西	北西	北	北西	北北西	北北西	北北西	北北西	北北西	北北西	西北西	西北西	北西	北西	北西	北西	北西
風速(m/s)	1.3	1.4	1.7	2.8	6.5	5.8	4.4	3.2	3.9	7.2	5.6	4.9	7.6	5.0	5.8	6.1	5.7	4.1	4.0	3.4	3.2	3.9

受信時刻 3月20日 8時48分
印刷時刻 3月20日 9時52分

各発電所等の環境モニタリング結果

単位：μSv/h

通常の平常値の範囲	会社名	発電所名	3月18日 12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00
0.023~0.027	北海道電力(株)	泊発電所	0.022	0.022	0.022	0.021	0.022	0.022	0.022	0.022	0.022	0.021	0.022	0.022
0.024~0.060	東北電力(株)	女川原子力発電所	2.60	2.60	2.60	2.60	2.50	2.50	2.50	2.50	2.50	2.40	2.40	2.40
0.012~0.060		東通原子力発電所	0.018	0.017	0.017	0.017	0.018	0.017	0.016	0.016	0.017	0.017	0.016	0.016
0.033~0.050	東京電力(株)	福島第一原子力発電所※	263.5	262	3414	3345	4485	5066	4084	3788	3611	419.1	393.9	373.6
0.036~0.052		福島第二原子力発電所	19.7	19.6	19.7	19.5	19.3	19.2	19.1	19.0	18.9	18.8	18.8	18.7
0.011~0.159		柏崎刈羽原子力発電所	0.062	0.063	0.063	0.063	0.063	0.063	0.062	0.062	0.064	0.064	0.064	0.063
0.036~0.053	日本原子力発電(株)	東海第二発電所	0.686	0.605	0.669	0.658	0.654	0.660	0.653	0.649	0.651	0.646	0.645	0.640
0.039~0.110		敦賀発電所	0.072	0.073	0.072	0.073	0.072	0.072	0.073	0.073	0.074	0.072	0.073	0.079
0.064~0.108	中部電力(株)	浜岡原子力発電所	0.068	0.068	0.068	0.068	0.068	0.068	0.068	0.068	0.068	0.068	0.068	0.068
0.0207~0.132	北陸電力(株)	志賀原子力発電所	0.031	0.031	0.031	0.031	0.031	0.032	0.032	0.032	0.031	0.032	0.032	0.032
0.028~0.130	中国電力(株)	島根原子力発電所	0.031	0.030	0.030	0.030	0.030	0.030	0.030	0.030	0.031	0.030	0.031	0.030
0.070~0.077	関西電力(株)	美浜発電所	0.071	0.071	0.070	0.071	0.072	0.071	0.071	0.072	0.072	0.072	0.070	0.073
0.045~0.047		高浜発電所	0.042	0.042	0.042	0.042	0.043	0.043	0.043	0.043	0.042	0.042	0.043	0.043
0.036~0.040		大飯発電所	0.034	0.034	0.034	0.034	0.033	0.034	0.034	0.033	0.034	0.036	0.036	0.036
0.011~0.080	四国電力(株)	伊方発電所	0.014	0.013	0.014	0.014	0.014	0.014	0.014	0.014	0.014	0.014	0.014	0.014
0.023~0.087	九州電力(株)	玄海原子力発電所	0.026	0.027	0.028	0.027	0.026	0.025	0.027	0.027	0.025	0.028	0.027	0.028
0.034~0.120		川内原子力発電所	0.036	0.037	0.033	0.039	0.036	0.037	0.037	0.037	0.039	0.039	0.039	0.038
0.009~0.069	日本原燃(株)	六ヶ所 再処理事業所	0.014	0.014	0.014	0.014	0.014	0.014	0.014	0.014	0.014	0.014	0.013	0.013
0.009~0.071		六ヶ所 埋設事業所	0.016	0.016	0.016	0.016	0.010	0.015	0.015	0.015	0.015	0.015	0.015	0.015

※福島第一原子力発電所については、作業状況により若干測定時間のずれ及び測定位置の変更が生じることもございます。

通常の平常値の範囲	会社名	発電所名	3月19日 0:00	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00
0.023~0.027	北海道電力(株)	泊発電所	0.022	0.022	0.022	0.022	0.022	0.022	0.021	0.022	0.022	0.022		
0.024~0.060	東北電力(株)	女川原子力発電所	2.40	2.30	2.30	2.30	2.30	2.30	2.20	2.20	2.20	2.30		
0.012~0.060		東通原子力発電所	0.017	0.016	0.017	0.017	0.017	0.017	0.016	0.017	0.016	0.017		
0.033~0.050	東京電力(株)	福島第一原子力発電所※	3229	3248	318.7	306.9	301.7	297.5	293.8	290.6	399	364.5		
0.036~0.052		福島第二原子力発電所	18.7	18.5	18.4	18.3	18.2	18	17.9	17.7	17.7	17.6		
0.011~0.159		柏崎刈羽原子力発電所	0.064	0.065	0.063	0.065	0.065	0.064	0.065	0.064	0.064	0.061		
0.036~0.053	日本原子力発電(株)	東海第二発電所	0.641	0.642	0.637	0.632	0.630	0.628	0.628	0.625	0.621	0.617		
0.039~0.110		敦賀発電所	0.073	0.073	0.074	0.074	0.073	0.072	0.074	0.073	0.073	0.073		
0.064~0.108	中部電力(株)	浜岡原子力発電所	0.068	0.068	0.068	0.068	0.068	0.068	0.068	0.068	0.068	0.068		
0.0207~0.132	北陸電力(株)	志賀原子力発電所	0.032	0.032	0.033	0.033	0.038	0.033	0.033	0.032	0.033	0.032		
0.028~0.130	中国電力(株)	島根原子力発電所	0.030	0.031	0.031	0.031	0.028	0.030	0.030	0.028	0.031	0.030		
0.070~0.077	関西電力(株)	美浜発電所	0.072	0.072	0.072	0.072	0.073	0.071	0.073	0.071	0.074			
0.045~0.047		高浜発電所	0.043	0.043	0.042	0.043	0.043	0.042	0.043	0.042	0.043			
0.036~0.040		大飯発電所	0.036	0.036	0.035	0.036	0.035	0.035	0.036	0.036	0.035			
0.011~0.080	四国電力(株)	伊方発電所	0.014	0.013	0.014	0.013	0.014	0.014	0.014	0.014	0.014	0.014		
0.023~0.087	九州電力(株)	玄海原子力発電所	0.027	0.025	0.027	0.027	0.020	0.027	0.026	0.020	0.027	0.026		
0.034~0.120		川内原子力発電所	0.039	0.038	0.038	0.038	0.043	0.038	0.036	0.038	0.036	0.035		
0.009~0.069	日本原燃(株)	六ヶ所 再処理事業所	0.014	0.013	0.013	0.013	0.014	0.013	0.014	0.014	0.014	0.013		
0.009~0.071		六ヶ所 埋設事業所	0.015	0.015	0.015	0.016	0.016	0.015	0.015	0.015	0.016	0.016		

※福島第一原子力発電所については、作業状況により若干測定時間のずれ及び測定位置の変更が生じることもございます。

3/19(土) 9時時点

3月19日　　福島第一(1F)　測定場所

①事務本館北(2号機より北西約0．5キロ)　②体育館付近(MP－5東側)(2号機より西北西約0．9キロ)
③西門付近(MP-5付近)(2号機より西約1．1キロ)　④正門付近前(MP-6付近)(2号機より西南西約1．0キロ)

測定場所	①																						
モニタリングカー	18:50	19:00	19:10	19:20	19:30	19:40	19:50	20:00	20:10	20:20	20:30	20:40	20:50	21:00	21:10	21:20	21:30	21:40	21:50	22:00	22:10	22:20	22:3
測定値(μSv/h)	2978.0	2972.0	2965.0	2961.0	2957.0	2946.0	2941.0	2937.0	2931.0	2924.0	2917.0	2912.0	2909.0	2906.0	2906.0	2895.0	2891.0	2883.0	2880.0	2880.0	2876.0	2855.0	2854.0
中性子	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D
風向	西	西南西	西南西	西南西	西	西	西	西	西	西	西	西	西	西	西	西	西	西	西北西	東北東	西南西	西	西
風速(m/s)	4.4	4.1	3.2	2.7	2.8	2.7	2.2	2.6	3.1	2.6	2.5	2.6	3.1	3.4	3.4	2.3	1.8	2.0	2.2	1.2	0.8	1.0	2.0

受信時刻 3月20日 0時49分

出力時刻 3月20日 0時52分

2011/3/19 23:

3月19日

福島第一(1F)　測定場所　①事務本館北(2号機より北西約0．5キロ)　②体育館付近(MP－5東側)(2号機より西北西約0．9キロ
③西門付近 (MP-5付近)(2号機より西約1．1キロ)　④正門付近前(MP-6付近)(2号機より西南西約1．0キロ

測定場所	③																						
モニタリングカー	3:40	3:50	4:00	4:10	4:20	4:30	4:40	4:50	5:00	5:10	5:20	5:30	5:40	5:50	6:00	6:10	6:20	6:30	6:40	6:50	7:00	7:10	7:2
測定値(μSv/h)	303.6	303.1	301.7	301.3	300.5	299.2	299.2	298.5	297.5	296.4	295.8	295.1	295.4	294.3	293.8	293.6	292.6	292.3	291.6	290.9	290.6	289.8	289.1
中性子	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D
風向	南南東	西北西	東	西	西北西	南東	西	南	南	南	東	北西	東	南東	西	南東	東北東	東南東	南南東	東	北西	西	西
風速(m/s)	0.9	0.6	0.6	0.5	0.4	0.6	0.6	0.4	0.5	0.5	0.9	0.9	0.9	0.6	0.9	0.7	0.5	0.4	0.3	0.4	0.7	0.3	0.

測定場所	③																						
モニタリングカー	7:30	7:40	7:50	8:00	8:10	8:20	8:30	8:40	8:50	9:00	9:10	9:20	9:30	9:40	9:50	10:00	10:10	10:20	10:30	10:40	10:50	11:00	11:1
測定値(μSv/h)	288.9	288.6	287.2	399.0	830.8	670.6	431.9	390.5	522.5	364.5	338.5	323.8	425.2	657.3	358.3	346.1	341.2	338.4	334.3	330.2	327.1	322.6	319.
中性子	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D
風向	西南西	南西	南東	北北東	西北西	西北西	東	東北東	東北東	北東	東	東	東	東	南東	南東	南	南東	東	南南東	南南東	南西	西
風速(m/s)	0.8	0.6	0.6	0.9	0.5	0.3	0.4	0.6	0.6	0.9	1.6	2.1	2.0	1.5	1.8	1.8	1.9	1.9	1.7	1.5	1.5	1.6	2

測定場所	③		測定位置変更※13	①																			
モニタリングカー	11:20	11:30		11:40	11:50	12:00	12:10	12:20	12:30	12:40	12:50	13:00	13:10	13:20	13:30	13:40	13:50	14:00	14:10	14:20	14:30	14:40	14:
測定値(μSv/h)	316.1	313.1		3954.0	3901.0	3882.0	3828.0	3802.0	3749.0	3704.0	3656.0	3629.0	3694.0	3586.0	3529.0	3491.0	3473.0	3443.0	3417.0	3396.0	3375.0	3348.0	3340.
中性子	N.D	N.D		N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D
風向	西北西	南西		西北西	西	西	西	西北西	西	西南西	西南西	北西	西	北西	西	西	南南西	西	北東	西	北	南南西	南東
風速(m/s)	2.9	3.4		4.0	4.7	6.8	5.7	5.6	5.7	5.9	6.1	4.2	3.7	5.3	4.3	5.1	4.9	5.8	3.4	4.6	4.9	3.1	2

測定場所	①																						
モニタリングカー	15:00	15:10	15:20	15:30	15:40	15:50	16:00	16:10	16:20	16:30	16:40	16:50	17:00	17:10	17:20	17:30	17:40	17:50	18:00	18:10	18:20	18:30	18:
測定値(μSv/h)	3279.0	3281.0	3229.0	3194.0	3474.0	3167.0	3165.0	3137.0	3136.0	3126.0	3111.0	3089.0	3078.0	3071.0	3058.0	3051.0	3033.0	3024.0	3020.6	3007.0	3002.0	2998.0	2992.
中性子	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D
風向	西	西	西	南西	南西	南	北西	西	西	西南西	西南西	西	西	西	北西	西	西	西	西	西	西	西	西
風速(m/s)	4.9	4.6	3.4	3.8	4.6	3.9	2.4	4.8	5.0	4.5	6.1	5.1	5.7	4.5	4.1	3.3	3.8	3.0	3.6	2.7	2.8	4.1	[illegible]

※13　事務本館北(2号機より北西約0．5キロ)　※放水活動による効果を測定するためにより近傍へ移動

3月18日　　福島第一(1F)　　測定場所　①事務本館北(2号機より北西約0．5キロ)　②体育館付近(MP－5東側)(2号機より西北西約0．9キロ
⑤西門付近 (MP-5付近)(2号機より西約1．1キロ)　④正門付近前(MP-6付近)(2号機より西南西約1．0キロ

測定場所	①											
モニタリングカー	14:45	14:50	14:55	15:00	15:10	15:20	15:30	15:40	15:50	16:00	16:10	16:20
測定値(μSv/h)	3357.0	3339.0	3346.0	3345.0	3368.0	3582.0	4076.0	3823.0	4396.0	4485.0	4352.0	4535.0
中性子	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D
風向	南南東	東南東	南	南東	南	南南東	南南東	南南東	南南東	南南東	東南東	南
風速(m/s)	1.6	1.5	1.5	1.4	1.7	1.9	2.3	2.1	2.2	2.4	2.0	2.1

測定場所	①											
モニタリングカー	16:30	16:40	16:50	17:00	17:10	17:20	17:30	17:40	17:50	18:00	18:1
測定値(μSv/h)	4419.0	4277.0	4735.0	5055.0	5033.0	4952.0	4251.0	4182.0	4090.0	4084.0	4069.(
中性子	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D
風向	南南東	東	南南東	南	南南東	南南東	南	南	南南西	南南西	南
風速(m/s)	1.8	2.1	2.1	2.0	2.1	3.1	2.3	1.8	1.8	1.2	1.:

測定場所	①											
モニタリングカー	18:20	18:30	18:40	18:50	19:00	19:10	19:20	19:30	19:40	19:50	20:00	測定位置変更※10
測定値(μSv/h)	4069.0	3922.0	3885.0	3832.0	3788.0	3745.0	3728.0	3699.0	3669.0	3634.0	3611.0	
中性子	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	
風向	南	南南西	南南西	南南西	西	南西	南西	南南西	南	西南西	西南西	
風速(m/s)	1.2	1.5	1.5	1.4	1.5	1.3	1.4	1.4	1.3	1.5	1.3	

測定場所	③										
モニタリングカー	20:10	20:20	20:30	20:40	20:50	21:00	21:10	21:20	21:30	21:40	21:5
測定値(μSv/h)	447.6	441.2	434.5	429.2	423.9	419.1	414.2	409.4	405.2	401.6	397.
中性子	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D
風向	南	西	西北西	南西	西南西	南南西	西	西	西	北北西	西
風速(m/s)	3.0	0.5	0.7	0.8	0.6	0.5	0.6	0.3	0.8	0.4	0.

測定場所	③										①		
モニタリングカー	22:00	22:10	22:20	22:30	22:40	22:50	23:00	23:10	23:20	測定位置変更※11	23:30	23:40	23:50
測定値(μSv/h)	393.9	389.2	385.9	382.9	379.6	375.9	373.6	371.2	368.9		3254.0	3256.0	3244.0
中性子	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D		N.D	N.D	N.D
風向	南西	南西	西	西	南西	西	北	北西	西南西		西南西	南西	西南西
風速(m/s)	0.5	0.7	0.5	0.5	0.4	0.4	0.3	0.4	0.3		2.8	1.2	1.2

3月19日

測定場所	①												
モニタリングカー	0:00	0:10	0:20	0:30	0:40	0:50	1:00	1:10	1:20	1:30	1:40	1:50	測定位置変更※12
測定値(μSv/h)	3229.0	3224.0	3219.0	3231.0	3342.0	3284.0	3248.0	3279.0	3247.0	3195.0	3188.0	3181.0	
中性子	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	
風向	西南西	西南西	南西	南西	西南西	西	西南西	西南西	西南西	西南西	南西	西南西	
風速(m/s)	1.4	1.4	1.2	1.1	0.9	1.4	1.3	1.3	1.3	1.4	1.6	1.3	

測定場所	③									
モニタリングカー	2:00	2:10	2:20	2:30	2:40	2:50	3:00	3:10	3:20	3:
測定値(μSv/h)	313.7	312.2	311.1	310.0	309.1	308.6	306.9	306.0	305.1	304.
中性子	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D
風向	北	北	南	西南西	西南西	北北東	西北西	南西	南南東	東
風速(m/s)	3.0	0.3	0.3	0.6	0.3	0.4	0.6	0.7	0.7	0.

※10　西門付近 (MP-5付近)(2号機より西約1．1キロ)　※定点で測定するため移動
※11　事務本館北(2号機より北西約0．5キロ)　※放水活動による効果を測定するためにより近傍へ移動
※12　西門付近 (MP-5付近)(2号機より西約1．1キロ)　※定点で測定するため移動

3月18日　　福島第一（1F）　　測定場所

①事務本館北（2号機より北西約0．5キロ）　②体育館付近（MP－5東側）（2号機より西北西約0．9キロ
③西門付近（MP-5付近）（2号機より西約1．1キロ）　④正門付近前（MP-6付近）（2号機より西南西約1．0キロ

測定場所	③																						
モニタリングカー	0:00	0:10	0:20	0:30	0:40	0:50	1:00	1:10	1:20	1:30	1:40	1:50	2:00	2:10	2:20	2:30	2:40	2:50	3:00	3:10	3:20	3:30	3:
測定値(μSv/h)	287.0	287.3	286.6	286.4	286.3	286.0	285.6	285.5	285.2	284.9	284.6	284.4	284.0	283.7	283.7	283.5	283.0	282.9	282.6	282.2	282.1	281.6	281
中性子	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D
風向	西	西	西	西	北西	西北西	北西	北西	北西	北西	北	北西	北西	北東	北東	北東	北北東	北西	西	西北西	西北西	西	北西
風速(m/s)	1.4	1.0	1.0	0.8	0.9	1.0	1.6	1.5	1.7	1.4	0.9	0.6	1.0	0.5	0.2	0.2	0.2	0.2	0.2	0.3	0.4	0.7	0

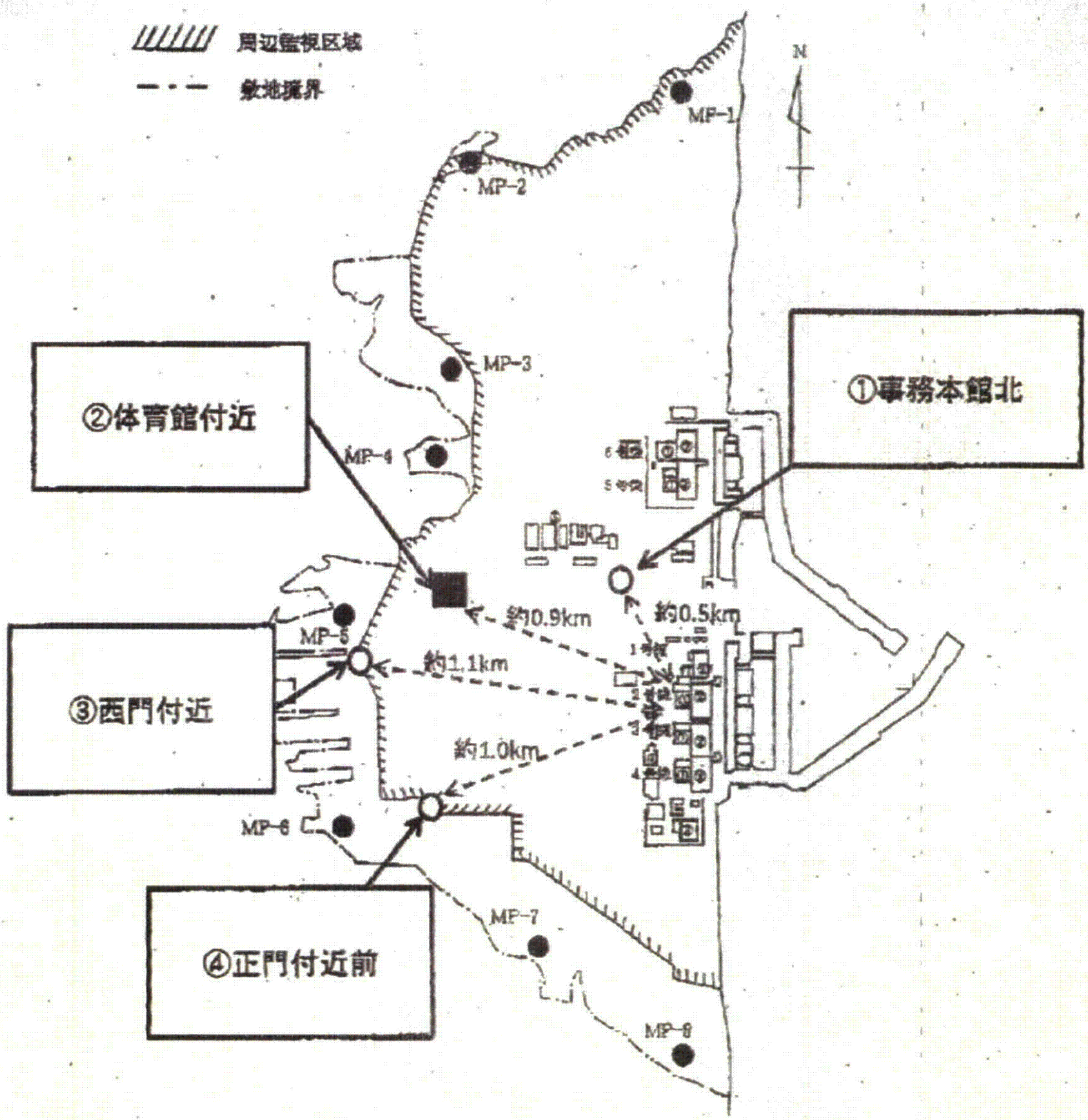
測定場所	③																						
モニタリングカー	3:50	4:00	4:10	4:20	4:30	4:40	4:50	5:00	5:10	5:20	5:30	5:40	5:50	6:00	6:10	6:20	6:30	6:40	6:50	7:00	7:10	7:20	7:
測定値(μSv/h)	281.1	281.1	280.9	280.7	280.2	280.0	279.8	279.4	279.3	279.0	278.9	278.9	277.1	274.0	274.0	273.8	274.1	272.7	273.4	272.4	271.7	271.6	271
中性子	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D
風向	東	西	西	北	北西	北	北東	北北東	北北西	北	北西	北西	北	北東	西	北	西	北西	西	西	北	北	西
風速(m/s)	0.4	0.5	0.5	0.4	0.2	0.6	0.5	0.5	0.5	0.6	0.7	1.0	1.0	1.3	1.6	1.4	1.2	1.5	1.6	2.3	2.1	1.9	2

測定場所	③																						
モニタリングカー	7:40	7:50	8:00	8:10	8:20	8:30	8:40	8:50	9:00	9:10	9:20	9:30	9:40	9:50	10:00	10:10	10:20	10:30	10:40	10:50	11:00	11:10	11:
測定値(μSv/h)	271.1	271.2	270.5	270.3	269.9	269.9	269.8	269.2	268.7	267.6	268.9	267.5	267.0	266.9	266.7	266.4	266.1	265.7	265.4	264.8	265.0	264.4	264
中性子	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D
風向	北西	北	北西	北西	西	西	西	北西	西北西	西北西	西	西	西	西北西	北北西	西	北西	北西	北	南西	西	北	北西
風速(m/s)	2.9	3.0	2.7	2.9	3.4	3.7	3.3	2.5	2.6	2.8	2.3	3.3	2.9	3.1	2.0	1.8	2.2	2.5	2.3	1.8	1.9	1.5	1

測定場所	③													測定位置変更※9	①								
モニタリングカー	11:30	11:40	11:50	12:00	12:10	12:20	12:30	12:40	12:50	13:00	13:10	13:20	13:30		13:50	14:00	14:10	14:15	14:20	14:25	14:30	14:35	14:
測定値(μSv/h)	264.1	264.4	263.4	263.5	263.1	262.9	263.3	264.3	261.3	262.0	261.9	262.7	264.1		3484.0	3414.0	3382.0	3371.0	3362.0	3357.0	3352.0	3342.0	3348
中性子	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D		N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D	N.D
風向	南西	南西	西北西	北	西	南東	東	南	南東	南	東南東	南東	東		東南東	南南東	南東	東南東	南	東南東	南東	南南東	南南
風速(m/s)	1.5	1.7	1.6	1.7	1.3	1.2	1.1	1.8	2.7	3.0	2.6	2.5	2.0		1.8	2.0	1.7	1.6	1.7	1.9	1.9	1.7	1

※9　事務本館北（2号機より北西約0．5キロ）　※放水活動による効果を測定するためにより近傍へ移動

福島第一原子力発電所



周辺監視区域
敷地境界
N
MP-1
MP-2
MP-3
MP-4
MP-5
MP-6
MP-7
MP-8
①事務本館北
②体育館付近
③西門付近
④正門付近前
約0.9km
約0.5km
約1.1km
約1.0km

From: LIA07 Hoc
Subject: 0600 EDT (March 24, 2011) USNRC Earthquake/Tsunami Status Update
Date: Thursday, March 24, 2011 6:23:44 AM
Attachments: NRC Status Update 3.24.11--0600 EDT.pdf

Please find attached a 0600 EDT (March 24, 2011) status update from the US Nuclear Regulatory Commission's Emergency Operations Center regarding the impacts of the earthquake/tsunami.

Please note that this information is "Official Use Only" and is only being shared within the federal family.

Please call the Headquarters Operations Officer at 301-816-5100 with questions.

-Jim

Jim Anderson
Office of Nuclear Security and Incident Response
US Nuclear Regulatory Commission
James.anderson@nrc.gov
LIA07.HOC@nrc.gov (Operations Center)

BBBB/158

From:	LIA07 Hoc
To:	LIA07 Hoc; Borchardt, Bill; Bradford, Anna; Cohen, Shari; Cooper, LaToya; Dyer, Jim; Flory, Shirley; Gibbs, Catina; Haney, Catherine; Hudson, Sharon; Jaczko, Gregory; Johnson, Michael; Leeds, Eric; Loyd, Susan; Pace, Patti; Schwarz, Sherry; Sheron, Brian; Speiser, Herald; Taylor, Renee; Virgilio, Martin; Walls, Lorena; Weber, Michael
Subject:	Correction to Update for "Go Books," 0600 3/24/11
Date:	Thursday, March 24, 2011 6:42:14 AM
Attachments:	NRC Status Update 3.24.11--0600 EDT.pdf

HOC

Please find attached a corrected 032411 0600 EDT Status Update. The previous version was incorrectly labeled as a "Draft."

Thank you,

-Jim

Jim Anderson
Office of Nuclear Security and Incident Response
US Nuclear Regulatory Commission
LIA07.HOC@nrc.gov
James.anderson@nrc.gov

BBBB/159

HOC

From: LIA07 Hoc
Cc: LIA07 Hoc
Subject: Corrected 0600 EDT (March 24, 2011) USNRC Earthquake/Tsunami Status Update
Date: Thursday, March 24, 2011 6:40:12 AM
Attachments: NRC Status Update 3.24.11--0600 EDT.pdf

Please find attached a 0600 EDT (March 24, 2011) status update from the US Nuclear Regulatory Commission's Emergency Operations Center regarding the impacts of the earthquake/tsunami. **This corrects the previous version that was incorrectly marked draft.**

Please note that this information is "Official Use Only" and is only being shared within the federal family.

Please call the Headquarters Operations Officer at 301-816-5100 with questions.

-Jim

Jim Anderson
Office of Nuclear Security and Incident Response
US Nuclear Regulatory Commission
James.anderson@nrc.gov
LIA07.HOC@nrc.gov (Operations Center)

BBBB/160

From: LIA07 Hoc
Subject: 1800 EDT (March 24, 2011) USNRC Earthquake/Tsunami Status Update
Date: Thursday, March 24, 2011 6:00:04 PM
Attachments: USNRC Earthquake-Tsunami Update.032411.1800EDT.pdf

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HOC

Attached, please find an 1800 EDT (March 24, 2011) status update from the US Nuclear Regulatory Commission's Emergency Operations Center regarding the impacts of the earthquake/tsunami.

Please note that this information is "Official Use Only" and is only being shared within the federal family.

Please call the Headquarters Operations Officer at 301-816-5100 with questions.

-Sara

Sara K. Mroz
Communications and Outreach
Office of Nuclear Security and Incident Response
US Nuclear Regulatory Commission
Sara.Mroz@nrc.gov
LIA07.HOC@nrc.gov (Operations Center)

BBBB/161

To:	PMT03 Hoc
Cc:	OST05 Hoc; LIA04 Hoc
Subject:	FW: Response to EPA drinking water limits question

PMT- Could you please get back to RI on this?
Contacts: Doug Tifft and Pamela Henderson

Thank you,
-Maria

From: Henderson, Pamela
Sent: Thursday, March 24, 2011 10:19 AM
To: OST05 Hoc
Cc: McNamara, Nancy; LIA04 Hoc; LIA03 Hoc; PMT03 Hoc; Hoc, PMT12; Tifft, Doug
Subject: RE: Response to EPA drinking water limits question

Maria,

I believe that RASCAL would utilize NRC limits?

From the EPA website.... EPA bases drinking water limits on a dose of 4 mrem/year to total body or any critical organ. For I-131 the limit is 3 pCi/liter. For Cs-137 the limit is 200 pCi/liter.

From: OST05 Hoc
Sent: Thursday, March 24, 2011 10:12 AM
To: Tifft, Doug; Henderson, Pamela
Cc: McNamara, Nancy; OST05 Hoc; LIA04 Hoc; LIA03 Hoc
Subject: RE: Response to EPA drinking water limits question

Good morning Doug,

I just verified the numbers and the units with RASCAL folks in PMT, and it was confirmed that they are correct.

If you have any additional question on this, please contact PMT at (301) 816-5499.

Thank you,
-Maria Arribas-Colon

From: Tifft, Doug
Sent: Thursday, March 24, 2011 7:59 AM
To: OST05 Hoc; LIA04 Hoc
Cc: Henderson, Pamela; McNamara, Nancy
Subject: RE: Response to EPA drinking water limits question

This doesn't sound right. I expected the units to be in pCi/L. And I'd also expect that the limits for one year olds would be lower than the limits for adults.

Would you mind double checking with your EPA contact what the EPA drinking water limit is for I-131 and Cs-137?

BBBB / 162

I've also got the question in to one of my Regional EPA contacts.

Thanks,
-Doug

From: OST05 Hoc
Sent: Wednesday, March 23, 2011 7:45 PM
To: Henderson, Pamela; Barker, Allan; Browder, Rachel; Erickson, Randy; Logaras, Harral; Maier, Bill; McNamara, Nancy; Tifft, Doug; Trojanowski, Robert; Woodruff, Gena
Cc: OST05 Hoc; LIA04 Hoc; Easson, Stuart; Flannery, Cindy; Lukes, Kim; Maupin, Cardelia; Noonan, Amanda; Rautzen, William; Rivera, Alison; Ryan, Michelle; Turtil, Richard; Virgilio, Rosetta
Subject: Response to EPA drinking water limits question

Doug/ Pam,

This email is in response to your question on the EPA drinking water standards limits for Iodine-131 and Cesium-137. See below.

Iodine-131
One year old: 167 Bq/Kg
Adult: 2420 Bq/Kg

Cesium-137
One year old: 2990 Bq/Kg
Adult: 1360 Bq/Kg

Thank you,
-Maria Arribas-Colon

From: PMT03 Hoc
Sent: Friday, March 25, 2011 8:14 PM
To: eoc_environmental_unit@epa.gov
Subject: FW: US Nuclear Plant Reported Measurements
Attachments: US Nuclear Plant Reported Measurements 03252011.xlsx

The message to 'eoc_environmentalunit@epa.gov' was returned undeliverable...

From: PMT03 Hoc
Sent: Friday, March 25, 2011 8:11 PM
To: 'eoc_environmentalunit@epa.gov'; 'eoc_manager@epa.gov'
Subject: US Nuclear Plant Reported Measurements

Ryan Craffey
Protective Measures Team, USNRC

BBBB / 163

~~OFFICIAL USE ONLY~~

Date	Plant	Isotope	Concentration
3/18/2011	San Onofre	I-131	1.4E-13 uCi/cc
3/18/2011	Diablo Canyon	I-131	3.8 to 6E-13 uCi/cc
3/19/2011	San Onofre	I-131	6.5E-13 to 7.0E-13 uCi/cc
3/19/2011	Palo Verde	Cs-134	2.22E-13 uCi/cc
3/19/2011	Palo Verde	Cs-137	3.58E-13 uCi/cc
3/19/2011	Palo Verde	I-131	1.54E-12 uCi/cc
3/20/2011	San Onofre	I-131	2.0E-12 uCi/cc
3/20/2011	Palo Verde	Cs-134	3.87E-13 uCi/cc
3/20/2011	Palo Verde	I-131	2.50E-12 uCi/cc
3/21/2011	Nine Mile Point	I-131	19.1 pCi/L (rainwater)
3/21/2011	Palo Verde	I-131	6.70E-13 uCi/cc
3/21/2011	Palo Verde	Cs-134	2.06E-13 uCi/cc,
3/21/2011	Palo Verde	Cs-137	2.71E-13 uCi/cc
3/22/2011	San Onofre	I-131	7.0 to 8.0E-13 uCi/cc
3/22/2011	San Onofre	Cs-137	1.25E-13 uCi/cc
3/22/2011	Columbia	I-131	6.74E-13 uCi/cc
3/22/2011	Nine Mile Point	I-131	18 pCi/L (rainwater)
3/22/2011	Ginna	I-131	26.8 pCi/L (rainwater)
3/22/2011	Palo Verde	I-131	2.01E-12 uCi/cc
3/22/2011	Palo Verde	Cs-137	2.93E-13 uCi/cc
3/22/2011	Palo Verde	Cs-134	2.76E-13 uCi/cc
3/23/2011	Millstone	I-131	25.6 pCi/L (rainwater)
3/23/2011	San Onofre	I-131	5E-13 to 6E-13 uCi/cc
3/23/2011	San Onofre	Cs-137	7E-14 uCi/cc
3/23/2011	Palo Verde	I-131	7.42E-13 uCi/cc
3/23/2011	TMI	I-131	95 pCi/L (rainwater)
3/24/2011	Palo Verde	I-131	6.30E-13 uCi/cc
3/24/2011	Oyster Creek	I-131	127 pCi/L (rainwater)
3/24/2011	San Onofre	I-131	3.0E-13 to 6.0E-13 uCi/cc
3/24/2011	Limerick	I-131	47 pCi/L (rainwater)
3/25/2011	South Texas	I-131	2.6E-13 uCi/cc

I-131 Reporting Levels
NUREG-1201 and NUREG-1302

	I-131	**Units**	I-131
Drinking Water	2	pCi/L	2.00E-09
Non-Drinking Water	20	pCi/L	2.00E-08
Air	0.9	pCi/m3	9.00E-13

3/25/2011	San Onofre	I-131	9.0E-13 to 1E-12 uCi/cc
3/25/2011	San Onofre	Cs-137	1E-13 to 3E-13 uCi/cc

~~OFFICIAL USE ONLY~~

Units
uCi/ml
uCi/ml
uCi/cc

From:	OST05 Hoc
Sent:	Thursday, March 24, 2011 12:53 PM
To:	PMT03 Hoc; Hoc, PMT12
Cc:	OST05 Hoc; LIA04 Hoc
Subject:	FW: Response to EPA drinking water limits question

PMT- forwarding this to PMT for response.

Thank you,
-Maria Arribas-Colon

From: Henderson, Pamela
Sent: Thursday, March 24, 2011 10:19 AM
To: OST05 Hoc
Cc: McNamara, Nancy; LIA04 Hoc; LIA03 Hoc; PMT03 Hoc; Hoc, PMT12; Tifft, Doug
Subject: RE: Response to EPA drinking water limits question

Maria,

I believe that RASCAL would utilize NRC limits?

From the EPA website.... EPA bases drinking water limits on a dose of 4 mrem/year to total body or any critical organ. For I-131 the limit is 3 pCi/liter. For Cs-137 the limit is 200 pCi/liter.

From: OST05 Hoc
Sent: Thursday, March 24, 2011 10:12 AM
To: Tifft, Doug; Henderson, Pamela
Cc: McNamara, Nancy; OST05 Hoc; LIA04 Hoc; LIA03 Hoc
Subject: RE: Response to EPA drinking water limits question

Good morning Doug,

I just verified the numbers and the units with RASCAL folks in PMT, and it was confirmed that they are correct.

If you have any additional question on this, please contact PMT at (301) 816-5499.

Thank you,
-Maria Arribas-Colon

From: Tifft, Doug
Sent: Thursday, March 24, 2011 7:59 AM
To: OST05 Hoc; LIA04 Hoc
Cc: Henderson, Pamela; McNamara, Nancy
Subject: RE: Response to EPA drinking water limits question

This doesn't sound right. I expected the units to be in pCi/L. And I'd also expect that the limits for one year olds would be lower than the limits for adults.

Would you mind double checking with your EPA contact what the EPA drinking water limit is for I-131 and Cs-137?

BBBB / 164

I've also got the question in to one of my Regional EPA contacts.

Thanks,
-Doug

From: OST05 Hoc
Sent: Wednesday, March 23, 2011 7:45 PM
To: Henderson, Pamela; Barker, Allan; Browder, Rachel; Erickson, Randy; Logaras, Harral; Maier, Bill; McNamara, Nancy; Tifft, Doug; Trojanowski, Robert; Woodruff, Gena
Cc: OST05 Hoc; LIA04 Hoc; Easson, Stuart; Flannery, Cindy; Lukes, Kim; Maupin, Cardelia; Noonan, Amanda; Rautzen, William; Rivera, Alison; Ryan, Michelle; Turtil, Richard; Virgilio, Rosetta
Subject: Response to EPA drinking water limits question

Doug/ Pam,

This email is in response to your question on the EPA drinking water standards limits for Iodine-131 and Cesium-137. See below.

Iodine-131
One year old: 167 Bq/Kg
Adult: 2420 Bq/Kg

Cesium-137
One year old: 2990 Bq/Kg
Adult: 1360 Bq/Kg

Thank you,
-Maria Arribas-Colon

From: LIA07 Hoc MSIR
Cc: LIA07 Hoc
Subject: 0430 EDT (March 25, 2011) USNRC Earthquake/Tsunami Status Update
Date: Friday, March 25, 2011 5:00:12 AM
Attachments: NRC Status Update 3.25.11--0430.pdf

HOC

Attached, please find a 0430 EDT (March 25, 2011) status update from the US Nuclear Regulatory Commission's Emergency Operations Center regarding the impacts of the earthquake/tsunami. **Please note that the NRC has moved the publication time of this document from 0600 to 0430 to better serve the needs of its team in Japan.**

Please note that this information is "Official Use Only" and is only being shared within the federal family.

Please call the Headquarters Operations Officer at 301-816-5100 with questions.

-Jim

Jim Anderson
Office of Nuclear Security and Incident Response
US Nuclear Regulatory Commission
James.anderson@nrc.gov
LIA07.HOC@nrc.gov (Operations Center)

BBBB/165

From: LIA07 Hoc
Sent: Friday, March 25, 2011 5:00 AM
Cc: LIA07 Hoc
Subject: 0430 EDT (March 25, 2011) USNRC Earthquake/Tsunami Status Update
Attachments: NRC Status Update 3.25.11--0430.pdf

Attached, please find a 0430 EDT (March 25, 2011) status update from the US Nuclear Regulatory Commission's Emergency Operations Center regarding the impacts of the earthquake/tsunami. **Please note that the NRC has moved the publication time of this document from 0600 to 0430 to better serve the needs of its team in Japan.**

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Please call the Headquarters Operations Officer at 301-816-5100 with questions.

-Jim

Jim Anderson
Office of Nuclear Security and Incident Response
US Nuclear Regulatory Commission
James.anderson@nrc.gov
LIA07.HOC@nrc.gov (Operations Center)

BBBB/166

WITH HOC

From:	LIA07 Hoc
To:	Borchardt, Bill; Bradford, Anna; Cohen, Shari; Cooper, LaToya; Dyer, Jim; Flory, Shirley; Gibbs, Catina; Haney, Catherine; Hudson, Sharon; Jaczko, Gregory; Johnson, Michael; Leeds, Eric; Loyd, Susan; Pace, Patti; Schwarz, Sherry; Sheron, Brian; Speiser, Herald; Sprogeris, Patricia; Taylor, Renee; Virgilio, Martin; Walls, Lorena; Weber, Michael
Subject:	Update for Go Books - 1800 EDT, March 25, 2011
Date:	Friday, March 25, 2011 6:55:45 PM
Attachments:	TEPCO Press Release 152.pdf TEPCO Press Release 162.pdf TEPCO Press Release 161.pdf TEPCO Press Release 160.pdf TEPCO Press Release 159.pdf TEPCO Press Release 158.pdf TEPCO Press Release 157.pdf TEPCO Press Release 156.pdf TEPCO Press Release 155.pdf TEPCO Press Release 154.pdf TEPCO Press Release 153.pdf GI-199 TP & QA 3-25-11.pdf ET Chronology 3-25-11 1800.pdf March 25 1500 EDT one pager (3).doc USNRC Earthquake-Tsunami Update 032511 1800EDT.PDF

Please find attached updated information for the "Go Books".

The updates include:

- The 1800 EDT, 03/25/11 Status Update
- The latest ET Chronology
- The latest TEPCO Press Releases (Numbers 152-162)
- NRC Talking Points (GI-199)
- "One Pager" (1500 EDT, 03/25/11)

Please let me know if you have any questions or concerns.

-Sara

Sara Mroz
Communications and Outreach
Office of Nuclear Security and Incident Response
US Nuclear Regulatory Commission
Sara.Mroz@nrc.gov
LIA07.HOC@nrc.gov (Operations Center)

BBBB/167

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Press Release (Mar 25,2011)
Plant Status of Fukushima Daini Nuclear Power Station (as of 9:00 am March 25th)

[No update from the last release issued at 9:00 pm, March 24th]

Unit	Status
1	· Reactor cold shutdown, stable water level, offsite power is available. · No reactor coolant is leaked to the reactor containment vessel. · Maintain average water temperature at 100°C in the Pressure Suppression Chamber.
2	· Reactor cold shutdown, stable water level, offsite power is available. · No reactor coolant is leaked to the reactor containment vessel. · Maintain average water temperature at 100°C in the Pressure Suppression Chamber.
3	· Reactor cold shutdown, stable water level, offsite power is available. · No reactor coolant is leaked to the reactor containment vessel. · Maintain average water temperature at 100°C in the Pressure Suppression Chamber.
4	· Reactor cold shutdown, stable water level, offsite power is available. · No reactor coolant is leaked to the reactor containment vessel. · Maintain average water temperature at 100°C in the Pressure Suppression Chamber.
Other	N.A.

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Press Releases

Press Release (Mar 25,2011)
Implementation Plan of Rolling Blackouts on and after March 26, 2011

Due to the tight power supply-demand balance, TEPCO has been implementing rolling blackout since Monday, March 14. We sincerely regret causing anxiety and inconvenience to our customers and the society. We appreciate your cooperation in conserving electricity consumption.
For customers who will be subject to rolling blackouts, please be prepared for the announced blackout periods. Also, for the customers who are not subject to blackouts, we would appreciate your continuous cooperation in reducing electricity usage by turning off unnecessary lightings and electrical appliances.
We would like to inform the implementation plan of rolling blackouts on and after March 26, 2011 as follows. Since today, we will, in principle, inform each 5 sub-group divided from each existing 5 group (Group 1 to 5) on the rolling blackout plan on the following day.

○Implementation plan of rolling blackout on March 26 (Sat.) and March 27 (Sun.)
On March 26, Saturday, no rolling-blackout will be implemented in any time periods based on the today's power demand, the weather forecast on March 26 and the trend of the power supply.
On March 27, Sunday, no rolling-blackout will be implemented in any time periods based on the trend of the current power supply and demand.

○Implementation plan of rolling blackout on March 28 (Mon.) and April 1 (Fri.)
Please refer to the appendix for details.

- The actual blackout period for each Group is planned to be maximum about 3 hours during the relevant scheduled time period.
- Each blackout period for each Group differs every day and starting and ending time of blackout periods may slightly differ.
- Depending on the supply-demand balance of the day, planned blackouts may not be carried out. In case the electricity supply-demand balance becomes tighter than expected, we will reconsider the rolling blackout plan and inform you accordingly before we implement the revised plan.
- A blackout may occur in the adjacent areas where the planned blackouts are carried out

[Others]

- In order to prevent fires, please make sure to switch off electric appliances such as hair driers when you leaving home.
- Please carefully pay attention to the traffic at the crossings in case the traffic lights are suddenly turned off.
- As for the buildings and apartments, please be aware that equipments and facilities such as elevators, automatic doors, automatic locks, and multilevel parking lots will not function. In particular, please avoid using elevators during the scheduled blackouts.

‹Reference›
○Prediction of demand and supply on March 25

Estimated Demand	35,000 MW (18:00-19:00)
Supply Capacity	37,500 MW

○Prediction of demand and supply on March 26

Estimated Demand	35,000 MW (18:00-19:00)
Supply Capacity	37,500 MW

*Prediction of demand
According to the weather forecast, the temperature tomorrow on March 26 will be lower than that of today. However, tomorrow is Saturday and we assume the estimated peak demand on March 26 will be 35,000MW, lower than that on weekdays.
*Estimated demand and supply capacity may change depending on the situation of the day.

attachment:Weekly Rolling Blackout Plan from Mar 26th (Sat) to Apr 1st (Fri)(PDF 63KB)

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Press Releases

Press Release (Mar 25,2011)
Plant Status of Fukushima Daiichi Nuclear Power Station (as of 10:30 PM Mar 25th)

*new items are underlined

All 6 units of Fukushima Daiichi Nuclear Power Station have been shut down.

Unit 1(Shut down)
-Reactor has been shut down. However, the explosive sound and white smoke were confirmed after the big quake occurred at 3:36 pm Mar 12th. It was assumed to be hydrogen explosion.
-At approximately 2:30 am on March 23rd, seawater was started to be injected to the nuclear reactor through the feed water system.
-At approximately 10:50 am on March 24th, white fog-like steam arising from the roof part of the reactor building was observed.
-At approximately 11:30 am on March 24th, lights in the main control room was restored.
-We had been injecting sea water into the reactor, but from 3:37 pm on March 25th, we started injecting fresh water into it.

Unit 2(Shut down)
-At approximately 6:00 am on March 15th, an abnormal noise began emanating from nearby Pressure Suppression Chamber and the pressure within this chamber decreased.
-At 6:20 pm on March 21st, white smoke was confirmed arising from the top of the reactor building. As of 7:11 am on March 22nd, smoke decreased to the level to nearly non-existent.
-We have been injecting sea water into the reactor.

Unit 3(Shut down)
-Reactor has been shut down. However, the explosive sound and white smoke were confirmed at 11:01am Mar 14th. It was assumed to be hydrogen explosion.
-At 8:30am on March 16th, fog like steam was confirmed arising from the reactor building.
-At approximately 6:15 am on March 17th the pressure of the Suppression Chamber has temporarily increased. We were preparing to implement a measurement to reduce the pressure of the reactor containment vessel (partial discharge of air containing radioactive material to outside) in order to fully secure safety. However, at present, it is not a situation to take a measure immediately to discharge air containing radioactive material to outside now. We will continue to monitor the status of the pressure of the reactor containment vessel.
-At approximately 4:00 pm, March 21st, light gray smoke was confirmed arising from the floor roof of the Unit 3 building. On March 22nd, the color of smoke changed to somewhat white and it is slowly dissipating.
-At approximately 10:45 pm on March 22nd, the light in the main control room was turned on.
-At around 4:20 pm on March 23rd, our staff confirmed light black smoke belching from the Unit 3 building. At approximately 11:30 pm on March 23rd and 4:50 am on March 24th, our employee found no signs of smoke.
-We had been injecting sea water into the reactor pressure vessel, but from 6:02 pm on March 25th, we started injecting fresh water into it.

Unit 4 (outage due to regular inspection)
-Reactor has been shut down. However, at approximately 6 am on March 15th. We have confirmed the explosive sound and the sustained damage around the 5th floor rooftop area of the Nuclear Reactor Building.
-On March 15th and 16th, we respectively confirmed the outbreak of fire at the 4th floor of the northwestern part of the Nuclear Reactor Building. We immediately reported this matter to the fire department and the related authorities. TEPCO employees confirmed that each fire had already died down by itself.
-At this moment, we do not consider any reactor coolant leakage inside the reactor happened.

Unit 5 (outage due to regular inspection)
-Reactor has been shut down and the sufficient level of reactor coolant to ensure safety is maintained.
-At 5 am, March 19th, we started the Residual Heat Removal System Pump (C) in order to cool the spent fuel pool.
-At this moment, we do not consider any reactor coolant leakage inside the reactor containment vessel happened.
-At 2:30 pm, March 20th, the reactor achieved reactor cold shutdown. At around 5:24 pm on March 23rd, when we switched the temporary Residual Heat Removal System Seawater Pump, it has stopped automatically. At around 4:14 pm, March 24th, we started replaced pump and at around 4:35 pm, cooling of reactor has restarted.

Unit 6 (outage due to regular inspection)

-Reactor has been shut down and the sufficient level of reactor coolant to ensure safety is maintained.
-We are working on receiving external power supply to Units 5 and 6. We completed the repair work on the emergency diesel generator (A).
-At 10:14 pm, March 19th, we started the Residual Heat Removal System Pump (B) of Unit 6 in order to cool the spent fuel pool.
-At this moment, we do not consider any reactor coolant leakage inside the reactor containment vessel happened.
-At 7:27 pm, March 20th, the reactor achieved reactor cold shutdown.
-In relation to the two seawater side pumps of the Residual Heat Removal System, we changed the power source from temporary to permanent at 3:38 PM and 3:42PM, Mar 25 respectively. They are operating normally.

Today's work for cooling the spent fuel pools
-At :05 am, March 25th, we started injecting seawater into the spent fuel pool of Unit 4, using Fuel Pool Cooling and Filtering(clean up) system (FPC) and finished at 10:20 am. At 10:30 am, March 25th, we started injecting seawater into the spent fuel pool of Unit 2, using Fuel Pool Cooling and Filtering (clean up) system (FPC) and finished it at 0:19 pm of the same day.
-Spraying at the spent fuel pool of Unit 3 by Kawasaki City Fire Department was carried out from 1:28 pm to 4:00 pm on March 25th.
-From 7:05 PM to 10:07 PM, Mar 25, water discharge by concrete pumping vehicle to the spent fuel pool of Unit 4 was conducted.
-We are considering further spraying at other units and others subject to the conditions of spent fuel pools.

Casualty
-2 workers of cooperative firm were injured at the occurrence of the earthquake, and were transported to the hospital on March 11th.
-Presence of 2 TEPCO employees at the site is not confirmed on March 11th.
-1 TEPCO employee who was not able to stand by his own holding left chest with his hand, was transported to the hospital by an ambulance on March 12th.
-4 workers were injured and transported to the hospital after explosive sound and white smoke were confirmed around the Unit 1on March 12th.
-1 subcontract worker at the key earthquake-proof building was unconscious and transported to the hospital by an ambulance on March 12th.
-The radiation exposure of 1 TEPCO employee, who was working inside the reactor building, exceeded 100mSv and he was transported to the hospital on March 12th.
-2 TEPCO employees felt bad during their operation in the central control rooms of Unit 1 and 2 while wearing full masks, and were transferred to Fukushima Daini Nuclear Power Station for consultation with a medical advisor on March 13th.
-11 workers were injured and transported to Fukushima Daini Nuclear Power Station etc. after explosive sound and white smoke were confirmed around the Unit 3. One of the workers was transported to the FUKUSHIMA Medical University Hospital on March 14th.
-At approximately 10 pm on March 22nd, 1 worker who had been working on setting up a temporary power panel in the common pool was injured and transported to Fukushima Daini Nuclear Power Station where the industrial doctor is.
-At approximately 1:30 am on March 23rd, 1 worker who had been working on transporting a temporary power panel in the common pool was injured and transported to Fukushima Daini Nuclear Power Station where the industrial doctor is.
-On March 24th, it was confirmed that 3 workers from cooperative companies who were in charge of cable laying work in the 1st floor and the underground floor of turbine building were exposed to the radiation dose of more than 170 mSv. 2 of them were confirmed that their leg skin were contaminated. Although they were decontaminated, since it there were possibility of beta ray burn injury, they were transferred to Fukushima Medical University Hospital. The third worker was also transferred to Fukushima Medical University Hospital today (March 25). The 3 workers are now been transferred to National Institute of Radiological Sciences in Chiba Prefecture.
Regarding this event, TEPCO has reported to related government ministries and agencies on measures to be taken to assure appropriate radiation dose control and radiation exposure related operations.
Before today's restoration work, we will make notification to the concerned parties and continue to take all possible measures to future management.

Others
-We measured radioactive materials (iodine etc.) inside of the nuclear power station area (outdoor) by monitoring car and confirmed that radioactive materials level is getting higher than ordinary level. As listed below, we have determined that specific incidents stipulated in article 15, clause 1 of Act on Special Measures Concerning Nuclear Emergency Preparedness (Abnormal increase in radiation dose measured at site boundary) have occurred.
·Determined at 4:17 pm Mar 12th (Around Monitoring Post 4)
·Determined at 8:56 am Mar 13th (Around Monitoring Post 4)
·Determined at 2:15 pm Mar 13th (Around Monitoring Post 4)
·Determined at 3:50 am Mar 14th (Around Monitoring Post 6)
·Determined at 4:15 am Mar 14th (Around Monitoring Post 2)
·Determined at 9:27 am Mar 14th (Around Monitoring Post 3)
·Determined at 9:37 pm Mar 14th (Around main entrance)
·Determined at 6:51 am Mar 15th (Around main entrance)
·Determined at 8:11 am Mar 15th (Around main entrance)
·Determined at 4:17 pm Mar 15th (Around main entrance)
·Determined at 11:05 pm Mar 15th (Around main entrance)
·Determined at 8:58 am Mar 19th (Around MP5)
From now on, if the measured figure fluctuates and goes above and below 500 micro Sv/h, we deem that as the continuous same event and will not regard that as a new specific incidents stipulated in article 15, clause 1 of the Act on Special Measures Concerning Nuclear Emergency Preparedness (Abnormal increase in radiation dose measured at site boundary) has occurred. In the interim, if we measure a manifestly abnormal figure and it is evident that the event is not the continuous same event, we will determine and notify.

-The national government has instructed evacuation for those local

residents within 20km radius of the periphery and evacuation to inside for those residents from 20km to 30km radius of the periphery, because it's possible that radioactive materials are discharged.
-At approximately 10am on March 15th, we observed 400mSv/h at the inland side of the Unit 3 reactor building and 100mSv/h at the inland side of the Unit 4 reactor building.
-At around 10:37 am March 21st, water spraying to common spent fuel pool and finished at 3:30 pm (conducted by TEPCO).
-At around 3:37 pm, March 24th, electricity supply to common spent fuel pool has started from external power source. At around 6:05 pm, fuel pool cooling pump was started to cool the pool.
-We found no signs of abnormal situation for the casks by visual observation during the patrol activity. A detailed inspection is under preparation.
-At Units 5 and 6, in order to prevent hydrogen gas from accumulating within the buildings, we have made three holes on the roof of the reactor building for each unit.
-In total 12 fire engines are lent for the water spraying to the spent fuel pools and water injection to the nuclear reactors by various regional fire departments* as well as Tokyo Fire Department. Also, instruction regarding the setting and operation of large scale decontamination system was provided by Niigata City Fire Headquarter and Hamamatsu City Fire Headquarter.
*: Koriyama Fire Department, Iwaki Fire Brigade Headquarters, Fire Headquarters of Sukagawa District Wide Area Fire-fighting Association, Yonezawa City Fire Headquarters, Utsunomiya City Fire Headquarters, Fire Headquarters of Aizu-Wakamatsu wide area municipal association, Saitama City Fire Bureau, and Niigata City Fire Bureau.
-By March 22nd, Units 1 through 6 were started to be energized from the external power source.
-We will continue to take all measures to ensure the safety and to continue monitoring the surrounding environment around the Power Station.

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Press Releases

Press Release (Mar 25,2011)
Plant Status of Fukushima Daiichi Nuclear Power Station (as of 4:30 PM Mar 25th)

*new items are underlined

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-At approximately 10:50 am on March 24th, white fog-like steam arising from the roof part of the reactor building was observed.
-At approximately 11:30 am on March 24th, lights in the main control room was restored.
-<u>We had injected sea water into the reactor pressure vessel, but at 3:37 pm on March 25th, we have started to inject fresh water into it.</u>

Unit 2(Shut down)
-At approximately 6:00 am on March 15th, an abnormal noise began emanating from nearby Pressure Suppression Chamber and the pressure within this chamber decreased.
-At 6:20 pm on March 21st, white smoke was confirmed arising from the top of the reactor building. As of 7:11 am on March 22nd, smoke decreased to the level where we can hardly confirm
-We have been injecting sea water into the reactor pressure vessel.

Unit 3(Shut down)
-Reactor has been shut down. However, the explosive sound and white smoke were confirmed at 11:01am Mar 14th. It was assumed to be hydrogen explosion.
-At 8:30am on March 16th, fog like steam was confirmed arising from the reactor building.
-At approximately 6:15 am on March 17th the pressure of the Suppression Chamber has temporarily increased. We were preparing to implement a measurement to reduce the pressure of the reactor containment vessel (partial discharge of air containing radioactive material to outside) in order to fully secure safety. However, at present, it is not a situation to take a measure immediately to discharge air containing radioactive material to outside now. We will continue to monitor the status of the pressure of the reactor containment vessel.
-At approximately 4:00 pm, March 21st, light gray smoke was confirmed arising from the floor roof of the Unit 3 building. On March 22nd, the color of smoke changed to somewhat white and it is slowly dissipating.
-At approximately 10:45 pm on March 22nd, the light in the main control room was turned on.
-At around 4:20 pm on March 23rd, our staff confirmed light black smoke belching from the Unit 3 building. At approximately 11:30 pm on March 23rd and 4:50 am on March 24th, our employee found no signs of smoke.
-We have been injecting sea water into the reactor pressure vessel.

Unit 4 (outage due to regular inspection)
-Reactor has been shut down. However, at approximately 6 am on March 15th. We have confirmed the explosive sound and the sustained damage around the 5th floor rooftop area of the Nuclear Reactor Building.
-On March 15th and 16th, we respectively confirmed the outbreak of fire at the 4th floor of the northwestern part of the Nuclear Reactor Building. We immediately reported this matter to the fire department and the related authorities. TEPCO employees confirmed that each fire had already died down by itself.
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Unit 6 (outage due to regular inspection)
-Reactor has been shut down and the sufficient level of reactor coolant to ensure safety is maintained.

-We are working on receiving external power supply to Units 5 and 6. We completed the repair work on the emergency diesel generator (A).
-At 10:14 pm, March 19th, we started the Residual Heat Removal System Pump (B) of Unit 6 in order to cool the spent fuel pool.
-At this moment, we do not consider any reactor coolant leakage inside the reactor containment vessel happened.
-At 7:27 pm, March 20th, the reactor achieved reactor cold shutdown.

Today's work for cooling the spent fuel pools
-At :05 am, March 25th, we started injecting seawater into the fuel spent pool of Unit 4, using Fuel Pool Cooling and Filtering(clean up) system (FPC) and finished at 10:20 am. At 10:30 am, March 25th, we started injecting seawater into the spent fuel pool of Unit 2, using Fuel Pool Cooling and Filtering (clean up) system (FPC) and finished it at 0:19 pm of the same day.
-Spraying at the spent fuel pool of Unit 3 by Kawasaki City Fire Department was carried out from 1:28 pm to 4:00 pm on March 25th.
-We are considering further spraying at other units and others subject to the conditions of spent fuel pools.

Casualty
-2 workers of cooperative firm were injured at the occurrence of the earthquake, and were transported to the hospital on March 11th.
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-The radiation exposure of 1 TEPCO employee, who was working inside the reactor building, exceeded 100mSv and he was transported to the hospital on March 12th.
-2 TEPCO employees felt bad during their operation in the central control rooms of Unit 1 and 2 while wearing full masks, and were transferred to Fukushima Daini Nuclear Power Station for consultation with a medical advisor on March 13th.
-11 workers were injured and transported to Fukushima Daini Nuclear Power Station etc. after explosive sound and white smoke were confirmed around the Unit 3. One of the workers was transported to the FUKUSHIMA Medical University Hospital on March 14th.
-At approximately 10 pm on March 22nd, 1 worker who had been working on setting up a temporary power panel in the common pool was injured and transported to Fukushima Daini Nuclear Power Station where the industrial doctor is.
-At approximately 1 am on March 23rd, 1 worker who had been working on transporting a temporary power panel in the common pool was injured and transported to Fukushima Daini Nuclear Power Station where the industrial doctor is.
-On March 24th, it was confirmed that 3 workers from cooperative companies who were in charge of cable laying work in the 1st floor and the underground floor of turbine building were exposed to the radiation dose of more than 170 mSv. 2 of them were confirmed that their leg skin were contaminated. Although they were decontaminated, since it there were possibility of beta ray burn injury, they were transferred to Fukushima Medical University Hospital. The third worker was also transferred to Fukushima Medical University Hospital today (March 25). The 3 workers are now been transferred to National Institute of Radiological Sciences in Chiba Prefecture.
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-The national government has instructed evacuation for those local residents within 20km radius of the periphery and evacuation to inside for those residents from 20km to 30km radius of the periphery, because it's possible that radioactive materials are discharged.
-At approximately 10am on March 15th, we observed 400mSv/h at the inland side of the Unit 3 reactor building and 100mSv/h at the inland side of the Unit 4 reactor building.
-At around 10:37 am March 21st, water spraying to common spent fuel pool and finished at 3:30 pm (conducted by TEPCO).

-At around 3:37 pm, March 24th, electricity supply to common spent fuel pool has started from external power source. At around 6:05 pm, fuel pool cooling pump was started to cool the pool.
-We found no signs of abnormal situation for the casks by visual observation during the patrol activity. A detailed inspection is under preparation.
-At Units 5 and 6, in order to prevent hydrogen gas from accumulating within the buildings, we have made three holes on the roof of the reactor building for each unit.
-In total 12 fire engines are lent for the water spraying to the spent fuel pools and water injection to the nuclear reactors by various regional fire departments* as well as Tokyo Fire Department. Also, instruction regarding the setting and operation of large scale decontamination system was provided by Niigata City Fire Headquarter and Hamamatsu City Fire Headquarter.
*: Koriyama Fire Department, Iwaki Fire Brigade Headquarters, Fire Headquarters of Sukagawa District Wide Area Fire-fighting Association, Yonezawa City Fire Headquarters, Utsunomiya City Fire Headquarters, Fire Headquarters of Aizu-Wakamatsu wide area municipal association, Saitama City Fire Bureau, and Niigata City Fire Bureau.
-Until March 22nd, Units 1 through 6 were started to be energized from the external power source.
-We will continue to take all measures to ensure the safety and to continue monitoring the surrounding environment around the Power Station.

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Press Releases

Press Release (Mar 25,2011)
Plant Status of Fukushima Daini Nuclear Power Station (as of 3:00 pm March 25th)

[No update from the last release issued at 9:00 am, March 25th]

Unit Status

1
- Reactor cold shutdown, stable water level, offsite power is available.
- No reactor coolant is leaked to the reactor containment vessel.
- Maintain average water temperature at 100°C in the Pressure Suppression Chamber.

2
- Reactor cold shutdown, stable water level, offsite power is available.
- No reactor coolant is leaked to the reactor containment vessel.
- Maintain average water temperature at 100°C in the Pressure Suppression Chamber.

3
- Reactor cold shutdown, stable water level, offsite power is available.
- No reactor coolant is leaked to the reactor containment vessel.
- Maintain average water temperature at 100°C in the Pressure Suppression Chamber.

4
- Reactor cold shutdown, stable water level, offsite power is available.
- No reactor coolant is leaked to the reactor containment vessel.
- Maintain average water temperature at 100°C in the Pressure Suppression Chamber.

Other N.A.

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Press Releases

Press Release (Mar 25,2011)
Special Measures for the electricity bills for the customers who have suffered from the Tohoku-Chihou-Taiheiyo-Oki Earthquake (2011)

We sincerely express our best wish for all the customers who have suffered from the Tohoku-Chihou-Taiheiyo-Oki Earthquake ("Earthquake").

If requested from customers who suffered from the Earthquake in the areas where the Disaster Relief Act was applied, we will offer special measures for the electricity bills for such customers (previously announce on March 15th, 16th and 18th).

Further to the additional application of Disaster Relief Act to 4 municipalities in Chiba Prefectures, we have decided to expand areas to those we apply exceptional conditions of electricity supply (Special Measures for the customers who have seriously suffered from Tohoku-Chihou-Taiheiyo-Oki Earthquake) to General Supply Provisions, based on a proviso of Section I of Article 21 of Electricity Business Act., have applied to Ministry of Economy, Trade and Industry for and have acquired an additional approval. The contents are as follows.

‹Eligible Customers›
All the customers who have suffered from the Earthquake since March 11th in the areas shown below to which the Disaster Relief Act is applied in relation to the Earthquake and who applied for the special measures:
Ibaraki Prefecture; Mito city, Hitachi city, Tsuchiura city, Ishioka city, Ryugasaki city, Shimotsuma city, Joso city, Hitachiota city, Takahagi city, Kitaibaraki city, Kasama city, Toride city, Ushiku city, Tsukuba city, Hitachinaka city, Kashima city, Itako city, Hitachiomiya city, Kasumigaura city, Sakuragawa city, Kamisu city, Namegata city, Hokota city, Tsukubamirai city, Omitama city, Ibaraki town, Oarai town, Shirosato town, Tokai village, Daigo town, Ami town, Naka city, Miho village, Kawachi village, Chikusei city, Inashiki city, Tone town
Tochigi Prefecture; Utsunomiya city, Oyama city, Moka city, Otawara city, Yaita city, Nasukarasuyama city, Sakura city, Nasushiobara city, Mashiko town, Motegi town, Ichikai town, Haga town, Takanezawa town, Nasu town, Nakagawa town
Chiba Prefecture; Asahi city, Katori city, Yamatake city, Tsukumo town, Chiba city (Mihama ward), Narashino city, Abiko city and Urayasu city,
and other neighboring areas below.
Ibaraki Prefecture; Bando city, Moriya city, Yachiyo town, Yuuki city, Koga city
Tochigi Prefecture; Nikko city, Kanuma city, Shimotsuke city, Shioya town, Mibu town, Kaminokawa town, Tochigi city, Nogi town
Chiba Prefecture; Noda city, Kashiwa city, Choshi city, Tohnosyo town, Narita city, Yachimata city, Togane city, Tomisato city, Sosa city, Sakae town, Oamishirasato town, Shibayama town, Yokoshibahikari town, Kanzaki town, Tako town, Inzai city, Chiba city (Chuo ward, Hanamigawa ward, Inage ward), Ichikawa city, Funabashi city, Yachiyo city
Tokyo; Edogawa ward

‹Special Measures›
1. Deferring the due date for 1 month
As to the electricity bill for February 2011 (whose due date is March 11 or afterward), March 2011, and April 2011, the due date* is deferred for 1 month.
*The due date is 30 days after the next day of meter-reading.

2. Exemption from payment for the months of no electricity use
If you have been used no electricity since the occurrence of damage from the Earthquake, we do not charge any amount for the 6 month after the month when the damage of the Earthquake has risen.

3. Exemption from the payment for the construction
If you have been used no electricity, terminate the contract of electricity since the occurrence of damage from the Earthquake, and applied for a new electricity contract by the end of September, 2011, basically we do not charge any amount for the construction.

4. Exemption from the payment for temporary construction
If you applied for an contract of temporary electricity for the purpose of restore the damaged areas by the end of September, 2011, we do not charge any amount for the temporarily construction.

5. Exemption from payment of the basic fee for the broken facilities due to the Earthquake
If customers' electricity facilities partly broke down due to the Earthquake, we do not charge basic fees for the broken facilities unless the facilities become in service, by the end of September 2011.

6. Exemption from the construction to install electricity meters etcetera

If you apply for changing the position of an electricity meter or a service wire by the end of September 2011, basically we do not charge any amount for the first part of the construction.

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Press Releases

Press Release (Mar 25,2011)
The improvement of implementation of rolling blackout (introduction of subdivision of each group)

TEPCO has been implementing the rolling blackout since March 14 due to the tightening power supply-demand balance caused by the Tohoku-Taiheiyou-Oki Earthquake. We sincerely regret causing anxiety and inconvenience to our customers and the society. We appreciate your cooperation in conserving electricity consumption.

As previously informed on March 22nd, we have recently divided the area subject to the rolling blackout into 5 groups and announced the schedule of blackout based on such groups. Hereafter from March 26th, we will ramify each existing group further into 5 sub groups based on prefecture.

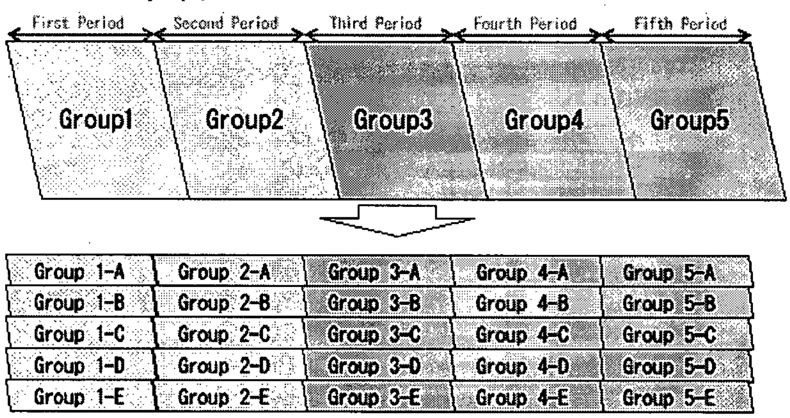
This is to enable our customers to predict the blackout more accurately as the blackout is currently implemented within the group entirely and partially depending on the actual demand-supply balance.

This improvement is to enable our customers to figure out the areas of rolling blackout more easily, therefore the concept of the rolling blackout, the existing groups and the period of blackout will remain unchanged.

Sub groups take turn for the blackout so that the unequal treatment among customers will be avoided.

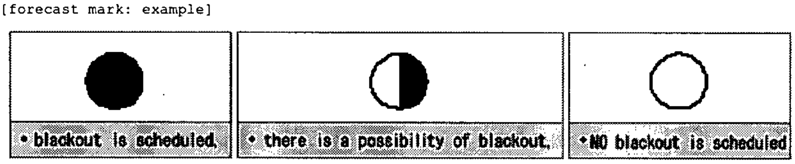
Please refer to the attachment on our website for the detailed region of the groups.

[Ramification of groups]



TEPCO plans to introduce additional measures to improve our operation such as the following example for the better announcement of blackout forecast. (actual introduction will be determined after successfully installing the group ramification.)

[forecast mark: example]



TEPCO will continue to do its utmost to secure the stable supply of electricity. We apology for the inconvenience caused and appreciate your continuous cooperation in conservation of electricity and your understanding for the rolling blackout.

attachment1:Datail of rollig blackout area for each group(PDF 46.6KB)
attachment2:Rolling blackout which segmentalizes areas(image)(PDF 69.7KB)

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Press Releases

Press Release (Mar 25,2011)
Power Supply and Demand Outlook in This Summer and Measures

1.Supply and Demand Situation and its Outlook
Because many of our nuclear power stations and thermal power stations are severely damaged and forced to shut down due to the Tohoku-Chihou-Taiheiyo-Oki Earthquake, TEPCO has made every endeavor to ensure a stable power supply now. The power supply capacity for this summer in TEPCO is estimated at around 46.50 million kW as of this moment.
In the meantime, given the prospect for influence of the earthquake and energy-saving effect, the peak demand for this summer in TEPCO is expected to be around 55.00 million kW (daily peak at generation end), which is 5.00 million kW less than that in the same season of last year. (The estimation of the average peak demand in weekday is estimated at around 48.00 million kW.)
For this reason, since it is expected that the power supply capacity will be much less than the peak demand in this summer, TEPCO will concentrate our efforts in strengthening the capacity for power supply, and will also vigorously pursue demand-side measures for further energy saving.

<Power Supply and Demand Outlook in this summer> (Unit: million kW)

	March 24, 2011 (past record)	End of July, 2011
Demand (Daily peak at generation end)	37.29	55.00
Supply Capacity	36.50 (38.50)	46.50 (※)
Reserve Capacity	▲ 0.50 (1.50)	▲ 8.50 (※)

Figure in parenthesis includes pumped hydropower generation.

※ Power supply capacity of pumped hydropower generation varies with trend in power supply and demand, thus, TEPCO will continuously monitor and examine it.

2.Additional Power Supply Capacity (included in the supply capacity as of end of July, 2011 in the above)
(1)Recovery from shutdown caused by the earthquake disaster [7.60 million kW]
Unit No.1 to No. 6 at Kashima Thermal Power Station, Unit No.1 at Hitachinaka Thermal Power Station, etc.
(2)Restart of operation of thermal power generation units under long-term scheduled shutdown [0.90 million kW]
Unit No.1 to No. 4 at Yokosuka Thermal Power Station
(3)Recovery from periodical inspection [3.70 million kW]
Unit No.1-1 at Shinagawa Thermal Power Station, Unit No.7-2 of Yokohama Thermal Power Station, etc.
(4)Installation of gas turbine, etc. [0.40 million kW]
(5)Others [▲2.60 million kW]
Decrease of output from existing thermal power stations in summer (due to increase of ambient temperature), etc.

TEPCO will continuously consider additional measure for further strengthening the power supply capacity.

3.Demand-Side Measures
While asking all of our customers to cooperate in energy saving, TEPCO will continue to improve power supply and demand situation, utilizing supply and demand adjustment contract.

We sincerely regret causing anxiety and inconvenience to our customers, and appreciate your continuous cooperation in conserving electricity consumption.

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Press Releases

Press Release (Mar 25,2011)
Status of TEPCO's Facilities and its services after Tohoku-Taiheiyou-Oki Earthquake (as of 3:00PM)

Due to the Tohoku-Taiheiyou-Oki Earthquake which occurred on March 11th 2011, TEPCO's facilities including our nuclear power stations have been severely damaged. We deeply apologize for the anxiety and inconvenience caused.

Below is the status of TEPCO's major facilities.
new items are underlined

[Nuclear Power Station]
Fukushima Daiichi Nuclear Power Station:
Units 1 to 3: shutdown due to earthquake
(Units 4 to 6: outage due to regular inspection)

* The national government has instructed to evacuate for those local residents within 20km radius of the site periphery and to remain indoors for those local residents between 20km and 30km radius of the site periphery.

*Off-site power was connected to Unit 1 to 6.

*Unit 1
The explosive sound and white smoke was confirmed near Unit 1 when the big quake occurred at 3:36pm, March 12th.
We have started injection of sea water at 8:20 pm, March 12th, and then boric acid which absorbs neutron into the reactor afterwards.

At approximately 2:30 am, March 23rd, we have started the injection of sea water into the reactor from feed water system.

At approximately 10:50 on March 24th, white smoke was confirmed arising from the top of the reactor building.

At approximately 11:30 am, March 24th, lights in the main control room were restored.

*Unit 2
At 1:25 pm, March 14th, since the Reactor Core Isolation Cooling System has failed, it was determined that a specific incident stipulated in Clause 1, Article 15 of Act on Special Measures Concerning Nuclear Emergency Preparedness occurred (failure of reactor cooling function).

At 5:17 pm, March 14th, while the water level in the reactor reached the top of the fuel rod, we have restarted the water injection with the valve operation.

At approximately 6:14 am, March 15th, the abnormal sound was confirmed near the suppression chamber and the pressure inside the chamber decreased afterwards. It was determined that there is a possibility that something happened in the suppression chamber. While sea water injection to the reactor continued, TEPCO employees and workers from other companies not in charge of injection work started tentative evacuation to a safe location. Sea water injection to the reactor continued.

On March 18th, power was delivered up to substation for backup power through offsite transmission line. We completed laying cable further to unit receiving facility in the building, and at 3:46 pm, March 20th the load-side power panel of the receiving facility started to be energized.

From 3: 05 pm to 5: 20 pm on March 20th, 40 tons of seawater was injected into Unit 2 by TEPCO employees.

At 6:20 on March 21st, white smoke was confirmed arising from the top of the reactor building. As of 7:11 am on March 22nd, smoke decreased to the level where we can hardly confirm.

From around 4 pm to 5 pm on March 22nd, approximately 18 tons of sea water was injected into the spent fuel pool by TEPCO employees.

From 10:30 am on March 25th, sea water injection through Fuel Pool Cooling and Filtering System was initiated.

*Unit 3
At 6:50 am, March 14th, while water injection to the reactor was under operation, the pressure in the reactor containment vessel increased to 530 kPa. As a result, at 7:44 am, it was determined that a specific incident stipulated in article 15, clause 1 occurred (abnormal increase of the pressure of reactor containment vessel). Afterwards, the pressure

has gradually decreased (as of 9:05 am, 490 kPa).

At approximately 11:01 am, March 14th, an explosion followed by white smoke occurred near Unit 3. 4 TEPCO employees and 3 workers from other companies (all of them are conscious) have sustained injuries and they were already taken to the hospital by ambulances.
As the temperature of water in the spent fuel pool rose, spraying water by helicopters with the support of the Self Defense Force was considered, however the operation on March 16th was cancelled.

At 6:15 am, March 17th, the pressure of the Suppression Chamber temporarily increased, but currently it is stable in a certain range.
On March 20th, we were preparing to implement a measurement to reduce the pressure of the reactor containment vessel (partial discharge of air containing radioactive material to outside) in order to fully secure safety. However, at present, it is not a situation to take a measure immediately to discharge air containing radioactive material to outside.
We will continue to monitor the status of the pressure of the reactor containment vessel. Monitoring will be continued.

In order to cool spent fuel pool, water was sprayed by helicopters on March 17th with the cooperation of Self-Defense Forces.

At approximately past 7:00 pm, March 17th, Self-Defense Forces and the police had started spraying water by water cannon trucks upon our request for the cooperation. At 8:09 pm, March 17th, they had finished the operation.

At 2:00 pm, March 18th, spraying water by fire engines was started with the cooperation of Self-Defense Forces and the United States Armed Forces. At 2:45 pm, March 18th, they had finished the operation.

At approximately 0:30 am, March 19th, spraying water was started with the cooperation of Fire Rescue Task Forces of Tokyo Fire Department started spraying water. At approximately 1:10 am, March 19th, they finished the operation. They resumed spraying water at 2:10 pm. At approximately 3:40 am, March 20th, they finished the operation.

At approximately 9:30 pm, March 20th, spraying water was started with the cooperation of Fire Rescue Task Forces of Tokyo Fire Department.
At approximately 3:58 am, March 21th, they finished the operation.

At approximately 3:55 pm, March 21st, light gray smoke was confirmed arising from the southeast side of the 5th floor roof of the Unit 3 building, and the situation was reported to the fire department at approximately 4:21 pm. The parameters of reactor pressure vessel, reactor containment vessel, and monitored environmental data remained at the same level. However, employees working around Unit 3 evacuated to a safe location. It is observed the smoke has been decreasing. On March 22nd, the color of smoke changed to somewhat white and it is slowly dissipating.

At approximately 3:10 pm on March 22nd, water discharge into Unit 3 by Tokyo Fire Department's Hyper Rescue and Osaka City Fire Department was conducted and completed at approximately 4:00 PM on the same day.

At approximately 10:45 pm on March 22nd, lights in the main operation room were restored.
At 11:00 am on March 23rd, the injection of sea water to spent fuel pool was conducted, and finished approximately at 1:20 pm on the same day.

At 4:20 pm on March 23rd, light gray smoke was observed belching from Unit 3 building. The situation was reported to the fire department at 4:25 pm on March 23rd.
The parameters of the reactor, the reactor containment vessel of Unit 3, and monitored figures around the site's immediate surroundings remained stable without significant change. To be safe, workers in the main control room of Unit 3 and around Unit 3 evacuated to a safe location.

At approximately 11:30 pm on March 23rd and 4:50 am on March 24th, TEPCO employees confirmed the smoke has disappeared. Accordingly, workers evacuation was lifted.

From approximately 5:35 am on March 24th, sea water injection through Fuel Pool Cooling and Filtering System was initiated and finished at approximately 4:05 pm on the same day.

*Unit 4
At approximately 6:00 am, March 15th, an explosive sound was heard and the damage in the 5th floor roof of Unit 4 reactor building was confirmed. At 9:38 am, the fire near the north-west part of 4th floor of Unit 4 reactor building was confirmed. At approximately 11:00 am, TEPCO employees confirmed that the fire was off.

At approximately 5:45 am on March 16th, a TEPCO employee discovered a fire at the northwest corner of the Nuclear Reactor Building. TEPCO immediately reported this incident to the fire department and the local government and proceeded with the extinction of fire.
At approximately 6:15 am, TEPCO staff confirmed at the site that there are no signs of fire.

At approximately 8:21 am on March 20th, spraying water by fire engines was started with the cooperation of Self-Defense Forces and they finished the operation at approximately 9:40 am. At approximately 6:45 pm spraying water was started by Self-Defenses' water cannon trucks and finished at approximately 7:45 pm.

At approximately 6:30 am, March 21st, spraying water by fire engines was started with the cooperation of Self-Defense Forces and the United States Armed Forces. At approximately 8:40 am, March 21, they had finished the operation.
On March 21st, cabling has been completed from temporary substation to the main power center.

From approximately 5:20 pm on March 22nd, spraying water from the concrete pumping vehicle was conducted and ended at approximately 8:30 pm on the same day.

From approximately 10:00 am on March 23rd, spraying water from the concrete pumping vehicle was conducted and ended at approximately 1:00 pm on the same day.

From approximately 2:35 pm on March 24th, spraying water by the concrete pumping vehicle was conducted and ended at approximately 5:30 pm on the same day.

From 6:05 am on March 25th, seawater injection through Fuel Pool Cooling and Filtering System was initiated and finished at approximately 10:20 am on the same day.

*Unit 5 and 6
At 5 am on March 19th, we started the Residual Heat Removal System Pump (C) of Unit 5 in order to cool the spent fuel pool. At 10:14 pm, we started the Residual Heat Removal System Pump (B) of Unit 6 in order to cool the spent fuel pool.

Unit 5 has been in reactor cold shutdown since 2:30 pm on March 20th.
Unit 6 has been in reactor cold shutdown since 7:27 pm on March 20th.

At Units 5 and 6, in order to prevent hydrogen gas from accumulating within the buildings, we have made three holes on the roof of the reactor building for each unit

At approximately 5:24 pm on March 23rd, the temporary Residual Heat Removal System Seawater Pump automatically stopped when its power source was switched. We plan to repair the pump while maintaining the appropriate the water level and the temperature in the reactor. At around 4:14 pm, March 24th, we started replaced pump and at around 4:35 pm, cooling of reactor has restarted.

*On March 18th, regarding the spent fuel in the common spent fuel pool, we have confirmed that the water level of the pool is secured. At around 10:37 am March 21st, water spraying to common spent fuel pool and finished at 3:30 pm. At around 6:05 pm, fuel pool cooling pump was started to cool the pool.
*common spent fuel pool: a spent fuel pool for common use set in a separate building in a plant site in order to preserve spent fuel which are transferred from the spent fuel pool in each Unit building.

*On March 17th, we patrolled buildings for dry casks and found no signs of abnormal situation for the casks by visual observation. A detailed inspection is under preparation.
*dry cask: a measure to store spent fuel in a dry storage casks in storages. Fukushima Daiichi Nuclear Power Station started to utilize the measure from August 1995.

* In total 13 fire engines are lent for spraying water to the spent fuel pools and water injection to the nuclear reactors by various regional fire departments* as well as Tokyo Fire Department. Also, instruction regarding the setting and operation of large scale decontamination system was provided.

* On March 24, 2011, it was confirmed that 3 workers from cooperative companies who were in charge of cable laying work in the 1st floor and the underground floor of turbine building were exposed to the radiation dose of more than 170mSv. 2 of them were confirmed that their leg skins were contaminated. Although they were decontaminated by laundering, they were transferred to Fukushima Medical University hospital because there is possibility that they get a burn injury by beta ray. On March 25th, remaining worker was also transferred to Fukushima Medical University hospital. All 3 workers are now being transferred to National Institute of Radiological Sciences in Chiba Prefecture. We will assess radiation dose of 2 worker's leg skin by beta ray. We thoroughly instruct our employees and workers of cooperative companies to recognize APD alarm and evacuate when the alarm rings. We will explain this event, together with appropriate measures to be taken, to the government and to people concerned in order to fully secure the safety in relation to radiation dose management and operations associated with radiation exposure.

* On March 21st, 23rd and 24th, we detected cobalt, iodine, cesium and tellurium from the seawater around discharge canal of Unit 1, 2, 3 and 4.

* On March 21st, 23rd and 24th, we detected iodine, cesium and tellurium in the air collected at the site of Fukushima Daiichi Nuclear Power Station.

*We will continuously endeavor to securing safety, and monitoring of the surrounding environment.

Fukushima Daini Nuclear Power Station:
Units 1 to 4: shutdown due to earthquake
* The national government has instructed evacuation for those local residents within 10km radius of the periphery.

* In order to achieve cold shutdown, reactor cooling function was restored and cooling of reactors was conducted. As a result, all reactors achieved cold shutdown: Unit 1 at 5:00 pm, March 14th, Unit 2 at 6:00 pm, March 14th, Unit 3 at 0:15 pm, March 12th, Unit 4 at 7:15 am, March 16th.

*Since March 12th, we had been preparing measures for reducing the pressure of reactor containment vessels (partial discharge of air containing radioactive materials to outside), but on March 17th, we released such preparation in all Units.

*(Unit 1)
As it is confirmed that the temperature of the Emergency Equipment Cooling Water System *1 has increased, at 3:20 pm, March 15th, we

stopped the Residual Heat Removal System (B) for the inspection. Subsequently, failure was detected in the power supply facility associated with the pumps of the Emergency Equipment Cooling Water System. At 4:25 pm, March 15th, after replacing the power facility, the pumps and the Residual Heat Removal System (B) have been reactivated.

*(Unit 4)
As it is confirmed that the pressure at the outlet of the pumps of the Emergency Equipment Cooling Water System*1 has been decreased, at 8:05 pm, March 15th, we stopped the Residual Heat Removal System (B) for the inspection. Subsequently, failure was detected in the power supply facility associated with the pumps of the Emergency Equipment Cooling Water System. At 9:25 pm, March 15th, after replacing the relevant facility, the pumps and the Residual Heat Removal System (B) have been reactivated.

*1:emergency water system in which cooling water (pure water) circulates which exchanged the heat with sea water in order to cool down bearing pumps and/or heat exchangers etc.

Kashiwazaki Kariwa Nuclear Power Station:
Units 1, 5, 6, 7: normal operation
(Units 2 to 4: outage due to regular inspection)

[Thermal Power Station]
Hirono Thermal Power Station Units 2 and 4: shutdown due to earthquake
Hitachinaka Thermal Power Station Unit 1: shutdown due to earthquake
Kashima Thermal Power Station Units 2, 3, 5, 6: shutdown due to earthquake

[Hydro Power Station]
* All the stations have been restored.
(Facilities damaged by the earthquake are now properly under consideration)

[Transmission System, etc.]
All substation failed due to the earthquake have been restored.

[Blackout in TEPCO's Service Area]
All the blackouts are resolved.

[Supply and Demand Status within TEPCO's Service Area to Secure Stable Power Supply]
Backup supply from Shinshinano Conversion Station: 600MW
Backup supply from Sakuma Conversion Station: 300MW
Backup supply from Higashi Shimizu Conversion Station: 100MW
Backup supply from Hokkaido-Honshu Interconnection Facilities: 600MW

Considering the critical balance of our power supply capacity and expected power demand forward, in order to avoid unexpected blackout, TEPCO has been implementing rolling blackout (planned blackout alternates from one area to another) since Mar 14th. We will make our utmost to secure the stable power supply as early as possible.
For customers who will be subject to rolling blackout, please be prepared for the announced blackout periods. Also for customers who are not subject to blackouts, TEPCO appreciates your continuous cooperation in reducing electricity usage by avoiding using unnecessary lighting and electrical equipment.

[Others]
Please do NOT touch cut-off electric wires.
In order to prevent fire, please make sure to switch off the electric appliances such as hair driers when you leave your house.
For the customer who has in-house power generation, please secure fuel for generator.

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Press Releases

Press Release (Mar 25,2011)
Detection of radioactive materials from the seawater around the discharge canal of Fukushima Daiichi Nuclear Power Station(5th release)

On March 21st 2011, radioactive materials were detected from the seawater around the discharge canal (south) of Fukushima Daiichi Nuclear Power Station which was damaged by the 2011 Tohoku-Taiheiyou-Oki Earthquake. This is the result of the sampling survey of radioactive materials in the seawater which was implemented as a part of monitoring activity of surrounding environment. We had informed the result to Nuclear and Industrial Safety Agency (NISA) and Fukushima prefecture.
(previously annouced)

On March 24th 2011, we had conducted re-sampling survey to examine the effect of radioactive materials in the seawater. We had informed the result to Nuclear and Industrial Safety Agency (NISA) and the government of Fukushima Prefecture, because radioactive materials were detected as shown in the attachment.

We will continue to conduct same kind of sampling survey.

attachment1:The result of the nuclide analysis of the seawater (Around the discharge canal (south) of Fukushima Daiichi Nuclear Power Station)(PDF 34.1KB)
attachment2:The result of the nuclide analysis of the seawater (Around the discharge canal (north) of Units 5 and 6 Fukushima Daiichi Nuclear Power Station) (PDF 34.0KB)
attachment3:The result of the nuclide analysis of the seawater (Around the discharge canal (north) of Units 3 and 4 of Fukushima Daini Nuclear Power Station) (PDF 34.0KB)
attachment4:The result of the nuclide analysis of the seawater (Around Iwasawa Coast) (PDF 33.9KB)
attachment5:Radioactivity Density of Seawater(PDF 72.8KB)

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Press Releases

Press Release (Mar 25,2011)
Plant Status of Fukushima Daiichi Nuclear Power Station (as of 0:30 PM Mar 25th)

*new items are underlined

All 6 units of Fukushima Daiichi Nuclear Power Station have been shut down.

Unit 1(Shut down)
- Reactor has been shut down. However, the explosive sound and white smoke were confirmed after the big quake occurred at 3:36 pm Mar 12th. It was assumed to be hydrogen explosion.
- At approximately 2:30 am on March 23rd, seawater was started to be injected to the nuclear reactor through the feed water system.
- At approximately 10:50 am on March 24th, white fog-like steam arising from the roof part of the reactor building was observed.
- At approximately 11:30 am on March 24th, lights in the main control room was restored.
- We have been injecting sea water into the reactor pressure vessel.

Unit 2(Shut down)
- At approximately 6:00 am on March 15th, an abnormal noise began emanating from nearby Pressure Suppression Chamber and the pressure within this chamber decreased.
- At 6:20 pm on March 21st, white smoke was confirmed arising from the top of the reactor building. As of 7:11 am on March 22nd, smoke decreased to the level where we can hardly confirm
- We have been injecting sea water into the reactor pressure vessel.

Unit 3(Shut down)
- Reactor has been shut down. However, the explosive sound and white smoke were confirmed at 11:01am Mar 14th. It was assumed to be hydrogen explosion.
- At 8:30am on March 16th, fog like steam was confirmed arising from the reactor building.
- At approximately 6:15 am on March 17th the pressure of the Suppression Chamber has temporarily increased. We were preparing to implement a measurement to reduce the pressure of the reactor containment vessel (partial discharge of air containing radioactive material to outside) in order to fully secure safety. However, at present, it is not a situation to take a measure immediately to discharge air containing radioactive material to outside now. We will continue to monitor the status of the pressure of the reactor containment vessel.
- At approximately 4:00 pm, March 21st, light gray smoke was confirmed arising from the floor roof of the Unit 3 building. On March 22nd, the color of smoke changed to somewhat white and it is slowly dissipating.
- At approximately 10:45 pm on March 22nd, the light in the main control room was turned on.
- At around 4:20 pm on March 23rd, our staff confirmed light black smoke belching from the Unit 3 building. At approximately 11:30 pm on March 23rd and 4:50 am on March 24th, our employee found no signs of smoke.
- We have been injecting sea water into the reactor pressure vessel.

Unit 4 (outage due to regular inspection)
- Reactor has been shut down. However, at approximately 6 am on March 15th. We have confirmed the explosive sound and the sustained damage around the 5th floor rooftop area of the Nuclear Reactor Building.
- On March 15th and 16th, we respectively confirmed the outbreak of fire at the 4th floor of the northwestern part of the Nuclear Reactor Building. We immediately reported this matter to the fire department and the related authorities. TEPCO employees confirmed that each fire had already died down by itself.
- At this moment, we do not consider any reactor coolant leakage inside the reactor containment vessel happened.

Unit 5 (outage due to regular inspection)
- Reactor has been shut down and the sufficient level of reactor coolant to ensure safety is maintained.
- At 5 am, March 19th, we started the Residual Heat Removal System Pump (C) in order to cool the spent fuel pool.
- At this moment, we do not consider any reactor coolant leakage inside the reactor containment vessel happened.
- At 2:30 pm, March 20th, the reactor achieved reactor cold shutdown. At around 5:24 pm on March 23rd, when we switched the temporary Residual Heat Removal System Seawater Pump, it has stopped automatically. At around 4:14 pm, March 24th, we started replaced pump and at around 4:35 pm, cooling of reactor has restarted.

Unit 6 (outage due to regular inspection)
- Reactor has been shut down and the sufficient level of reactor coolant

to ensure safety is maintained.
- We are working on receiving external power supply to Units 5 and 6. We completed the repair work on the emergency diesel generator (A).
- At 10:14 pm, March 19th, we started the Residual Heat Removal System Pump (B) of Unit 6 in order to cool the spent fuel pool.
- At this moment, we do not consider any reactor coolant leakage inside the reactor containment vessel happened.
- At 7:27 pm, March 20th, the reactor achieved reactor cold shutdown.

Today's work for cooling the spent fuel pools
- At approximately 6:05 am, March 25th, we started injecting seawater into the fuel spent pool of Unit 4, using Fuel Pool Cooling and Filtering (clean up) system (FPC) and finished at 10:20 am. At approximately 10:30 am, March 25th, we started injecting seawater into the fuel spent pool of Unit 2, using Fuel Pool.Cooling and Filtering(clean up) system (FPC).
- We are considering further spraying at other units and others subject to the conditions of spent fuel pools.

Casualty
- 2 workers of cooperative firm were injured at the occurrence of the earthquake, and were transported to the hospital on March 11th.
- 4 workers were injured and transported to the hospital after explosive sound and white smoke were confirmed around the Unit 1on March 11th.
- Presence of 2 TEPCO employees at the site is not confirmed on March 11th.
- 1 TEPCO employee who was not able to stand by his own holding left chest with his hand, was transported to the hospital by an ambulance on March 12th.
- 1 subcontract worker at the key earthquake-proof building was unconscious and transported to the hospital by an ambulance on March 12th.
- The radiation exposure of 1 TEPCO employee, who was working inside the reactor building, exceeded 100mSv and he was transported to the hospital on March 12th.
- 2 TEPCO employees felt bad during their operation in the central control rooms of Unit 1 and 2 while wearing full masks, and were transferred to Fukushima Daini Nuclear Power Station for consultation with a medical advisor on March 13th.
- 11 workers were injured and transported to Fukushima Daini Nuclear Power Station etc. after explosive sound and white smoke were confirmed around the Unit 3. One of the workers was transported to the FUKUSHIMA Medical University Hospital on March 14th.
- At approximately 10 pm on March 22nd, 1 worker who had been working on setting up a temporary power panel in the common pool was injured and transported to Fukushima Daini Nuclear Power Station where the industrial doctor is.
- At approximately 1 am on March 23rd, 1 worker who had been working on transporting a temporary power panel in the common pool was injured and transported to Fukushima Daini Nuclear Power Station where the industrial doctor is.
- On March 24th, it was confirmed that 3 workers from cooperative companies who were in charge of cable laying work in the 1st floor and the underground floor of turbine building were exposed to the radiation dose of more than 170 mSv. 2 of them were confirmed that their leg skin were contaminated. Although they were decontaminated, since it is judged that there is possibility of beta ray burn injury, they were transferred to Fukushima Medical University Hospital. The third person also transferred to National Institute of Radiological Sciences in Chiba Prefecture today (March 25). After medical examination at Fukushima Medical University Hospital, they will be transferred to National Institute of Radiological Sciences in Chiba Prefecture today (March 25). Regarding this event, Fukushima Labour Bureau gave TEPCO verbal instructions.After writing up lessons and future measures, taking comments of Fukushima Labour Bureau to heart, TEPCO will report related government ministries and agencies to make assurance doubly sure thoroughness of radiation control and exposure to radiation.
Before today's restoration work, we will make notification to the concerned parties and continue to take all possible measures to future management.

Others
- We measured radioactive materials (iodine etc.) inside of the nuclear power station area (outdoor) by monitoring car and confirmed that radioactive materials level is getting higher than ordinary level. As listed below, we have determined that specific incidents stipulated in article 15, clause 1 of Act on Special Measures Concerning Nuclear Emergency Preparedness (Abnormal increase in radiation dose measured at site boundary) have occurred.
  - ·Determined at 4:17 pm Mar 12th (Around Monitoring Post 4)
  - ·Determined at 8:56 am Mar 13th (Around Monitoring Post 4)
  - ·Determined at 2:15 pm Mar 13th (Around Monitoring Post 4)
  - ·Determined at 3:50 am Mar 14th (Around Monitoring Post 6)
  - ·Determined at 4:15 am Mar 14th (Around Monitoring Post 2)
  - ·Determined at 9:27 am Mar 14th (Around Monitoring Post 3)
  - ·Determined at 9:37 pm Mar 14th (Around main entrance)
  - ·Determined at 6:51 am Mar 15th (Around main entrance)
  - ·Determined at 8:11 am Mar 15th (Around main entrance)
  - ·Determined at 4:17 pm Mar 15th (Around main entrance)
  - ·Determined at 11:05 pm Mar 15th (Around main entrance)
  - ·Determined at 8:58 am Mar 19th (Around MP5)

From now on, if the measured figure fluctuates and goes above and below 500 micro Sv/h, we deem that as the continuous same event and will not regard that as a new specific incidents stipulated in article 15, clause 1 of the Act on Special Measures Concerning Nuclear Emergency Preparedness (Abnormal increase in radiation dose measured at site boundary) has occurred. In the interim, if we measure a manifestly abnormal figure and it is evident that the event is not the continuous same event, we will determine and notify.

- The national government has instructed evacuation for those local residents within 20km radius of the periphery and evacuation to inside for those residents from 20km to 30km radius of the periphery, because it's possible that radioactive materials are discharged.
- At approximately 10am on March 15th, we observed 400mSv/h at the inland side of the Unit 3 reactor building and 100mSv/h at the inland side of

the Unit 4 reactor building.

- At around 10:37 am March 21st, water spraying to common spent fuel pool and finished at 3:30 pm (conducted by TEPCO).
- At around 3:37 pm, March 24th, electricity supply to common spent fuel pool has started from external power source. At around 6:05 pm, fuel pool cooling pump was started to cool the pool.
- We found no signs of abnormal situation for the casks by visual observation during the patrol activity. A detailed inspection is under preparation.
- At Units 5 and 6, in order to prevent hydrogen gas from accumulating within the buildings, we have made three holes on the roof of the reactor building for each unit.
- In total 12 fire engines are lent for the water spraying to the spent fuel pools and water injection to the nuclear reactors by various regional fire departments* as well as Tokyo Fire Department. Also, instruction regarding the setting and operation of large scale decontamination system was provided by Niigata City Fire Headquarter and Hamamatsu City Fire Headquarter.

*: Koriyama Fire Department, Iwaki Fire Brigade Headquarters, Fire Headquarters of Sukagawa District Wide Area Fire-fighting Association, Yonezawa City Fire Headquarters, Utsunomiya City Fire Headquarters, Fire Headquarters of Aizu-Wakamatsu wide area municipal association, Saitama City Fire Bureau, and Niigata City Fire Bureau.

- Until March 22nd, Units 1 through 6 were started to be energized from the external power source.
- We will continue to take all measures to ensure the safety and to continue monitoring the surrounding environment around the Power Station.

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GI-199 Safety Risk Assessment Background Information

Talking Points

- The NRC's GI-199 safety risk assessment was completed in August 2010. It is publically available. http://pbadupws.nrc.gov/docs/ML1002/ML100270582.html
- The purpose of the GI-199 safety risk assessment was to perform a conservative, screening-level assessment to determine whether additional seismic safety review was needed for nuclear plants in the Central and Eastern United States (CEUS).
- Updates to seismic data and models indicate increased seismic hazard estimates for some operating nuclear power plant sites in CEUS.
- The results of this assessment are not final estimates of plant-specific seismic risk.
- The NRC does not rank plants by seismic risk.
- The NRC continues to conclude that all plants have adequate seismic safety margin and continue to operate safely.

Q&A

1. What is GI-199?

Generic Issue 199 investigates the safety implications of updated earthquake-related data and models. These updated data and models suggest that the probability for earthquake ground shaking above the seismic design basis for some nuclear power plants in the Central and Eastern United States (CEUS) is still low, but larger than previous estimates.

2. Are the NRC reviews/analyses based on 2004 seismic data from USGS? Is there other updated earthquake information and modeling?

In 2004, preliminary results from United States Geological Survey (USGS) work indicated an increase in the probability of exceeding the Safe Shutdown Earthquake (SSE) for 29 nuclear power sites in the CEUS. The probability increases identified by USGS were primarily due to recent developments in the modeling of earthquake ground motion in the CEUS. USGS published updated data in 2008, which is what was used in the NRC's GI-199 safety risk assessment.

3. The NRC report talks about "screening reviews." What does that mean?

In December 2007, NRC completed a limited scope screening analysis, which is used by the NRC staff to decide whether an issue requires additional review. The screening compared the new seismic data with earlier seismic evaluations conducted by the NRC staff. The limited scope screening analysis concluded that seismic designs of plants in the CEUS continue to provide adequate safety margins. However, because the NRC recognized that this new seismic data could reduce available safety margins, the NRC staff conducted further analysis by performing NRC's GI-199 safety risk assessment.

4. Does the GI-199 study examine all nuclear power plants?

The GI-199 safety risk assessment is limited to all plants in the CEUS. Although plants at the Columbia, Diablo Canyon, Palo Verde, and San Onofre sites are not included in the GI-199 safety risk assessment, the NRC Information Notice on GI-199 is addressed to all operating power plants in the U.S. (as well as all independent spent fuel storage installation licensees). The NRC will also consider inclusion of operating reactors in the Western U.S. in its future generic communication information requests.

5. Does the GI-199 study consider spent fuel pools?

Spent fuel pools (SFPs) were not specifically evaluated as part of GI-199 safety risk assessment. However, based on their design characteristics, the NRC concludes that SFPs remain safe. SFPs are constructed of reinforced concrete, several feet thick, with a stainless steel liner to prevent leakage and maintain water quality. SFPs are inherently structurally-rugged and are designed to the same seismic requirements as the nuclear plant.

6. Is the NRC performing any inspections for GI-199?

The NRC is not currently performing inspections that are directly related to GI-199. However, on March 23, 2011, the NRC directed its inspectors to assess the actions taken by nuclear plant licensees in response to events at the Fukushima Daiichi nuclear station in Japan. NRC inspectors were given direction in the form of a Temporary Instruction (TI), which is one of the processes that NRC inspectors use to perform inspections following specific events. Using TI 2515/183, NRC inspectors will verify that important equipment and materials are adequate and properly staged, tested, and maintained in order to respond to a severe earthquake, flooding event, or loss of all electrical power. This inspection is an additional NRC activity. It does not replace any of the routine reviews that NRC inspectors perform daily at every nuclear power plant. Inspection activities for TI 2515/183 are expected to be completed by April 29, 2011. The results will be issued in a publically available inspection report by May 13, 2011

7. What happens next with GI-199?

The NRC is developing a Generic Letter (GL) to request information from all nuclear plants in the CEUS, which is a total of 96 operating reactors. The GL is scheduled to be issued for public comment in the late spring 2011. In addition its internal review processes, the NRC will also present the GL to the Advisory Committee on Reactor Safeguards (ACRS) both before and after the public comment period. The GL should be issued by end of 2011, near the time when new seismic models become available. These new seismic models are being developed by NRC, DOE, and EPRI. In addition the USGS will review the model. Information requested in the GL will likely require 3 to 6 months for nuclear plant licensees to prepare. NRC's review will be on-going as information is collected. Based on NRC's review of that information, a determination will be made regarding required changes at nuclear plants.

8. What if the GI-199 is wrong and an unexpected earthquake happens?

Following the events of September 11, 2001, NRC required all nuclear plant licensees to take additional steps to protect public health and safety in the event of a large fire or explosion. If needed, these additional steps could also be used during natural phenomena such as earthquakes, tornadoes, floods, and tsunami. In general, these additional steps are plans, procedures, and pre-staged equipment whose intent is to minimize the effects of adverse events. In accordance with NRC regulations, all nuclear power plants are required to maintain or restore cooling for the reactor core, containment building, and spent fuel pool under the circumstances associated with a large fire or explosion. These requirements include using existing or readily available equipment and personnel, having strategies for firefighting, operations to minimize fuel damage, and actions to minimize radiological release to the environment.

Date: March 25, 2011

Lee, Richard

From: Basu, Sudhamay
Sent: Friday, March 25, 2011 5:14 PM
To: Lee, Richard
Subject: Fukushima Unit 1

Richard,

Here is a tally of information from different sources.

GRS is quoting the Japanese TV station saying "presumably" 70% fuel assemblies damaged.
Japan government spokesman Edano acknowledged there may have been a core meltdown.
Japan Atomic Industrial Forum (JAIF) is saying there is core damage, but is not quoting any number.
TEPCO is silent on core damage

Sud

BBBB/ 168

Lee, Richard

From: Lee, Richard
Sent: Friday, March 25, 2011 7:55 AM
To: Scott, Michael; Gibson, Kathy; Voglewede, John; Santiago, Patricia
Subject: RE: QUESTION FROM JAPAN

Mike:

Charlie Tinkler is our hydrogen expert. So is Allen Notafrensesco. I do not know who did the slide show.

Richard

From: Scott, Michael
Sent: Friday, March 25, 2011 5:44 AM
To: Gibson, Kathy; Lee, Richard; Voglewede, John; Santiago, Patricia
Subject: QUESTION FROM JAPAN

I seem to remember someone sending out a slide show on hydrogen since I've been in RES. I can't remember who our expert was, but I need to get a copy of the slide show he or she had developed on the subject. Can any of you recall?

Thanks

Mike

From: PMT09 Hoc
Sent: Friday, March 25, 2011 9:48 AM
To: PMT03 Hoc
Attachments: RE: Q about shelf-life for KI Tablets - Can you find your document summarizing shelf-life extension for KI; RE: Emailing: boardfile.htm

BBBB/ 170

From: LIA05 Hoc
Sent: Friday, March 25, 2011 7:01 PM
To: Dan Feighert; Andrew Seward; Harry Sherwood; John Simpson; Michelle Ralston; Steve Horwitz; Tim Greten; Vanessa E. Quinn
Subject: NRC Status Update 1800 25 march 2011
Attachments: NRC Status Update 3.25.11--1800.pdf

Please find the attached.

Ken Wierman Nightshift 1500-2300
FEMA REP Liaison
NRC Operations Center
(301) 816-5187

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DO NOT RELEASE OUTSIDE OF THE FEDERAL FAMILY

BBBB/171

Bensi, Michelle

From: Bensi, Michelle
Sent: Friday, March 25, 2011 5:49 PM
To: Kammerer, Annie
Subject: SONGS Q&A attached
Attachments: SONGS QAs_3-25-11_MBedit.docx

See attached file.

BBBB/172

What does the Japanese Earthquake Mean to San Onofre?

1) Could an earthquake and tsunami the size of the one in Japan happen at San Onofre?

The March 2011 Tohoku earthquake occurred on a subduction zone, which is the type of tectonic region that produces earthquakes of the largest magnitude. A subduction zone is a tectonic plate boundary where one tectonic plate is pushed under another plate. Severe tsunamis like the one experienced in Japan are only produced by earthquakes occurring at this type of plate boundary. The only subduction zone affecting the continental US is the Cascadia subduction zone, which lies off the coasts of Oregon, Washington, and the northernmost portion of California. Consequently, an earthquake and tsunami as large as the one experienced in Japan could only happen in that coastal region of the continental US.

~~No. This earthquake occurred on a "subduction zone", which is the type of tectonic region that produces the largest magnitudes earthquake. A subduction zone is a tectonic plate boundary where one tectonic plate is pushed under another plate. Subduction zone earthquakes are also required to produce the kind of massive tsunami seen in Japan. In the continental US, the only subduction zone is the Cascadia subduction zone which lies off the coast of far northern California, Oregon and Washington. So, a continental earthquake and tsunami as large as in Japan could only happen there.~~

Earthquakes occurring outside of the Cascadia subduction zone are not expected to exceed a magnitude of approximately 8.25. Earthquakes of this magnitude would only occur on the largest fault lines, such as the San Andreas fault, which is 50 miles away from San Onofre. ~~Outside of the Cascadia subduction zone, earthquakes are not expected to exceed a magnitude of approximately 8.25; and that would only occur on the largest fault lines, such as the San Andreas fault, which is 50 miles away onshore.~~ Furthermore, the San Andreas is an onshore fault and thus not capable of producing a tsunami.

Comment [MB1]: Edited to match DCNPP document.

2) What magnitude earthquake are currently operating US nuclear plants such as ~~SONGS~~ San Onofre designed to?

Structures, systems and components respond to the specific *ground motion* experienced during an earthquake. Ground motion intensity is a function of the magnitude of an earthquake, the distance from the fault to the site, and other geologic characteristics. Nuclear plants, and in fact all engineered structures, are designed based on ground motions, not earthquake magnitudes. Each nuclear power plant in the United States is designed for a ground motion intensity that is determined on a site-specific basis.

~~Each reactor is designed for a different ground motion that is determined on a site-specific basis. Ground motion is a function of both the magnitude of an earthquake and the distance from the fault to the site; and it is ground motion that causes damage. So, Nuclear plants, and in fact all engineered structures, are actually designed based on ground motion levels, not earthquake magnitudes.~~ The existing nuclear plants were designed using a "deterministic" or "scenario earthquake" approach that accounted for the largest earthquakes expected in the area around the plant. ~~The existing nuclear plants were designed based on a "deterministic" or "scenario earthquake" basis that accounted for the largest earthquakes expected in the area around the plant.~~ The scenario earthquake at ~~SONGS~~San Onofre is a magnitude 7 approximately 5 miles from the main plant. ~~This~~ The scenario earthquake results in a ground motion that has a peak ground acceleration of 0.67g, that is 67% of the acceleration of gravity.

3) Could San Onofre withstand an earthquake of the magnitude of the Japanese earthquake?

~~It~~ San Onofree ~~could~~ is designed to withstand the ground shaking experienced by the Japanese nuclear plants. As discussed above, it is the ground motions, not the magnitude, that structures, systems, and components "feel" (note: the strength of ground motion is a function of the earthquake magnitude and other factors).~~As discussed above, it is actually ground motions that structures, systems, and components "feel".~~ At this time, ~~We~~ we do not have direct recordings of ground motion at the Japanese reactors. However, we do have estimates of shaking ~~that come~~ from a ShakeMap produced by the K-NET system. The ground motion at the Japanese nuclear reactors is believed to be somewhat on the order of the 0.67g, or possibly slightly higher.~~,~~ Thus the ground shaking is similar to or slightly higher than ~~that~~ the peak ground acceleration to which San Onofre ~~peak ground acceleration~~ has been analyzed ~~to~~. However, US nuclear plants have ~~additional~~ seismic margin beyond the design basis ground motion, as demonstrated by the results of the Individual Plant Examination of External Events program carried out by the NRC in the mid-90s.

It should be noted that, the Fukushima plant itself withstood the ground shaking resulting from the Tohoku earthquake. Preliminary information suggests that important safety systems performed their required function in the period between the occurrence of the earthquake and the impact of the tsunami. It appears that the emergency diesel generators successfully started once offsite power was lost following the earthquake. Therefore, the tsunami appears to have played a key role in the loss of power sources at the site (including the diesel generators), ultimately resulting in a condition known as station blackout. The station blackout has been a critical factor in the ongoing problems.~~the Fukushima plant also withstood the earthquake. In the hour or so after the earthquake the Fukushima plant's safety systems, including the diesel generators, performed as expected and effectively shut down the reactor. The cause of the problems at the plant stemmed from the loss of emergency power that appears to be the direct result of the subsequent tsunami, which far exceeded the design basis tsunami for the Fukushima plant~~.

Comment [MB2]: This wording was taken from the wording used in the public FAQ (that Annie has already approved, at least preliminarily). I have copied it here for consistency.

4) Is possible to have a tsunami at San Onofre that is capable of damaging the plant?

The plant grade of San Onofre Units 2 and 3 ~~plant grade~~ is elevation +30.0 feet MLLW. San Onofre has a reinforced concrete cantilevered retaining seawall and screen well perimeter wall designed to withstand the design basis earthquake, followed by the maximum predicted tsunami with coincident storm wave action. The controlling tsunami for San Onofre, occurring during simultaneous high tide and storm surge, produces a maximum runup to elevation +15.6 feet MLLW at the Unit 2 and 3 seawall. When storm waves are superimposed, the predicted maximum runup is to elevation +27 MLLW. Tsunami protection for the ~~SONGS~~San Onofre site is provided by a reinforced concrete seawall constructed to elevation +30.0 MLLW. A tsunami larger than this is extremely unlikely.

5) Has the earthquake hazard at San Onofre been reviewed like Diablo Canyon nuclear power plant is doing? Are they planning on doing an update before relicensing?

Relicensing does not evaluate seismic hazard or other siting issues. Seismic safety is part of NRC's ongoing licensing activities. If an immediate safety concern ~~immerged~~immerges, the issue ~~would be~~is addressed ~~as part of NRC's response~~by the NRC, regardless of relicensing status.

-The closest active fault to the plant is approximately five miles offshore from San Onofre, where a system of folds and faults exists called the offshore zone of deformation (OZD). The OZD includes the Newport-Inglewood-Rose Canyon fault system. The Cristianitos fault is ½ mile southeast of San Onofre, but is an inactive fault. Other faults such as the San Andreas and San Jacinto, which can generate ~~a~~

larger magnitude earthquakes, are sufficiently far ~~enough~~ away that they would produce ground motions at San Onofre that are much less severe than earthquakes in the OZD ~~for San Onofre~~.

Notwithstanding the above, the NRC is considering extending the Generic Issue 199 program to all operating reactors. (Generic Issue 199 currently focuses on plants in the central and eastern United States.) This extension would require a reassessment of hazard for San Onofre using the latest probabilistic seismic hazard assessment approaches. Based on a preliminary assessment using the source model developed by the USGS for the national seismic hazard maps, the annual probability of occurrence of a 0.67g ground motion at the San Onofre site is only slightly higher than ~~is than~~ the annual probability of occurrence that is recommended for new nuclear plants.

6) How do we know that the emergency diesel generators in San Onofre will not fail to operate like in Japan?

Emergency Diesel Generators (EDGs) are installed in a seismically qualified structure and are seismic Category I equipment. ~~Even if these EDGs did fail, plants can safely shutdown using station blackout power source law 10 CFR 50.63.~~ In addition, in the 1980s, the NRC instituted a rule that requires nuclear power plants to further assure that a loss of both offsite and onsite emergency AC power systems (a condition known as a station blackout) would not adversely affect public health and safety. As a result of this rule all plants have (1) established station blackout coping and recovery procedures; (2) completed training for these procedures; (3) implemented modifications as necessary to cope with a station blackout; and (4) ensured a 4-16 hour coping capability. Subsequently, studies conducted by the NRC have shown that the hardware and procedures that have been implemented to meet the station blackout requirements have resulted in a significant risk reduction and have further enhanced defense-in-depth. ~~In 1988 the NRC concluded that additional regulatory requirements were justified in order to provide further assurance that a loss of both offsite and onsite emergency ac power systems would not adversely affect public health and safety and the station blackout rule was enacted. Studies conducted by the NRC since this rule has been in effect confirms that the hardware and procedures that have been implemented to meet the station blackout requirements have resulted in significant risk reduction and have further enhanced defense in depth.~~ However, ~~we~~ NRC plans to carefully evaluate the lessons learned from the events in Japan to determine if enhancements to the station blackout rule are warranted.

7) Was there any damage to San Onofre from either the earthquake or the resulting tsunami?

There was no damage at the San Onofre nuclear plant from either the earthquake or tsunami.

8) What about emergency planning for San Onofre. Does it consider tsunami?

FEMA reviews off-site evacuation plans every 2 years during a biennial emergency preparedness exercise. During the same exercise, NRC evaluates on-site evacuation plans. Population studies are done every 10 years, and evacuation time estimates are re-evaluated at that time. FEMA reviews these evacuation plans, and will only accept the plans if there is "reasonable assurance" that the off-site facilities and infrastructure are capable of protecting public health and safety in the event of an emergency at ~~FEMA reviews off-site evacuation plans formally every 2 years during a biennial emergency preparedness exercise. NRC evaluates on-site evacuation plans during the same exercise. Population studies are formally done every 10 years, and evacuation time estimates are re-evaluated at that time. FEMA reviews these evacuation plans, and will conclude their acceptability through a finding of "reasonable assurance" that the off-site facilities and infrastructure is capable of protecting public~~

Comment [MB3]: Larger than what?

Comment [MB4]: Recommended or required?

Comment [MB5]: Changed to have consistent wording with the public FAQ

Comment [MB6]: Wording revised to match DCNPP document

~~health and safety in the event of an emergency at~~ San Onofre. The next such exercise is planned for April 12, 2011.

-The San Onofre emergency plan initiates the emergency response organization and results in declaration of emergency conditions via their Emergency Action Levels. The facility would ~~then~~ make protective action recommendations to the Governor, who would then decide on what protective actions would be ordered for the residents around San Onofre. The consideration of tsunami would be contained in the ~~State~~ state and local (~~City~~city, ~~County~~county) emergency plans, which are reviewed by FEMA.

Bensi, Michelle

From:	Bensi, Michelle
Sent:	Friday, March 25, 2011 5:14 PM
To:	Kammerer, Annie
Subject:	Public FAQ
Attachments:	Frequently asked questions related to the March 11 2011 Earthquake and Tsunami 3-24-2011.docx

For your review: Attached are the edits, comments, and additions for the public FAQ.
-Shelby

BBBB/173

NRC frequently asked questions related to the March 11, 2011 Japanese Earthquake and Tsunami

3-~~19~~25-11 (DRAFT) Version

Compiled by Annie Kammerer, Jon Ake, and Cliff Munson for submission to OPA and NRR. We would appreciate getting an edited word file back to assure that the public comments and the internal document are consistent.

Draft - OUO

List of Questions

Draft - OUO

1) Can an earthquake and tsunami as large as happened in Japan also happen here?

This Tohoku earthquake occurred on a "subduction zone", which is the type of tectonic region that produces earthquakes of the largest magnitude. A subduction zone is a tectonic plate boundary where one tectonic plate is pushed under another plate. Severe tsunamis like the one experienced in Japan are only produced by earthquakes occurring at this type of plate boundary. ~~Subduction zone earthquakes are also required to produce the kind of massive tsunami seen in Japan.~~ The only subduction zone affecting the continental US is the Cascadia subduction zone, which lies off the coasts of Oregon, Washington, and the northernmost portion of California. Consequently, a continental earthquake and tsunami as large as the one experienced in Japan could only happen in that coastal region. ~~In the continental US, the only subduction zone is the Cascadia subduction zone which lies off the coast of northern California, Oregon and Washington. So, a continental earthquake and tsunami as large as in Japan could only happen there.~~ The only nuclear plant near the Cascadia subduction zone is the Columbia Generating Station. This plant is located a large distance from both the coast (approximately 225 miles) and the subduction zone (approximately 300 miles). Because of the distance between the plant and the Cascadia subduction zone, the strength of ground motion expected at the plant is far lower than the ground motion experienced at the Fukushima plants. The large distance between the Columbia Generating Station and the coast also precludes the possibility of a tsunami affecting the plant.~~), so the ground motions estimated at the plant are far lower than those seen at the Fukushima plants. This distance also precludes the possibility of a tsunami affecting the plant.~~ Outside of the Cascadia subduction zone, earthquakes are not expected to exceed a magnitude of approximately 8, which is significantly smaller than the magnitude of the Tohoku earthquake. Magnitude is measured on a log scale and so a magnitude 9 earthquake produces about ten times stronger shaking and releases about 31 times more energy than a magnitude 8 earthquake.

2) Did the Japanese underestimate the size of the maximum credible earthquake ~~and tsunami~~ that could affect the plants?

The magnitude of the earthquake was somewhat greater than was expected for ~~that~~ the part of the subduction zone on which the ~~[NAME]~~Tohoku earthquake occured. However, the Japanese nuclear plants were recently reassessed using ground motion levels similar to those that are believed to have occurred at the sites during the ~~[NAME]~~ Tohoku earthquake. The ground motions against which the Japanese nuclear plants were ~~reviewed~~ reassessed were expected to result from earthquakes that were of smaller magnitude, but that were much closer to the sites. ~~The NRC does not currently have information on the maximum tsunami height that was expected at the sites.~~

3) How high was the tsunami at the Fukushima nuclear plants? Was it higher than was expected?

The tsunami modeling team at the National Oceanic and Atmospheric Administration's Pacific Marine Environmental Lab have estimated the wave height just offshore (at the 5 meter bathymetric line) to be approximately 8 meters in height at Fukushima Daiichi and approximately 7 meters in Fukushima Daini. This estimate is based on recordings from NOAA's Deep-ocean Assessment and Reporting of Tsunamis (DART) buoys and a high resolution numerical model developed for the tsunami warning system. ~~If plant recordings exist they were not yet provided to the NRC.~~ A recent estimate released by TEPCO indicates that the tsunami water at the Fukushima Daiichi site reached a height of 14 meters. The report also indicates that the design basis tsunami height was 5.7 meters and that the emergency diesel generators were located 10-13 meters above sea levels. This data was provided by TEPCO and has not been confirmed by the NRC.

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Comment [MB1]: Added earthquake name and took out references to tsunami (moved those to the next question)

Comment [MB2]: Added more recent information (info verified by Annie)

4) Was the damage to the Japanese nuclear plants mostly from the earthquake or the tsunami?

Because this event ~~happened~~ occurred in Japan, it ~~is~~ will be hard for NRC staff to ~~make the assessment necessary to~~ understand exactly what happened ~~at this time~~until comprehensive assessments can be performed. Preliminary information suggests that important safety systems performed their required function in the period between the occurrence of the earthquake and the impact of the tsunami. It appears that the emergency diesel generators successfully started once offsite power was lost. ~~In the nuclear plants there may have been some damage from the shaking, and the earthquake caused the loss of offsite power.~~ ~~However~~Therefore, the tsunami appears to have played a key role in the loss of ~~other~~ power sources at the site (including the diesel generators), ~~producing~~ ultimately resulting in a condition known as station blackout~~,~~. ~~which~~ The station blackout has been ~~is~~ a critical factor in the ongoing problems.

> **Comment [MB3]:** Updated to reflect more recent information.

5) Have any lessons for US nuclear plants been identified?

The NRC is in the process of following and reviewing the events in real time. This will undoubtedly lead to the identification of issues that warrant further study. However, a complete understanding of lessons learned will require more information than is currently available to NRC staff.

6) Was there any damage to US reactors from either the earthquake or the resulting tsunami?

No.

7) How many US reactors are located in active earthquake zones?

Although we often think of the US as having "active" and "non-active" earthquake zones, earthquakes can actually happen almost anywhere. Seismologists typically separate the US into low, moderate, and high seismicity zones. The NRC requires that every nuclear plant be designed for site-specific ground motions that are appropriate for ~~their~~ its location~~s~~. In addition, the NRC has specified a minimum ground motion level to which nuclear plants must be designed.

8) What level of earthquake hazard are the US reactors designed for?

Each reactor is designed for a ~~different~~ ground motion level that is determined on a site-specific basis. The existing nuclear plants were designed ~~on~~ using a "deterministic" or "scenario earthquake" ~~basis~~ approach that accounted for the largest earthquakes expected in the area around the plant, without consideration of the likelihood of the earthquakes ~~considered~~occurring. New reactors are designed using probabilistic techniques that characterize both the ground motion levels and associated uncertainty in the definition of the seismic hazard at the proposed site. These probabilistic techniques account for the ground motions that may result from all potential seismic sources in the region around the site. Technically speaking, ~~this is~~ new nuclear plants are designed for the ground motion with an annual frequency of occurrence of $1x10^{-4}$/year. ~~, but t~~This can be thought of as the ground motion that occurs every 10,000 years, on average. One important aspect ~~is that~~associated with the use of probabilistic seismic hazard and other ~~and~~ risk-assessment techniques is that they account for beyond-design basis events. NRC's Generic Issue 199 (GI-199) project is using ~~the latest~~ state-of-the-art probabilistic techniques ~~used for new nuclear plants~~ to review the seismic safety of the existing plants. [see questions 16 to 21 for more information about GI-199]

> **Comment [MB4]:** It seems strange to me to says "uncertainty at the proposed site." It made me ask "uncertainty in what?" I tried to add some words, that while vague, add a little more info.

9) What magnitude earthquake are currently operating US nuclear plants designed to?

Ground motion is a function of both the magnitude of an earthquake, and the distance from the fault to the site, and other geologic characteristics. Nuclear plants, and in fact all engineered structures, are actually designed based on ground motion levels, not earthquake magnitudes. The existing nuclear plants were designed based on using a "deterministic" or "scenario earthquake" basis approach that accounted for the largest earthquakes expected in the area around the plant. A margin is further added to the predicted ground motions to provide added robustness.

10) Have events in Japan changed our perception of earthquake risk to the nuclear plants in the US?

The NRC continues to determine that US nuclear plants are safe. This The events transpiring in Japan following the Tohoku earthquake does not change the NRC's perception of earthquake hazard (i.e., ground motion levels) at US nuclear plants. It is too early to tell what the lessons will be learned from this earthquake are. The NRC will look closely at all aspects of the response of the Fukushima plants to the earthquake and tsunami to determine if any actions need to be taken in US nuclear plants and if any changes are necessary to NRC regulations.

11) Can significant damage to a nuclear plant like we see in Japan happen in the US due to an earthquake? Are the Japanese nuclear plants similar to US nuclear plants?

All US nuclear plants are built to withstand environmental hazards, including earthquakes and tsunamis. Eeven those nuclear plants that are located within areas with low and moderate seismic activity are designed for safety in the event of such a natural disasters. The NRC requires that safety-significant structures, systems, and components be designed to take into account even rare and extreme seismic and tsunami events. In addition to the design of the plants, significant effort goes intois devoted to emergency response planning and severe accident management. This approach is called defense-in-depth.

Comment [MB5]: Seems redundant to first sentence.

The Japanese facilities at Fukushima are similar in design to some US facilities. However, the NRC has required modifications to the US plants since they were designed and built. Examples of these modifications, including include design changes to control hydrogen and pressure in the containment. The NRC has also required requires plants to have additional equipment and measures in place to mitigate damage stemming from large fires and explosions resulting from a beyond-design-basis event. The measures include providing core and spent fuel pool cooling and an additional means to power other equipment on site.

Comment [MB6]: Not past tense if the requirement is still in place.

In addition, in the 1980s, the NRC instituted a rule that required nuclear power plants to further assure that a loss of both offsite and onsite emergency AC power systems (a condition known as a station blackout) would not adversely affect public health and safety. As a result of this rule, all plants have (1) established station blackout coping and recovery procedures; (2) completed training for these procedures; (3) implemented modifications as necessary to cope with a station blackout; and (4) ensured a 4-16 hour coping capability. Subsequently, studies conducted by the NRC have shown that the hardware and procedures that have been implemented to meet the station blackout requirements have resulted in a significant risk reduction and have further enhanced defense-in-depth.

Comment [MB7]: Added station blackout reference (at recommendation of NEI). This text is from the commission briefing document.

12) What is the likelihood of the design basis or "SSE" ground motions being exceeded over the life of a nuclear plant?

The ground motions that are used as seismic design bases at US nuclear plants are called the Safe Shutdown Earthquake (SSE) ground motions (SSE). It is important to remember that structures, systems

Comment [MB8]: Is there more than one GM design basis? The original sentence is written half plural, half singular.

and components are required to have "adequate margin," meaning that they must continue be able withstand shaking levels that are above the plant's design basis.

In the mid to late 1990s, the NRC staff reviewed the potential for ground motions beyond the design basis as part of the Individual Plant Examination of External Events (IPEEE). From this review, the staff determined that seismic designs of operating nuclear plants in the US have adequate safety margins for withstanding earthquakes. Currently, the NRC is in the process of conducting GI-199 to again assess the resistance of US nuclear plants to earthquakes. Based on NRC's preliminary analyses to date, the mean probability of ground motions exceeding the SSE over the life of the plant, for the plants in the Central and Eastern United States, is less than about 1%. ~~Based on NRC's analyses to date, the probability of ground motions exceeding the SSE for the plants in the Central and Eastern United States is less than 2%, with values ranging from a low of 0.1% to a high of 6%.~~

Comment [MB9]: Modified based on edits made during the construction of the commission briefing document.

~~It is important to remember that structures, systems and components are required to have "adequate margin," meaning that they must continue be able withstand shaking levels that are above the plant's design basis.~~

13) Which reactors are along coastal areas that could be affected by a tsunami?

Many nuclear plants are located in coastal areas that could potentially be affected by a tsunami. Two nuclear plants, Diablo Canyon and San Onofre, are on the Pacific Coast, which is known to have a tsunami hazard. Two nuclear plants on the Gulf Coast, South Texas and Crystal River, could also be affected by tsunami. There are many nuclear plants on the Atlantic Coast or on rivers that may be affected by a tidal bore resulting from a tsunami. These include St. Lucie, Turkey Point, Brunswick, Oyster Creek, Millstone, Pilgrim, Seabrook, Calvert Cliffs, Salem/Hope Creek, and Surry. Tsunami on the Gulf and Atlantic Coasts occur, but are very rare. Generally the flooding anticipated from hurricane storm surge exceeds the flooding expected from a tsunami for nuclear plants on the Atlantic and Gulf Coast. Regardless, all nuclear plants are designed to withstand a tsunami.

Comment [MB10]: Do you want to say something about plants being designed to resist the hurricane? It isn't said here explicitly.

Comment [MB11]: I don't know how confident I feel in this statement. I believe some plants says in their FSARs that "the plant isn't affected by tsunami" and then don't say much more. I don't know if I would classify this as "designed for tsunami" – maybe you want to clarify by saying that all plants affected by tsunami are designed to withstand them.

14) What is magnitude anyway? What is the Richter Scale? What is intensity?

An earthquake's magnitude is a measure of the strength of the earthquake as determined from seismographic observations. Magnitude is essentially an objective, quantitative measure of the size of an earthquake. The magnitude can be expressed in various ways based on seismographic records (e.g., Richter Local Magnitude, Surface Wave Magnitude, Body Wave Magnitude, and Moment Magnitude). Currently, the most commonly used magnitude measurement is the Moment Magnitude, Mw, which is based on the strength of the rock that ruptured, the area of the fault that ruptured, and the average amount of slip. Moment magnitude is, therefore, a direct measure of the energy released during an earthquake. Because of the logarithmic basis of the scale, each whole number increase in magnitude represents a tenfold increase in measured amplitude. ~~; a~~As an estimate of energy, each whole number step in the magnitude scale corresponds to the release of about 31 times more energy than the amount associated with the preceding whole number value.

The Richter magnitude scale was developed in 1935 by Charles F. Richter of the California Institute of Technology and was based on the behavior of a specific seismograph that was manufactured at that time. The instruments are no longer in use and the magnitude scale is, therefore, no longer used in the technical community. However, the Richter Scale is a term that is so commonly used by the public that scientists generally just answer questions about "Richter" magnitude by substituting moment magnitude without correcting the misunderstanding. Like moment magnitude, the Richter Scale is a ~~logarithm~~logarithmic scale. Each whole number increase corresponds to a tenfold increase in measured amplitude and about 31 times more energy.

The intensity of an earthquake is a qualitative assessment of the effects of the earthquake at a particular location. The intensity assigned is based on observed effects on humans, on human-built structures, and on the earth's surface at a particular location. The most commonly used scale in the US is the Modified Mercalli Intensity (MMI) scale, which has values ranging from I to XII in the order of severity. MMI of I indicates an earthquake that was not felt except by a very few, whereas MMI of XII indicates total damage of all works of construction, either partially or completely. While an earthquake has only one magnitude, intensity depends on the effects at each particular location.

15) How do magnitude and ground motion relate to each other?

The ground motion experienced at a particular location is a function of the magnitude of the earthquake, the distance from the fault to the location of interest, and other elements such as the geologic materials through which the waves pass.

16) What is Generic Issue 199 about?

GI-199 investigates the safety and risk implications of updated earthquake-related data and models on existing nuclear plants. For some nuclear plants in the Central and Eastern United States, ~~These~~ these updated data and models suggest that the probability ~~for~~ that earthquake ground motion ~~above~~ will exceed the seismic design basis ~~for some nuclear plants in the Central and Eastern United States~~, ~~although is~~while still low, is larger than previously ~~estimates~~estimated.

17) Does GI-199 provide rankings of US nuclear plants in terms of safety?

The NRC does not rank nuclear plants by seismic risk. The objective of the GI-199 Safety/Risk Assessment was to ~~perform a conservative, screening-level assessment to~~ evaluate ~~if~~ whether further investigations of seismic safety for operating reactors in the central and eastern US (CEUS) are warranted, consistent with NRC directives. The results of the GI-199 safety risk assessment should not be interpreted as definitive estimates of plant-specific seismic risk because some analyses were ~~very~~ conservative making the calculated risk higher than in reality. The nature of the information used in the analyses, ~~(both seismic hazard data and plant-level fragility information)~~ make these estimates useful only as a screening tool.

18) What are the current findings of GI-199?

Currently operating nuclear plants in the US remain safe, with no need for immediate action. This determination is based on NRC staff reviews of updated seismic hazard information and the conclusions of the first stage of GI-199. Existing nuclear plants were designed, with considerable margin, to be able to withstand the ground motions from the "deterministic" or "scenario earthquake" that accounted for the largest earthquakes expected in the area around the plant. The results of the GI-199 assessment demonstrate that the probability of exceeding the design basis ground motion may have increased at some sites, but only by a relatively small amount. In addition, the probabilities of seismic core damage are lower than the guidelines for taking immediate action. Although there is not an immediate safety concern, the NRC is focused on assuring safety during even very rare and extreme events. Therefore, the NRC has determined that assessment of updated seismic hazards and plant performance should continue.

19) What do you mean by "increased estimates of seismic hazards" at nuclear plant sites?

Seismic hazard (earthquake hazard) represents the chance (or probability) that a specific level of ground motion could be observed or exceeded at a given location. Our estimates of seismic hazard at some Central and Eastern United States locations, have changed based on results from recent research, indicating that earthquakes occurred more often in some locations than previously estimated. Our estimates of seismic hazard have also changed because the models used to predict the level of ground motion, as caused by a specific magnitude earthquake at a certain distance from a site, changed have improved. The increased estimates of seismic hazard at some locations in the Central and Eastern United States were discussed in a memorandum to the Commission, dated July 26, 2006. (The memorandum is available in the NRC Agencywide Documents Access and Management System [ADAMS] under Accession No. ML052360044).

20) Does the Seismic Core Damage Frequency represent a measurement of the risk of radiation release or only the risk of core damage (not accounting for additional containment)?

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Seismic core damage frequency is the probability of damage to the core resulting from a seismic initiating event. It does not imply either a meltdown or the loss of containment, which would bise required necessary for radiological release to occur. The likelihood of radiation release is far lower than the core damage frequency.

21) Where can I get current information about Generic Issue 199?

The public NRC Generic Issues Program (GIP) website (http://www.nrc.gov/about-nrc/regulatory/gen-issues.html) contains program information and documents, background and historical information, generic issue status information, and links to related programs. The latest Generic Issue Management Control System quarterly report, which has regularly updated GI-199 information, is publicly available at http://www.nrc.gov/reading-rm/doc-collections/generic-issues/quarterly/index.html. Additionally, the US Geological Survey provides data and results that are publicly available at http://earthquake.usgs.gov/hazards/products/conterminous/2008/.

22) Could an accident sequence like the one at Japan's Fukushima Daiichi nuclear plants happen in the US?

It is difficult to answer this question until we have a better understanding of the precise problems and conditions that faced the operators at Fukushima Daiichi. We do know, however, that Fukushima Daiichi Units 1-3 lost all offsite power and emergency diesel generators. This situation is called "station blackout." US nuclear power plants are designed to cope with a station blackout event that involves a loss of offsite power and onsite emergency power. The Nuclear Regulatory Commission's detailed regulations address this scenario. US nuclear power plants are designed to cope with a station blackout event that involves a loss of offsite power and onsite emergency power. In addition to design features, US nuclear plants are required to conduct a "coping" assessment, perform modifications if necessary, and develop a strategy to demonstrate to the NRC that they could can maintain the plant in a safe condition during a station blackout scenario. These assessments, proposed modifications to the plant, and operating procedures were reviewed and approved by the NRC. Several plants added additional AC power sources to comply with this regulation. Additional information about the NRC's station blackout rule is contained in question #11.

Comment [MB12]: Better to say can??? I don't know.

In addition, US nuclear plant designs and operating practices since in response to the terrorist events of September 11, 2001, the NRC issued an Interim Compensatory Measures (ICM) Order are designedrequiring licensees to take certain actions to mitigate severe accident scenarios such as aircraft impact., which These scenarios include the complete loss of offsite power and all on-site emergency power sources.

~~US nuclear plant designs include consideration of seismic events and tsunamis'. It is important not to extrapolate earthquake and tsunami data from one location of the world to another when evaluating these natural hazards. These catastrophic natural events are very region- and location-specific, based on tectonic and geological fault line locations.~~

Comment [MB13]: How does this info apply to the question?

THE FOLLOWING QUESTIONS ARE TENTATIVE!

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23) Are the spent fuel pools designed to resist earthquake shaking?

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Spent fuel pools are constructed of reinforced concrete, several feet thick, with a stainless steel liner to prevent leakage and maintain water quality. Due to their configuration, spent fuel pools are inherently structurally-rugged and are designed to the same seismic requirements and ground motion levels as the nuclear plant.

24) Does the NRC have a research program that is designed to look at seismic and tsunami issues?

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Comment [MB14]: Annie to answer this question.

Insert answer here.

25) What prevents radiation from being released into the environment?

Comment [MB15]: Someone will need to decide if this answer should really be included in this document (or if the document should stick to seismic questions). If it is to be included, someone will need to review this answer.

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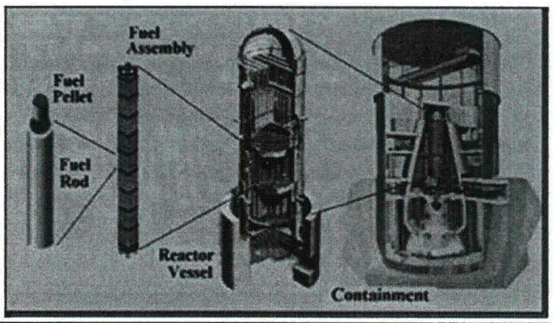
There are three barriers to prevent the release of radiation into the environment. The first barrier is a tube around the reactor fuel rod known as cladding. The second next barrier to release is the reactor vessel and associated pumps and piping. This is a closed loop system that prevents radioactive material from being released from the core. The third barrier is the containment structure. This is a steel-lined concrete structure. The containment structure prevents the release of radioactive material into the environment in the event of an accident.



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From:	LIA07 Hoc
Subject:	1800 EDT (March 25, 2011) USNRC Earthquake/Tsunami Status Update
Date:	Friday, March 25, 2011 6:50:39 PM
Attachments:	USNRC Earthquake-Tsunami Update 032511 1800EDT.pdf

HOC

Attached, please find an 1800 EDT (March 25, 2011) status update from the US Nuclear Regulatory Commission's Emergency Operations Center regarding the impacts of the earthquake/tsunami.

Please note that this information is "Official Use Only" and is only being shared within the federal family.

Please call the Headquarters Operations Officer at 301-816-5100 with questions.

-Sara

Sara K. Mroz
Communications and Outreach
Office of Nuclear Security and Incident Response
US Nuclear Regulatory Commission
Sara.Mroz@nrc.gov
LIA07.HOC@nrc.gov (Operations Center)

BBBB/174

From: PMT03 Hoc
Sent: Saturday, March 26, 2011 12:58 AM
To: Hinson, Charles
Subject: PMT Dose Assessor

Charlie,

We have you scheduled to work with Tony Huffert, Saturday, 3/26, from 7am-3pm. There is a slot still unfilled on Sunday, 3/27, where Tony is still scheduled by himself. I'll speak with you when you arrive this morning to see if you could work that shift also.

Thanks.

Lou

BBBB/175

From: PMT03 Hoc
Sent: Saturday, March 26, 2011 1:23 AM
To: Costa, Arlon; Chowdhury, Prosanta
Cc: OST02 HOC; OST01 HOC
Subject: PMT Coordinator

Arlon, Prosanta,

We're almost complete on the PMT Coordinator roster for next week, but there are two slots needing filled next Saturday, April 2nd, if you're available. The slots are 7am-3pm and 3pm-11pm (and actually 11pm-7am Sunday which I will take if it remains unfilled). If each of you can fill one of these slots, that would be great. Please respond by copying OST01 and OST02, to be placed on the roster.

Hope to see you then.

Thanks.

Lou

BBBB/ 176

Lee, Richard

From: Lee, Richard
Sent: Friday, March 25, 2011 3:48 PM
To: 'powess@crossnet.org'
Subject: FW: Garwin comments of Science Group call of 03/24. To Binkley list of 03/24.
Attachments: ATT00001..gif

Another one.

From: Sheron, Brian
Sent: Friday, March 25, 2011 12:44 PM
To: Lee, Richard
Subject: FW: Garwin comments of Science Group call of 03/24. To Binkley list of 03/24.

From: Richard L Garwin [mailto:rlg2@us.ibm.com]
Sent: Friday, March 25, 2011 11:32 AM
To: Binkley, Steve
Cc: Brinkman, Bill; Hurlbut, Brandon; Sheron, Brian; Poneman, Daniel; 'harold.mcfarlane@inl.gov'; Adams, Ian; 'jholdren@ostp.eop.gov'; Kelly, John E (NE); 'john.grossenbacher@inl.gov'; Owens, Missy; 'peterson@nuc.berkeley.edu'; Lyons, Peter; 'phillip.finck@inl.gov'; 'rgarwin@ostp.eop.gov'; 'RJBudnitz@lbl.gov'; 'ronaldo.szilard@inl.gov'; SCHU; Aoki, Steven; Koonin, Steven; 'Steven_A._Fetter@ostp.eop.gov'; DAgostino, Thomas
Subject: Garwin comments of Science Group call of 03/24. To Binkley list of 03/24.

Some observations by Dick Garwin:

1. GET DATA ON VENTING AS IT HAPPENS. I believe it was John Kelly who said that if one watched Japanese TV one could hear a statement from TEPCO that they were about to vent , and there would be a TV image of the accompanying "white smoke" (steam). It would be very valuable to us all to have this information in the next report rather than "3 days later." There must be millions of Japanese people at home, glued to their TV, a few of whom could be asked/paid to send an email or IM or twitter recounting the venting statement. That way we would have redundant, timely reporting that could be provided in a section of the 12-hr SITREP or elsewhere.

2. DETAILS OF HARDENED VENT PIPE. We have heard of the "hardened vent pipe" to the plant stack. Could we have details of that, please, sa well a of any filters in the stack? Bob Budnitz and I were two of the authors of the 1975 Report to the Amerian Physical Society of the study group on light-water-reactor safety,"[http://rmp.aps.org/pdf/RMP/v47/iS1/pS1_1] as was Frank von Hippel, who just published an OpEd in the New York Times [http://www.nytimes.com/2011/03/24/opinion/24Von-Hippel.html]. On page S110 of the Report we find,

BBBB/177

Similarly, in PWR accidents where the containment might fail due to melt-through by the core, rather than by overpressure, the total fission product release is assumed to be reduced greatly as a result of the filtering action of the soil (Draft WASH-1400, Appendix V).

These possible effects suggest that emphasis be placed on containment designs which ensure that, in case of containment failure, fission products would be scrubbed and/or filtered before their release. Thus, for example, a BWR containment might be designed to fail in a controlled way via pressure release valves which vented from the pressure-suppression pool or through large stabilized-bed filters. The remaining gases could then be filtered through the standby gas treatment system.

The von Hippel OpEd states, "Even before Three Mile Island, a group of nuclear engineers had proposed that filtered vents be attached to buildings around reactors, which are intended to contain the gases released from overheated fuel. If the pressure inside these containment buildings increased dangerously — as has happened repeatedly at Fukushima — the vents would release these gases after the filters greatly reduced their radioactivity. France and Germany installed such filters in their plants, but the Nuclear Regulatory Commission declined to require them. Given the influence of America's example, had the commission demanded the addition of filtered vents, they would likely have been required worldwide, including in Japan." Perhaps TEPCO has installed such filters. Does any of the Science Group know? Can we provide some expedient filters that will handle the temperature and heat load?

3. MOVING FLUIDS BY PUMPING OR VALVING AIR. We mentioned moving fluids by periodically pressurizing containments or other vessels. This requires pipe access to the fluid to be moved. A generic pump of this kind would be a tank with an inlet valve and an outlet valve, with air space above the fluid. Closing the outlet valve, opening the inlet valve and venting the air (through a filter) would allow the pump volume to be largely filled with fluid. Closing the inlet, opening the outlet and pumping air into the head space would expel the fluid. If the fluid evolves hydrogen, then nitrogen should be used for pressurizing.

4. PREPARING FOR MASSIVE REPLUMBING. In the control of the Macondo well at 5000-ft water depth, remotely operatec vehicles (ROV) were essential. But so were the ingenious and powerful hydraulically powered wrenches, not much bigger than the massive bolts and nuts they were to unscrew or reinsert. Our labs, industry, and counterparts on the Japanese side should amass and test this capability, together with waterjet cutters and other tools suitable for remote operation. It might even be desirable to bore holes through concrete containment under modest internal pressure, without leaking much of the contents.

I believe that that sort of operation is routine in the oil industry-- with structures under much higher pressure. Perhaps a US-Japanese technical working group could be created for this task.

5. MITIGATING CORROSION FROM SALT. In addition to the super-important impact of massive salt accumulation on the ability to cool the reactor, there was early recognition of the corrosive effects of salt. A note from a retired Canadian engineer experienced in both nuclear power and desalination is attached. Most of this we know and are acting on, but I was ignorant of the zirconium corrosion hazard. I pass this to those in contact with our experts, for whatever new it may add.

Bensi, Michelle

From: Bensi, Michelle
Sent: Friday, March 25, 2011 2:22 PM
To: Kammerer, Annie
Subject: Diablo Q&As
Attachments: Diablo Canyon QAs_MBedit_3-25.docx

Annie,

I have attached the Diablo Canyon Q&As with edits. You will see that I have replaced big chunks of words in the Diablo doc with the exact text used in the public FAQs (based on the revisions we made yesterday). I thought it would be good to have the wording be consistent between the documents.

With regard to the SONGS doc: Some of the questions are common between the SONGS and Diablo documents. I will not edit the common questions until I get back your revisions on the Diablo questions (so that the answers will use the same wording).

I am working on the public FAQs now.

Shelby

BBBB/178

What does the Japanese Earthquake Mean to Diablo Canyon?

1) Could an earthquake and tsunami the size of the one in Japan happen at Diablo Canyon?

~~No. This earthquake occurred on a "subduction zone", which is the type of tectonic region that produces the largest magnitudes earthquake. A subduction zone is a tectonic plate boundary where one tectonic plate is pushed under another plate. Subduction zone earthquakes are also required to produce the kind of massive tsunami seen in Japan. In the continental US, the only subduction zone is the Cascadia subduction zone which lies off the coast of far northern California, Oregon and Washington. So, a continental earthquake and tsunami as large as in Japan could only happen there.~~

The Tohoku earthquake occurred on a subduction zone, which is the type of tectonic region that produces earthquakes of the largest magnitude. A subduction zone is a tectonic plate boundary where one tectonic plate is pushed under another plate. Severe tsunamis like the one experienced in Japan are only produced by earthquakes occurring at this type of plate boundary. The only subduction zone affecting the continental US is the Cascadia subduction zone, which lies off the coasts of Oregon, Washington, and the northernmost portion of California. Consequently, a continental earthquake and tsunami as large as the one experienced in Japan could only happen in that coastal region.

Comment [MB1]: Changed wording to be consistent with the public FAQ document.

Diablo Canyon Nuclear Power Plant is located outside of the Cascadia subduction zone. ~~Outside of the Cascadia subduction zone, e~~ Earthquakes occurring outside of the Cascadia subduction zone are not expected to exceed a magnitude of approximately 8.25~~;~~. ~~and that would only~~ Earthquakes of this magnitude would only occur on the largest fault lines, such as the San Andreas fault, which is 50 miles away from Diablo Canyon Nuclear Power Plant. Furthermore, the San Andreas is an onshore fault and thus not capable of producing a tsunami.

Comment [MB2]: Can you make this statement a little "stronger" by saying the only fault that is capable of producing such large EQs and that is located near DCNPP is the San Andreas? If not, then this answer is incomplete and you would really need to list other large faults.

2) What magnitude earthquake are currently operating US nuclear plants such as Diablo Canyon designed to?

Structural damage is caused by the ~~intensity~~strength of *ground motion* experienced during an earthquake. Ground motion intensity is a function of the magnitude of an earthquake, the distance from the fault to the site, and other geologic characteristics. Nuclear plants, and in fact all engineered structures, are designed based on ground motion ~~intensity levels~~, not earthquake magnitudes. Each ~~reactor~~ nuclear power plant in the United States is designed for a ~~different~~ ground motion intensity that is determined on a site-specific basis. ~~Ground motion is a function of both the magnitude of an earthquake and the distance from the fault to the site; and it is ground motion that causes damage. So, Nuclear plants, and in fact all engineered structures, are actually designed based on ground motion levels, not earthquake magnitudes.~~

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Comment [m3]: This isn't "perfectly" accurate because the actual numerical numbers may be the same for some plants (e.g. PGA=0.1g).

The existing nuclear plants were designed ~~based~~ using ~~on~~ a "deterministic" or "scenario earthquake" ~~basis~~ approach that accounted for the largest earthquakes expected in the area around the plant. The scenario earthquake at Diablo Canyon is a magnitude 7.5 on the Hosgri Fault, which is located 3 miles from the main plant. This earthquake is expected to results in a ground motion that has a peak ground acceleration of 0.75g~~, that is~~ (~75% of the acceleration of gravity).

3) Could the newly discovered Shoreline Fault produce a larger "~~Scenario~~ scenario ~~Earthquake~~earthquake"?

Diablo Canyon Nuclear Power Plant was designed for a "scenario earthquake" occurring on the Hosgri Fault. The Shoreline Fault is smaller than the Hosgri Fault, and the maximum magnitude expected on the Shoreline Fault is smaller than the maximum magnitude expected on the Hosgri Fault. The NRC's preliminary analyses indicate that the ground motions from the largest earthquakes expected on the ~~smaller~~ Shoreline Fault ~~do~~ will not exceed the ground motions expected from an earthquake ~~from~~ on the Hosgri Fault, ~~,~~ Diablo Canyon ~~for which the plant~~ has already been analyzed for a large earthquake on the Hosgri Fault and been found to be safe.

NRC is currently reviewing the Final Report on the Shoreline Fault, ~~that~~ which was submitted to the NRC earlier this year. As part of the review, ~~T~~the NRC is performing an independent analysis of potential ground motions based the data contained in the report and other information. Much of the data on the Shoreline Fault comes from the USGS in Menlo Park.

4) Could Diablo Canyon withstand an earthquake of the magnitude of the Japanese earthquake?

~~It~~ Diablo Canyon Nuclear Power Plant ~~could~~ is designed to withstand the level of ground shaking experienced by the Japanese nuclear plants during the Tohoku earthquake. As discussed above, it is ~~actually~~ the ground motions, not the magnitude, that structures, systems, and components "feel" (note: the strength of ground shaking is a function of the earthquake magnitude and other factors). At this time, ~~W~~we do not have direct recordings of the ground motion at the Japanese reactors. However, we do have estimates of shaking that come from a ShakeMap produced by the the K-NET system. Based on the available information, ~~T~~the ground motion at the Japanese nuclear reactors is believed to be somewhat smaller than the 0.75g peak ground acceleration that Diablo Canyon has been ~~analyzed to~~ designed to withstand. ~~Do,~~ Consequently, the NRC believes that Diablo Canyon could withstand the ground shaking experienced by the Fukushima plant.

~~In fact~~ Furthermore, the Fukushima plant also withstood the ground shaking resulting from the Tohoku earthquake. Preliminary information suggests that important safety systems performed their required function in the period between the occurrence of the earthquake and the impact of the tsunami. It appears that the emergency diesel generators successfully started once offsite power was lost. Therefore, the tsunami appears to have played a key role in the loss of power sources at the site (including the diesel generators), ultimately resulting in a condition known as station blackout. The station blackout has been a critical factor in the ongoing problems. ~~In the hour or so after the earthquake the Fukushima plant's safety systems, including the diesel generators, performed as expected and effectively shut down the reactor. The cause of the problems at the plant stemmed from the loss of emergency power that appears to be the direct result of the subsequent tsunami, which far exceeded the design basis tsunami for the Fukushima plant.~~

5) Is Diablo Canyon's equipment vulnerable to tsunami?

Nuclear plants are designed to ~~withstand~~ provide protection against natural phenomena such as tsunami and ~~,~~ earthquakes. Diablo Canyon's main plant is located above the flood level associated with the maximum expected tsunami. The intake structures and Auxiliary Sea Water System at Diablo canyon are designed for combination of tsunami and storm wave activity.

6) How do we know that the emergency diesel generators in Diablo Canyon and SONGS will not fail to operate like in Japan?

Emergency Diesel Generators (EDGs) are installed in a seismically qualified structure(s). In addition, in the 1980s, the NRC instituted a rule that required nuclear power plants to further assure that a loss of both offsite and onsite emergency AC power systems (a condition known as a station blackout) would not adversely affect public health and safety. As a result of this rule all plants have (1) established station blackout coping and recovery procedures; (2) completed training for these procedures; (3)

Comment [MB4]: Is this true? Was it designed for this or was it reviewed for this level? I don't like saying "could withstand" in such a certain way. There is always uncertainty when working with earthquakes b/c no single GM IM is a full descriptor of ground shaking (which of course you know! ☺)

Comment [MB5]: We have received other information about the GM intensity at the plants, however the information is in gal, and I am not familiar with that system. Please see the further table in the "useful tables" section of the seismic Q&A document.

Comment [MB6]: This wording was taken from the wording used in the public FAQ (that Annie has already approved, at least preliminarily). I have copied it here for consistency.

Comment [MB7]: What do you mean by "main plant"? This is used throughout the document. Do you mean the reactor and aux bldg?

Comment [MB8]: Do you mean to say it is above any tsunami that could affect the plant ever? That's a pretty certain statement.

implemented modifications as necessary to cope with a station blackout; and (4) ensured a 4-16 hour coping capability. Subsequently, studies conducted by the NRC have shown that the hardware and procedures that have been implemented to meet the station blackout requirements have resulted in a significant risk reduction and have further enhanced defense-in-depth.

Comment [MB9]: Changes to have consistent wording with the public FAQ

~~Even if these EDGs did fail, plants can safely shutdown using station blackout power source law 10 CFR 50.63. In 1988 the NRC concluded that additional regulatory requirements were justified in order to provide further assurance that a loss of both offsite and onsite emergency ac power systems would not adversely affect public health and safety and the station blackout rule was enacted. Studies conducted by the NRC since this rule has been in effect confirms that the hardware and procedures that have been implemented to meet the station blackout requirements have resulted in significant risk reduction and have further enhanced defense-in-depth. However, we plan to carefully evaluate the lessons learned from the events in Japan to determine if enhancements to the station blackout rule are warranted.~~

7) Was there any damage to Diablo Canyon from either the earthquake or the resulting tsunami?

A small tsunami did hit the region around Diablo Canyon. There was no damage at the nuclear plant.

8) How do we know the evacuation routes in the region around Diablo Canyon are realistic?

FEMA reviews off-site evacuation plans ~~formally~~ every 2 years during a biennial emergency preparedness exercise. During the same exercise, NRC evaluates on-site evacuation plans ~~during the same exercise~~. Population studies are ~~formally~~ done every 10 years, and evacuation time estimates are re-evaluated at that time. FEMA reviews these evacuation plans, and will ~~conclude their acceptability through a finding of~~only accept the plans if there is "reasonable assurance" that the off-site facilities and infrastructure ~~is~~ are capable of protecting public health and safety in the event of an emergency at DCNPP.

Lee, Richard

From: Lee, Richard
Sent: Saturday, March 26, 2011 3:28 PM
To: Aissa, Mourad; Algama, Don
Subject: FW: ANS Technical Brief: MOX Fuel & Fukushima
Attachments: ANS-Technical-Brief-MOX-Fukushima.pdf

Fyi. I think we concur with ANS position.

-----Original Message-----
From: Gibson, Kathy
Sent: Saturday, March 26, 2011 1:45 PM
To: Lee, Richard; Tinkler, Charles
Subject: Fw: ANS Technical Brief: MOX Fuel & Fukushima

I'm using you guys as the clearinghouses for all the stuff I get so you can draw whatever conclusions are appropriate based on all the relevant information coming in.

----- Original Message -----
From: Hoxie, Chris
To: Gibson, Kathy
Sent: Sat Mar 26 13:26:25 2011
Subject: FW: ANS Technical Brief: MOX Fuel & Fukushima

Do you get these? Anyway, briefly it says the fact that its MOX at Japan is not a big deal....

-----Original Message-----
From: ANS Broadcasts [mailto:broadcasts@ans.org]
Sent: Saturday, March 26, 2011 5:02 AM
To: Hoxie, Chris
Subject: ANS Technical Brief: MOX Fuel & Fukushima

The ANS Special Committee on Nuclear Non-Proliferation has prepared the attached Technical Brief on The Impact of Mixed Oxide Fuel Use on Accident Consequences at Fukushima Daiichi.

For additional Fukushima resources, visit the "Featured Content" box on the front page of the American Nuclear Society's website:

http://www.ans.org/

BBBB/179

From: ET02 Hoc
Sent: Saturday, March 26, 2011 10:13 PM
To: RST01 Hoc; RST12 Hoc; RST09 Hoc
Subject: FW: http://www.youtube.com/watch?v=5teJiklZIJU All 4 units are steaming now

---

From: ET02 Hoc
Sent: Saturday, March 26, 2011 9:56 PM
To: ET02 Hoc
Subject: http://www.youtube.com/watch?v=5teJiklZIJU

BBBB/180

Relaese

Bano, Mahmooda

From: Scott, Michael
Sent: Saturday, March 26, 2011 2:15 AM
To: LIA02 Hoc
Cc: LIA03 Hoc; Casto, Chuck; Monninger, John; Dorman, Dan
Subject: RE: ACTION - Decommissioning Type Information for Ops Center

I think this is more what they were looking for, rather than the licensing discussion previously sent. Please advise me when this is fully vetted and can be released to the Japanese. Thanks.

From: LIA02 Hoc
Sent: Friday, March 25, 2011 12:25 PM
To: Scott, Michael
Cc: LIA03 Hoc
Subject: FW: ACTION - Decommissioning Type Information for Ops Center

Some more information.

Steve

-----Original Message-----
From: Richards, Stuart
Sent: Wednesday, March 23, 2011 6:51 PM
To: Camper, Larry; Bowman, Gregory; Rini, Brett
Subject: FW: ACTION - Decommissioning Type Information for Ops Center

fyi - Stu

From: Rahimi, Meraj
Sent: Wednesday, March 23, 2011 5:50 PM
To: Ordaz, Vonna; Benner, Eric; ET05 Hoc; RST01 Hoc; Richards, Stuart
Cc: White, Bernard; Mohseni, Aby; Davis, Jack; Weaver, Doug; Doolittle, Elizabeth; Waters, Michael; Kinneman, John; Bailey, Marissa; Tschiltz, Michael
Subject: RE: ACTION - Decommissioning Type Information for Ops Center

Here is the proposed SFST/FCCS/HLW coordinated response:

We would not recommend early entombment considerations due to the high thermal loads and associated negative effects on entombment material properties. In fact, we believe it might not be prudent to entomb at all. We believe that Japan should consider waiting until the core or spent fuel debris can be cooled sufficiently and then removed similar to TMI. We would initially recommend pumping continuously borated water into the molten core or spent fuel pool. Longer term, if entombment is considered by Japan, it is our opinion that entombment would be less problematic (with respect to criticality issues) if the entombment is around the molten core or pool, rather than directly onto the fuel and in the primary containment vessel. We believe that heat transfer will be a significant challenge and thus it would be best if the entombment was built with low and high vents that would enable the transfer of heat through air convection. If the entombment is considered by pouring some type of material on the molten core or spent fuel pool the system reactivity and heat transfer capability is highly dependent on the material of use. We believe, the temperature in the reactor core or the dried spent fuel pool is too high for the concrete to cure. Both concrete (especially wet) and sand would be a neutron moderator and could raise criticality

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concerns. Whatever is used should be carefully evaluated. Due to the unknown configuration in the core, any medium should conservatively be heavily borated. Another option maybe the use of sand with boron frits which would turn into glass when contacted with the molten core. This would immobilize the radionuclides. However, the temperature at which the sand is added must be at the point that the glass can solidified. This may require longer cooling time.

In the interim while options are considered, it might be advisable to confine the core or the pool with filtered flexible enclosure.

Meraj Rahimi
Chief of Criticality, Shielding, and Dose Assessment Branch Division of Spent Fuel Storage and Transportation Office of Nuclear Materials Safety and Safeguard U.S. Nuclear Regulatory Commission
6003 Executive Blvd., Suite 301
Rockville, MD 20852
Phone: 301-492-3338
Fax: 301-492-3348
e-mail: meraj.rahimi@nrc.gov

From: Ordaz, Vonna
Sent: Wednesday, March 23, 2011 3:21 PM
To: Benner, Eric
Cc: White, Bernard; Mohseni, Aby; Davis, Jack; Weaver, Doug; Rahimi, Meraj; Doolittle, Elizabeth; Waters, Michael; Kinneman, John; Bailey, Marissa; Tschiltz, Michael
Subject: ACTION - Decommissioning Type Information for Ops Center
Importance: High

Eric,

SFST has the lead to coordinate a response with HLW and FCSS, and respond to the Reactor Safety Team, the ET Response Coordinator, and Stu Richards in the Operations Center with a CC to Dan Dorman by 6pm.

Thanks,
Vonna

From: Ordaz, Vonna
Sent: Wednesday, March 23, 2011 3:13 PM
To: Richards, Stuart; Weaver, Doug; Mohseni, Aby; Davis, Jack
Cc: RST01 Hoc; Bowman, Gregory; Hickman, John; Lee, Richard; Rini, Brett; Case, Michael; McConnell, Keith; Watson, Bruce; Camper, Larry; Deegan, George; Waters, Michael
Subject: RE: Decommissioning Type Information

Thanks, Stu. We'll get back to you.

Vonna

From: Richards, Stuart
Sent: Wednesday, March 23, 2011 2:32 PM
To: Weaver, Doug; Mohseni, Aby; Davis, Jack
Cc: RST01 Hoc; Bowman, Gregory; Hickman, John; Lee, Richard; Rini, Brett; Case, Michael; McConnell, Keith; Watson, Bruce; Camper, Larry; Deegan, George; Ordaz, Vonna; Waters, Michael
Subject: RE: Decommissioning Type Information
Importance: High

Dan Dorman has asked the Ops Center to respond to a number of questions related to the Japanese event.

Can NMSS respond to the following?

8. What should they be considering with respect to criticality prevention and decay heat removal during the entombment period?

The goal is to provide the response to the Ops Center by 6 pm tonight.

I will forward you the original request, which may help.

Thanks
Stu

From: Deegan, George
Sent: Wednesday, March 23, 2011 2:05 PM
To: Richards, Stuart; Camper, Larry
Cc: RST01 Hoc; Bowman, Gregory; Hickman, John; Lee, Richard; Rini, Brett; Case, Michael; McConnell, Keith; Watson, Bruce
Subject: RE: Decommissioning Type Information

Stu- As your email came in, Brett Rini and I were speaking with one another. I indicated that FSME will be working on #7 (licensing requirements) and #9 (whatever relevant info we can pull together from the TMI event), but that the best shop for criticality type issues (Question #8) is probably NMSS.

From: Richards, Stuart
Sent: Wednesday, March 23, 2011 1:51 PM
To: Camper, Larry
Cc: Deegan, George; RST01 Hoc; Bowman, Gregory; Hickman, John; Lee, Richard; Rini, Brett; Case, Michael
Subject: RE: Decommissioning Type Information

Larry

RES might be able to help you with Question #8. Richard Lee in DSA is our POC on this one.

We can provide you some thoughts on enclosures, but I agree that a good answer will take a lot of time and a lot more information on the status of the units.

Stu

From: Camper, Larry
Sent: Wednesday, March 23, 2011 12:49 PM
To: Dorman, Dan
Cc: Deegan, George; RST01 Hoc; Bowman, Gregory; Hickman, John
Subject: Decommissioning Type Information

Dan,
Greetings! Trust you are holding up well over there! Regarding your message of earlier today, we will be able to provide feedback on Question number 6 today by the 18:00 timeframe. Questions 6,8 and 9 will require a bit of review and interface with RES but we will start that process today. Standby for a better timeline on those. The staff did some work on the entombment issue via a couple of SECY's but the approach died out because it became clear that industry was not going to utilize it in the US. Of course, the situation in Japan is quite different etc. Regardless, our earlier work should be of some benefit but we just have

to resurrect it and review etc. In thinking ahead just a bit, I suspect that we will need to put together some sort of Task Force or think tank type group to analyze possible paths forward for the overall decommissioning of the site and for the related waste management etc. Of course, we have some time to think about this issue but not too long etc.

From: OST01 HOC
Sent: Saturday, March 26, 2011 12:32 PM
To: PMT02 Hoc; PMT11 Hoc; Hoc, PMT12; PMT01 Hoc
Subject: FW: Skin Dose Coefficients per Tony Huffert's Request
Attachments: SkinDose_WaterImmersion.xls; DecayChains.TXT

Importance: High

From: HOO Hoc
Sent: Saturday, March 26, 2011 12:29 PM
To: LIA07 Hoc; OST01 HOC; OST02 HOC; OST03 HOC
Subject: FW: Skin Dose Coefficients per Tony Huffert's Request
Importance: High

From: Eckerman, Keith F. [mailto:eckermankf@ornl.gov]
Sent: Saturday, March 26, 2011 12:26 PM
To: HOO Hoc
Subject: Re: Skin Dose Coefficients per Tony Huffert's Request
Importance: High

Attached are the skin and effective (ICRP 60 wTs) dose rate coefficients for water immersion; i.e., swimming. See the Excel file SkinDose_Waterlmmersion.XLS. Please note:
1. The values reflect no consideration of protective clothing.
2. The values are for the individual radioisotope with no consideration of their decay chain. That is the Sr-90 value does not include Y-90, Cs-137 values does not include Ba-137m, etc.

Also attached is a file (DecayChains.TXT) listing of the decay chains. That file can be opened via MS Notebook or any ASCI editor.

The values are based on the nuclear decay data of ICRP 107 and the computational methods of Federal Guidance Report 12 & 13.

Keith F. Eckerman, Ph.D.
Dosimetry Research Team
P.O. Box 2008 MS6495
Oak Ridge National Laboratory
Oak Ridge , TN 37871-6495

Phone: (865) 574-6251
FAX: (865) 574-3266
E-mail: eckermankf@ornl.gov
Web site: http://ordose.ornl.gov/

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Decay Chains of the ICRP-07 Collection

```
Ne-24
                          -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife     f1        Nuclide    f2       Nuclide    f3
Nuclide    f4       Nuclide
  1 Ne-24       3.38m  1.000E+00 Na-24
  2 Na-24    14.9590h  1.000E+00 Mg-24$

Mg-28
                          -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife     f1        Nuclide    f2       Nuclide    f3
Nuclide    f4       Nuclide
  1 Mg-28     20.915h  1.000E+00 Al-28
  2 Al-28     2.2414m  1.000E+00 Si-28$

Si-32
                          -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife     f1        Nuclide    f2       Nuclide    f3
Nuclide    f4       Nuclide
  1 Si-32        132y  1.000E+00 P-32
  2 P-32      14.263d  1.000E+00 S-32$

S-38
                          -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife     f1        Nuclide    f2       Nuclide    f3
Nuclide    f4       Nuclide
  1 S-38       170.3m  1.000E+00 Cl-38
  2 Cl-38      37.24m  1.000E+00 Ar-38$

Cl-34m
                          -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife     f1        Nuclide    f2       Nuclide    f3
Nuclide    f4       Nuclide
  1 Cl-34m     32.00m  4.460E-01 Cl-34    5.540E-01 S-34$
  2 Cl-34     1.5264s  1.000E+00 S-34$

Cl-39
                          -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife     f1        Nuclide    f2       Nuclide    f3
Nuclide    f4       Nuclide
  1 Cl-39       55.6m  1.000E+00 Ar-39
  2 Ar-39        269y  1.000E+00 K-39$

Ar-42
                          -------------------------  Daughter
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Products  -------------------------
    Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
Nuclide    f4      Nuclide
  1 Ar-42       32.9y  1.000E+00 K-42
  2 K-42      12.360h  1.000E+00 Ca-42$

Ar-43
                                 -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
Nuclide    f4      Nuclide
  1 Ar-43       5.37m  1.000E+00 K-43
  2 K-43        22.3h  1.000E+00 Ca-43$

Ar-44
                                 -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
Nuclide    f4      Nuclide
  1 Ar-44      11.87m  1.000E+00 K-44
  2 K-44       22.13m  1.000E+00 Ca-44$

K-45
                                 -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
Nuclide    f4      Nuclide
  1 K-45        17.3m  1.000E+00 Ca-45
  2 Ca-45     162.67d  1.000E+00 Sc-45$

Ca-47
                                 -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
Nuclide    f4      Nuclide
  1 Ca-47      4.536d  1.000E+00 Sc-47
  2 Sc-47     3.3492d  1.000E+00 Ti-47$

Ca-49
                                 -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
Nuclide    f4      Nuclide
  1 Ca-49      8.718m  1.000E+00 Sc-49
  2 Sc-49       57.2m  1.000E+00 Ti-49$

Sc-44m
                                 -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
Nuclide    f4      Nuclide
  1 Sc-44m     58.61h  9.880E-01 Sc-44   1.200E-02 Ca-44$
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  2 Sc-44       3.97h  1.000E+00 Ca-44$

Ti-44
                             -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1      Nuclide   f2      Nuclide   f3
Nuclide   f4      Nuclide
  1 Ti-44        60.0y  1.000E+00 Sc-44
  2 Sc-44        3.97h  1.000E+00 Ca-44$

Ti-52
                             -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1      Nuclide   f2      Nuclide   f3
Nuclide   f4      Nuclide
  1 Ti-52         1.7m  1.000E+00 V-52
  2 V-52        3.743m  1.000E+00 Cr-52$

Cr-48
                             -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1      Nuclide   f2      Nuclide   f3
Nuclide   f4      Nuclide
  1 Cr-48       21.56h  1.000E+00 V-48
  2 V-48      15.9735d  1.000E+00 Ti-48$

Cr-49
                             -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1      Nuclide   f2      Nuclide   f3
Nuclide   f4      Nuclide
  1 Cr-49        42.3m  1.000E+00 V-49
  2 V-49          330d  1.000E+00 Ti-49$

Cr-56
                             -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1      Nuclide   f2      Nuclide   f3
Nuclide   f4      Nuclide
  1 Cr-56        5.94m  1.000E+00 Mn-56
  2 Mn-56      2.5789h  1.000E+00 Fe-56$

Mn-51
                             -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1      Nuclide   f2      Nuclide   f3
Nuclide   f4      Nuclide
  1 Mn-51        46.2m  1.000E+00 Cr-51
  2 Cr-51     27.7025d  1.000E+00 V-51$

Mn-52m
                             -------------------------  Daughter
```

```
Products    -------------------------
     Nuclide  Halflife     f1       Nuclide    f2       Nuclide    f3
Nuclide   f4        Nuclide
  1 Mn-52m       21.1m  1.750E-02 Mn-52    9.825E-01 Cr-52$
  2 Mn-52       5.591d  1.000E+00 Cr-52$

Fe-52
                                    -------------------------  Daughter
Products    -------------------------
     Nuclide  Halflife     f1       Nuclide    f2       Nuclide    f3
Nuclide   f4        Nuclide
  1 Fe-52       8.275h  1.000E+00 Mn-52m
  2 Mn-52m       21.1m  1.750E-02 Mn-52    9.825E-01 Cr-52$
  3 Mn-52       5.591d  1.000E+00 Cr-52$

Fe-53
                                    -------------------------  Daughter
Products    -------------------------
     Nuclide  Halflife     f1       Nuclide    f2       Nuclide    f3
Nuclide   f4        Nuclide
  1 Fe-53        8.51m  1.000E+00 Mn-53
  2 Mn-53      3.7E+6y  1.000E+00 Cr-53$

Fe-53m
                                    -------------------------  Daughter
Products    -------------------------
     Nuclide  Halflife     f1       Nuclide    f2       Nuclide    f3
Nuclide   f4        Nuclide
  1 Fe-53m      2.526m  1.000E+00 Fe-53
  2 Fe-53        8.51m  1.000E+00 Mn-53
  3 Mn-53      3.7E+6y  1.000E+00 Cr-53$

Fe-60
                                    -------------------------  Daughter
Products    -------------------------
     Nuclide  Halflife     f1       Nuclide    f2       Nuclide    f3
Nuclide   f4        Nuclide
  1 Fe-60      1.5E+6y  1.000E+00 Co-60m
  2 Co-60m     10.467m  9.976E-01 Co-60    2.400E-03 Ni-60$
  3 Co-60      5.2713y  1.000E+00 Ni-60$

Fe-61
                                    -------------------------  Daughter
Products    -------------------------
     Nuclide  Halflife     f1       Nuclide    f2       Nuclide    f3
Nuclide   f4        Nuclide
  1 Fe-61        5.98m  1.000E+00 Co-61
  2 Co-61       1.650h  1.000E+00 Ni-61$

Fe-62
                                    -------------------------  Daughter
Products    -------------------------
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    Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
Nuclide    f4      Nuclide
  1 Fe-62         68s  1.000E+00 Co-62
  2 Co-62       1.50m  1.000E+00 Ni-62$

Co-55
                                -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
Nuclide    f4      Nuclide
  1 Co-55      17.53h  1.000E+00 Fe-55
  2 Fe-55      2.737y  1.000E+00 Mn-55$

Co-58m
                                -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
Nuclide    f4      Nuclide
  1 Co-58m      9.04h  1.000E+00 Co-58
  2 Co-58      70.86d  1.000E+00 Fe-58$

Co-60m
                                -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
Nuclide    f4      Nuclide
  1 Co-60m    10.467m  9.976E-01 Co-60   2.400E-03 Ni-60$
  2 Co-60     5.2713y  1.000E+00 Ni-60$

Ni-56
                                -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
Nuclide    f4      Nuclide
  1 Ni-56      6.075d  1.000E+00 Co-56
  2 Co-56      77.23d  1.000E+00 Fe-56$

Ni-57
                                -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
Nuclide    f4      Nuclide
  1 Ni-57      35.60h  1.000E+00 Co-57
  2 Co-57     271.74d  1.000E+00 Fe-57$

Ni-66
                                -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
Nuclide    f4      Nuclide
  1 Ni-66       54.6h  1.000E+00 Cu-66
  2 Cu-66      5.120m  1.000E+00 Zn-66$
```

```
Cu-57
                          -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
Nuclide    f4       Nuclide
  1 Cu-57      0.1963s  1.000E+00 Ni-57
  2 Ni-57       35.60h  1.000E+00 Co-57
  3 Co-57      271.74d  1.000E+00 Fe-57$

Cu-59
                          -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
Nuclide    f4       Nuclide
  1 Cu-59         81.5s  1.000E+00 Ni-59
  2 Ni-59      1.01E+5y  1.000E+00 Co-59$

Cu-69
                          -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
Nuclide    f4       Nuclide
  1 Cu-69         2.85m  1.000E+00 Zn-69
  2 Zn-69         56.4m  1.000E+00 Ga-69$

Zn-60
                          -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
Nuclide    f4       Nuclide
  1 Zn-60         2.38m  1.000E+00 Cu-60
  2 Cu-60         23.7m  1.000E+00 Ni-60$

Zn-61
                          -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
Nuclide    f4       Nuclide
  1 Zn-61         89.1s  1.000E+00 Cu-61
  2 Cu-61        3.333h  1.000E+00 Ni-61$

Zn-62
                          -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
Nuclide    f4       Nuclide
  1 Zn-62        9.186h  1.000E+00 Cu-62
  2 Cu-62        9.673m  1.000E+00 Ni-62$

Zn-69m
                          -------------------------  Daughter
```

```
Products  -------------------------
    Nuclide  Halflife    f1       Nuclide    f2       Nuclide    f3
Nuclide    f4       Nuclide
  1 Zn-69m      13.76h  9.997E-01 Zn-69   3.300E-04 Ga-69$
  2 Zn-69        56.4m  1.000E+00 Ga-69$

Zn-72
                         -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1       Nuclide    f2       Nuclide    f3
Nuclide    f4       Nuclide
  1 Zn-72        46.5h  1.000E+00 Ga-72
  2 Ga-72       14.10h  1.000E+00 Ge-72$

Ga-65
                         -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1       Nuclide    f2       Nuclide    f3
Nuclide    f4       Nuclide
  1 Ga-65        15.2m  1.000E+00 Zn-65
  2 Zn-65      244.06d  1.000E+00 Cu-65$

Ge-66
                         -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1       Nuclide    f2       Nuclide    f3
Nuclide    f4       Nuclide
  1 Ge-66        2.26h  1.000E+00 Ga-66
  2 Ga-66        9.49h  1.000E+00 Zn-66$

Ge-67
                         -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1       Nuclide    f2       Nuclide    f3
Nuclide    f4       Nuclide
  1 Ge-67        18.9m  1.000E+00 Ga-67
  2 Ga-67      3.2612d  1.000E+00 Zn-67$

Ge-68
                         -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1       Nuclide    f2       Nuclide    f3
Nuclide    f4       Nuclide
  1 Ge-68      270.95d  1.000E+00 Ga-68
  2 Ga-68       67.71m  1.000E+00 Zn-68$

Ge-77
                         -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1       Nuclide    f2       Nuclide    f3
Nuclide    f4       Nuclide
  1 Ge-77       11.30h  1.000E+00 As-77
```

```
  2 As-77       38.83h  1.000E+00 Se-77$

Ge-78
                                 -------------------------  Daughter
Products -------------------------
    Nuclide  Halflife     f1       Nuclide    f2       Nuclide    f3
Nuclide   f4       Nuclide
  1 Ge-78          88m  1.000E+00 As-78
  2 As-78        90.7m  1.000E+00 Se-78$

As-68
                                 -------------------------  Daughter
Products -------------------------
    Nuclide  Halflife     f1       Nuclide    f2       Nuclide    f3
Nuclide   f4       Nuclide
  1 As-68       151.6s  1.000E+00 Ge-68
  2 Ge-68      270.95d  1.000E+00 Ga-68
  3 Ga-68       67.71m  1.000E+00 Zn-68$

As-69
                                 -------------------------  Daughter
Products -------------------------
    Nuclide  Halflife     f1       Nuclide    f2       Nuclide    f3
Nuclide   f4       Nuclide
  1 As-69       15.23m  1.000E+00 Ge-69
  2 Ge-69       39.05h  1.000E+00 Ga-69$

As-71
                                 -------------------------  Daughter
Products -------------------------
    Nuclide  Halflife     f1       Nuclide    f2       Nuclide    f3
Nuclide   f4       Nuclide
  1 As-71       65.28h  1.000E+00 Ge-71
  2 Ge-71       11.43d  1.000E+00 Ga-71$

As-79
                                 -------------------------  Daughter
Products -------------------------
    Nuclide  Halflife     f1       Nuclide    f2       Nuclide    f3
Nuclide   f4       Nuclide
  1 As-79        9.01m  9.719E-01 Se-79m  2.812E-02 Se-79
  2 Se-79m       3.92m  9.994E-01 Se-79   5.600E-04 Br-79$
  3 Se-79    2.95E+5y  1.000E+00 Br-79$

Se-70
                                 -------------------------  Daughter
Products -------------------------
    Nuclide  Halflife     f1       Nuclide    f2       Nuclide    f3
Nuclide   f4       Nuclide
  1 Se-70        41.1m  1.000E+00 As-70
  2 As-70        52.6m  1.000E+00 Ge-70$
```

```
Se-71
                          -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife     f1       Nuclide    f2       Nuclide    f3
Nuclide    f4       Nuclide
  1 Se-71        4.74m  1.000E+00 As-71
  2 As-71       65.28h  1.000E+00 Ge-71
  3 Ge-71       11.43d  1.000E+00 Ga-71$

Se-72
                          -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife     f1       Nuclide    f2       Nuclide    f3
Nuclide    f4       Nuclide
  1 Se-72        8.40d  1.000E+00 As-72
  2 As-72        26.0h  1.000E+00 Ge-72$

Se-73
                          -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife     f1       Nuclide    f2       Nuclide    f3
Nuclide    f4       Nuclide
  1 Se-73        7.15h  1.000E+00 As-73
  2 As-73       80.30d  1.000E+00 Ge-73$

Se-73m
                          -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife     f1       Nuclide    f2       Nuclide    f3
Nuclide    f4       Nuclide
  1 Se-73m       39.8m  7.260E-01 Se-73   2.740E-01 As-73
  2 Se-73        7.15h  1.000E+00 As-73
  3 As-73       80.30d  1.000E+00 Ge-73$

Se-79m
                          -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife     f1       Nuclide    f2       Nuclide    f3
Nuclide    f4       Nuclide
  1 Se-79m       3.92m  9.994E-01 Se-79   5.600E-04 Br-79$
  2 Se-79     2.95E+5y  1.000E+00 Br-79$

Se-81m
                          -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife     f1       Nuclide    f2       Nuclide    f3
Nuclide    f4       Nuclide
  1 Se-81m      57.28m  9.995E-01 Se-81   5.200E-04 Br-81$
  2 Se-81       18.45m  1.000E+00 Br-81$

Se-83
                          -------------------------  Daughter
```

```
Products   -------------------------
    Nuclide  Halflife    f1       Nuclide    f2       Nuclide    f3
Nuclide   f4       Nuclide
  1 Se-83        22.3m  1.000E+00 Br-83
  2 Br-83        2.40h  9.984E-01 Kr-83m  1.552E-03 Kr-83$
  3 Kr-83m       1.83h  1.000E+00 Kr-83$

Se-83m
                        -------------------------  Daughter
Products   -------------------------
    Nuclide  Halflife    f1       Nuclide    f2       Nuclide    f3
Nuclide   f4       Nuclide
  1 Se-83m       70.1s  1.000E+00 Br-83
  2 Br-83        2.40h  9.984E-01 Kr-83m  1.552E-03 Kr-83$
  3 Kr-83m       1.83h  1.000E+00 Kr-83$

Se-84
                        -------------------------  Daughter
Products   -------------------------
    Nuclide  Halflife    f1       Nuclide    f2       Nuclide    f3
Nuclide   f4       Nuclide
  1 Se-84         3.1m  1.000E+00 Br-84
  2 Br-84       31.80m  1.000E+00 Kr-84$

Br-72
                        -------------------------  Daughter
Products   -------------------------
    Nuclide  Halflife    f1       Nuclide    f2       Nuclide    f3
Nuclide   f4       Nuclide
  1 Br-72        78.6s  1.000E+00 Se-72
  2 Se-72        8.40d  1.000E+00 As-72
  3 As-72        26.0h  1.000E+00 Ge-72$

Br-73
                        -------------------------  Daughter
Products   -------------------------
    Nuclide  Halflife    f1       Nuclide    f2       Nuclide    f3
Nuclide   f4       Nuclide
  1 Br-73         3.4m  9.988E-01 Se-73m  1.192E-03 Se-73
  2 Se-73m       39.8m  7.260E-01 Se-73   2.740E-01 As-73
  3 Se-73        7.15h  1.000E+00 As-73
  4 As-73       80.30d  1.000E+00 Ge-73$

Br-75
                        -------------------------  Daughter
Products   -------------------------
    Nuclide  Halflife    f1       Nuclide    f2       Nuclide    f3
Nuclide   f4       Nuclide
  1 Br-75        96.7m  1.000E+00 Se-75
  2 Se-75     119.779d  1.000E+00 As-75$

Br-76m
```

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
				Daughter Products						
1	Br-76m	1.31s	9.970E-01	Br-76	3.000E-03	Se-76$				
2	Br-76	16.2h	1.000E+00	Se-76$						

Br-77m

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
				Daughter Products						
1	Br-77m	4.28m	1.000E+00	Br-77						
2	Br-77	57.036h	1.000E+00	Se-77$						

Br-80m

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
				Daughter Products						
1	Br-80m	4.4205h	1.000E+00	Br-80						
2	Br-80	17.68m	9.170E-01	Kr-80$	8.300E-02	Se-80$				

Br-82m

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
				Daughter Products						
1	Br-82m	6.13m	9.760E-01	Br-82	2.400E-02	Kr-82$				
2	Br-82	35.30h	1.000E+00	Kr-82$						

Br-83

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
				Daughter Products						
1	Br-83	2.40h	9.984E-01	Kr-83m	1.552E-03	Kr-83$				
2	Kr-83m	1.83h	1.000E+00	Kr-83$						

Br-85

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
				Daughter Products						
1	Br-85	2.90m	9.978E-01	Kr-85m	2.211E-03	Kr-85				
2	Kr-85m	4.480h	2.140E-01	Kr-85	7.860E-01	Rb-85$				
3	Kr-85	10.756y	1.000E+00	Rb-85$						

Kr-74

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3
				Daughter Products			

```
Nuclide    f4       Nuclide
  1 Kr-74        11.50m  1.000E+00 Br-74
  2 Br-74         25.4m  1.000E+00 Se-74$

Kr-75
                                      ------------------------  Daughter
Products  ------------------------
    Nuclide  Halflife     f1        Nuclide    f2       Nuclide    f3
Nuclide    f4       Nuclide
  1 Kr-75         4.29m  1.000E+00 Br-75
  2 Br-75         96.7m  1.000E+00 Se-75
  3 Se-75     119.779d  1.000E+00 As-75$

Kr-76
                                      ------------------------  Daughter
Products  ------------------------
    Nuclide  Halflife     f1        Nuclide    f2       Nuclide    f3
Nuclide    f4       Nuclide
  1 Kr-76         14.8h  8.114E-03 Br-76m  9.919E-01 Br-76
  2 Br-76m        1.31s  9.970E-01 Br-76   3.000E-03 Se-76$
  3 Br-76         16.2h  1.000E+00 Se-76$

Kr-77
                                      ------------------------  Daughter
Products  ------------------------
    Nuclide  Halflife     f1        Nuclide    f2       Nuclide    f3
Nuclide    f4       Nuclide
  1 Kr-77         74.4m  9.613E-02 Br-77m  9.039E-01 Br-77
  2 Br-77m        4.28m  1.000E+00 Br-77
  3 Br-77       57.036h  1.000E+00 Se-77$

Kr-81m
                                      ------------------------  Daughter
Products  ------------------------
    Nuclide  Halflife     f1        Nuclide    f2       Nuclide    f3
Nuclide    f4       Nuclide
  1 Kr-81m       13.10s  1.000E+00 Kr-81   2.500E-05 Br-81$
  2 Kr-81      2.29E+5y  1.000E+00 Br-81$

Kr-85m
                                      ------------------------  Daughter
Products  ------------------------
    Nuclide  Halflife     f1        Nuclide    f2       Nuclide    f3
Nuclide    f4       Nuclide
  1 Kr-85m       4.480h  2.140E-01 Kr-85   7.860E-01 Rb-85$
  2 Kr-85       10.756y  1.000E+00 Rb-85$

Kr-87
                                      ------------------------  Daughter
Products  ------------------------
    Nuclide  Halflife     f1        Nuclide    f2       Nuclide    f3
Nuclide    f4       Nuclide
```

プレス発表資料

福島第一原子力発電所の20km以遠のモニタリング結果について

平成23年4月8日 13時00分現在
文　部　科　学　省

○文部科学省が集計した結果

＊1　GM(ガイガーミューラー計測管)における値
＊2　電離箱における値
＊3　NaI(ヨウ化ナトリウム)シンチレータにおける値
＊4　測定時間内における測定値の変動範囲

場所(福島第1発電所からの距離)	測定日時	数値(マイクロシーベルト／時)(記載のない限り屋外)	天候	実施者
測定エリア【1】（約60km北西）	4月8日8時31分	0.8 *2	降雨なし	文部科学省
測定エリア【2】（約55km北西）	4月8日9時10分	3.5 *2	降雨なし	日本原子力研究開発機構
測定エリア【3】（約45km北西）	4月8日10時20分	2.8 *2	降雨なし	日本原子力研究開発機構
測定エリア【4】（約50km北西）	4月8日9時29分	2.3 *2	降雨なし	文部科学省
測定エリア【5】（約45km北）	4月8日11時03分	0.5 *2	降雨なし	日本原子力研究開発機構
測定エリア【6】（約35km北）	4月8日11時25分	0.6 *2	降雨なし	日本原子力研究開発機構
測定エリア【7】（約35km北）	4月8日11時39分	0.7 *2	降雨なし	日本原子力研究開発機構
測定エリア【10】（約40km北西）	4月8日9時43分	1.7 *2	降雨なし	文部科学省
測定エリア【11】（約40km北西）	4月8日9時54分	1.9 *2	降雨なし	文部科学省
測定エリア【12】（約40km西）	4月8日10時32分	0.7 *2	降雨なし	文部科学省
測定エリア【13】（約40km西）	4月8日10時39分	1.0 *2	降雨なし	文部科学省
測定エリア【14】（約35km西）	4月8日10時49分	0.8 *2	降雨なし	文部科学省
測定エリア【15】（約35km西）	4月8日10時59分	1.3 *2	降雨なし	文部科学省
測定エリア【20】（約45km北西）	4月8日10時18分	1.3 *2	降雨なし	文部科学省
測定エリア【31】（約30km西北西）	4月8日10時51分	9.0 *2	降雨なし	文部科学省

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  1 Kr-87        76.3m  1.000E+00 Rb-87
  2 Rb-87    4.923E10y  1.000E+00 Sr-87$

Kr-88
                                 -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1       Nuclide    f2       Nuclide    f3
Nuclide    f4      Nuclide
  1 Kr-88        2.84h  1.000E+00 Rb-88
  2 Rb-88       17.78m  1.000E+00 Sr-88$

Kr-89
                                 -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1       Nuclide    f2       Nuclide    f3
Nuclide    f4      Nuclide
  1 Kr-89        3.15m  1.000E+00 Rb-89
  2 Rb-89       15.15m  1.000E+00 Sr-89
  3 Sr-89       50.53d  1.000E+00 Y-89$

Rb-77
                                 -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1       Nuclide    f2       Nuclide    f3
Nuclide    f4      Nuclide
  1 Rb-77        3.77m  1.000E+00 Kr-77
  2 Kr-77        74.4m  9.613E-02 Br-77m  9.039E-01 Br-77
  3 Br-77m       4.28m  1.000E+00 Br-77
  4 Br-77     57.036h  1.000E+00 Se-77$

Rb-78m
                                 -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1       Nuclide    f2       Nuclide    f3
Nuclide    f4      Nuclide
  1 Rb-78m       5.74m  1.000E-01 Rb-78   9.000E-01 Kr-78$
  2 Rb-78       17.66m  1.000E+00 Kr-78$

Rb-79
                                 -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1       Nuclide    f2       Nuclide    f3
Nuclide    f4      Nuclide
  1 Rb-79        22.9m  1.000E+00 Kr-79
  2 Kr-79       35.04h  1.000E+00 Br-79$

Rb-81
                                 -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1       Nuclide    f2       Nuclide    f3
Nuclide    f4      Nuclide
  1 Rb-81       4.576h  9.569E-01 Kr-81m  4.309E-02 Kr-81
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```
  2 Kr-81m     13.10s  1.000E+00 Kr-81   2.500E-05 Br-81$
  3 Kr-81    2.29E+5y  1.000E+00 Br-81$

Rb-81m
                                 -------------------------  Daughter
Products -------------------------
    Nuclide  Halflife     f1      Nuclide    f2       Nuclide    f3
Nuclide   f4       Nuclide
  1 Rb-81m      30.5m  9.760E-01 Rb-81   2.135E-04 Kr-81m
2.379E-02 Kr-81
  2 Rb-81      4.576h  9.569E-01 Kr-81m  4.309E-02 Kr-81
  3 Kr-81m     13.10s  1.000E+00 Kr-81   2.500E-05 Br-81$
  4 Kr-81    2.29E+5y  1.000E+00 Br-81$

Rb-83
                                 -------------------------  Daughter
Products -------------------------
    Nuclide  Halflife     f1      Nuclide    f2       Nuclide    f3
Nuclide   f4       Nuclide
  1 Rb-83       86.2d  7.429E-01 Kr-83m  2.571E-01 Kr-83$
  2 Kr-83m      1.83h  1.000E+00 Kr-83$

Rb-84m
                                 -------------------------  Daughter
Products -------------------------
    Nuclide  Halflife     f1      Nuclide    f2       Nuclide    f3
Nuclide   f4       Nuclide
  1 Rb-84m     20.26m  1.000E+00 Rb-84
  2 Rb-84      32.77d  9.620E-01 Kr-84$   3.800E-02 Sr-84$

Rb-86m
                                 -------------------------  Daughter
Products -------------------------
    Nuclide  Halflife     f1      Nuclide    f2       Nuclide    f3
Nuclide   f4       Nuclide
  1 Rb-86m     1.017m  1.000E+00 Rb-86
  2 Rb-86     18.642d  1.000E+00 Sr-86$   5.200E-05 Kr-86$

Rb-89
                                 -------------------------  Daughter
Products -------------------------
    Nuclide  Halflife     f1      Nuclide    f2       Nuclide    f3
Nuclide   f4       Nuclide
  1 Rb-89      15.15m  1.000E+00 Sr-89
  2 Sr-89      50.53d  1.000E+00 Y-89$

Rb-90
                                 -------------------------  Daughter
Products -------------------------
    Nuclide  Halflife     f1      Nuclide    f2       Nuclide    f3
Nuclide   f4       Nuclide
  1 Rb-90        158s  1.000E+00 Sr-90
```

```
  2 Sr-90       28.79y  1.000E+00 Y-90
  3 Y-90        64.10h  1.000E+00 Zr-90$

Rb-90m
                                -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife     f1      Nuclide    f2      Nuclide    f3
Nuclide   f4       Nuclide
  1 Rb-90m        258s  2.600E-02 Rb-90   9.740E-01 Sr-90
  2 Rb-90         158s  1.000E+00 Sr-90
  3 Sr-90       28.79y  1.000E+00 Y-90
  4 Y-90        64.10h  1.000E+00 Zr-90$

Sr-79
                                -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife     f1      Nuclide    f2      Nuclide    f3
Nuclide   f4       Nuclide
  1 Sr-79        2.25m  1.000E+00 Rb-79
  2 Rb-79        22.9m  1.000E+00 Kr-79
  3 Kr-79       35.04h  1.000E+00 Br-79$

Sr-80
                                -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife     f1      Nuclide    f2      Nuclide    f3
Nuclide   f4       Nuclide
  1 Sr-80       106.3m  1.000E+00 Rb-80
  2 Rb-80        33.4s  1.000E+00 Kr-80$

Sr-81
                                -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife     f1      Nuclide    f2      Nuclide    f3
Nuclide   f4       Nuclide
  1 Sr-81        22.3m  1.442E-03 Rb-81m  9.986E-01 Rb-81
  2 Rb-81m       30.5m  9.760E-01 Rb-81   2.135E-04 Kr-81m
2.379E-02 Kr-81
  3 Rb-81       4.576h  9.569E-01 Kr-81m  4.309E-02 Kr-81
  4 Kr-81m      13.10s  1.000E+00 Kr-81   2.500E-05 Br-81$
  5 Kr-81     2.29E+5y  1.000E+00 Br-81$

Sr-82
                                -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife     f1      Nuclide    f2      Nuclide    f3
Nuclide   f4       Nuclide
  1 Sr-82       25.36d  1.000E+00 Rb-82
  2 Rb-82       1.273m  1.000E+00 Kr-82$

Sr-83
                                -------------------------  Daughter
```

```
Products  -------------------------
    Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
Nuclide   f4      Nuclide
  1 Sr-83      32.41h  1.000E+00 Rb-83
  2 Rb-83       86.2d  7.429E-01 Kr-83m  2.571E-01 Kr-83$
  3 Kr-83m      1.83h  1.000E+00 Kr-83$

Sr-85m
                       -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
Nuclide   f4      Nuclide
  1 Sr-85m     67.63m  8.660E-01 Sr-85   1.340E-01 Rb-85$
  2 Sr-85      64.84d  1.000E+00 Rb-85$

Sr-87m
                       -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
Nuclide   f4      Nuclide
  1 Sr-87m     2.815h  3.000E-03 Rb-87   9.970E-01 Sr-87$
  2 Rb-87   4.923E10y  1.000E+00 Sr-87$

Sr-90
                       -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
Nuclide   f4      Nuclide
  1 Sr-90      28.79y  1.000E+00 Y-90
  2 Y-90       64.10h  1.000E+00 Zr-90$

Sr-91
                       -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
Nuclide   f4      Nuclide
  1 Sr-91       9.63h  5.825E-01 Y-91m   4.175E-01 Y-91
  2 Y-91m      49.71m  1.000E+00 Y-91
  3 Y-91       58.51d  1.000E+00 Zr

Sr-92
                       -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
Nuclide   f4      Nuclide
  1 Sr-92       2.66h  1.000E+00 Y-92
  2 Y-92        3.54h  1.000E+00 Zr-92$

Sr-93
                       -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
```

```
Nuclide    f4       Nuclide
  1 Sr-93       7.423m  1.000E+00 Y-93
  2 Y-93        10.18h  1.000E+00 Zr-93
  3 Zr-93     1.53E+6y  9.750E-01 Nb-93m  2.500E-02 Nb-93$
  4 Nb-93m      16.13y  1.000E+00 Nb-93$

Sr-94
                                 -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife     f1       Nuclide    f2       Nuclide    f3
Nuclide    f4       Nuclide
  1 Sr-94        75.3s  1.000E+00 Y-94
  2 Y-94         18.7m  1.000E+00 Zr-94$

Y-81
                                 -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife     f1       Nuclide    f2       Nuclide    f3
Nuclide    f4       Nuclide
  1 Y-81         70.4s  1.000E+00 Sr-81
  2 Sr-81        22.3m  1.442E-03 Rb-81m  9.986E-01 Rb-81
  3 Rb-81m       30.5m  9.760E-01 Rb-81   2.135E-04 Kr-81m
2.379E-02 Kr-81
  4 Rb-81       4.576h  9.569E-01 Kr-81m  4.309E-02 Kr-81
  5 Kr-81m      13.10s  1.000E+00 Kr-81   2.500E-05 Br-81$
  6 Kr-81     2.29E+5y  1.000E+00 Br-81$

Y-83
                                 -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife     f1       Nuclide    f2       Nuclide    f3
Nuclide    f4       Nuclide
  1 Y-83         7.08m  1.000E+00 Sr-83
  2 Sr-83       32.41h  1.000E+00 Rb-83
  3 Rb-83        86.2d  7.429E-01 Kr-83m  2.571E-01 Kr-83$
  4 Kr-83m       1.83h  1.000E+00 Kr-83$

Y-83m
                                 -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife     f1       Nuclide    f2       Nuclide    f3
Nuclide    f4     . Nuclide
  1 Y-83m        2.85m  4.000E-01 Y-83    6.000E-01 Sr-83
  2 Y-83         7.08m  1.000E+00 Sr-83
  3 Sr-83       32.41h  1.000E+00 Rb-83
  4 Rb-83        86.2d  7.429E-01 Kr-83m  2.571E-01 Kr-83$
  5 Kr-83m       1.83h  1.000E+00 Kr-83$

Y-85
                                 -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife     f1       Nuclide    f2       Nuclide    f3
```

```
Nuclide    f4        Nuclide
  1 Y-85          2.68h  1.000E+00 Sr-85m
  2 Sr-85m       67.63m  8.660E-01 Sr-85    1.340E-01 Rb-85$
  3 Sr-85        64.84d  1.000E+00 Rb-85$

Y-85m
                                  -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
Nuclide    f4        Nuclide
  1 Y-85m         4.86h  4.000E-02 Sr-85m   9.600E-01 Sr-85
  2 Sr-85m       67.63m  8.660E-01 Sr-85    1.340E-01 Rb-85$
  3 Sr-85        64.84d  1.000E+00 Rb-85$

Y-86m
                                  -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
Nuclide    f4        Nuclide
  1 Y-86m           48m  9.931E-01 Y-86     6.900E-03 Sr-86$
  2 Y-86         14.74h  1.000E+00 Sr-86$

Y-87
                                  -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
Nuclide    f4        Nuclide
  1 Y-87          79.8h  1.000E+00 Sr-87m
  2 Sr-87m       2.815h  3.000E-03 Rb-87    9.970E-01 Sr-87$
  3 Rb-87   4.923E10y  1.000E+00 Sr-87$

Y-87m
                                  -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
Nuclide    f4        Nuclide
  1 Y-87m        13.37h  9.843E-01 Y-87     1.570E-02 Sr-87$
  2 Y-87          79.8h  1.000E+00 Sr-87m
  3 Sr-87m       2.815h  3.000E-03 Rb-87    9.970E-01 Sr-87$
  4 Rb-87   4.923E10y  1.000E+00 Sr-87$

Y-90m
                                  -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
Nuclide    f4        Nuclide
  1 Y-90m         3.19h  1.000E+00 Y-90     1.800E-05 Zr-90$
  2 Y-90         64.10h  1.000E+00 Zr-90$

Y-91m
                                  -------------------------  Daughter
Products  -------------------------
```

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	Y-91m	49.71m	1.000E+00	Y-91						
2	Y-91	58.51d	1.000E+00	Zr-91$						

Y-93

------------------------- Daughter Products -------------------------

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	Y-93	10.18h	1.000E+00	Zr-93						
2	Zr-93	1.53E+6y	9.750E-01	Nb-93m	2.500E-02	Nb-93$				
3	Nb-93m	16.13y	1.000E+00	Nb-93$						

Y-95

------------------------- Daughter Products -------------------------

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	Y-95	10.3m	1.000E+00	Zr-95						
2	Zr-95	64.032d	1.080E-02	Nb-95m	9.892E-01	Nb-95				
3	Nb-95m	3.61d	9.440E-01	Nb-95	5.600E-02	Mo-95$				
4	Nb-95	34.991d	1.000E+00	Mo-95$						

Zr-85

------------------------- Daughter Products -------------------------

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	Zr-85	7.86m	9.684E-01	Y-85m	3.159E-02	Y-85				
2	Y-85m	4.86h	4.000E-02	Sr-85m	9.600E-01	Sr-85				
3	Y-85	2.68h	1.000E+00	Sr-85m						
4	Sr-85m	67.63m	8.660E-01	Sr-85	1.340E-01	Rb-85$				
5	Sr-85	64.84d	1.000E+00	Rb-85$						

Zr-86

------------------------- Daughter Products -------------------------

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	Zr-86	16.5h	1.000E+00	Y-86						
2	Y-86	14.74h	1.000E+00	Sr-86$						

Zr-87

------------------------- Daughter Products -------------------------

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	Zr-87	1.68h	9.970E-01	Y-87m	2.964E-03	Y-87				
2	Y-87m	13.37h	9.843E-01	Y-87	1.570E-02	Sr-87$				
3	Y-87	79.8h	1.000E+00	Sr-87m						
4	Sr-87m	2.815h	3.000E-03	Rb-87	9.970E-01	Sr-87$				

```
  5 Rb-87   4.923E10y  1.000E+00 Sr-87$

Zr-88
                          -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife     f1       Nuclide    f2       Nuclide    f3
Nuclide   f4        Nuclide
  1 Zr-88        83.4d  1.000E+00 Y-88
  2 Y-88       106.65d  1.000E+00 Sr-88$

Zr-89m
                          -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife     f1       Nuclide    f2       Nuclide    f3
Nuclide   f4        Nuclide
  1 Zr-89m     4.161m  9.377E-01 Zr-89   6.230E-02 Y-89$
  2 Zr-89      78.41h  1.000E+00 Y-89$

Zr-93
                          -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife     f1       Nuclide    f2       Nuclide    f3
Nuclide   f4        Nuclide
  1 Zr-93    1.53E+6y  9.750E-01 Nb-93m  2.500E-02 Nb-93$
  2 Nb-93m     16.13y  1.000E+00 Nb-93$

Zr-95
                          -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife     f1       Nuclide    f2       Nuclide    f3
Nuclide   f4        Nuclide
  1 Zr-95     64.032d  1.080E-02 Nb-95m  9.892E-01 Nb-95
  2 Nb-95m      3.61d  9.440E-01 Nb-95   5.600E-02 Mo-95$
  3 Nb-95     34.991d  1.000E+00 Mo-95$

Zr-97
                          -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife     f1       Nuclide    f2       Nuclide    f3
Nuclide   f4        Nuclide
  1 Zr-97     16.744h  1.000E+00 Nb-97
  2 Nb-97       72.1m  1.000E+00 Mo-97$

Nb-87
                          -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife     f1       Nuclide    f2       Nuclide    f3
Nuclide   f4        Nuclide
  1 Nb-87       3.75m  1.000E+00 Zr-87
  2 Zr-87       1.68h  9.970E-01 Y-87m   2.964E-03 Y-87
  3 Y-87m      13.37h  9.843E-01 Y-87    1.570E-02 Sr-87$
  4 Y-87        79.8h  1.000E+00 Sr-87m
```

```
  5 Sr-87m     2.815h  3.000E-03 Rb-87   9.970E-01 Sr-87$
  6 Rb-87   4.923E10y  1.000E+00 Sr-87$

Nb-88
                            -------------------------  Daughter
Products -------------------------
    Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
Nuclide    f4      Nuclide
  1 Nb-88       14.5m  1.000E+00 Zr-88
  2 Zr-88       83.4d  1.000E+00 Y-88
  3 Y-88      106.65d  1.000E+00 Sr-88$

Nb-88m
                            -------------------------  Daughter
Products -------------------------
    Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
Nuclide    f4      Nuclide
  1 Nb-88m      7.78m  1.000E+00 Zr-88
  2 Zr-88       83.4d  1.000E+00 Y-88
  3 Y-88      106.65d  1.000E+00 Sr-88$

Nb-89
                            -------------------------  Daughter
Products -------------------------
    Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
Nuclide    f4      Nuclide
  1 Nb-89       2.03h  1.228E-02 Zr-89m  9.877E-01 Zr-89
  2 Zr-89m     4.161m  9.377E-01 Zr-89   6.230E-02 Y-89$
  3 Zr-89      78.41h  1.000E+00 Y-89$

Nb-89m
                            -------------------------  Daughter
Products -------------------------
    Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
Nuclide    f4      Nuclide
  1 Nb-89m        66m  1.000E+00 Zr-89m
  2 Zr-89m     4.161m  9.377E-01 Zr-89   6.230E-02 Y-89$
  3 Zr-89      78.41h  1.000E+00 Y-89$

Nb-91m
                            -------------------------  Daughter
Products -------------------------
    Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
Nuclide    f4      Nuclide
  1 Nb-91m     60.86d  9.660E-01 Nb-91   3.400E-02 Zr-91$
  2 Nb-91        680y  1.000E+00 Zr-91$

Nb-94m
                            -------------------------  Daughter
Products -------------------------
    Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
Nuclide    f4      Nuclide
```

```
  1 Nb-94m      6.263m  9.950E-01 Nb-94    5.000E-03 Mo-94$
  2 Nb-94     2.03E+4y  1.000E+00 Mo-94$

Nb-95m
                                 -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife     f1       Nuclide     f2       Nuclide    f3
Nuclide   f4       Nuclide
  1 Nb-95m       3.61d  9.440E-01 Nb-95    5.600E-02 Mo-95$
  2 Nb-95      34.991d  1.000E+00 Mo-95$

Nb-99
                                 -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife     f1       Nuclide     f2       Nuclide    f3
Nuclide   f4       Nuclide
  1 Nb-99        15.0s  1.000E+00 Mo-99
  2 Mo-99       65.94h  8.773E-01 Tc-99m   1.227E-01 Tc-99
  3 Tc-99m      6.015h  1.000E+00 Tc-99    3.700E-05 Ru-99$
  4 Tc-99    2.111E+5y  1.000E+00 Ru-99$

Nb-99m
                                 -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife     f1       Nuclide     f2       Nuclide    f3
Nuclide   f4       Nuclide
  1 Nb-99m        2.6m  2.000E-02 Nb-99    9.800E-01 Mo-99
  2 Nb-99        15.0s  1.000E+00 Mo-99
  3 Mo-99       65.94h  8.773E-01 Tc-99m   1.227E-01 Tc-99
  4 Tc-99m      6.015h  1.000E+00 Tc-99    3.700E-05 Ru-99$
  5 Tc-99    2.111E+5y  1.000E+00 Ru-99$

Mo-89
                                 -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife     f1       Nuclide     f2       Nuclide    f3
Nuclide   f4       Nuclide
  1 Mo-89        2.11m  1.000E+00 Nb-89
  2 Nb-89        2.03h  1.228E-02 Zr-89m   9.877E-01 Zr-89
  3 Zr-89m      4.161m  9.377E-01 Zr-89    6.230E-02 Y-89$
  4 Zr-89       78.41h  1.000E+00 Y-89$

Mo-90
                                 -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife     f1       Nuclide     f2       Nuclide    f3
Nuclide   f4       Nuclide
  1 Mo-90        5.56h  1.000E+00 Nb-90
  2 Nb-90       14.60h  1.000E+00 Zr-90$

Mo-91
                                 -------------------------  Daughter
```

```
Products  -------------------------
    Nuclide  Halflife    f1       Nuclide    f2       Nuclide    f3
Nuclide   f4       Nuclide
  1 Mo-91       15.49m  3.423E-04 Nb-91m  9.997E-01 Nb-91
  2 Nb-91m      60.86d  9.660E-01 Nb-91   3.400E-02 Zr-91$
  3 Nb-91         680y  1.000E+00 Zr-91$

Mo-91m
                         -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1       Nuclide    f2       Nuclide    f3
Nuclide   f4       Nuclide
  1 Mo-91m       64.6s  5.000E-01 Mo-91   5.000E-01 Nb-91m
  2 Mo-91       15.49m  3.423E-04 Nb-91m  9.997E-01 Nb-91
  3 Nb-91m      60.86d  9.660E-01 Nb-91   3.400E-02 Zr-91$
  4 Nb-91         680y  1.000E+00 Zr-91$

Mo-93
                         -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1       Nuclide    f2       Nuclide    f3
Nuclide   f4       Nuclide
  1 Mo-93      4.0E+3y  8.800E-01 Nb-93m  1.200E-01 Nb-93$
  2 Nb-93m      16.13y  1.000E+00 Nb-93$

Mo-93m
                         -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1       Nuclide    f2       Nuclide    f3
Nuclide   f4       Nuclide
  1 Mo-93m       6.85h  9.988E-01 Mo-93   1.200E-03 Nb-93$
  2 Mo-93      4.0E+3y  8.800E-01 Nb-93m  1.200E-01 Nb-93$
  3 Nb-93m      16.13y  1.000E+00 Nb-93$

Mo-99
                         -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1       Nuclide    f2       Nuclide    f3
Nuclide   f4       Nuclide
  1 Mo-99       65.94h  8.773E-01 Tc-99m  1.227E-01 Tc-99
  2 Tc-99m      6.015h  1.000E+00 Tc-99   3.700E-05 Ru-99$
  3 Tc-99   2.111E+5y  1.000E+00 Ru-99$

Mo-101
                         -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1       Nuclide    f2       Nuclide    f3
Nuclide   f4       Nuclide
  1 Mo-101      14.61m  1.000E+00 Tc-101
  2 Tc-101       14.2m  1.000E+00 Ru-101$

Mo-102
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```
                       -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
Nuclide   f4       Nuclide
  1 Mo-102       11.3m  1.000E+00 Tc-102
  2 Tc-102       5.28s  1.000E+00 Ru-102$

Tc-91
                       -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
Nuclide   f4       Nuclide
  1 Tc-91        3.14m  6.979E-03 Mo-91m  9.930E-01 Mo-91
  2 Mo-91m       64.6s  5.000E-01 Mo-91   5.000E-01 Nb-91m
  3 Mo-91       15.49m  3.423E-04 Nb-91m  9.997E-01 Nb-91
  4 Nb-91m      60.86d  9.660E-01 Nb-91   3.400E-02 Zr-91$
  5 Nb-91         680y  1.000E+00 Zr-91$

Tc-91m
                       -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
Nuclide   f4       Nuclide
  1 Tc-91m        3.3m  9.798E-01 Mo-91m  2.024E-02 Mo-91
  2 Mo-91m       64.6s  5.000E-01 Mo-91   5.000E-01 Nb-91m
  3 Mo-91       15.49m  3.423E-04 Nb-91m  9.997E-01 Nb-91
  4 Nb-91m      60.86d  9.660E-01 Nb-91   3.400E-02 Zr-91$
  5 Nb-91         680y  1.000E+00 Zr-91$

Tc-93
                       -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
Nuclide   f4       Nuclide
  1 Tc-93        2.75h  1.000E+00 Mo-93
  2 Mo-93      4.0E+3y  8.800E-01 Nb-93m  1.200E-01 Nb-93$
  3 Nb-93m      16.13y  1.000E+00 Nb-93$

Tc-93m
                       -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
Nuclide   f4       Nuclide
  1 Tc-93m       43.5m  7.660E-01 Tc-93   2.340E-01 Mo-93
  2 Tc-93        2.75h  1.000E+00 Mo-93
  3 Mo-93      4.0E+3y  8.800E-01 Nb-93m  1.200E-01 Nb-93$
  4 Nb-93m      16.13y  1.000E+00 Nb-93$

Tc-95m
                       -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
```

```
Nuclide    f4       Nuclide
  1 Tc-95m          61d  3.880E-02 Tc-95   9.612E-01 Mo-95$
  2 Tc-95         20.0h  1.000E+00 Mo-95$

Tc-96m
                           -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife     f1       Nuclide    f2       Nuclide    f3
Nuclide   f4       Nuclide
  1 Tc-96m        51.5m  9.800E-01 Tc-96   2.000E-02 Mo
  2 Tc-96         4.28d  1.000E+00 Mo-96$

Tc-97m
                           -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife     f1       Nuclide    f2       Nuclide    f3
Nuclide   f4       Nuclide
  1 Tc-97m        90.1d  1.000E+00 Tc-97
  2 Tc-97       2.6E+6y  1.000E+00 Mo-97$

Tc-99m
                           -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife     f1       Nuclide    f2       Nuclide    f3
Nuclide   f4       Nuclide
  1 Tc-99m       6.015h  1.000E+00 Tc-99   3.700E-05 Ru-99$
  2 Tc-99    2.111E+5y  1.000E+00 Ru-99$

Tc-102m
                           -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife     f1       Nuclide    f2       Nuclide    f3
Nuclide   f4       Nuclide
  1 Tc-102m       4.35m  2.000E-02 Tc-102  9.800E-01 Ru-102$
  2 Tc-102        5.28s  1.000E+00 Ru-102$

Tc-105
                           -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife     f1       Nuclide    f2       Nuclide    f3
Nuclide   f4       Nuclide
  1 Tc-105         7.6m  1.000E+00 Ru-105
  2 Ru-105        4.44h  1.000E+00 Rh-105
  3 Rh-105       35.36h  1.000E+00 Pd-105$

Ru-92
                           -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife     f1       Nuclide    f2       Nuclide    f3
Nuclide   f4       Nuclide
  1 Ru-92         3.65m  1.000E+00 Tc-92
  2 Tc-92         4.25m  1.000E+00 Mo-92$
```

```
Ru-94
                                 --------------------------  Daughter
Products  --------------------------
    Nuclide  Halflife    f1      Nuclide   f2      Nuclide   f3
Nuclide  f4     Nuclide
  1 Ru-94       51.8m  1.000E+00 Tc-94m
  2 Tc-94m      52.0m  1.000E+00 Mo-94$

Ru-95
                                 --------------------------  Daughter
Products  --------------------------
    Nuclide  Halflife    f1      Nuclide   f2      Nuclide   f3
Nuclide  f4     Nuclide
  1 Ru-95      1.643h  2.613E-02 Tc-95m  9.739E-01 Tc-95
  2 Tc-95m        61d  3.880E-02 Tc-95   9.612E-01 Mo-95$
  3 Tc-95       20.0h  1.000E+00 Mo-95$

Ru-97
                                 --------------------------  Daughter
Products  --------------------------
    Nuclide  Halflife    f1      Nuclide   f2      Nuclide   f3
Nuclide  f4     Nuclide
  1 Ru-97        2.9d  4.218E-04 Tc-97m  9.996E-01 Tc-97
  2 Tc-97m      90.1d  1.000E+00 Tc-97
  3 Tc-97     2.6E+6y  1.000E+00 Mo-97$

Ru-103
                                 --------------------------  Daughter
Products  --------------------------
    Nuclide  Halflife    f1      Nuclide   f2      Nuclide   f3
Nuclide  f4     Nuclide
  1 Ru-103     39.26d  9.876E-01 Rh-103m 1.245E-02 Rh-103$
  2 Rh-103m   56.114m  1.000E+00 Rh-103$

Ru-105
                                 --------------------------  Daughter
Products  --------------------------
    Nuclide  Halflife    f1      Nuclide   f2      Nuclide   f3
Nuclide  f4     Nuclide
  1 Ru-105      4.44h  1.000E+00 Rh-105
  2 Rh-105     35.36h  1.000E+00 Pd-105$

Ru-106
                                 --------------------------  Daughter
Products  --------------------------
    Nuclide  Halflife    f1      Nuclide   f2      Nuclide   f3
Nuclide  f4     Nuclide
  1 Ru-106    373.59d  1.000E+00 Rh-106
  2 Rh-106     29.80s  1.000E+00 Pd-106$

Ru-107
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```
                          -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1      Nuclide    f2       Nuclide    f3
Nuclide    f4       Nuclide
  1 Ru-107       3.75m  1.000E+00 Rh-107
  2 Rh-107       21.7m  1.000E+00 Pd-107
  3 Pd-107     6.5E+6y  1.000E+00 Ag-107$

Ru-108
                          -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1      Nuclide    f2       Nuclide    f3
Nuclide    f4       Nuclide
  1 Ru-108       4.55m  1.000E+00 Rh-108
  2 Rh-108       16.8s  1.000E+00 Pd-108$

Rh-94
                          -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1      Nuclide    f2       Nuclide    f3
Nuclide    f4       Nuclide
  1 Rh-94        70.6s  1.000E+00 Ru-94
  2 Ru-94        51.8m  1.000E+00 Tc-94m
  3 Tc-94m       52.0m  1.000E+00 Mo-94$

Rh-95
                          -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1      Nuclide    f2       Nuclide    f3
Nuclide    f4       Nuclide
  1 Rh-95        5.02m  1.000E+00 Ru-95
  2 Ru-95       1.643h  2.613E-02 Tc-95m  9.739E-01 Tc-95
  3 Tc-95m         61d  3.880E-02 Tc-95   9.612E-01 Mo-95$
  4 Tc-95        20.0h  1.000E+00 Mo-95$

Rh-95m
                          -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1      Nuclide    f2       Nuclide    f3
Nuclide    f4       Nuclide
  1 Rh-95m       1.96m  8.800E-01 Rh-95   1.200E-01 Ru-95
  2 Rh-95        5.02m  1.000E+00 Ru-95
  3 Ru-95       1.643h  2.613E-02 Tc-95m  9.739E-01 Tc-95
  4 Tc-95m         61d  3.880E-02 Tc-95   9.612E-01 Mo-95$
  5 Tc-95        20.0h  1.000E+00 Mo-95$

Rh-96m
                          -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1      Nuclide    f2       Nuclide    f3
Nuclide    f4       Nuclide
  1 Rh-96m       1.51m  6.000E-01 Rh-96   4.000E-01 Ru-96$
```

```
  2 Rh-96        9.90m  1.000E+00 Ru-96$

Rh-97
                                  ------------------------  Daughter
Products  ------------------------
    Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
Nuclide   f4      Nuclide
  1 Rh-97        30.7m  1.000E+00 Ru-97
  2 Ru-97         2.9d  4.218E-04 Tc-97m  9.996E-01 Tc-97
  3 Tc-97m       90.1d  1.000E+00 Tc-97
  4 Tc-97      2.6E+6y  1.000E+00 Mo-97$

Rh-97m
                                  ------------------------  Daughter
Products  ------------------------
    Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
Nuclide   f4      Nuclide
  1 Rh-97m       46.2m  5.600E-02 Rh-97   9.440E-01 Ru-97
  2 Rh-97        30.7m  1.000E+00 Ru-97
  3 Ru-97         2.9d  4.218E-04 Tc-97m  9.996E-01 Tc-97
  4 Tc-97m       90.1d  1.000E+00 Tc-97
  5 Tc-97      2.6E+6y  1.000E+00 Mo-97$

Rh-100m
                                  ------------------------  Daughter
Products  ------------------------
    Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
Nuclide   f4      Nuclide
  1 Rh-100m       4.6m  9.830E-01 Rh-100  1.700E-02 Ru-100$
  2 Rh-100       20.8h  1.000E+00 Ru-100$

Rh-101m
                                  ------------------------  Daughter
Products  ------------------------
    Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
Nuclide   f4      Nuclide
  1 Rh-101m      4.34d  6.400E-02 Rh-101  9.360E-01 Ru-101$
  2 Rh-101        3.3y  1.000E+00 Ru-101$

Rh-102m
                                  ------------------------  Daughter
Products  ------------------------
    Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
Nuclide   f4      Nuclide
  1 Rh-102m     3.742y  2.330E-03 Rh-102  9.977E-01 Ru-102$
  2 Rh-102        207d  7.800E-01 Ru-102$  2.200E-01 Pd-102$

Rh-104m
                                  ------------------------  Daughter
Products  ------------------------
    Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
Nuclide   f4      Nuclide
```

```
  1 Rh-104m      4.34m  9.987E-01 Rh-104   1.300E-03 Pd-104$
  2 Rh-104       42.3s  9.955E-01 Pd-104$  4.500E-03 Ru-104$

Rh-107
                        -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
Nuclide   f4      Nuclide
  1 Rh-107       21.7m  1.000E+00 Pd-107
  2 Pd-107     6.5E+6y  1.000E+00 Ag-107$

Rh-109
                        -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
Nuclide   f4      Nuclide
  1 Rh-109         80s  1.000E+00 Pd-109
  2 Pd-109    13.7012h  1.000E+00 Ag-109$

Pd-96
                        -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
Nuclide   f4      Nuclide
  1 Pd-96         122s  1.000E+00 Rh-96m
  2 Rh-96m       1.51m  6.000E-01 Rh-96    4.000E-01 Ru-96$
  3 Rh-96        9.90m  1.000E+00 Ru-96$

Pd-97
                        -------------------------. Daughter
Products  -------------------------
    Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
Nuclide   f4      Nuclide
  1 Pd-97        3.10m  1.162E-02 Rh-97m   9.884E-01 Rh-97
  2 Rh-97m       46.2m  5.600E-02 Rh-97    9.440E-
  3 Rh-97        30.7m  1.000E+00 Ru-97
  4 Ru-97         2.9d  4.218E-04 Tc-97m   9.996E-01 Tc-97
  5 Tc-97m       90.1d  1.000E+00 Tc-97
  6 Tc-97      2.6E+6y  1.000E+00 Mo-97$

Pd-98
                        -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
Nuclide   f4      Nuclide
  1 Pd-98        17.7m  1.000E+00 Rh-98
  2 Rh-98         8.7m  1.000E+00 Ru-98$

Pd-99
                        -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
```

```
Nuclide   f4      Nuclide
  1 Pd-99        21.4m  9.665E-01 Rh-99m  3.353E-02 Rh-99
  2 Rh-99m        4.7h  1.000E+00 Ru-99$
  3 Rh-99        16.1d  1.000E+00 Ru-99$

Pd-100
                        -------------------------  Daughter
Products -------------------------
    Nuclide  Halflife    f1       Nuclide    f2      Nuclide    f3
Nuclide   f4      Nuclide
  1 Pd-100       3.63d  1.000E+00 Rh-100
  2 Rh-100       20.8h  1.000E+00 Ru-100$

Pd-101
                        -------------------------  Daughter
Products -------------------------
    Nuclide  Halflife    f1       Nuclide    f2      Nuclide    f3
Nuclide   f4      Nuclide
  1 Pd-101       8.47h  9.973E-01 Rh-101m 2.700E-03 Rh-101
  2 Rh-101m      4.34d  6.400E-02 Rh-101  9.360E-01 Ru-101$
  3 Rh-101        3.3y  1.000E+00 Ru-101$

Pd-103
                        -------------------------  Daughter
Products -------------------------
    Nuclide  Halflife    f1       Nuclide    f2      Nuclide    f3
Nuclide   f4      Nuclide
  1 Pd-103    16.991d  9.988E-01 Rh-103m 1.251E-03 Rh-103$
  2 Rh-103m   56.114m  1.000E+00 Rh-103$

Pd-109m
                        -------------------------  Daughter
Products -------------------------
    Nuclide  Halflife    f1       Nuclide    f2      Nuclide    f3
Nuclide   f4      Nuclide
  1 Pd-109m      4.69m  1.000E+00 Pd-109
  2 Pd-109   13.7012h  1.000E+00 Ag-109$

Pd-111
                        -------------------------  Daughter
Products -------------------------
    Nuclide  Halflife    f1       Nuclide    f2      Nuclide    f3
Nuclide   f4      Nuclide
  1 Pd-111       23.4m  9.976E-01 Ag-111m 2.437E-03 Ag-111
  2 Ag-111m      64.8s  9.930E-01 Ag-111  7.000E-03 Cd-111$
  3 Ag-111       7.45d  1.000E+00 Cd-111$

Pd-112
                        -------------------------  Daughter
Products -------------------------
    Nuclide  Halflife    f1       Nuclide    f2      Nuclide    f3
Nuclide   f4      Nuclide
```

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  1 Pd-112      21.03h  1.000E+00 Ag-112
  2 Ag-112      3.130h  1.000E+00 Cd-112$

Pd-114
                         -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife     f1       Nuclide    f2       Nuclide    f3
Nuclide    f4      Nuclide
  1 Pd-114       2.42m  1.000E+00 Ag-114
  2 Ag-114        4.6s  1.000E+00 Cd-114$

Ag-99
                         -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife     f1       Nuclide    f2       Nuclide    f3
Nuclide    f4      Nuclide
  1 Ag-99         124s  1.000E+00 Pd-99
  2 Pd-99        21.4m  9.665E-01 Rh-99m  3.353E-02 Rh-99
  3 Rh-99m        4.7h  1.000E+00 Ru-99$
  4 Rh-99        16.1d  1.000E+00 Ru-99$

Ag-100m
                         -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife     f1       Nuclide    f2       Nuclide    f3
Nuclide    f4      Nuclide
  1 Ag-100m      2.24m  1.000E+00 Pd-100
  2 Pd-100       3.63d  1.000E+00 Rh-100
  3 Rh-100       20.8h  1.000E+00 Ru-100$

Ag-101
                         -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife     f1       Nuclide    f2       Nuclide    f3
Nuclide    f4      Nuclide
  1 Ag-101       11.1m  1.000E+00 Pd-101
  2 Pd-101       8.47h  9.973E-01 Rh-101m 2.700E-03 Rh-101
  3 Rh-101m      4.34d  6.400E-02 Rh-101  9.360E-01 Ru-101$
  4 Rh-101        3.3y  1.000E+00 Ru-101$

Ag-102m
                         -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife     f1       Nuclide    f2       Nuclide    f3
Nuclide    f4      Nuclide
  1 Ag-102m       7.7m  4.900E-01 Ag-102  5.100E-01 Pd-102$
  2 Ag-102       12.9m  1.000E+00 Pd-102$

Ag-103
                         -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife     f1       Nuclide    f2       Nuclide    f3
```

```
Nuclide   f4       Nuclide
  1 Ag-103       65.7m  1.000E+00 Pd-103
  2 Pd-103     16.991d  9.988E-01 Rh-103m 1.251E-03 Rh-103$
  3 Rh-103m    56.114m  1.000E+00 Rh-103$

Ag-104m
                        -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1       Nuclide    f2       Nuclide    f3
Nuclide   f4       Nuclide
  1 Ag-104m      33.5m  7.000E-04 Ag-104  9.993E-01 Pd-104$
  2 Ag-104       69.2m  1.000E+00 Pd-104$

Ag-105m
                        -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1       Nuclide    f2       Nuclide    f3
Nuclide   f4       Nuclide
  1 Ag-105m      7.23m  9.966E-01 Ag-105  3.400E-03 Pd-105$
  2 Ag-105      41.29d  1.000E+00 Pd-105$

Ag-108m
                        -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1       Nuclide    f2       Nuclide    f3
Nuclide   f4       Nuclide
  1 Ag-108m       418y  8.700E-02 Ag-108  9.130E-01 Pd-108$
  2 Ag-108       2.37m  9.715E-01 Cd-108$  2.850E-02 Pd-108$

Ag-110m
                        -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1       Nuclide    f2       Nuclide    f3
Nuclide   f4       Nuclide
  1 Ag-110m   249.76d  1.360E-02 Ag-110  9.864E-01 Cd-110$
  2 Ag-110      24.6s  9.970E-01 Cd-110$  3.000E-03 Pd-110$

Ag-111m
                        -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1       Nuclide    f2       Nuclide    f3
Nuclide   f4       Nuclide
  1 Ag-111m      64.8s  9.930E-01 Ag-111  7.000E-03 Cd-111$
  2 Ag-111       7.45d  1.000E+00 Cd-111$

Ag-113
                        -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1       Nuclide    f2       Nuclide    f3
Nuclide   f4       Nuclide
  1 Ag-113       5.37h  1.739E-02 Cd-113m 9.826E-01 Cd-113
  2 Cd-113m      14.1y  1.400E-03 Cd-113  9.986E-01 In-113$
```

```
  3 Cd-113    7.7E+15y  1.000E+00 In-113$

Ag-113m
                         -------------------------  Daughter
Products -------------------------
    Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
Nuclide   f4       Nuclide
  1 Ag-113m      68.7s  6.400E-01 Ag-113   3.600E-01 Cd-113
  2 Ag-113       5.37h  1.739E-02 Cd-113m  9.826E-01 Cd-113
  3 Cd-113m      14.1y  1.400E-03 Cd-113   9.986E-01 In-113$
  4 Cd-113    7.7E+15y  1.000E+00 In-113$

Ag-115
                         -------------------------  Daughter
Products -------------------------
    Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
Nuclide   f4       Nuclide
  1 Ag-115       20.0m  9.421E-01 Cd-115   5.787E-02 Cd-115m
  2 Cd-115      53.46h  1.000E+00 In-115m
  3 Cd-115m      44.6d  1.058E-04 In-115m  9.999E-01 In-115
  4 In-115m     4.486h  9.500E-01 In-115   5.000E-02 Sn-115$
  5 In-115   4.41E+14y  1.000E+00 Sn-115$

Ag-117
                         -------------------------  Daughter
Products -------------------------
    Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
Nuclide   f4       Nuclide
  1 Ag-117       73.6s  8.470E-01 Cd-117   1.530E-01 Cd-117m
  2 Cd-117       2.49h  9.151E-01 In-117m  8.493E-02 In-117
  3 Cd-117m      3.36h  9.983E-03 In-117m  9.900E-01 In-117
  4 In-117m     116.2m  4.710E-01 In-117   5.290E-01 Sn-117$
  5 In-117       43.2m  3.532E-03 Sn-117m  9.965E-01 Sn-117$
  6 Sn-117m     13.76d  1.000E+00 Sn-117$

Cd-101
                         -------------------------  Daughter
Products -------------------------
    Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
Nuclide   f4       Nuclide
  1 Cd-101       1.36m  1.000E+00 Ag-101
  2 Ag-101       11.1m  1.000E+00 Pd-101
  3 Pd-101       8.47h  9.973E-01 Rh-101m  2.700E-03 Rh-101
  4 Rh-101m      4.34d  6.400E-02 Rh-101   9.360E-01 Ru-101$
  5 Rh-101        3.3y  1.000E+00 Ru-101$

Cd-102
                         -------------------------  Daughter
Products -------------------------
    Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
Nuclide   f4       Nuclide
  1 Cd-102        5.5m  9.462E-01 Ag-102m  5.376E-02 Ag-102
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  2 Ag-102m       7.7m  4.900E-01 Ag-102   5.100E-01 Pd-102$
  3 Ag-102       12.9m  1.000E+00 Pd-102$

Cd-103
                        -------------------------  Daughter
Products -------------------------
    Nuclide  Halflife     f1       Nuclide    f2       Nuclide    f3
Nuclide   f4       Nuclide
  1 Cd-103        7.3m  1.000E+00 Ag-103
  2 Ag-103       65.7m  1.000E+00 Pd-103
  3 Pd-103     16.991d  9.988E-01 Rh-103m 1.251E-03 Rh-103$
  4 Rh-103m    56.114m  1.000E+00 Rh-103$

Cd-104
                        -------------------------  Daughter
Products -------------------------
    Nuclide  Halflife     f1       Nuclide    f2       Nuclide    f3
Nuclide   f4       Nuclide
  1 Cd-104       57.7m  1.000E+00 Ag-104m
  2 Ag-104m      33.5m  7.000E-04 Ag-104   9.993E-01 Pd-104$
  3 Ag-104       69.2m  1.000E+00 Pd-104$

Cd-105
                        -------------------------  Daughter
Products -------------------------
    Nuclide  Halflife     f1       Nuclide    f2       Nuclide    f3
Nuclide   f4       Nuclide
  1 Cd-105       55.5m  8.296E-01 Ag-105m 1.704E-01 Ag-105
  2 Ag-105m      7.23m  9.966E-01 Ag-105   3.400E-03 Pd-105$
  3 Ag-105      41.29d  1.000E+00 Pd-105$

Cd-113m
                        -------------------------  Daughter
Products -------------------------
    Nuclide  Halflife     f1       Nuclide    f2       Nuclide    f3
Nuclide   f4       Nuclide
  1 Cd-113m      14.1y  1.400E-03 Cd-113   9.986E-01 In-113$
  2 Cd-113   7.7E+15y  1.000E+00 In-113$

Cd-115
                        -------------------------  Daughter
Products -------------------------
    Nuclide  Halflife     f1       Nuclide    f2       Nuclide    f3
Nuclide   f4       Nuclide
  1 Cd-115      53.46h  1.000E+00 In-115m
  2 In-115m     4.486h  9.500E-01 In-115   5.000E-02 Sn-115$
  3 In-115  4.41E+14y  1.000E+00 Sn-115$

Cd-115m
                        -------------------------  Daughter
Products -------------------------
    Nuclide  Halflife     f1       Nuclide    f2       Nuclide    f3
```

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	Cd-115m	44.6d	1.058E-04	In-115m	9.999E-01	In-115				
2	In-115m	4.486h	9.500E-01	In-115	5.000E-02	Sn-115$				
3	In-115	4.41E+14y	1.000E+00	Sn-115$						

Cd-117

------------------------- Daughter Products -------------------------

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	Cd-117	2.49h	9.151E-01	In-117m	8.493E-02	In-117				
2	In-117m	116.2m	4.710E-01	In-117	5.290E-01	Sn-117$				
3	In-117	43.2m	3.532E-03	Sn-117m	9.965E-01	Sn-117$				
4	Sn-117m	13.76d	1.000E+00	Sn-117$						

Cd-117m

------------------------- Daughter Products -------------------------

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	Cd-117m	3.36h	9.983E-03	In-117m	9.900E-01	In-117				
2	In-117m	116.2m	4.710E-01	In-117	5.290E-01	Sn-117$				
3	In-117	43.2m	3.532E-03	Sn-117m	9.965E-01	Sn-117$				
4	Sn-117m	13.76d	1.000E+00	Sn-117$						

Cd-118

------------------------- Daughter Products -------------------------

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	Cd-118	50.3m	1.000E+00	In-118						
2	In-118	5.0s	1.000E+00	Sn-118$						

Cd-119

------------------------- Daughter Products -------------------------

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	Cd-119	2.69m	9.009E-01	In-119m	9.909E-02	In-119				
2	In-119m	18.0m	5.600E-02	In-119	9.440E-01	Sn-119$				
3	In-119	2.4m	9.477E-03	Sn-119m	9.905E-01	Sn-119$				
4	Sn-119m	293.1d	1.000E+00	Sn-119$						

Cd-119m

------------------------- Daughter Products -------------------------

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	Cd-119m	2.20m	2.133E-03	In-119m	9.979E-01	In-119				
2	In-119m	18.0m	5.600E-02	In-119	9.440E-01	Sn-119$				
3	In-119	2.4m	9.477E-03	Sn-119m	9.905E-01	Sn-119$				
4	Sn-119m	293.1d	1.000E+00	Sn-119$						

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In-103
                         -------------------------  Daughter
Products -------------------------
    Nuclide  Halflife    f1      Nuclide    f2       Nuclide    f3
Nuclide   f4       Nuclide
  1 In-103        60s  1.000E+00 Cd-103
  2 Cd-103       7.3m  1.000E+00 Ag-103
  3 Ag-103      65.7m  1.000E+00 Pd-103
  4 Pd-103    16.991d  9.988E-01 Rh-103m 1.251E-03 Rh-103$
  5 Rh-103m   56.114m  1.000E+00 Rh-103$

In-105
                         -------------------------  Daughter
Products -------------------------
    Nuclide  Halflife    f1      Nuclide    f2       Nuclide    f3
Nuclide   f4       Nuclide
  1 In-105      5.07m  1.000E+00 Cd-105
  2 Cd-105      55.5m  8.296E-01 Ag-105m 1.704E-01 Ag-105
  3 Ag-105m     7.23m  9.966E-01 Ag-105  3.400E-03 Pd-105$
  4 Ag-105     41.29d  1.000E+00 Pd-105$

In-107
                         -------------------------  Daughter
Products -------------------------
    Nuclide  Halflife    f1      Nuclide    f2       Nuclide    f3
Nuclide   f4       Nuclide
  1 In-107      32.4m  1.000E+00 Cd-107
  2 Cd-107      6.50h  1.000E+00 Ag-107$

In-109
                         -------------------------  Daughter
Products -------------------------
    Nuclide  Halflife    f1      Nuclide    f2       Nuclide    f3
Nuclide   f4       Nuclide
  1 In-109       4.2h  1.000E+00 Cd-109
  2 Cd-109     461.4d  1.000E+00 Ag-109$

In-109m
                         -------------------------  Daughter
Products -------------------------
    Nuclide  Halflife    f1      Nuclide    f2       Nuclide    f3
Nuclide   f4       Nuclide
  1 In-109m     1.34m  1.000E+00 In-109
  2 In-109       4.2h  1.000E+00 Cd-109
  3 Cd-109     461.4d  1.000E+00 Ag-109$

In-111
                         -------------------------  Daughter
Products -------------------------
    Nuclide  Halflife    f1      Nuclide    f2       Nuclide    f3
Nuclide   f4       Nuclide
```

```
  1 In-111     2.8047d  5.000E-05 Cd-111m 1.000E+00 Cd-111$
  2 Cd-111m     48.50m  1.000E+00 Cd-111$

In-111m
                         ------------------------- Daughter
Products -------------------------
    Nuclide  Halflife     f1      Nuclide    f2      Nuclide    f3
Nuclide    f4       Nuclide
  1 In-111m      7.7m  1.000E+00 In-111
  2 In-111     2.8047d  5.000E-05 Cd-111m 1.000E+00 Cd-111$
  3 Cd-111m     48.50m  1.000E+00 Cd-111$

In-112m
                         ------------------------- Daughter
Products -------------------------
    Nuclide  Halflife     f1      Nuclide    f2      Nuclide    f3
Nuclide    f4       Nuclide
  1 In-112m     20.56m  1.000E+00 In-112
  2 In-112      14.97m  5.600E-01 Cd-112$  4.400E-01 Sn-112$

In-114m
                         ------------------------- Daughter
Products -------------------------
    Nuclide  Halflife     f1      Nuclide    f2      Nuclide    f3
Nuclide    f4       Nuclide
  1 In-114m     49.51d  9.675E-01 In-114  3.250E-02 Cd-114$
  2 In-114       71.9s  9.950E-01 Sn-114$  5.000E-03 Cd-114$

In-115m
                         ------------------------- Daughter
Products -------------------------
    Nuclide  Halflife     f1      Nuclide    f2      Nuclide    f3
Nuclide    f4       Nuclide
  1 In-115m     4.486h  9.500E-01 In-115  5.000E-02 Sn-115$
  2 In-115  4.41E+14y  1.000E+00 Sn-115$

In-117
                         ------------------------- Daughter
Products -------------------------
    Nuclide  Halflife     f1      Nuclide    f2      Nuclide    f3
Nuclide    f4       Nuclide
  1 In-117       43.2m  3.532E-03 Sn-117m 9.965E-01 Sn-117$
  2 Sn-117m     13.76d  1.000E+00 Sn-117$

In-117m
                         ------------------------- Daughter
Products -------------------------
    Nuclide  Halflife     f1      Nuclide    f2      Nuclide    f3
Nuclide    f4       Nuclide
  1 In-117m     116.2m  4.710E-01 In-117  5.290E-01 Sn-117$
  2 In-117       43.2m  3.532E-03 Sn-117m 9.965E-01 Sn-117$
  3 Sn-117m     13.76d  1.000E+00 Sn-117$
```

```
In-119
                          -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife     f1       Nuclide    f2       Nuclide    f3
Nuclide   f4       Nuclide
  1 In-119       2.4m  9.477E-03 Sn
  2 Sn-119m    293.1d  1.000E+00 Sn-119$

In-119m
                          -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife     f1       Nuclide    f2       Nuclide    f3
Nuclide   f4       Nuclide
  1 In-119m     18.0m  5.600E-02 In-119   9.440E-01 Sn-119$
  2 In-119       2.4m  9.477E-03 Sn-119m 9.905E-01 Sn-119$
  3 Sn-119m    293.1d  1.000E+00 Sn-119$

In-121
                          -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife     f1       Nuclide    f2       Nuclide    f3
Nuclide   f4       Nuclide
  1 In-121      23.1s  1.135E-01 Sn-121m 8.865E-01 Sn-121
  2 Sn-121m     43.9y  7.760E-01 Sn-121   2.240E-01 Sb-121$
  3 Sn-121     27.03h  1.000E+00 Sb-121$

In-121m
                          -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife     f1       Nuclide    f2       Nuclide    f3
Nuclide   f4       Nuclide
  1 In-121m     3.88m  1.200E-02 In-121   9.880E-01 Sn-121
  2 In-121      23.1s  1.135E-01 Sn-121m 8.865E-01 Sn-121
  3 Sn-121m     43.9y  7.760E-01 Sn-121   2.240E-01 Sb-121$
  4 Sn-121     27.03h  1.000E+00 Sb-121$

Sn-106
                          -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife     f1       Nuclide    f2       Nuclide    f3
Nuclide   f4       Nuclide
  1 Sn-106      1.92m  1.000E+00 In-106m
  2 In-106m      5.2m  1.000E+00 Cd-106$

Sn-108
                          -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife     f1       Nuclide    f2       Nuclide    f3
Nuclide   f4       Nuclide
  1 Sn-108     10.30m  1.000E+00 In-108m
  2 In-108m     39.6m  1.000E+00 Cd-108$
```

Sn-109

------------------------- Daughter Products -------------------------

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	Sn-109	18.0m	2.827E-01	In-109m	7.173E-01	In-109				
2	In-109m	1.34m	1.000E+00	In-109						
3	In-109	4.2h	1.000E+00	Cd-109						
4	Cd-109	461.4d	1.000E+00	Ag-109$						

Sn-110

------------------------- Daughter Products -------------------------

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	Sn-110	4.11h	1.000E+00	In-110m						
2	In-110m	69.1m	1.000E+00	Cd-110$						

Sn-111

------------------------- Daughter Products -------------------------

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	Sn-111	35.3m	2.074E-03	In-111m	9.979E-01	In-111				
2	In-111m	7.7m	1.000E+00	In-111						
3	In-111	2.8047d	5.000E-05	Cd-111m	1.000E+00	Cd-111$				
4	Cd-111m	48.50m	1.000E+00	Cd-111$						

Sn-113

------------------------- Daughter Products -------------------------

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	Sn-113	115.09d	1.000E+00	In-113m	2.235E-05	In-113$				
2	In-113m	1.6579h	1.000E+00	In-113$						

Sn-113m

------------------------- Daughter Products -------------------------

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	Sn-113m	21.4m	9.110E-01	Sn-113	8.900E-02	In-113$				
2	Sn-113	115.09d	1.000E+00	In-113m	2.235E-05	In-113$				
3	In-113m	1.6579h	1.000E+00	In-113$						

Sn-121m

------------------------- Daughter Products -------------------------

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	Sn-121m	43.9y	7.760E-01	Sn-121	2.240E-01	Sb-121$				

```
  2 Sn-121     27.03h  1.000E+00 Sb-121$

Sn-125
                                  -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1       Nuclide    f2      Nuclide    f3
Nuclide   f4      Nuclide
  1 Sn-125      9.64d  1.000E+00 Sb-125
  2 Sb-125   2.75856y  2.314E-01 Te-125m 7.686E-01 Te-125$
  3 Te-125m    57.40d  1.000E+00 Te-125$

Sn-125m
                                  -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1       Nuclide    f2      Nuclide    f3
Nuclide   f4      Nuclide
  1 Sn-125m     9.52m  1.000E+00 Sb-125
  2 Sb-125   2.75856y  2.314E-01 Te-125m 7.686E-01 Te-125$
  3 Te-125m    57.40d  1.000E+00 Te-125$

Sn-126
                                  -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1       Nuclide    f2      Nuclide    f3
Nuclide   f4      Nuclide
  1 Sn-126   2.30E+5y  1.000E+00 Sb-126m
  2 Sb-126m    19.15m  1.400E-01 Sb-126  8.600E-01 Te-126$
  3 Sb-126     12.35d  1.000E+00 Te-126$

Sn-127
                                  -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1       Nuclide    f2      Nuclide    f3
Nuclide   f4      Nuclide
  1 Sn-127      2.10h  1.000E+00 Sb-127
  2 Sb-127      3.85d  1.768E-01 Te-127m 8.232E-01 Te-127
  3 Te-127m      109d  9.760E-01 Te-127  2.400E-02 I-127$
  4 Te-127      9.35h  1.000E+00 I-127$

Sn-127m
                                  -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1       Nuclide    f2      Nuclide    f3
Nuclide   f4      Nuclide
  1 Sn-127m     4.13m  1.000E+00 Sb-127
  2 Sb-127      3.85d  1.768E-01 Te-127m 8.232E-01 Te-127
  3 Te-127m      109d  9.760E-01 Te-127  2.400E-02 I-127$
  4 Te-127      9.35h  1.000E+00 I-127$

Sn-128
                                  -------------------------  Daughter
Products  -------------------------
```

Nuclide Halflife f1 Nuclide f2 Nuclide f3
Nuclide f4 Nuclide
1 Sn-128 59.07m 1.000E+00 Sb-128m
2 Sb-128m 10.4m 3.600E-02 Sb-128 9.640E-01 Te-128$
3 Sb-128 9.01h 1.000E+00 Te-128$

Sn-129
------------------------- Daughter
Products -------------------------
Nuclide Halflife f1 Nuclide f2 Nuclide f3
Nuclide f4 Nuclide
1 Sn-129 2.23m 1.000E+00 Sb-129
2 Sb-129 4.40h 2.262E-01 Te-129m 7.738E-01 Te-129
3 Te-129m 33.6d 6.300E-01 Te-129 3.700E-01 I-129
4 Te-129 69.6m 1.000E+00 I-129
5 I-129 1.57E+7y 1.000E+00 Xe-129$

Sn-130
------------------------- Daughter
Products -------------------------
Nuclide Halflife f1 Nuclide f2 Nuclide f3
Nuclide f4 Nuclide
1 Sn-130 3.72m 1.000E+00 Sb-130m
2 Sb-130m 6.3m 1.000E+00 Te-130$

Sn-130m
------------------------- Daughter
Products -------------------------
Nuclide Halflife f1 Nuclide f2 Nuclide f3
Nuclide f4 Nuclide
1 Sn-130m 1.7m 8.600E-01 Sb-130 1.399E-01 Sb-130m
2 Sb-130 39.5m 1.000E+00 Te-130$
3 Sb-130m 6.3m 1.000E+00 Te-130$

Sb-111
------------------------- Daughter
Products -------------------------
Nuclide Halflife f1 Nuclide f2 Nuclide f3
Nuclide f4 Nuclide
1 Sb-111 75s 1.000E+00 Sn-111
2 Sn-111 35.3m 2.074E-03 In-111m 9.979E-01 In-111
3 In-111m 7.7m 1.000E+00 In-111
4 In-111 2.8047d 5.000E-05 Cd-111m 1.000E+00 Cd-111$
5 Cd-111m 48.50m 1.000E+00 Cd-111$

Sb-113
------------------------- Daughter
Products -------------------------
Nuclide Halflife f1 Nuclide f2 Nuclide f3
Nuclide f4 Nuclide
1 Sb-113 6.67m 2.243E-01 Sn-113m 7.757E-01 Sn-113
2 Sn-113m 21.4m 9.110E-01 Sn-113 8.900E-02 In-113$

```
  3 Sn-113     115.09d  1.000E+00 In-113m 2.235E-05 In-113$
  4 In-113m    1.6579h  1.000E+00 In-113$

Sb-122m
                       -------------------------  Daughter
Products -------------------------
    Nuclide  Halflife    f1       Nuclide    f2       Nuclide    f3
Nuclide   f4      Nuclide
  1 Sb-122m    4.191m  1.000E+00 Sb-122
  2 Sb-122    2.7238d  9.759E-01 Te-122$  2.410E-02 Sn-122$

Sb-124m
                       -------------------------  Daughter
Products -------------------------
    Nuclide  Halflife    f1       Nuclide    f2       Nuclide    f3
Nuclide   f4      Nuclide
  1 Sb-124m       93s  7.500E-01 Sb-124  2.500E-01 Te-124$
  2 Sb-124     60.20d  1.000E+00 Te-124$

Sb-124n
                       -------------------------  Daughter
Products -------------------------
    Nuclide  Halflife    f1       Nuclide    f2       Nuclide    f3
Nuclide   f4      Nuclide
  1 Sb-124n     20.2m  1.000E+00 Sb-124m
  2 Sb-124m       93s  7.500E-01 Sb-124  2.500E-01 Te-124$
  3 Sb-124     60.20d  1.000E+00 Te-124$

Sb-125
                       -------------------------  Daughter
Products -------------------------
    Nuclide  Halflife    f1       Nuclide    f2       Nuclide    f3
Nuclide   f4      Nuclide
  1 Sb-125   2.75856y  2.314E-01 Te-125m 7.686E-01 Te-125$
  2 Te-125m    57.40d  1.000E+00 Te-125$

Sb-126m
                       -------------------------  Daughter
Products -------------------------
    Nuclide  Halflife    f1       Nuclide    f2       Nuclide    f3
Nuclide   f4      Nuclide
  1 Sb-126m    19.15m  1.400E-01 Sb-126  8.600E-01 Te-126$
  2 Sb-126     12.35d  1.000E+00 Te-126$

Sb-127
                       -------------------------  Daughter
Products -------------------------
    Nuclide  Halflife    f1       Nuclide    f2       Nuclide    f3
Nuclide   f4      Nuclide
  1 Sb-127      3.85d  1.768E-01 Te-127m 8.232E-01 Te-127
  2 Te-127m      109d  9.760E-01 Te-127  2.400E-02 I-127$
  3 Te-127      9.35h  1.000E+00 I-127$
```

Sb-128m

------------------------- Daughter Products -------------------------

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	Sb-128m	10.4m	3.600E-02	Sb-128	9.640E-01	Te-128$				
2	Sb-128	9.01h	1.000E+00	Te-128$						

Sb-129

------------------------- Daughter Products -------------------------

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	Sb-129	4.40h	2.262E-01	Te-129m	7.738E-01	Te-129				
2	Te-129m	33.6d	6.300E-01	Te-129	3.700E-01	I-129				
3	Te-129	69.6m	1.000E+00	I-129						
4	I-129	1.57E+7y	1.000E+00	Xe-129$						

Sb-131

------------------------- Daughter Products -------------------------

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	Sb-131	23.03m	8.207E-02	Te-131m	9.179E-01	Te-131				
2	Te-131m	30h	2.220E-01	Te-131	7.780E-01	I-131				
3	Te-131	25.0m	1.000E+00	I-131						
4	I-131	8.02070d	1.176E-02	Xe-131m	9.882E-01	Xe-131$				
5	Xe-131m	11.84d	1.000E+00	Xe-131$						

Sb-133

------------------------- Daughter Products -------------------------

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	Sb-133	2.5m	1.734E-01	Te-133m	8.266E-01	Te-133				
2	Te-133m	55.4m	1.750E-01	Te-133	8.250E-01	I-133				
3	Te-133	12.5m	1.000E+00	I-133						
4	I-133	20.8h	2.885E-02	Xe-133m	9.711E-01	Xe-133				
5	Xe-133m	2.19d	1.000E+00	Xe-133						
6	Xe-133	5.243d	1.000E+00	Cs-133$						

Te-113

------------------------- Daughter Products -------------------------

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	Te-113	1.7m	1.000E+00	Sb-113						
2	Sb-113	6.67m	2.243E-01	Sn-113m	7.757E-01	Sn-113				
3	Sn-113m	21.4m	9.110E-01	Sn-113	8.900E-02	In-113$				
4	Sn-113	115.09d	1.000E+00	In-113m	2.235E-05	In-113$				
5	In-113m	1.6579h	1.000E+00	In-113$						

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Te-114
                           -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
Nuclide   f4       Nuclide
  1 Te-114       15.2m  1.000E+00 Sb-114
  2 Sb-114       3.49m  1.000E+00 Sn-114$

Te-115
                           -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
Nuclide   f4       Nuclide
  1 Te-115        5.8m  1.000E+00 Sb-115
  2 Sb-115       32.1m  1.000E+00 Sn-115$

Te-115m
                           -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
Nuclide   f4       Nuclide
  1 Te-115m       6.7m  1.000E+00 Sb-115
  2 Sb-115       32.1m  1.000E+00 Sn-115$

Te-116
                           -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
Nuclide   f4       Nuclide
  1 Te-116       2.49h  1.000E+00 Sb-116
  2 Sb-116       15.8m  1.000E+00 Sn-116$

Te-117
                           -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
Nuclide   f4       Nuclide
  1 Te-117         62m  1.000E+00 Sb-117
  2 Sb-117       2.80h  1.000E+00 Sn-117$

Te-118
                           -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
Nuclide   f4       Nuclide
  1 Te-118       6.00d  1.000E+00 Sb-118
  2 Sb-118        3.6m  1.000E+00 Sn-118$

Te-119
                           -------------------------  Daughter
Products  -------------------------
```

```
    Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
Nuclide   f4       Nuclide
  1 Te-119      16.05h  1.000E+00 Sb-119
  2 Sb-119      38.19h  1.000E+00 Sn-119$

Te-119m
                               -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
Nuclide   f4       Nuclide
  1 Te-119m      4.70d  1.000E+00 Sb-119
  2 Sb-119      38.19h  1.000E+00 Sn-119$

Te-121m
                               -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
Nuclide   f4       Nuclide
  1 Te-121m       154d  8.860E-01 Te-121  1.140E-01 Sb-121$
  2 Te-121      19.16d  1.000E+00 Sb-121$

Te-123m
                               -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
Nuclide   f4       Nuclide
  1 Te-123m   119.25d  1.000E+00 Te-123
  2 Te-123  6.00E+14y  1.000E+00 Sb-123$

Te-127m
                               -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
Nuclide   f4       Nuclide
  1 Te-127m       109d  9.760E-01 Te-127  2.400E-02 I-127$
  2 Te-127       9.35h  1.000E+00 I-127$

Te-129
                               -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
Nuclide   f4       Nuclide
  1 Te-129       69.6m  1.000E+00 I-129
  2 I-129    1.57E+7y  1.000E+00 Xe-129$

Te-129m
                               -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
Nuclide   f4       Nuclide
  1 Te-129m      33.6d  6.300E-01 Te-129  3.700E-01 I-129
  2 Te-129       69.6m  1.000E+00 I-129
```

```
  3 I-129    1.57E+7y  1.000E+00 Xe-129$

Te-131
                                 -------------------------  Daughter
Products -------------------------
    Nuclide  Halflife    f1       Nuclide   f2       Nuclide    f3
Nuclide   f4       Nuclide
  1 Te-131      25.0m  1.000E+00 I-131
  2 I-131    8.02070d  1.176E-02 Xe-131m 9.882E-01 Xe-131$
  3 Xe-131m    11.84d  1.000E+00 Xe-131$

Te-131m
                                 -------------------------  Daughter
Products -------------------------
    Nuclide  Halflife    f1       Nuclide   f2       Nuclide    f3
Nuclide   f4       Nuclide
  1 Te-131m       30h  2.220E-01 Te-131  7.780E-01 I-131
  2 Te-131      25.0m  1.000E+00 I-131
  3 I-131    8.02070d  1.176E-02 Xe-131m 9.882E-01 Xe-131$
  4 Xe-131m    11.84d  1.000E+00 Xe-131$

Te-132
                                 -------------------------  Daughter
Products -------------------------
    Nuclide  Halflife    f1       Nuclide   f2       Nuclide    f3
Nuclide   f4       Nuclide
  1 Te-132     3.204d  1.000E+00 I-132
  2 I-132      2.295h  1.000E+00 Xe-132$

Te-133
                                 -------------------------  Daughter
Products -------------------------
    Nuclide  Halflife    f1       Nuclide   f2       Nuclide    f3
Nuclide   f4       Nuclide
  1 Te-133      12.5m  1.000E+00 I-133
  2 I-133       20.8h  2.885E-02 Xe-133m 9.711E-01 Xe-133
  3 Xe-133m     2.19d  1.000E+00 Xe-133
  4 Xe-133     5.243d  1.000E+00 Cs-133$

Te-133m
                                 -------------------------  Daughter
Products -------------------------
    Nuclide  Halflife    f1       Nuclide   f2       Nuclide    f3
Nuclide   f4       Nuclide
  1 Te
  2 Te-133      12.5m  1.000E+00 I-133
  3 I-133       20.8h  2.885E-02 Xe-133m 9.711E-01 Xe-133
  4 Xe-133m     2.19d  1.000E+00 Xe-133
  5 Xe-133     5.243d  1.000E+00 Cs-133$

Te-134
                                 -------------------------  Daughter
```

```
Products  -------------------------
    Nuclide  Halflife    f1       Nuclide    f2       Nuclide    f3
Nuclide   f4       Nuclide
  1 Te-134       41.8m  1.000E+00 I-134
  2 I-134        52.5m  1.000E+00 Xe-134$

I-118
                         -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1       Nuclide    f2       Nuclide    f3
Nuclide   f4       Nuclide
  1 I-118        13.7m  1.000E+00 Te-118
  2 Te-118       6.00d  1.000E+00 Sb-118
  3 Sb-118        3.6m  1.000E+00 Sn-118$

I-118m
                         -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1       Nuclide    f2       Nuclide    f3
Nuclide   f4       Nuclide
  1 I-118m        8.5m  1.000E+00 Te-118
  2 Te-118       6.00d  1.000E+00 Sb-118
  3 Sb-118        3.6m  1.000E+00 Sn-118$

I-119
                         -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1       Nuclide    f2       Nuclide    f3
Nuclide   f4       Nuclide
  1 I-119        19.1m  9.905E-01 Te-119   9.542E-03 Te-119m
  2 Te-119      16.05h  1.000E+00 Sb-119
  3 Te-119m      4.70d  1.000E+00 Sb-119
  4 Sb-119      38.19h  1.000E+00 Sn-119$

I-121
                         -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1       Nuclide    f2       Nuclide    f3
Nuclide   f4       Nuclide
  1 I-121        2.12h  2.863E-03 Te-121m 9.971E-01 Te-121
  2 Te-121m       154d  8.860E-01 Te-121  1.140E-01 Sb-121$
  3 Te-121      19.16d  1.000E+00 Sb-121$

I-123
                         -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1       Nuclide    f2       Nuclide    f3
Nuclide   f4       Nuclide
  1 I-123       13.27h  4.442E-05 Te-123m 1.000E+00 Te-123
  2 Te-123m    119.25d  1.000E+00 Te-123
  3 Te-123  6.00E+14y   1.000E+00 Sb-123$
```

```
I-130m
                                    -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife     f1       Nuclide    f2       Nuclide    f3
Nuclide   f4       Nuclide
  1 I-130m      8.84m  8.400E-01 I-130   1.600E-01 Xe-130$
  2 I-130      12.36h  1.000E+00 Xe-130$

I-131
                                    -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife     f1       Nuclide    f2       Nuclide    f3
Nuclide   f4       Nuclide
  1 I-131    8.02070d  1.176E-02 Xe-131m 9.882E-01 Xe-131$
  2 Xe-131m    11.84d  1.000E+00 Xe-131$

I-132m
                                    -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife     f1       Nuclide    f2       Nuclide    f3
Nuclide   f4       Nuclide
  1 I-132m     1.387h  8.600E-01 I-132   1.400E-01 Xe-132$
  2 I-132      2.295h  1.000E+00 Xe-132$

I-133
                                    -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife     f1       Nuclide    f2       Nuclide    f3
Nuclide   f4       Nuclide
  1 I-133       20.8h  2.885E-02 Xe-133m 9.711E-01 Xe-133
  2 Xe-133m     2.19d  1.000E+00 Xe-133
  3 Xe-133     5.243d  1.000E+00 Cs-133$

I-134m
                                    -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife     f1       Nuclide    f2       Nuclide    f3
Nuclide   f4       Nuclide
  1 I-134m      3.60m  9.770E-01 I-134   2.300E-02 Xe-134$
  2 I-134       52.5m  1.000E+00 Xe-134$

I-135
                                    -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife     f1       Nuclide    f2       Nuclide    f3
Nuclide   f4       Nuclide
  1 I-135       6.57h  1.657E-01 Xe-135m 8.343E-01 Xe-135
  2 Xe-135m    15.29m  9.940E-01 Xe-135  6.000E-03 Cs-135
  3 Xe-135      9.14h  1.000E+00 Cs-135
  4 Cs-135    2.3E+6y  1.000E+00 Ba-135$

Xe-120
```

```
                                   -------------------------  Daughter
Products -------------------------
    Nuclide  Halflife     f1       Nuclide    f2       Nuclide    f3
Nuclide   f4       Nuclide
  1 Xe-120        40m  1.000E+00 I-120
  2 I-120       81.6m  1.000E+00 Te-120$

Xe-121
                                   -------------------------  Daughter
Products -------------------------
    Nuclide  Halflife     f1       Nuclide    f2       Nuclide    f3
Nuclide   f4       Nuclide
  1 Xe-121      40.1m  1.000E+00 I-121
  2 I-121       2.12h  2.863E-03 Te-121m 9.971E-01 Te-121
  3 Te-121m      154d  8.860E-01 Te-121  1.140E-01 Sb-121$
  4 Te-121     19.16d  1.000E+00 Sb-121$

Xe-122
                                   -------------------------  Daughter
Products -------------------------
    Nuclide  Halflife     f1       Nuclide    f2       Nuclide    f3
Nuclide   f4       Nuclide
  1 Xe-122      20.1h  1.000E+00 I-122
  2 I-122       3.63m  1.000E+00 Te-122$

Xe-123
                                   -------------------------  Daughter
Products -------------------------
    Nuclide  Halflife     f1       Nuclide    f2       Nuclide    f3
Nuclide   f4       Nuclide
  1 Xe-123      2.08h  1.000E+00 I-123
  2 I-123      13.27h  4.442E-05 Te-123m 1.000E+00 Te-123
  3 Te-123m   119.25d  1.000E+00 Te-123
  4 Te-123  6.00E+14y  1.000E+00 Sb-123$

Xe-125
                                   -------------------------  Daughter
Products -------------------------
    Nuclide  Halflife     f1       Nuclide    f2       Nuclide    f3
Nuclide   f4       Nuclide
  1 Xe-125      16.9h  1.000E+00 I-125
  2 I-125     59.400d  1.000E+00 Te-125$

Xe-127m
                                   -------------------------  Daughter
Products -------------------------
    Nuclide  Halflife     f1       Nuclide    f2       Nuclide    f3
Nuclide   f4       Nuclide
  1 Xe-127m     69.2s  1.000E+00 Xe-127
  2 Xe-127      36.4d  1.000E+00 I-127$

Xe-133m
```

```
                             -------------------------  Daughter
Products -------------------------
    Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
Nuclide   f4       Nuclide
  1 Xe-133m      2.19d  1.000E+00 Xe-133
  2 Xe-133      5.243d  1.000E+00 Cs-133$

Xe-135
                             -------------------------  Daughter
Products -------------------------
    Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
Nuclide   f4       Nuclide
  1 Xe-135       9.14h  1.000E+00 Cs-135
  2 Cs-135     2.3E+6y  1.000E+00 Ba-135$

Xe-135m
                             -------------------------  Daughter
Products -------------------------
    Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
Nuclide   f4       Nuclide
  1 Xe-135m     15.29m  9.940E-01 Xe-135  6.000E-03 Cs-135
  2 Xe-135       9.14h  1.000E+00 Cs-135
  3 Cs-135     2.3E+6y  1.000E+00 Ba-135$

Xe-137
                             -------------------------  Daughter
Products -------------------------
    Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
Nuclide   f4       Nuclide
  1 Xe-137      3.818m  1.000E+00 Cs-137
  2 Cs-137   30.1671y  9.440E-01 Ba-137m 5.600E-02 Ba-137$
  3 Ba-137m     2.552m  1.000E+00 Ba-137$

Xe-138
                             -------------------------  Daughter
Products -------------------------
    Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
Nuclide   f4       Nuclide
  1 Xe-138      14.08m  1.000E+00 Cs-138
  2 Cs-138      33.41m  1.000E+00 Ba-138$

Cs-121
                             -------------------------  Daughter
Products -------------------------
    Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
Nuclide   f4       Nuclide
  1 Cs-121        155s  1.000E+00 Xe-121
  2 Xe-121       40.1m  1.000E+00 I-121
  3 I-121        2.12h  2.863E-03 Te-121m 9.971E-01 Te-121
  4 Te-121m       154d  8.860E-01 Te-121  1.140E-01 Sb-121$
  5 Te-121      19.16d  1.000E+00 Sb-121$
```

```
Cs-121m
                    -------------------------   Daughter
Products  -------------------------
    Nuclide  Halflife    f1       Nuclide    f2       Nuclide    f3
Nuclide   f4       Nuclide
  1 Cs-121m      122s  1.700E-01 Cs-121  8.300E-01 Xe-121
  2 Cs-121       155s  1.000E+00 Xe-121
  3 Xe-121      40.1m  1.000E+00 I-121
  4 I-121       2.12h  2.863E-03 Te-121m 9.971E-01 Te-121
  5 Te-121m      154d  8.860E-01 Te-121  1.140E-01 Sb-121$
  6 Te-121     19.16d  1.000E+00 Sb-

Cs-123
                    -------------------------   Daughter
Products  -------------------------
    Nuclide  Halflife    f1       Nuclide    f2       Nuclide    f3
Nuclide   f4       Nuclide
  1 Cs-123      5.88m  1.000E+00 Xe-123
  2 Xe-123      2.08h  1.000E+00 I-123
  3 I-123      13.27h  4.442E-05 Te-123m 1.000E+00 Te-123
  4 Te-123m   119.25d  1.000E+00 Te-123
  5 Te-123  6.00E+14y  1.000E+00 Sb-123$

Cs-125
                    -------------------------   Daughter
Products  -------------------------
    Nuclide  Halflife    f1       Nuclide    f2       Nuclide    f3
Nuclide   f4       Nuclide
  1 Cs-125        45m  1.000E+00 Xe-125
  2 Xe-125      16.9h  1.000E+00 I-125
  3 I-125     59.400d  1.000E+00 Te-125$

Cs-127
                    -------------------------   Daughter
Products  -------------------------
    Nuclide  Halflife    f1       Nuclide    f2       Nuclide    f3
Nuclide   f4       Nuclide
  1 Cs-127      6.25h  1.000E+00 Xe-127
  2 Xe-127      36.4d  1.000E+00 I-127$

Cs-130m
                    -------------------------   Daughter
Products  -------------------------
    Nuclide  Halflife    f1       Nuclide    f2       Nuclide    f3
Nuclide   f4       Nuclide
  1 Cs-130m     3.46m  9.984E-01 Cs-130  1.600E-03 Xe-130$
  2 Cs-130     29.21m  9.840E-01 Xe-130$  1.600E-02 Ba-130$

Cs-134m
                    -------------------------   Daughter
Products  -------------------------
    Nuclide  Halflife    f1       Nuclide    f2       Nuclide    f3
```

```
Nuclide   f4       Nuclide
  1 Cs-134m     2.903h  1.000E+00 Cs-134
  2 Cs-134    2.0648y  1.000E+00 Ba-134$  3.000E-06 Xe-134$

Cs-135m
                                -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
Nuclide   f4       Nuclide
  1 Cs-135m        53m  1.000E+00 Cs-135
  2 Cs-135    2.3E+6y  1.000E+00 Ba-135$

Cs-137
                                -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
Nuclide   f4       Nuclide
  1 Cs-137   30.1671y  9.440E-01 Ba-137m 5.600E-02 Ba-137$
  2 Ba-137m     2.552m  1.000E+00 Ba-137$

Cs-138m
                                -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
Nuclide   f4       Nuclide
  1 Cs-138m      2.91m  8.100E-01 Cs-138   1.900E-01 Ba-138$
  2 Cs-138      33.41m  1.000E+00 Ba-138$

Cs-139
                                -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
Nuclide   f4       Nuclide
  1 Cs-139       9.27m  1.000E+00 Ba-139
  2 Ba-139      83.06m  1.000E+00 La-139$

Cs-140
                                -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
Nuclide   f4       Nuclide
  1 Cs-140       63.7s  1.000E+00 Ba-140
  2 Ba-140    12.752d  1.000E+00 La-140
  3 La-140    1.6781d  1.000E+00 Ce-140$

Ba-124
                                -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
Nuclide   f4       Nuclide
  1 Ba-124       11.0m  1.000E+00 Cs-124
  2 Cs-124       30.8s  1.000E+00 Xe-124$
```

```
Ba-126
                          -------------------------- Daughter
Products --------------------------
    Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
Nuclide   f4       Nuclide
  1 Ba-126         100m  1.000E+00 Cs-126
  2 Cs-126        1.64m  1.000E+00 Xe-126$

Ba-127
                          -------------------------- Daughter
Products --------------------------
    Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
Nuclide   f4       Nuclide
  1 Ba-127        12.7m  1.000E+00 Cs-127
  2 Cs-127        6.25h  1.000E+00 Xe-127
  3 Xe-127        36.4d  1.000E+00 I-127$

Ba-128
                          -------------------------- Daughter
Products --------------------------
    Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
Nuclide   f4       Nuclide
  1 Ba-128        2.43d  1.000E+00 Cs-128
  2 Cs-128      3.640m  1.000E+00 Xe-128$

Ba-129
                          -------------------------- Daughter
Products --------------------------
    Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
Nuclide   f4       Nuclide
  1 Ba-129        2.23h  1.000E+00 Cs-129
  2 Cs-129       32.06h  1.000E+00 Xe-129$

Ba-129m
                          -------------------------- Daughter
Products --------------------------
    Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
Nuclide   f4       Nuclide
  1 Ba-129m       2.16h  1.000E+00 Cs-129
  2 Cs-129       32.06h  1.000E+00 Xe-129$

Ba-131
                          -------------------------- Daughter
Products --------------------------
    Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
Nuclide   f4       Nuclide
  1 Ba-131       11.50d  1.000E+00 Cs-131
  2 Cs-131       9.689d  1.000E+00 Xe-131$

Ba-131m
                          -------------------------- Daughter
```

```
Products  -------------------------
    Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
Nuclide   f4       Nuclide
  1 Ba-131m      14.6m  1.000E+00 Ba-131
  2 Ba-131      11.50d  1.000E+00 Cs-131
  3 Cs-131      9.689d  1.000E+00 Xe-131$

Ba-133m
                                 -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
Nuclide   f4       Nuclide
  1 Ba-133m      38.9h  9.999E-01 Ba-133  9.600E-05 Cs-133$
  2 Ba-133      10.52y  1.000E+00 Cs-133$

Ba-140
                                 -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
Nuclide   f4       Nuclide
  1 Ba-140    12.752d  1.000E+00 La-140
  2 La-140    1.6781d  1.000E+00 Ce-140$

Ba-141
                                 -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
Nuclide   f4       Nuclide
  1 Ba-141      18.27m  1.000E+00 La-141
  2 La-141       3.92h  1.000E+00 Ce-141
  3 Ce-141    32.508d  1.000E+00 Pr-141$

Ba-142
                                 -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
Nuclide   f4       Nuclide
  1 Ba-142       10.6m  1.000E+00 La-142
  2 La-142       91.1m  1.000E+00 Ce-142$

La-128
                                 -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
Nuclide   f4       Nuclide
  1 La-128       5.18m  1.000E+00 Ba-128
  2 Ba-128       2.43d  1.000E+00 Cs-128
  3 Cs-128      3.640m  1.000E+00 Xe-128$

La-129
                                 -------------------------  Daughter
Products  -------------------------
```

```
    Nuclide  Halflife    f1       Nuclide    f2       Nuclide    f3
Nuclide    f4       Nuclide
  1 La-129       11.6m  9.238E-01 Ba-129  7.616E-02 Ba-129m
  2 Ba-129       2.23h  1.000E+00 Cs-129
  3 Ba-129m      2.16h  1.000E+00 Cs-129
  4 Cs-129      32.06h  1.000E+00 Xe-129$

La-131
                          -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1       Nuclide    f2       Nuclide    f3
Nuclide    f4       Nuclide
  1 La-131         59m  1.000E+00 Ba-131
  2 Ba-131      11.50d  1.000E+00 Cs-131
  3 Cs-131      9.689d  1.000E+00 Xe-131$

La-132m
                          -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1       Nuclide    f2       Nuclide    f3
Nuclide    f4       Nuclide
  1 La-132m      24.3m  7.600E-01 La-132  2.400E-01 Ba-132$
  2 La-132        4.8h  1.000E+00 Ba-132$

La-133
                          -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1       Nuclide    f2       Nuclide    f3
Nuclide    f4       Nuclide
  1 La-133      3.912h  1.000E+00 Ba-133
  2 Ba-133      10.52y  1.000E+00 Cs-133$

La-141
                          -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1       Nuclide    f2       Nuclide    f3
Nuclide    f4       Nuclide
  1 La-141       3.92h  1.000E+00 Ce-141
  2 Ce-141     32.508d  1.000E+00 Pr-141$

La-143
                          -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1       Nuclide    f2       Nuclide    f3
Nuclide    f4       Nuclide
  1 La-143       14.2m  1.000E+00 Ce-143
  2 Ce-143     33.039h  1.000E+00 Pr-143
  3 Pr-143      13.57d  1.000E+00 Nd-

Ce-130
                          -------------------------  Daughter
Products  -------------------------
```

```
    Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
Nuclide    f4       Nuclide
  1 Ce-130       22.9m  1.000E+00 La-130
  2 La-130        8.7m  1.000E+00 Ba-130$

Ce-131
                           -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
Nuclide    f4       Nuclide
  1 Ce-131       10.2m  1.000E+00 La-131
  2 La-131         59m  1.000E+00 Ba-131
  3 Ba-131     11.50d  1.000E+00 Cs-131
  4 Cs-131      9.689d  1.000E+00 Xe-131$

Ce-132
                           -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
Nuclide    f4       Nuclide
  1 Ce-132       3.51h  1.000E+00 La-132
  2 La-132        4.8h  1.000E+00 Ba-132$

Ce-133
                           -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
Nuclide    f4       Nuclide
  1 Ce-133         97m  1.000E+00 La-133
  2 La-133     3.912h  1.000E+00 Ba-133
  3 Ba-133     10.52y  1.000E+00 Cs-133$

Ce-133m
                           -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
Nuclide    f4       Nuclide
  1 Ce-133m       4.9h  1.000E+00 La-133
  2 La-133     3.912h  1.000E+00 Ba-133
  3 Ba-133     10.52y  1.000E+00 Cs-133$

Ce-134
                           -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
Nuclide    f4       Nuclide
  1 Ce-134      3.16d  1.000E+00 La-134
  2 La-134      6.45m  1.000E+00 Ba-134$

Ce-135
                           -------------------------  Daughter
Products  -------------------------
```

```
    Nuclide  Halflife     f1       Nuclide    f2       Nuclide    f3
Nuclide   f4       Nuclide
  1 Ce-135       17.7h  1.000E+00 La-135
  2 La-135       19.5h  1.000E+00 Ba-135$

Ce-137
                          -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife     f1       Nuclide    f2       Nuclide    f3
Nuclide   f4       Nuclide
  1 Ce-137        9.0h  1.000E+00 La-137
  2 La-137     6.0E+4y  1.000E+00 Ba-137$

Ce-137m
                          -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife     f1       Nuclide    f2       Nuclide    f3
Nuclide   f4       Nuclide
  1 Ce-137m      34.4h  9.922E-01 Ce-137  7.800E-03 La-137
  2 Ce-137        9.0h  1.000E+00 La-137
  3 La-137     6.0E+4y  1.000E+00 Ba-137$

Ce-143
                          -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife     f1       Nuclide    f2       Nuclide    f3
Nuclide   f4       Nuclide
  1 Ce-143     33.039h  1.000E+00 Pr-143
  2 Pr-143      13.57d  1.000E+00 Nd-143$

Ce-144
                          -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife     f1       Nuclide    f2       Nuclide    f3
Nuclide   f4       Nuclide
  1 Ce-144     284.91d  9.770E-03 Pr-144m 9.902E-01 Pr-144
  2 Pr-144m       7.2m  9.993E-01 Pr-144  7.000E-04 Nd-144
  3 Pr-144      17.28m  1.000E+00 Nd-144
  4 Nd-144   2.29E+15y  1.000E+00 Ce-140$

Ce-145
                          -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife     f1       Nuclide    f2       Nuclide    f3
Nuclide   f4       Nuclide
  1 Ce-145       3.01m  1.000E+00 Pr-145
  2 Pr-145      5.984h  1.000E+00 Nd-145$

Pr-134
                          -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife     f1       Nuclide    f2       Nuclide    f3
```

```
Nuclide   f4       Nuclide
  1 Pr-134          11m  1.000E+00 Ce-134
  2 Ce-134       3.16d  1.000E+00 La-134
  3 La-134       6.45m  1.000E+00 Ba-134$

Pr-134m
                         -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife     f1       Nuclide    f2       Nuclide    f3
Nuclide   f4       Nuclide
  1 Pr-134m         17m  1.000E+00 Ce-134
  2 Ce-134       3.16d  1.000E+00 La-134
  3 La-134       6.45m  1.000E+00 Ba-134$

Pr-135
                         -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife     f1       Nuclide    f2       Nuclide    f3
Nuclide   f4       Nuclide
  1 Pr-135          24m  1.000E+00 Ce-135
  2 Ce-135       17.7h  1.000E+00 La-135
  3 La-135       19.5h  1.000E+00 Ba-135$

Pr-137
                         -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife     f1       Nuclide    f2       Nuclide    f3
Nuclide   f4       Nuclide
  1 Pr-137       1.28h  1.000E+00 Ce-137
  2 Ce-137        9.0h  1.000E+00 La-137
  3 La-137     6.0E+4y  1.000E+00 Ba-137$

Pr-139
                         -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife     f1       Nuclide    f2       Nuclide    f3
Nuclide   f4       Nuclide
  1 Pr-139       4.41h  1.000E+00 Ce-139
  2 Ce-139   137.641d  1.000E+00 La-139$

Pr-142m
                         -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife     f1       Nuclide    f2       Nuclide    f3
Nuclide   f4       Nuclide
  1 Pr-142m      14.6m  1.000E+00 Pr-142
  2 Pr-142      19.12h  9.998E-01 Nd-142$  1.640E-04 Ce-142$

Pr-144
                         -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife     f1       Nuclide    f2       Nuclide    f3
```

```
Nuclide    f4        Nuclide
  1 Pr-144      17.28m  1.000E+00 Nd-144
  2 Nd-144  2.29E+15y  1.000E+00 Ce-140$

Pr-144m
                                -------------------------   Daughter
Products  -------------------------
    Nuclide  Halflife     f1       Nuclide    f2       Nuclide    f3
Nuclide    f4        Nuclide
  1 Pr-144m       7.2m  9.993E-01 Pr-144  7.000E-04 Nd-144
  2 Pr-144      17.28m  1.000E+00 Nd-144
  3 Nd-144  2.29E+15y  1.000E+00 Ce-140$

Pr-147
                                -------------------------   Daughter
Products  -------------------------
    Nuclide  Halflife     f1       Nuclide    f2       Nuclide    f3
Nuclide    f4        Nuclide
  1 Pr-147       13.4m  1.000E+00 Nd-147
  2 Nd-147      10.98d  1.000E+00 Pm-147
  3 Pm-147     2.6234y  1.000E+00 Sm-147
  4 Sm-147  1.060E11y  1.000E+00 Nd-143$

Nd-134
                                -------------------------   Daughter
Products  -------------------------
    Nuclide  Halflife     f1       Nuclide    f2       Nuclide    f3
Nuclide    f4        Nuclide
  1 Nd-134        8.5m  1.000E+00 Pr-134m
  2 Pr-134m        17m  1.000E+00 Ce-134
  3 Ce-134       3.16d  1.000E+00 La-134
  4 La-134       6.45m  1.000E+00 Ba-134$

Nd-135
                                -------------------------   Daughter
Products  -------------------------
    Nuclide  Halflife     f1       Nuclide    f2       Nuclide    f3
Nuclide    f4        Nuclide
  1 Nd-135       12.4m  1.000E+00 Pr-135
  2 Pr-135         24m  1.000E+00 Ce-135
  3 Ce-135       17.7h  1.000E+00 La-135
  4 La-135       19.5h  1.000E+00 Ba-135$

Nd-136
                                -------------------------   Daughter
Products  -------------------------
    Nuclide  Halflife     f1       Nuclide    f2       Nuclide    f3
Nuclide    f4        Nuclide
  1 Nd-136      50.65m  1.000E+00 Pr-136
  2 Pr-136       13.1m  1.000E+00 Ce-136$

Nd-137
```

-------------------------- Daughter Products --------------------------

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	Nd-137	38.5m	1.000E+00	Pr-137						
2	Pr-137	1.28h	1.000E+00	Ce-137						
3	Ce-137	9.0h	1.000E+00	La-137						
4	La-137	6.0E+4y	1.000E+00	Ba-137$						

Nd-138

-------------------------- Daughter Products --------------------------

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	Nd-138	5.04h	1.000E+00	Pr-138						
2	Pr-138	1.45m	1.000E+00	Ce-138$						

Nd-139

-------------------------- Daughter Products --------------------------

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	Nd-139	29.7m	1.000E+00	Pr-139						
2	Pr-139	4.41h	1.000E+00	Ce-139						
3	Ce-139	137.641d	1.000E+00	La-139$						

Nd-139m

-------------------------- Daughter Products --------------------------

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	Nd-139m	5.50h	1.180E-01	Nd-139	8.820E-01	Pr-139				
2	Nd-139	29.7m	1.000E+00	Pr-139						
3	Pr-139	4.41h	1.000E+00	Ce-139						
4	Ce-139	137.641d	1.000E+00	La-139$						

Nd-140

-------------------------- Daughter Products --------------------------

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	Nd-140	3.37d	1.000E+00	Pr-140						
2	Pr-140	3.39m	1.000E+00	Ce-140$						

Nd-141m

-------------------------- Daughter Products --------------------------

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	Nd-141m	62.0s	9.997E-01	Nd-141	3.200E-04	Pr-141$				
2	Nd-141	2.49h	1.000E+00	Pr-141$						

```
Nd-147
                          -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife     f1       Nuclide    f2      Nuclide    f3
Nuclide   f4       Nuclide
  1 Nd-147      10.98d  1.000E+00 Pm-147
  2 Pm-147     2.6234y  1.000E+00 Sm-147
  3 Sm-147  1.060E11y  1.000E+00 Nd-143$

Nd-149
                          -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife     f1       Nuclide    f2      Nuclide    f3
Nuclide   f4       Nuclide
  1 Nd-149      1.728h  1.000E+00 Pm-149
  2 Pm-149      53.08h  1.000E+00 Sm-149$

Nd-151
                          -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife     f1       Nuclide    f2      Nuclide    f3
Nuclide   f4       Nuclide
  1 Nd-151      12.44m  1.000E+00 Pm-151
  2 Pm-151      28.40h  1.000E+00 Sm-151
  3 Sm-151         90y  1.000E+00 Eu-151$

Nd-152
                          -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife     f1       Nuclide    f2      Nuclide    f3
Nuclide   f4       Nuclide
  1 Nd-152       11.4m  1.000E+00 Pm-152
  2 Pm-152       4.12m  1.000E+00 Sm-152$

Pm-136
                          -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife     f1       Nuclide    f2      Nuclide    f3
Nuclide   f4       Nuclide
  1 Pm-136        107s  1.000E+00 Nd-136
  2 Nd-136      50.65m  1.000E+00 Pr-136
  3 Pr-136       13.1m  1.000E+00 Ce-136$

Pm-137m
                          -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife     f1       Nuclide    f2      Nuclide    f3
Nuclide   f4       Nuclide
  1 Pm-137m       2.4m  1.000E+00 Nd-137
  2 Nd-137       38.5m  1.000E+00 Pr-137
  3 Pr-137       1.28h  1.000E+00 Ce-137
  4 Ce-137        9.0h  1.000E+00 La-137
```

```
  5 La-137    6.0E+4y  1.000E+00 Ba-137$

Pm-139
                                -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
Nuclide   f4      Nuclide
  1 Pm-139      4.15m  1.000E+00 Nd-139
  2 Nd-139      29.7m  1.000E+00 Pr-139
  3 Pr-139      4.41h  1.000E+00 Ce-139
  4 Ce-139   137.641d  1.000E+00 La-139$

Pm-140
                                -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
Nuclide   f4      Nuclide
  1 Pm-140       9.2s  1.000E+00 Nd-140
  2 Nd-140      3.37d  1.000E+00 Pr-140
  3 Pr-140      3.39m  1.000E+00 Ce-140$

Pm-140m
                                -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
Nuclide   f4      Nuclide
  1 Pm-140m     5.95m  1.000E+00 Nd-140
  2 Nd-140      3.37d  1.000E+00 Pr-140
  3 Pr-140      3.39m  1.000E+00 Ce-140$

Pm-141
                                -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
Nuclide   f4      Nuclide
  1 Pm-141     20.90m  1.665E-03 Nd-141m 9.983E-01 Nd-141
  2 Nd-141m     62.0s  9.997E-01 Nd-141  3.200E-04 Pr-141$
  3 Nd-141      2.49h  1.000E+00 Pr-141$

Pm-144
                                -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
Nuclide   f4      Nuclide
  1 Pm-144       363d  1.000E+00 Nd-144
  2 Nd-144  2.29E+15y  1.000E+00 Ce-140$

Pm-146
                                -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
Nuclide   f4      Nuclide
```

```
  1 Pm-146      5.53y  3.400E-01 Sm-146  6.600E-01 Nd-146$
  2 Sm-146   1.03E+8y  1.000E+00 Nd-142$

Pm-147
                         -------------------------  Daughter
Products -------------------------
    Nuclide  Halflife    f1       Nuclide    f2       Nuclide    f3
Nuclide   f4       Nuclide
  1 Pm-147    2.6234y  1.000E+00 Sm-147
  2 Sm-147  1.060E11y  1.000E+00 Nd-143$

Pm-148
                         -------------------------  Daughter
Products -------------------------
    Nuclide  Halflife    f1       Nuclide    f2       Nuclide    f3
Nuclide   f4       Nuclide
  1 Pm-148     5.368d  1.000E+00 Sm-148
  2 Sm-148     7E+15y  1.000E+00 Nd-144
  3 Nd-144  2.29E+15y  1.000E+00 Ce-140$

Pm-148m
                         -------------------------  Daughter
Products -------------------------
    Nuclide  Halflife    f1       Nuclide    f2       Nuclide    f3
Nuclide   f4       Nuclide
  1 Pm-148m    41.29d  4.200E-02 Pm-148  9.580E-01 Sm-148
  2 Pm-148     5.368d  1.000E+00 Sm-148
  3 Sm-148     7E+15y  1.000E+00 Nd-144
  4 Nd-144  2.29E+15y  1.000E+00 Ce-140$

Pm-151
                         -------------------------  Daughter
Products -------------------------
    Nuclide  Halflife    f1       Nuclide    f2       Nuclide    f3
Nuclide   f4       Nuclide
  1 Pm-151     28.40h  1.000E+00 Sm-151
  2 Sm-151        90y  1.000E+00 Eu-151$

Pm-153
                         -------------------------  Daughter
Products -------------------------
    Nuclide  Halflife    f1       Nuclide    f2       Nuclide    f3
Nuclide   f4       Nuclide
  1 Pm-153      5.25m  1.000E+00 Sm-153
  2 Sm-153     46.50h  1.000E+00 Eu-153$

Sm-139
                         -------------------------  Daughter
Products -------------------------
    Nuclide  Halflife    f1       Nuclide    f2       Nuclide    f3
Nuclide   f4       Nuclide
  1 Sm-139      2.57m  1.000E+00 Pm-139
```

2 Pm-139 4.15m 1.000E+00 Nd-139
3 Nd-139 29.7m 1.000E+00 Pr-139
4 Pr-139 4.41h 1.000E+00 Ce-139
5 Ce-139 137.641d 1.000E+00 La-139$

Sm-140

------------------------- Daughter
Products -------------------------
Nuclide Halflife f1 Nuclide f2 Nuclide f3
Nuclide f4 Nuclide

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide
1	Sm-140	14.82m	1.000E+00	Pm-140		
2	Pm-140	9.2s	1.000E+00	Nd-140		
3	Nd-140	3.37d	1.000E+00	Pr-140		
4	Pr-140	3.39m	1.000E+00	Ce-140$		

Sm-141

------------------------- Daughter
Products -------------------------
Nuclide Halflife f1 Nuclide f2 Nuclide f3
Nuclide f4 Nuclide

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide
1	Sm-141	10.2m	1.000E+00	Pm-141		
2	Pm-141	20.90m	1.665E-03	Nd-141m	9.983E-01	Nd-141
3	Nd-141m	62.0s	9.997E-01	Nd-141	3.200E-04	Pr-141$
4	Nd-141	2.49h	1.000E+00	Pr-141$		

Sm-141m

------------------------- Daughter
Products -------------------------
Nuclide Halflife f1 Nuclide f2 Nuclide f3
Nuclide f4 Nuclide

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide
1	Sm-141m	22.6m	3.100E-03	Sm-141	9.969E-01	Pm-141
2	Sm-141	10.2m	1.000E+00	Pm-141		
3	Pm-141	20.90m	1.665E-03	Nd-141m	9.983E-01	Nd-141
4	Nd-141m	62.0s	9.997E-01	Nd-141	3.200E-04	Pr-141$
5	Nd-141	2.49h	1.000E+00	Pr-141$		

Sm-142

------------------------- Daughter
Products -------------------------
Nuclide Halflife f1 Nuclide f2 Nuclide f3
Nuclide f4 Nuclide

	Nuclide	Halflife	f1	Nuclide
1	Sm-142	72.49m	1.000E+00	Pm-142
2	Pm-142	40.5s	1.000E+00	Nd-142$

Sm-143

------------------------- Daughter
Products -------------------------
Nuclide Halflife f1 Nuclide f2 Nuclide f3
Nuclide f4 Nuclide

	Nuclide	Halflife	f1	Nuclide
1	Sm-143	8.75m	1.000E+00	Pm-143
2	Pm-143	265d	1.000E+00	Nd-143$

```
Sm-143m
                          --------------------------  Daughter
Products  --------------------------
    Nuclide  Halflife     f1       Nuclide    f2       Nuclide    f3
Nuclide    f4      Nuclide
  1 Sm-143m       66s  9.976E-01 Sm-143  2.400E-03 Pm-143
  2 Sm-143      8.75m  1.000E+00 Pm-143
  3 Pm-143       265d  1.000E+00 Nd-143$

Sm-145
                          --------------------------  Daughter
Products  --------------------------
    Nuclide  Halflife     f1       Nuclide    f2       Nuclide    f3
Nuclide    f4      Nuclide
  1 Sm-145       340d  1.000E+00 Pm-145
  2 Pm-145      17.7y  1.000E+00 Nd-145$  2.800E-09 Pr-141$

Sm-148
                          --------------------------  Daughter
Products  --------------------------
    Nuclide  Halflife     f1       Nuclide    f2       Nuclide    f3
Nuclide    f4      Nuclide
  1 Sm-148     7E+15y  1.000E+00 Nd-144
  2 Nd-144  2.29E+15y  1.000E+00 Ce-140$

Sm-155
                          --------------------------  Daughter
Products  --------------------------
    Nuclide  Halflife     f1       Nuclide    f2       Nuclide    f3
Nuclide    f4      Nuclide
  1 Sm-155      22.3m  1.000E+00 Eu-155
  2 Eu-155    4.7611y  1.000E+00 Gd-155$

Sm-156
                          --------------------------  Daughter
Products  --------------------------
    Nuclide  Halflife     f1       Nuclide    f2       Nuclide    f3
Nuclide    f4      Nuclide
  1 Sm-156       9.4h  1.000E+00 Eu-156
  2 Eu-156     15.19d  1.000E+00 Gd-156$

Sm-157
                          --------------------------  Daughter
Products  --------------------------
    Nuclide  Halflife     f1       Nuclide    f2       Nuclide    f3
Nuclide    f4      Nuclide
  1 Sm-157      8.03m  1.000E+00 Eu-157
  2 Eu-157     15.18h  1.000E+00 Gd-157$

Eu-142
                          --------------------------  Daughter
Products  --------------------------
```

```
    Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
Nuclide   f4       Nuclide
  1 Eu-142       2.34s  1.000E+00 Sm-142
  2 Sm-142      72.49m  1.000E+00 Pm-142
  3 Pm-142       40.5s  1.000E+00 Nd-142$

Eu-142m
                            -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
Nuclide   f4       Nuclide
  1 Eu-142m    1.223m  1.000E+00 Sm-142
  2 Sm-142      72.49m  1.000E+00 Pm-142
  3 Pm-142       40.5s  1.000E+00 Nd-142$

Eu-143
                            -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
Nuclide   f4       Nuclide
  1 Eu-143       2.59m  1.207E-03 Sm-143m 9.988E-01 Sm-143
  2 Sm-143m        66s  9.976E-01 Sm-143  2.400E-03 Pm-143
  3 Sm-143       8.75m  1.000E+00 Pm-143
  4 Pm-143        265d  1.000E+00 Nd-143$

Eu-145
                            -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
Nuclide   f4       Nuclide
  1 Eu-145       5.93d  1.000E+00 Sm-145
  2 Sm-145        340d  1.000E+00 Pm-145
  3 Pm-145       17.7y  1.000E+00 Nd-145$  2.800E-09 Pr-141$

Eu-146
                            -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
Nuclide   f4       Nuclide
  1 Eu-146       4.61d  1.000E+00 Sm-146
  2 Sm-146    1.03E+8y  1.000E+00 Nd-142$

Eu-147
                            -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
Nuclide   f4       Nuclide
  1 Eu-147       24.1d  1.000E+00 Sm-147  2.200E-05 Pm-143
  2 Sm-147  1.060E11y  1.000E+00 Nd-143$
  3 Pm-143        265d  1.000E+00 Nd-143$

Eu-148
```

```
                         -------------------------  Daughter
Products  -------------------------
     Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
Nuclide   f4       Nuclide
  1 Eu-148       54.5d  1.000E+00 Sm-148  9.400E-09 Pm-144
  2 Sm-148      7E+15y  1.000E+00 Nd-144
  3 Pm-144        363d  1.000E+00 Nd-144
  4 Nd-144  2.29E+15y  1.000E+00 Ce-140$

Eu-150m
                         -------------------------  Daughter
Products  -------------------------
     Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
Nuclide   f4       Nuclide
  1 Eu-150m      12.8h  8.900E-01 Gd-150  1.100E-01 Sm-150$
  2 Gd-150   1.79E+6y  1.000E+00 Sm-146
  3 Sm-146   1.03E+8y  1.000E+00 Nd-142$

Eu-152
                         -------------------------  Daughter
Products  -------------------------
     Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
Nuclide   f4       Nuclide
  1 Eu-152     13.537y  2.790E-01 Gd-152  7.210E-01 Sm-152$
  2 Gd-152  1.08E+14y  1.000E+00 Sm-148
  3 Sm-148      7E+15y  1.000E+00 Nd-144
  4 Nd-144  2.29E+15y  1.000E+00 Ce-140$

Eu-152m
                         -------------------------  Daughter
Products  -------------------------
     Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
Nuclide   f4       Nuclide
  1 Eu-152m    9.3116h  7.200E-01 Gd-152  2.800E-01 Sm-152$
  2 Gd-152  1.08E+14y  1.000E+00 Sm-148
  3 Sm-148      7E+15y  1.000E+00 Nd-144
  4 Nd-144  2.29E+15y  1.000E+00 Ce-140$

Eu-152n
                         -------------------------  Daughter
Products  -------------------------
     Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
Nuclide   f4       Nuclide
  1 Eu-152n        96m  1.000E+00 Eu-152
  2 Eu-152     13.537y  2.790E-01 Gd-152  7.210E-01 Sm-152$
  3 Gd-152  1.08E+14y  1.000E+00 Sm-148
  4 Sm-148      7E+15y  1.000E+00 Nd-144
  5 Nd-144  2.29E+15y  1.000E+00 Ce-140$

Eu-154m
                         -------------------------  Daughter
Products  -------------------------
```

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	Eu-154m	46.0m	1.000E+00	Eu-154						
2	Eu-154	8.593y	9.998E-01	Gd-154$	2.000E-04	Sm-154$				

Eu-159

------------------------- Daughter Products -------------------------

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	Eu-159	18.1m	1.000E+00	Gd-159						
2	Gd-159	18.479h	1.000E+00	Tb-159$						

Gd-142

------------------------- Daughter Products -------------------------

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	Gd-142	70.2s	1.000E+00	Eu-142						
2	Eu-142	2.34s	1.000E+00	Sm-142						
3	Sm-142	72.49m	1.000E+00	Pm-142						
4	Pm-142	40.5s	1.000E+00	Nd-142$						

Gd-143m

------------------------- Daughter Products -------------------------

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	Gd-143m	110.0s	1.000E+00	Eu-143						
2	Eu-143	2.59m	1.207E-03	Sm-143m	9.988E-01	Sm-143				
3	Sm-143m	66s	9.976E-01	Sm-143	2.400E-03	Pm-143				
4	Sm-143	8.75m	1.000E+00	Pm-143						
5	Pm-143	265d	1.000E+00	Nd-143$						

Gd-144

------------------------- Daughter Products -------------------------

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	Gd-144	4.47m	1.000E+00	Eu-144						
2	Eu-144	10.2s	1.000E+00	Sm-144$						

Gd-145

------------------------- Daughter Products -------------------------

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	Gd-145	23.0m	1.000E+00	Eu-145						
2	Eu-145	5.93d	1.000E+00	Sm-145						
3	Sm-145	340d	1.000E+00	Pm-145						
4	Pm-145	17.7y	1.000E+00	Nd-145$	2.800E-09	Pr-141$				

Gd-145m

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
			Daughter Products							
1	Gd-145m	85s	9.430E-01	Gd-145	5.700E-02	Eu-145				
2	Gd-145	23.0m	1.000E+00	Eu-145						
3	Eu-145	5.93d	1.000E+00	Sm-145						
4	Sm-145	340d	1.000E+00	Pm-145						
5	Pm-145	17.7y	1.000E+00	Nd-145$	2.800E-09	Pr-141$				

Gd-146

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
			Daughter Products							
1	Gd-146	48.27d	1.000E+00	Eu-146						
2	Eu-146	4.61d	1.000E+00	Sm-146						
3	Sm-146	1.03E+8y	1.000E+00	Nd-142$						

Gd-147

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
			Daughter Products							
1	Gd-147	38.1h	1.000E+00	Eu-147						
2	Eu-147	24.1d	1.000E+00	Sm-147	2.200E-05	Pm-143				
3	Sm-147	1.060E11y	1.000E+00	Nd-143$						
4	Pm-143	265d	1.000E+00	Nd-143$						

Gd-149

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
			Daughter Products							
1	Gd-149	9.28d	1.000E+00	Eu-149						
2	Eu-149	93.1d	1.000E+00	Sm-149$						

Gd-150

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
			Daughter Products							
1	Gd-150	1.79E+6y	1.000E+00	Sm-146						
2	Sm-146	1.03E+8y	1.000E+00	Nd-142$						

Gd-151

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
			Daughter Products							
1	Gd-151	124d	1.000E-08	Sm-147	1.000E+00	Eu-151$				

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  2 Sm-147  1.060E11y  1.000E+00 Nd-143$

Gd-152
                          ------------------------  Daughter
Products  ------------------------
    Nuclide  Halflife    f1      Nuclide    f2       Nuclide    f3
Nuclide   f4      Nuclide
  1 Gd-152  1.08E+14y  1.000E+00 Sm-148
  2 Sm-148     7E+15y  1.000E+00 Nd-144
  3 Nd-144  2.29E+15y  1.000E+00 Ce-140$

Gd-162
                          ------------------------  Daughter
Products  ------------------------
    Nuclide  Halflife    f1      Nuclide    f2       Nuclide    f3
Nuclide   f4      Nuclide
  1 Gd-162       8.4m  1.000E+00 Tb-162
  2 Tb-162      7.60m  1.000E+00 Dy-162$

Tb-146
                          ------------------------  Daughter
Products  ------------------------
    Nuclide  Halflife    f1      Nuclide    f2       Nuclide    f3
Nuclide   f4      Nuclide
  1 Tb-146        23s  1.000E+00 Gd-146
  2 Gd-146    48.27d  1.000E+00 Eu-146
  3 Eu-146     4.61d  1.000E+00 Sm-146
  4 Sm-146   1.03E+8y  1.000E+00 Nd-142$

Tb-147
                          ------------------------  Daughter
Products  ------------------------
    Nuclide  Halflife    f1      Nuclide    f2       Nuclide    f3
Nuclide   f4      Nuclide
  1 Tb-147      1.64h  1.000E+00 Gd-147
  2 Gd-147      38.1h  1.000E+00 Eu-147
  3 Eu-147      24.1d  1.000E+00 Sm-147  2.200E-05 Pm-143
  4 Sm-147  1.060E11y  1.000E+00 Nd-143$
  5 Pm-143       265d  1.000E+00 Nd-143$

Tb-147m
                          ------------------------  Daughter
Products  ------------------------
    Nuclide  Halflife    f1      Nuclide    f2       Nuclide    f3
Nuclide   f4      Nuclide
  1 Tb-147m     1.87m  1.000E+00 Gd-147
  2 Gd-147      38.1h  1.000E+00 Eu-147
  3 Eu-147      24.1d  1.000E+00 Sm-147  2.200E-05 Pm-143
  4 Sm-147  1.060E11y  1.000E+00 Nd-143$
  5 Pm-143       265d  1.000E+00 Nd-143$

Tb-148
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			---- Daughter Products ----							
	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	Tb-148	60m	1.000E+00	Gd-148						
2	Gd-148	74.6y	1.000E+00	Sm-144$						

Tb-148m

			---- Daughter Products ----							
	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	Tb-148m	2.20m	1.000E+00	Gd-148						
2	Gd-148	74.6y	1.000E+00	Sm-144$						

Tb-149

			---- Daughter Products ----							
	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	Tb-149	4.118h	8.330E-01	Gd-149	1.670E-01	Eu-145				
2	Gd-149	9.28d	1.000E+00	Eu-149						
3	Eu-145	5.93d	1.000E+00	Sm-145						
4	Eu-149	93.1d	1.000E+00	Sm-149$						
5	Sm-145	340d	1.000E+00	Pm-145						
6	Pm-145	17.7y	1.000E+00	Nd-145$	2.800E-09	Pr-141$				

Tb-149m

			---- Daughter Products ----							
	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	Tb-149m	4.16m	9.998E-01	Gd-149	2.200E-04	Eu-145				
2	Gd-149	9.28d	1.000E+00	Eu-149						
3	Eu-145	5.93d	1.000E+00	Sm-145						
4	Eu-149	93.1d	1.000E+00	Sm-149$						
5	Sm-145	340d	1.000E+00	Pm-145						
6	Pm-145	17.7y	1.000E+00	Nd-145$	2.800E-09	Pr-141$				

Tb-150

			---- Daughter Products ----							
	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	Tb-150	3.48h	1.000E+00	Gd-150	7.000E-06	Eu-146				
2	Gd-150	1.79E+6y	1.000E+00	Sm-146						
3	Eu-146	4.61d	1.000E+00	Sm-146						
4	Sm-146	1.03E+8y	1.000E+00	Nd-142$						

Tb-150m

------------------------- Daughter Products -------------------------

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	Tb-150m	5.8m	1.000E+00	Gd-150						
2	Gd-150	1.79E+6y	1.000E+00	Sm-146						
3	Sm-146	1.03E+8y	1.000E+00	Nd-142$						

Tb-151

------------------------- Daughter Products -------------------------

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	Tb-151	17.609h	1.000E+00	Gd-151	9.500E-05	Eu-147				
2	Gd-151	124d	1.000E-08	Sm-147	1.000E+00	Eu-151$				
3	Eu-147	24.1d	1.000E+00	Sm-147	2.200E-05	Pm-143				
4	Sm-147	1.060E11y	1.000E+00	Nd-143$						
5	Pm-143	265d	1.000E+00	Nd-143$						

Tb-151m

------------------------- Daughter Products -------------------------

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	Tb-151m	25s	9.340E-01	Tb-151	6.600E-02	Gd-151				
2	Tb-151	17.609h	1.000E+00	Gd-151	9.500E-05	Eu-147				
3	Gd-151	124d	1.000E-08	Sm-147	1.000E+00	Eu-151$				
4	Eu-147	24.1d	1.000E+00	Sm-147	2.200E-05	Pm-143				
5	Sm-147	1.060E11y	1.000E+00	Nd-143$						
6	Pm-143	265d	1.000E+00	Nd-143$						

Tb-152

------------------------- Daughter Products -------------------------

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	Tb-152	17.5h	1.000E+00	Gd-152						
2	Gd-152	1.08E+14y	1.000E+00	Sm-148						
3	Sm-148	7E+15y	1.000E+00	Nd-144						
4	Nd-144	2.29E+15y	1.000E+00	Ce-140$						

Tb-152m

------------------------- Daughter Products -------------------------

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	Tb-152m	4.2m	7.880E-01	Tb-152	2.120E-01	Gd-152				
2	Tb-152	17.5h	1.000E+00	Gd-152						
3	Gd-152	1.08E+14y	1.000E+00	Sm-148						
4	Sm-148	7E+15y	1.000E+00	Nd-144						
5	Nd-144	2.29E+15y	1.000E+00	Ce-140$						

Tb-153

------------------------- Daughter

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Products  -------------------------
     Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
Nuclide   f4       Nuclide
  1 Tb-153       2.34d  1.000E+00 Gd-153
  2 Gd-153      240.4d  1.000E+00 Eu-153$

Tb-156m
                                  -------------------------  Daughter
Products  -------------------------
     Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
Nuclide   f4       Nuclide
  1 Tb-156m      24.4h  1.000E+00 Tb-156
  2 Tb-156       5.35d  1.000E+00 Gd-156$

Tb-156n
                                  -------------------------  Daughter
Products  -------------------------
     Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
Nuclide   f4       Nuclide
  1 Tb-156n       5.3h  1.000E+00 Tb-156
  2 Tb-156       5.35d  1.000E+00 Gd-156$

Tb-165
                                  -------------------------  Daughter
Products  -------------------------
     Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
Nuclide   f4       Nuclide
  1 Tb-165       2.11m  8.903E-01 Dy-165m 1.097E-01 Dy-165
  2 Dy-165m     1.257m  9.776E-01 Dy-165  2.240E-02 Ho-165$
  3 Dy-165      2.334h  1.000E+00 Ho-165$

Dy-148
                                  -------------------------  Daughter
Products  -------------------------
     Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
Nuclide   f4       Nuclide
  1 Dy-148        3.3m  1.000E+00 Tb-148
  2 Tb-148         60m  1.000E+00 Gd-148
  3 Gd-148       74.6y  1.000E+00 Sm-144$

Dy-149
                                  -------------------------  Daughter
Products  -------------------------
     Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
Nuclide   f4       Nuclide
  1 Dy-149       4.20m  5.668E-01 Tb-149  4.332E-01 Tb-149m
  2 Tb-149      4.118h  8.330E-01 Gd-149  1.670E-01 Eu-145
  3 Tb-149m      4.16m  9.998E-01 Gd-149  2.200E-04 Eu-145
  4 Gd-149       9.28d  1.000E+00 Eu-149
  5 Eu-145       5.93d  1.000E+00 Sm-145
  6 Eu-149       93.1d  1.000E+00 Sm-149$
  7 Sm-145        340d  1.000E+00 Pm-145
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8	Pm-145	17.7y	1.000E+00	Nd-145$	2.800E-09	Pr-141$

Dy-150

Daughter Products

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	Dy-150	7.17m	6.400E-01	Tb-150	3.600E-01	Gd-146				
2	Tb-150	3.48h	1.000E+00	Gd-150	7.000E-06	Eu-146				
3	Gd-146	48.27d	1.000E+00	Eu-146						
4	Gd-150	1.79E+6y	1.000E+00	Sm-146						
5	Eu-146	4.61d	1.000E+00	Sm-146						
6	Sm-146	1.03E+8y	1.000E+00	Nd-142$						

Dy-151

Daughter Products

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	Dy-151	17.9m	4.102E-01	Tb-151m	5.338E-01	Tb-151	5.600E-02	Gd-147		
2	Tb-151m	25s	9.340E-01	Tb-151	6.600E-02	Gd-151				
3	Tb-151	17.609h	1.000E+00	Gd-151	9.500E-05	Eu-147				
4	Gd-147	38.1h	1.000E+00	Eu-147						
5	Gd-151	124d	1.000E-08	Sm-147	1.000E+00	Eu-151$				
6	Eu-147	24.1d	1.000E+00	Sm-147	2.200E-05	Pm-143				
7	Sm-147	1.060E11y	1.000E+00	Nd-143$						
8	Pm-143	265d	1.000E+00	Nd-143$						

Dy-152

Daughter Products

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	Dy-152	2.38h	9.990E-01	Tb-152	1.000E-03	Gd-148				
2	Tb-152	17.5h	1.000E+00	Gd-152						
3	Gd-148	74.6y	1.000E+00	Sm-144$						
4	Gd-152	1.08E+14y	1.000E+00	Sm-148						
5	Sm-148	7E+15y	1.000E+00	Nd-144						
6	Nd-144	2.29E+15y	1.000E+00	Ce-140$						

Dy-153

Daughter Products

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	Dy-153	6.4h	1.000E+00	Tb-153	9.400E-05	Gd-149				
2	Tb-153	2.34d	1.000E+00	Gd-153						
3	Gd-149	9.28d	1.000E+00	Eu-149						
4	Gd-153	240.4d	1.000E+00	Eu-153$						
5	Eu-149	93.1d	1.000E+00	Sm-149$						

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Dy-154
                              -------------------------    Daughter
Products  -------------------------
    Nuclide  Halflife    f1      Nuclide   f2      Nuclide   f3
Nuclide   f4       Nuclide
  1 Dy-154    3.0E+6y  1.000E+00 Gd-150
  2 Gd-150   1.79E+6y  1.000E+00 Sm-146
  3 Sm-146   1.03E+8y  1.000E+00 Nd-142$

Dy-155
                              -------------------------    Daughter
Products  -------------------------
    Nuclide  Halflife    f1      Nuclide   f2      Nuclide   f3
Nuclide   f4       Nuclide
  1 Dy-155       9.9h  1.000E+00 Tb-155
  2 Tb-155      5.32d  1.000E+00 Gd-155$

Dy-157
                              -------------------------    Daughter
Products  -------------------------
    Nuclide  Halflife    f1      Nuclide   f2      Nuclide   f3
Nuclide   f4       Nuclide
  1 Dy-157      8.14h  1.000E+00 Tb-157
  2 Tb-157        71y  1.000E+00 Gd-157$

Dy-165m
                              -------------------------    Daughter
Products  -------------------------
    Nuclide  Halflife    f1      Nuclide   f2      Nuclide   f3
Nuclide   f4       Nuclide
  1 Dy-165m    1.257m  9.776E-01 Dy-165  2.240E-02 Ho-165$
  2 Dy-165     2.334h  1.000E+00 Ho-165$

Dy-166
                              -------------------------    Daughter
Products  -------------------------
    Nuclide  Halflife    f1      Nuclide   f2      Nuclide   f3
Nuclide   f4       Nuclide
  1 Dy-166      81.6h  1.000E+00 Ho-166
  2 Ho-166     26.80h  1.000E+00 Er-166$

Dy-167
                              -------------------------    Daughter
Products  -------------------------
    Nuclide  Halflife    f1      Nuclide   f2      Nuclide   f3
Nuclide   f4       Nuclide
  1 Dy-167      6.20m  1.000E+00 Ho-167
  2 Ho-167       3.1h  1.000E+00 Er-167$

Dy-168
                              -------------------------    Daughter
Products  -------------------------
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	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	Dy-168	8.7m	1.000E+00	Ho-168						
2	Ho-168	2.99m	1.000E+00	Er-168$						

Ho-150

------------------------- Daughter Products -------------------------

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	Ho-150	76.8s	1.000E+00	Dy-150						
2	Dy-150	7.17m	6.400E-01	Tb-150	3.600E-01	Gd-146				
3	Tb-150	3.48h	1.000E+00	Gd-150	7.000E-06	Eu-146				
4	Gd-146	48.27d	1.000E+00	Eu-146						
5	Gd-150	1.79E+6y	1.000E+00	Sm-146						
6	Eu-146	4.61d	1.000E+00	Sm-146						
7	Sm-146	1.03E+8y	1.000E+00	Nd-142$						

Ho-153

------------------------- Daughter Products -------------------------

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	Ho-153	2.01m	9.995E-01	Dy-153	5.100E-04	Tb-149m				
2	Dy-153	6.4h	1.000E+00	Tb-153	9.400E-05	Gd-149				
3	Tb-149m	4.16m	9.998E-01	Gd-149	2.200E-04	Eu-145				
4	Tb-153	2.34d	1.000E+00	Gd-153						
5	Gd-149	9.28d	1.000E+00	Eu-149						
6	Gd-153	240.4d	1.000E+00	Eu-153$						
7	Eu-149	93.1d	1.000E+00	Sm-149$						
8	Eu-145	5.93d	1.000E+00	Sm-145						
9	Sm-145	340d	1.000E+00	Pm-145						
10	Pm-145	17.7y	1.000E+00	Nd-145$	2.800E-09	Pr-141$				

Ho-153m

------------------------- Daughter Products -------------------------

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	Ho-153m	9.3m	9.982E-01	Dy-153	1.800E-03	Tb-149				
2	Dy-153	6.4h	1.000E+00	Tb-153	9.400E-05	Gd-149				
3	Tb-149	4.118h	8.330E-01	Gd-149	1.670E-01	Eu-145				
4	Tb-153	2.34d	1.000E+00	Gd-153						
5	Gd-149	9.28d	1.000E+00	Eu-149						
6	Gd-153	240.4d	1.000E+00	Eu-153$						
7	Eu-149	93.1d	1.000E+00	Sm-149$						
8	Eu-145	5.93d	1.000E+00	Sm-145						
9	Sm-145	340d	1.000E+00	Pm-145						
10	Pm-145	17.7y	1.000E+00	Nd-145$	2.800E-09	Pr-141$				

Ho-154

------------------------- Daughter

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Products  -------------------------
    Nuclide  Halflife    f1      Nuclide    f2       Nuclide    f3
Nuclide   f4       Nuclide
  1 Ho-154      11.76m  9.998E-01 Dy-154  1.900E-04 Tb-150
  2 Dy-154     3.0E+6y  1.000E+00 Gd-150
  3 Tb-150       3.48h  1.000E+00 Gd-150  7.000E-06 Eu-146
  4 Gd-150   1.79E+6y  1.000E+00 Sm-146
  5 Eu-146       4.61d  1.000E+00 Sm-146
  6 Sm-146   1.03E+8y  1.000E+00 Nd-142$

Ho-154m
                          -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1      Nuclide    f2       Nuclide    f3
Nuclide   f4       Nuclide
  1 Ho-154m      3.10m  1.000E+00 Dy-154  1.000E-05 Tb-150m
  2 Dy-154     3.0E+6y  1.000E+00 Gd-150
  3 Tb-150m       5.8m  1.000E+00 Gd-150
  4 Gd-150   1.79E+6y  1.000E+00 Sm-146
  5 Sm-146   1.03E+8y  1.000E+00 Nd-142$

Ho-155
                          -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1      Nuclide    f2       Nuclide    f3
Nuclide   f4       Nuclide
  1 Ho-155         48m  1.000E+00 Dy-155
  2 Dy-155        9.9h  1.000E+00 Tb-155
  3 Tb-155       5.32d  1.000E+00 Gd-155$

Ho-157
                          -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1      Nuclide    f2       Nuclide    f3
Nuclide   f4       Nuclide
  1 Ho-157       12.6m  1.000E+00 Dy-157
  2 Dy-157       8.14h  1.000E+00 Tb-157
  3 Tb-157         71y  1.000E+00 Gd-157$

Ho-159
                          -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1      Nuclide    f2       Nuclide    f3
Nuclide   f4       Nuclide
  1 Ho-159      33.05m  1.000E+00 Dy-159
  2 Dy-159      144.4d  1.000E+00 Tb-159$

Ho-162m
                          -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1      Nuclide    f2       Nuclide    f3
Nuclide   f4       Nuclide
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  1 Ho-162m      67.0m  6.200E-01 Ho-162  3.800E-01 Dy-162$
  2 Ho-162       15.0m  1.000E+00 Dy-162$

Ho-164m
                        -------------------------  Daughter
Products -------------------------
    Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
Nuclide   f4       Nuclide
  1 Ho-164m      38.0m  1.000E+00 Ho-164
  2 Ho-164         29m  6.000E-01 Dy-164$  4.000E-01 Er-164$

Ho-168m
                        -------------------------  Daughter
Products -------------------------
    Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
Nuclide   f4       Nuclide
  1 Ho-168m       132s  1.000E+00 Ho-168
  2 Ho-168       2.99m  1.000E+00 Er-168$

Er-154
                        -------------------------  Daughter
Products -------------------------
    Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
Nuclide   f4       Nuclide
  1 Er-154       3.73m  9.953E-01 Ho-154  4.700E-03 Dy-150
  2 Ho-154      11.76m  9.998E-01 Dy-154  1.900E-04 Tb-150
  3 Dy-150       7.17m  6.400E-01 Tb-150  3.600E-01 Gd-146
  4 Dy-154     3.0E+6y  1.000E+00 Gd-150
  5 Tb-150       3.48h  1.000E+00 Gd-150  7.000E-06 Eu-146
  6 Gd-150    1.79E+6y  1.000E+00 Sm-146
  7 Gd-146      48.27d  1.000E+00 Eu-146
  8 Eu-146       4.61d  1.000E+00 Sm-146
  9 Sm-146    1.03E+8y  1.000E+00 Nd-142$

Er-156
                        -------------------------  Daughter
Products -------------------------
    Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
Nuclide   f4       Nuclide
  1 Er-156       19.5m  1.000E+00 Ho-156
  2 Ho-156         56m  1.000E+00 Dy-156$

Er-159
                        -------------------------  Daughter
Products -------------------------
    Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
Nuclide   f4       Nuclide
  1 Er-159         36m  1.000E+00 Ho-159
  2 Ho-159      33.05m  1.000E+00 Dy-159
  3 Dy-159      144.4d  1.000E+00 Tb-159$

Er-161
```

```
                              -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
Nuclide   f4       Nuclide
  1 Er-161       3.21h  1.000E+00 Ho-161
  2 Ho-161       2.48h  1.000E+00 Dy-161$

Er-163
                              -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
Nuclide   f4       Nuclide
  1 Er-163       75.0m  1.000E+00 Ho-163
  2 Ho-163       4570y  1.000E+00 Dy-163$

Er-171
                              -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
Nuclide   f4       Nuclide
  1 Er-171      7.516h  1.000E+00 Tm-171
  2 Tm-171       1.92y  1.000E+00 Yb-171$

Er-172
                              -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
Nuclide   f4       Nuclide
  1 Er-172       49.3h  1.000E+00 Tm-172
  2 Tm-172       63.6h  1.000E+00 Yb-172$

Er-173
                              -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
Nuclide   f4       Nuclide
  1 Er-173      1.434m  1.000E+00 Tm-173
  2 Tm-173       8.24h  1.000E+00 Yb-173$

Tm-161
                              -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
Nuclide   f4       Nuclide
  1 Tm-161       30.2m  1.000E+00 Er-161
  2 Er-161       3.21h  1.000E+00 Ho-161
  3 Ho-161       2.48h  1.000E+00 Dy-161$

Tm-163
                              -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
```

```
Nuclide    f4       Nuclide
  1 Tm-163     1.810h  1.000E+00 Er-163
  2 Er-163      75.0m  1.000E+00 Ho-163
  3 Ho-163      4570y  1.000E+00 Dy-163$

Tm-165
                                -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1       Nuclide    f2       Nuclide    f3
Nuclide    f4       Nuclide
  1 Tm-165     30.06h  1.000E+00 Er-165
  2 Er-165     10.36h  1.000E+00 Ho-165$

Tm-175
                                -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1       Nuclide    f2       Nuclide    f3
Nuclide    f4       Nuclide
  1 Tm-175      15.2m  1.000E+00 Yb-175
  2 Yb-175     4.185d  1.000E+00 Lu-175$

Yb-162
                                -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1       Nuclide    f2       Nuclide    f3
Nuclide    f4       Nuclide
  1 Yb-162     18.87m  1.000E+00 Tm-162
  2 Tm-162     21.70m  1.000E+00 Er-162$

Yb-163
                                -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1       Nuclide    f2       Nuclide    f3
Nuclide    f4       Nuclide
  1 Yb-163     11.05m  1.000E+00 Tm-163
  2 Tm-163     1.810h  1.000E+00 Er-163
  3 Er-163      75.0m  1.000E+00 Ho-163
  4 Ho-163      4570y  1.000E+00 Dy-163$

Yb-164
                                -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1       Nuclide    f2       Nuclide    f3
Nuclide    f4       Nuclide
  1 Yb-164      75.8m  1.000E+00 Tm-164
  2 Tm-164       2.0m  1.000E+00 Er-164$

Yb-165
                                -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1       Nuclide    f2       Nuclide    f3
Nuclide    f4       Nuclide
```

```
  1 Yb-165       9.9m  1.000E+00 Tm-165
  2 Tm-165      30.06h  1.000E+00 Er-165
  3 Er-165      10.36h  1.000E+00 Ho-165$

Yb-166
                                 -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
Nuclide   f4       Nuclide
  1 Yb-166       56.7h  1.000E+00 Tm-166
  2 Tm-166       7.70h  1.000E+00 Er-166$

Yb-167
                                 -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
Nuclide   f4       Nuclide
  1 Yb-167       17.5m  1.000E+00 Tm-167
  2 Tm-167       9.25d  1.000E+00 Er-167$

Yb-177
                                 -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
Nuclide   f4       Nuclide
  1 Yb-177      1.911h  1.000E+00 Lu-177
  2 Lu-177      6.647d  1.000E+00 Hf-177$

Yb-178
                                 -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
Nuclide   f4       Nuclide
  1 Yb-178         74m  1.000E+00 Lu-178
  2 Lu-178       28.4m  1.000E+00 Hf-178$

Yb-179
                                 -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
Nuclide   f4       Nuclide
  1 Yb-179        8.0m  1.000E+00 Lu-179
  2 Lu-179       4.59h  1.000E+00 Hf-179$

Lu-165
                                 -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
Nuclide   f4       Nuclide
  1 Lu-165      10.74m  1.000E+00 Yb-165
  2 Yb-165        9.9m  1.000E+00 Tm-165
  3 Tm-165      30.06h  1.000E+00 Er-165
```

```
  4 Er-165      10.36h  1.000E+00 Ho-165$

Lu-167
                          -------------------------  Daughter
Products -------------------------
    Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
Nuclide   f4       Nuclide
  1 Lu-167       51.5m  1.000E+00 Yb-167
  2 Yb-167       17.5m  1.000E+00 Tm-167
  3 Tm-167       9.25d  1.000E+00 Er-167$

Lu-169
                          -------------------------  Daughter
Products -------------------------
    Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
Nuclide   f4       Nuclide
  1 Lu-169      34.06h  1.000E+00 Yb-169
  2 Yb-169    32.026d  1.000E+00 Tm-169$

Lu-169m
                          -------------------------  Daughter
Products -------------------------
    Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
Nuclide   f4       Nuclide
  1 Lu-169m       160s  1.000E+00 Lu-169
  2 Lu-169      34.06h  1.000E+00 Yb-169
  3 Yb-169    32.026d  1.000E+00 Tm-169$

Lu-171m
                          -------------------------  Daughter
Products -------------------------
    Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
Nuclide   f4       Nuclide
  1 Lu-171m        79s  1.000E+00 Lu-171
  2 Lu-171       8.24d  1.000E+00 Yb-171$

Lu-172m
                          -------------------------  Daughter
Products -------------------------
    Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
Nuclide   f4       Nuclide
  1 Lu-172m       3.7m  1.000E+00 Lu-172
  2 Lu-172       6.70d  1.000E+00 Yb-172$

Lu-174m
                          -------------------------  Daughter
Products -------------------------
    Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
Nuclide   f4       Nuclide
  1 Lu-174m       142d  9.938E-01 Lu-174  6.200E-03 Yb-174$
  2 Lu-174       3.31y  1.000E+00 Yb-174$
```

```
Lu-177m
                              -------------------------   Daughter
Products  -------------------------
    Nuclide  Halflife     f1       Nuclide    f2       Nuclide    f3
Nuclide   f4       Nuclide
  1 Lu-177m     160.4d  2.170E-01 Lu-177  7.830E-01 Hf-177$
  2 Lu-177      6.647d  1.000E+00 Hf-177$

Lu-181
                              -------------------------   Daughter
Products  -------------------------
    Nuclide  Halflife     f1       Nuclide    f2       Nuclide    f3
Nuclide   f4       Nuclide
  1 Lu-181        3.5m  1.000E+00 Hf-181
  2 Hf-181     42.39d  1.000E+00 Ta-181$

Hf-167
                              -------------------------   Daughter
Products  -------------------------
    Nuclide  Halflife     f1       Nuclide    f2       Nuclide    f3
Nuclide   f4       Nuclide
  1 Hf-167       2.05m  1.000E+00 Lu-167
  2 Lu-167       51.5m  1.000E+00 Yb-167
  3 Yb-167       17.5m  1.000E+00 Tm-167
  4 Tm-167       9.25d  1.000E+00 Er-167$

Hf-169
                              -------------------------   Daughter
Products  -------------------------
    Nuclide  Halflife     f1       Nuclide    f2       Nuclide    f3
Nuclide   f4       Nuclide
  1 Hf-169       3.24m  3.096E-02 Lu-169m 9.690E-01 Lu-169
  2 Lu-169m       160s  1.000E+00 Lu-169
  3 Lu-169      34.06h  1.000E+00 Yb-169
  4 Yb-169    32.026d  1.000E+00 Tm-169$

Hf-170
                              -------------------------   Daughter
Products  -------------------------
    Nuclide  Halflife     f1       Nuclide    f2       Nuclide    f3
Nuclide   f4       Nuclide
  1 Hf-170      16.01h  1.000E+00 Lu-170
  2 Lu-170      2.012d  1.000E+00 Yb-170$

Hf-172
                              -------------------------   Daughter
Products  -------------------------
    Nuclide  Halflife     f1       Nuclide    f2       Nuclide    f3
Nuclide   f4       Nuclide
  1 Hf-172       1.87y  1.000E+00 Lu-172m
  2 Lu-172m       3.7m  1.000E+00 Lu-172
  3 Lu-172       6.70d  1.000E+00 Yb-172$
```

```
Hf-173
                         -------------------------  Daughter
Products -------------------------
    Nuclide  Halflife     f1       Nuclide     f2      Nuclide    f3
Nuclide    f4       Nuclide
  1 Hf-173       23.6h  1.000E+00 Lu-173
  2 Lu-173       1.37y  1.000E+00 Yb-173$

Hf-182
                         -------------------------  Daughter
Products -------------------------
    Nuclide  Halflife     f1       Nuclide     f2      Nuclide    f3
Nuclide    f4       Nuclide
  1 Hf-182       9E+6y  1.000E+00 Ta-182
  2 Ta-182     114.43d  1.000E+00 W-182$

Hf-182m
                         -------------------------  Daughter
Products -------------------------
    Nuclide  Halflife     f1       Nuclide     f2      Nuclide    f3
Nuclide    f4       Nuclide
  1 Hf-182m      61.5m  4.200E-01 Hf-182  8.928E-02 Ta-182m
4.907E-01 Ta-182
  2 Hf-182       9E+6y  1.000E+00 Ta-182
  3 Ta-182m     15.84m  1.000E+00 Ta-182
  4 Ta-182     114.43d  1.000E+00 W-182$

Hf-183
                         -------------------------  Daughter
Products -------------------------
    Nuclide  Halflife     f1       Nuclide     f2      Nuclide    f3
Nuclide    f4       Nuclide
  1 Hf-183      1.067h  1.000E+00 Ta-183
  2 Ta-183        5.1d  1.000E+00 W-183$

Hf-184
                         -------------------------  Daughter
Products -------------------------
    Nuclide  Halflife     f1       Nuclide     f2      Nuclide    f3
Nuclide    f4       Nuclide
  1 Hf-184       4.12h  1.000E+00 Ta-184
  2 Ta-184        8.7h  1.000E+00 W-184$

Ta-170
                         -------------------------  Daughter
Products -------------------------
    Nuclide  Halflife     f1       Nuclide     f2      Nuclide    f3
Nuclide    f4       Nuclide
  1 Ta-170       6.76m  1.000E+00 Hf-170
  2 Hf-170      16.01h  1.000E+00 Lu-170
  3 Lu-170      2.012d  1.000E+00 Yb-170$
```

Ta-172

			Daughter Products							
	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	Ta-172	36.8m	1.000E+00	Hf-172						
2	Hf-172	1.87y	1.000E+00	Lu-172m						
3	Lu-172m	3.7m	1.000E+00	Lu-172						
4	Lu-172	6.70d	1.000E+00	Yb-172$						

Ta-173

			Daughter Products							
	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	Ta-173	3.14h	1.000E+00	Hf-173						
2	Hf-173	23.6h	1.000E+00	Lu-173						
3	Lu-173	1.37y	1.000E+00	Yb-173$						

Ta-174

			Daughter Products							
	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	Ta-174	1.14h	1.000E+00	Hf-174						
2	Hf-174	2.0E+15y	1.000E+00	Yb-170$						

Ta-175

			Daughter Products							
	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	Ta-175	10.5h	1.000E+00	Hf-175						
2	Hf-175	70d	1.000E+00	Lu-175$						

Ta-182m

			Daughter Products							
	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	Ta-182m	15.84m	1.000E+00	Ta-182						
2	Ta-182	114.43d	1.000E+00	W-182$						

Ta-185

			Daughter Products							
	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	Ta-185	49.4m	1.000E+00	W-185						
2	W-185	75.1d	1.000E+00	Re-185$						

```
W-177
                          -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
Nuclide   f4      Nuclide
  1 W-177        132m  1.000E+00 Ta-177
  2 Ta-177     56.56h  1.000E+00 Hf-177$

W-178
                          -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
Nuclide   f4      Nuclide
  1 W-178       21.6d  1.000E+00 Ta-178
  2 Ta-178      9.31m  1.000E+00 Hf-178$

W-179
                          -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
Nuclide   f4      Nuclide
  1 W-179      37.05m  1.000E+00 Ta-179
  2 Ta-179      1.82y  1.000E+00 Hf-179$

W-179m
                          -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
Nuclide   f4      Nuclide
  1 W-179m      6.40m  9.972E-01 W-179   2.800E-03 Ta-179
  2 W-179      37.05m  1.000E+00 Ta-179
  3 Ta-179      1.82y  1.000E+00 Hf-179$

W-185m
                          -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
Nuclide   f4      Nuclide
  1 W-185m     1.597m  1.000E+00 W-185
  2 W-185       75.1d  1.000E+00 Re-185$

W-187
                          -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
Nuclide   f4      Nuclide
  1 W-187      23.72h  1.000E+00 Re-187
  2 Re-187  4.12E+10y  1.000E+00 Os-187$

W-188
                          -------------------------  Daughter
Products  -------------------------
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```
    Nuclide  Halflife    f1       Nuclide    f2       Nuclide    f3
Nuclide    f4       Nuclide
  1 W-188        69.78d  1.000E+00 Re-188
  2 Re-188    17.0040h  1.000E+00 Os-188$

W-190
                                 -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1       Nuclide    f2       Nuclide    f3
Nuclide    f4       Nuclide
  1 W-190        30.0m  1.000E+00 Re-190
  2 Re-190        3.1m  1.000E+00 Os-190$

Re-178
                                 -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1       Nuclide    f2       Nuclide    f3
Nuclide    f4       Nuclide
  1 Re-178       13.2m  1.000E+00 W-178
  2 W-178        21.6d  1.000E+00 Ta-178
  3 Ta-178       9.31m  1.000E+00 Hf-178$

Re-179
                                 -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1       Nuclide    f2       Nuclide    f3
Nuclide    f4       Nuclide
  1 Re-179       19.5m  2.392E-01 W-179m  7.608E-01 W-179
  2 W-179m       6.40m  9.972E-01 W-179   2.800E-03 Ta-179
  3 W-179       37.05m  1.000E+00 Ta-179
  4 Ta-179       1.82y  1.000E+00 Hf-179$

Re-181
                                 -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1       Nuclide    f2       Nuclide    f3
Nuclide    f4       Nuclide
  1 Re-181       19.9h  1.000E+00 W-181
  2 W-181       121.2d  1.000E+00 Ta-181$

Re-184m
                                 -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1       Nuclide    f2       Nuclide    f3
Nuclide    f4       Nuclide
  1 Re-184m       169d  7.540E-01 Re-184  2.460E-01 W-184$
  2 Re-184       38.0d  1.000E+00 W-184$

Re-186
                                 -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1       Nuclide    f2       Nuclide    f3
```

```
Nuclide    f4       Nuclide
  1 Re-186     3.7183d  9.253E-01 Os-186   7.470E-02 W-186$
  2 Os-186   2.0E+15y  1.000E+00 W-182$

Re~186m
                                  -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife     f1       Nuclide    f2       Nuclide    f3
Nuclide    f4       Nuclide
  1 Re-186m  2.00E+5y  1.000E+00 Re-186
  2 Re-186     3.7183d  9.253E-01 Os-186   7.470E-02 W-186$
  3 Os-186   2.0E+15y  1.000E+00 W-182$

Re~188m
                                  -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife     f1       Nuclide    f2       Nuclide    f3
Nuclide    f4       Nuclide
  1 Re-188m    18.59m  1.000E+00 Re-188
  2 Re-188   17.0040h  1.000E+00 Os-188$

Re~189
                                  -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife     f1       Nuclide    f2       Nuclide    f3
Nuclide    f4       Nuclide
  1 Re-189      24.3h  1.221E-01 Os-189m 8.779E-01 Os-189$
  2 Os-189m      5.8h  1.000E+00 Os-189$

Re~190m
                                  -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife     f1       Nuclide    f2       Nuclide    f3
Nuclide    f4       Nuclide
  1 Re-190m      3.2h  4.560E-01 Re-190   5.440E-01 Os-190$
  2 Re-190       3.1m  1.000E+00 Os-190$

Os~180
                                  -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife     f1       Nuclide    f2       Nuclide    f3
Nuclide    f4       Nuclide
  1 Os-180      21.5m  1.000E+00 Re-180
  2 Re-180      2.44m  1.000E+00 W-180$

Os~181
                                  -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife     f1       Nuclide    f2       Nuclide    f3
Nuclide    f4       Nuclide
  1 Os-181       105m  1.000E+00 Re-181
  2 Re-181      19.9h  1.000E+00 W-181
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  3 W-181       121.2d  1.000E+00 Ta-181$

Os-182
                              -------------------------  Daughter
Products -------------------------
    Nuclide  Halflife    f1       Nuclide    f2       Nuclide    f3
Nuclide    f4      Nuclide
  1 Os-182      22.10h  1.000E+00 Re-182m
  2 Re-182m      12.7h  1.000E+00 W-182$

Os-183
                              -------------------------  Daughter
Products -------------------------
    Nuclide  Halflife    f1       Nuclide    f2       Nuclide    f3
Nuclide    f4      Nuclide
  1 Os-183       13.0h  1.000E+00 Re-183
  2 Re-183       70.0d  1.000E+00 W-183$

Os-183m
                              -------------------------  Daughter
Products -------------------------
    Nuclide  Halflife    f1       Nuclide    f2       Nuclide    f3
Nuclide    f4      Nuclide
  1 Os-183m       9.9h  1.500E-01 Os-183  8.500E-01 Re-183
  2 Os-183       13.0h  1.000E+00 Re-183
  3 Re-183       70.0d  1.000E+00 W-183$

Os-191m
                              -------------------------  Daughter
Products -------------------------
    Nuclide  Halflife    f1       Nuclide    f2       Nuclide    f3
Nuclide    f4      Nuclide
  1 Os-191m     13.10h  1.000E+00 Os-191
  2 Os-191       15.4d  1.000E+00 Ir-191$

Os-193
                              -------------------------  Daughter
Products -------------------------
    Nuclide  Halflife    f1       Nuclide    f2       Nuclide    f3
Nuclide    f4      Nuclide
  1 Os-193      30.11h  3.476E-03 Ir-193m 9.965E-01 Ir-193$
  2 Ir-193m     10.53d  1.000E+00 Ir-193$

Os-194
                              -------------------------  Daughter
Products -------------------------
    Nuclide  Halflife    f1       Nuclide    f2       Nuclide    f3
Nuclide    f4      Nuclide
  1 Os-194        6.0y  1.000E+00 Ir-194
  2 Ir-194      19.28h  1.000E+00 Pt-194$

Os-196
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```
                          -------------------------  Daughter
Products -------------------------
    Nuclide  Halflife    f1       Nuclide    f2       Nuclide    f3
Nuclide   f4       Nuclide
  1 Os-196      34.9m  1.000E+00 Ir-196
  2 Ir-196        52s  1.000E+00 Pt-196$

Ir-180
                          -------------------------  Daughter
Products -------------------------
    Nuclide  Halflife    f1       Nuclide    f2       Nuclide    f3
Nuclide   f4       Nuclide
  1 Ir-180       1.5m  1.000E+00 Os-180
  2 Os-180      21.5m  1.000E+00 Re-180
  3 Re-180      2.44m  1.000E+00 W-180$

Ir-182
                          -------------------------  Daughter
Products -------------------------
    Nuclide  Halflife    f1       Nuclide    f2       Nuclide    f3
Nuclide   f4       Nuclide
  1 Ir-182        15m  1.000E+00 Os-182
  2 Os-182     22.10h  1.000E+00 Re-182m
  3 Re-182m     12.7h  1.000E+00 W-182$

Ir-183
                          -------------------------  Daughter
Products -------------------------
    Nuclide  Halflife    f1       Nuclide    f2       Nuclide    f3
Nuclide   f4       Nuclide
  1 Ir-183        58m  7.097E-01 Os-183m 2.903E-01 Os-183
  2 Os-183m      9.9h  1.500E-01 Os-183  8.500E-01 Re-183
  3 Os-183      13.0h  1.000E+00 Re-183
  4 Re-183      70.0d  1.000E+00 W-183$

Ir-185
                          -------------------------  Daughter
Products -------------------------
    Nuclide  Halflife    f1       Nuclide    f2       Nuclide    f3
Nuclide   f4       Nuclide
  1 Ir-185      14.4h  1.000E+00 Os-185
  2 Os-185      93.6d  1.000E+00 Re-185$

Ir-186
                          -------------------------  Daughter
Products -------------------------
    Nuclide  Halflife    f1       Nuclide    f2       Nuclide    f3
Nuclide   f4       Nuclide
  1 Ir-186     16.64h  1.000E+00 Os-186
  2 Os-186   2.0E+15y  1.000E+00 W-182$

Ir-186m
```

```
                          ------------------------  Daughter
Products  ------------------------
    Nuclide  Halflife     f1       Nuclide    f2       Nuclide    f3
Nuclide    f4        Nuclide
  1 Ir-186m      1.92h  2.500E-01 Ir-186  7.500E-01 Os-186
  2 Ir-186      16.64h  1.000E+00 Os-186
  3 Os-186   2.0E+15y  1.000E+00 W-182$

Ir-189
                          ------------------------  Daughter
Products  ------------------------
    Nuclide  Halflife     f1       Nuclide    f2       Nuclide    f3
Nuclide    f4        Nuclide
  1 Ir-189       13.2d  7.426E-02 Os-189m 9.257E-01 Os-189$
  2 Os-189m       5.8h  1.000E+00 Os-189$

Ir-190m
                          ------------------------  Daughter
Products  ------------------------
    Nuclide  Halflife     f1       Nuclide    f2       Nuclide    f3
Nuclide    f4        Nuclide
  1 Ir-190m     1.120h  1.000E+00 Ir-190
  2 Ir-190      11.78d  1.000E+00 Os-190$

Ir-190n
                          ------------------------  Daughter
Products  ------------------------
    Nuclide  Halflife     f1       Nuclide    f2       Nuclide    f3
Nuclide    f4        Nuclide
  1 Ir-190n     3.087h  9.140E-01 Os-190m 8.600E-02 Ir-190
  2 Os-190m       9.9m  1.000E+00 Os-190$
  3 Ir-190      11.78d  1.000E+00 Os-190$

Ir-192m
                          ------------------------  Daughter
Products  ------------------------
    Nuclide  Halflife     f1       Nuclide    f2       Nuclide    f3
Nuclide    f4        Nuclide
  1 Ir-192m      1.45m  9.998E-01 Ir-192  1.750E-04 Pt-192$
  2 Ir-192     73.827d  9.513E-01 Pt-192$  4.870E-02 Os-192$

Ir-192n
                          ------------------------  Daughter
Products  ------------------------
    Nuclide  Halflife     f1       Nuclide    f2       Nuclide    f3
Nuclide    f4        Nuclide
  1 Ir-192n       241y  1.000E+00 Ir-192
  2 Ir-192     73.827d  9.513E-01 Pt-192$  4.870E-02 Os-192$

Ir-195m
                          ------------------------  Daughter
Products  ------------------------
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```
    Nuclide  Halflife    f1       Nuclide    f2       Nuclide    f3
Nuclide    f4       Nuclide
  1 Ir-195m       3.8h  4.369E-01 Pt-195m 5.000E-02 Ir-195
5.131E-01 Pt-195$
  2 Pt-195m      4.02d  1.000E+00 Pt-195$
  3 Ir-195        2.5h  1.000E+00 Pt-195$

Pt-184
                         -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1       Nuclide    f2       Nuclide    f3
Nuclide    f4       Nuclide
  1 Pt-184       17.3m  1.000E+00 Ir-184  1.700E-05 Os-180
  2 Ir-184       3.09h  1.000E+00 Os-184$
  3 Os-180       21.5m  1.000E+00 Re-180
  4 Re-180       2.44m  1.000E+00 W-180$

Pt-186
                         -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1       Nuclide    f2       Nuclide    f3
Nuclide    f4       Nuclide
  1 Pt-186       2.08h  8.194E-01 Ir-186m 1.806E-01 Ir-186
1.000E-06 Os-182
  2 Ir-186m      1.92h  2.500E-01 Ir-186  7.500E-01 Os-186
  3 Ir-186      16.64h  1.000E+00 Os-186
  4 Os-182      22.10h  1.000E+00 Re-182m
  5 Os-186   2.0E+15y  1.000E+00 W-182$
  6 Re-182m      12.7h  1.000E+00 W-182$

Pt-187
                         -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1       Nuclide    f2       Nuclide    f3
Nuclide    f4       Nuclide
  1 Pt-187       2.35h  1.000E+00 Ir-187
  2 Ir-187       10.5h  1.000E+00 Os-187$

Pt-188
                         -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1       Nuclide    f2       Nuclide    f3
Nuclide    f4       Nuclide
  1 Pt-188       10.2d  1.000E+00 Ir-188  2.900E-07 Os-184$
  2 Ir-188       41.5h  1.000E+00 Os-188$

Pt-189
                         -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1       Nuclide    f2       Nuclide    f3
Nuclide    f4       Nuclide
  1 Pt-189      10.87h  1.000E+00 Ir-189
```

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  2 Ir-189       13.2d  7.426E-02 Os-189m 9.257E-01 Os-189$
  3 Os-189m       5.8h  1.000E+00 Os-189$

Pt-190
                                 ------------------------- Daughter
Products -------------------------
    Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
Nuclide   f4      Nuclide
  1 Pt-190  6.50E+11y  1.000E+00 Os-186
  2 Os-186   2.0E+15y  1.000E+00 W-182$

Pt-193m
                                 ------------------------- Daughter
Products -------------------------
    Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
Nuclide   f4      Nuclide
  1 Pt-193m     4.33d  1.000E+00 Pt-193
  2 Pt-193        50y  1.000E+00 Ir-193$

Pt-197m
                                 ------------------------- Daughter
Products -------------------------
    Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
Nuclide   f4      Nuclide
  1 Pt-197m    95.41m  9.670E-01 Pt-197  3.300E-02 Au-197$
  2 Pt-197   19.8915h  1.000E+00 Au-197$

Pt-199
                                 ------------------------- Daughter
Products -------------------------
    Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
Nuclide   f4      Nuclide
  1 Pt-199     30.80m  1.000E+00 Au-199
  2 Au-199     3.139d  1.000E+00 Hg-199$

Pt-200
                                 ------------------------- Daughter
Products -------------------------
    Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
Nuclide   f4      Nuclide
  1 Pt-200      12.5h  1.000E+00 Au-200
  2 Au-200      48.4m  1.000E+00 Hg-200$

Pt-202
                                 ------------------------- Daughter
Products -------------------------
    Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
Nuclide   f4      Nuclide
  1 Pt-202        44h  1.000E+00 Au-202
  2 Au-202      28.8s  1.000E+00 Hg-202$

Au-186
```

```
                          -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
Nuclide   f4      Nuclide
  1 Au-186      10.7m  1.000E+00 Pt-186
  2 Pt-186      2.08h  8.194E-01 Ir-186m 1.806E-01 Ir-186
1.000E-06 Os-182
  3 Ir-186m     1.92h  2.500E-01 Ir-186  7.500E-01 Os-186
  4 Ir-186     16.64h  1.000E+00 Os-186
  5 Os-182     22.10h  1.000E+00 Re-182m
  6 Os-186   2.0E+15y  1.000E+00 W-182$
  7 Re-182m     12.7h  1.000E+00 W-182$

Au-187
                          -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
Nuclide   f4      Nuclide
  1 Au-187       8.4m  1.000E+00 Pt-187  3.000E-05 Ir-183
  2 Pt-187      2.35h  1.000E+00 Ir-187
  3 Ir-183        58m  7.097E-01 Os-183m 2.903E-01 Os-183
  4 Ir-187      10.5h  1.000E+00 Os-187$
  5 Os-183m      9.9h  1.500E-01 Os-183  8.500E-01 Re-183
  6 Os-183      13.0h  1.000E+00 Re-183
  7 Re-183      70.0d  1.000E+00 W-183$

Au-190
                          -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
Nuclide   f4      Nuclide
  1 Au-190      42.8m  1.000E+00 Pt-190
  2 Pt-190  6.50E+11y  1.000E+00 Os-186
  3 Os-186   2.0E+15y  1.000E+00 W-182$

Au-191
                          -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
Nuclide   f4      Nuclide
  1 Au-191      3.18h  1.000E+00 Pt-191
  2 Pt-191     2.802d  1.000E+00 Ir-191$

Au-193
                          -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
Nuclide   f4      Nuclide
  1 Au-193     17.65h  1.000E+00 Pt-193
  2 Pt-193        50y  1.000E+00 Ir-193$

Au-193m
```

```
                                 ------------------------- Daughter
Products -------------------------
    Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
Nuclide   f4      Nuclide
  1 Au-193m      3.9s  9.997E-01 Au-193  3.000E-04 Pt-193m
  2 Au-193     17.65h  1.000E+00 Pt-193
  3 Pt-193m     4.33d  1.000E+00 Pt-193
  4 Pt-193        50y  1.000E+00 Ir-193$

Au-195m
                                 ------------------------- Daughter
Products -------------------------
    Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
Nuclide   f4      Nuclide
  1 Au-195m     30.5s  1.000E+00 Au-195
  2 Au-195   186.098d  1.000E+00 Pt-195$

Au-196m
                                 ------------------------- Daughter
Products -------------------------
    Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
Nuclide   f4      Nuclide
  1 Au-196m      9.6h  1.000E+00 Au-196
  2 Au-196     6.183d  9.280E-01 Pt-196$  7.200E-02 Hg-196$

Au-198m
                                 ------------------------- Daughter
Products -------------------------
    Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
Nuclide   f4      Nuclide
  1 Au-198m     2.27d  1.000E+00 Au-198
  2 Au-198   2.69517d  1.000E+00 Hg-198$

Au-200m
                                 ------------------------- Daughter
Products -------------------------
    Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
Nuclide   f4      Nuclide
  1 Au-200m     18.7h  1.800E-01 Au-200  8.200E-01 Hg-200$
  2 Au-200      48.4m  1.000E+00 Hg-200$

Hg-190
                                 ------------------------- Daughter
Products -------------------------
    Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
Nuclide   f4      Nuclide
  1 Hg-190      20.0m  1.000E+00 Au-190
  2 Au-190      42.8m  1.000E+00 Pt-190
  3 Pt-190 6.50E+11y  1.000E+00 Os-186
  4 Os-186   2.0E+15y  1.000E+00 W-182$

Hg-191m
```

```
                         -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
Nuclide   f4       Nuclide
  1 Hg-191m      50.8m  1.000E+00 Au-191
  2 Au-191       3.18h  1.000E+00 Pt-191
  3 Pt-191     2.802d  1.000E+00 Ir-191$

Hg-192
                         -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
Nuclide   f4       Nuclide
  1 Hg-192       4.85h  1.000E+00 Au-192
  2 Au-192       4.94h  1.000E+00 Pt-192$

Hg-193
                         -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
Nuclide   f4       Nuclide
  1 Hg-193       3.80h  3.541E-02 Au-193m 9.646E-01 Au-193
  2 Au-193m       3.9s  9.997E-01 Au-193  3.000E-04 Pt-193m
  3 Au-193     17.65h  1.000E+00 Pt-193
  4 Pt-193m      4.33d  1.000E+00 Pt-193
  5 Pt-193         50y  1.000E+00 Ir-193$

Hg-193m
                         -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
Nuclide   f4       Nuclide
  1 Hg-193m      11.8h  7.100E-02 Hg-193  8.920E-01 Au-193m
3.703E-02 Au-193
  2 Hg-193       3.80h  3.541E-02 Au-193m 9.646E-01 Au-193
  3 Au-193m       3.9s  9.997E-01 Au-193  3.000E-04 Pt-193m
  4 Au-193     17.65h  1.000E+00 Pt-193
  5 Pt-193m      4.33d  1.000E+00 Pt-193
  6 Pt-193         50y  1.000E+00 Ir-193$

Hg-194
                         -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
Nuclide   f4       Nuclide
  1 Hg-194        440y  1.000E+00 Au-194
  2 Au-194     38.02h  1.000E+00 Pt-194$

Hg-195
                         -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
```

```
Nuclide   f4      Nuclide
  1 Hg-195      10.53h  1.000E+00 Au-195
  2 Au-195    186.098d  1.000E+00 Pt-195$

Hg-195m
                                  -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife     f1       Nuclide    f2       Nuclide    f3
Nuclide   f4      Nuclide
  1 Hg-195m     41.6h  5.420E-01 Hg-195  4.580E-01 Au-195
  2 Hg-195      10.53h  1.000E+00 Au-195
  3 Au-195    186.098d  1.000E+00 Pt-195$

Hg-197m
                                  -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife     f1       Nuclide    f2       Nuclide    f3
Nuclide   f4      Nuclide
  1 Hg-197m     23.8h  9.140E-01 Hg-197  8.600E-02 Au-197$
  2 Hg-197      64.94h  1.000E+00 Au-197$

Hg-206
                                  -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife     f1       Nuclide    f2       Nuclide    f3
Nuclide   f4      Nuclide
  1 Hg-206      8.15m  1.000E+00 Tl-206
  2 Tl-206      4.200m  1.000E+00 Pb-206$

Hg-207
                                  -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife     f1       Nuclide    f2       Nuclide    f3
Nuclide   f4      Nuclide
  1 Hg-207       2.9m  1.000E+00 Tl-207
  2 Tl-207      4.77m  1.000E+00 Pb-207$

Tl-190
                                  -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife     f1       Nuclide    f2       Nuclide    f3
Nuclide   f4      Nuclide
  1 Tl-190       2.6m  1.000E+00 Hg-190
  2 Hg-190      20.0m  1.000E+00 Au-190
  3 Au-190      42.8m  1.000E+00 Pt-190
  4 Pt-190  6.50E+11y  1.000E+00 Os-186
  5 Os-186   2.0E+15y  1.000E+00 W-182$

Tl-190m
                                  -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife     f1       Nuclide    f2       Nuclide    f3
```

```
Nuclide    f4       Nuclide
  1 Tl-190m       3.7m  1.000E+00 Hg-190
  2 Hg-190       20.0m  1.000E+00 Au-190
  3 Au-190       42.8m  1.000E+00 Pt-190
  4 Pt-190  6.50E+11y  1.000E+00 Os-186
  5 Os-186   2.0E+15y  1.000E+00 W-182$

Tl-194
                        -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife     f1       Nuclide    f2       Nuclide    f3
Nuclide    f4       Nuclide
  1 Tl-194       33.0m  1.000E+00 Hg-194
  2 Hg-194        440y  1.000E+00 Au-194
  3 Au-194      38.02h  1.000E+00 Pt-194$

Tl-194m
                        -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife     f1       Nuclide    f2       Nuclide    f3
Nuclide    f4       Nuclide
  1 Tl-194m      32.8m  1.000E+00 Hg-194
  2 Hg-194        440y  1.000E+00 Au-194
  3 Au-194      38.02h  1.000E+00 Pt-194$

Tl-195
                        -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife     f1       Nuclide    f2       Nuclide    f3
Nuclide    f4       Nuclide
  1 Tl-195       1.16h  3.436E-03 Hg-195m 9.966E-01 Hg-195
  2 Hg-195m      41.6h  5.420E-01 Hg-195  4.580E-01 Au-195
  3 Hg-195      10.53h  1.000E+00 Au-195
  4 Au-195    186.098d  1.000E+00 Pt-195$

Tl-197
                        -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife     f1       Nuclide    f2       Nuclide    f3
Nuclide    f4       Nuclide
  1 Tl-197       2.84h  1.000E+00 Hg-197
  2 Hg-197      64.94h  1.000E+00 Au-197$

Tl-198m
                        -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife     f1       Nuclide    f2       Nuclide    f3
Nuclide    f4       Nuclide
  1 Tl-198m      1.87h  4.600E-01 Tl-198  5.400E-01 Hg-198$
  2 Tl-198        5.3h  1.000E+00 Hg-198$

Tl-206m
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------------------------- Daughter Products -------------------------

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	Tl-206m	3.74m	1.000E+00	Tl-206						
2	Tl-206	4.200m	1.000E+00	Pb-206$						

Tl-209

------------------------- Daughter Products -------------------------

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	Tl-209	2.161m	1.000E+00	Pb-209						
2	Pb-209	3.253h	1.000E+00	Bi-209$						

Tl-210

------------------------- Daughter Products -------------------------

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	Tl-210	1.30m	1.000E+00	Pb-210						
2	Pb-210	22.20y	1.000E+00	Bi-210	1.900E-08	Hg-206				
3	Bi-210	5.013d	1.000E+00	Po-210	1.320E-06	Tl-206				
4	Hg-206	8.15m	1.000E+00	Tl-206						
5	Po-210	138.376d	1.000E+00	Pb-206$						
6	Tl-206	4.200m	1.000E+00	Pb-206$						

Pb-194

------------------------- Daughter Products -------------------------

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	Pb-194	12.0m	1.000E+00	Tl-194	7.300E-08	Hg-190				
2	Tl-194	33.0m	1.000E+00	Hg-194						
3	Hg-190	20.0m	1.000E+00	Au-190						
4	Hg-194	440y	1.000E+00	Au-194						
5	Au-194	38.02h	1.000E+00	Pt-194$						
6	Au-190	42.8m	1.000E+00	Pt-190						
7	Pt-190	6.50E+11y	1.000E+00	Os-186						
8	Os-186	2.0E+15y	1.000E+00	W-182$						

Pb-195m

------------------------- Daughter Products -------------------------

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	Pb-195m	15m	1.000E+00	Tl-195						
2	Tl-195	1.16h	3.436E-03	Hg-195m	9.966E-01	Hg-195				
3	Hg-195m	41.6h	5.420E-01	Hg-195	4.580E-01	Au-195				
4	Hg-195	10.53h	1.000E+00	Au-195						
5	Au-195	186.098d	1.000E+00	Pt-195$						

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Pb-196
                              -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1       Nuclide    f2       Nuclide    f3
Nuclide   f4       Nuclide
  1 Pb-196         37m  1.000E+00 Tl-196
  2 Tl-196       1.84h  1.000E+00 Hg-196$

Pb-197
                              -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1       Nuclide    f2       Nuclide    f3
Nuclide   f4       Nuclide
  1 Pb-197          8m  1.000E+00 Tl-197
  2 Tl-197       2.84h  1.000E+00 Hg-197
  3 Hg-197      64.94h  1.000E+00 Au-197$

Pb-197m
                              -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1       Nuclide    f2       Nuclide    f3
Nuclide   f4       Nuclide
  1 Pb-197m        43m  1.900E-01 Pb-197  8.100E-01 Tl-197
  2 Pb-197          8m  1.000E+00 Tl-197
  3 Tl-197       2.84h  1.000E+00 Hg-197
  4 Hg-197      64.94h  1.000E+00 Au-197$

Pb-198
                              -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1       Nuclide    f2       Nuclide    f3
Nuclide   f4       Nuclide
  1 Pb-198        2.4h  1.000E+00 Tl-198
  2 Tl-198        5.3h  1.000E+00 Hg-198$

Pb-199
                              -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1       Nuclide    f2       Nuclide    f3
Nuclide   f4       Nuclide
  1 Pb-199         90m  1.000E+00 Tl-199
  2 Tl-199       7.42h  1.000E+00 Hg-199$

Pb-200
                              -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1       Nuclide    f2       Nuclide    f3
Nuclide   f4       Nuclide
  1 Pb-200       21.5h  1.000E+00 Tl-200
  2 Tl-200       26.1h  1.000E+00 Hg-200$

Pb-201
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```
                        -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1      Nuclide    f2       Nuclide    f3
Nuclide   f4       Nuclide
  1 Pb-201       9.33h  1.000E+00 Tl-201
  2 Tl-201     72.912h  1.000E+00 Hg-201$

Pb-201m
                        -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1      Nuclide    f2       Nuclide    f3
Nuclide   f4       Nuclide
  1 Pb-201m        61s  1.000E+00 Pb-201
  2 Pb-201       9.33h  1.000E+00 Tl-201
  3 Tl-201     72.912h  1.000E+00 Hg-201$

Pb-202
                        -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1      Nuclide    f2       Nuclide    f3
Nuclide   f4       Nuclide
  1 Pb-202    5.25E+4y  9.900E-01 Tl-202  1.000E-02 Hg-198$
  2 Tl-202      12.23d  1.000E+00 Hg-202$

Pb-202m
                        -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1      Nuclide    f2       Nuclide    f3
Nuclide   f4       Nuclide
  1 Pb-202m      3.53h  9.050E-01 Pb-202  9.500E-02 Tl-202
  2 Pb-202    5.25E+4y  9.900E-01 Tl-202  1.000E-02 Hg-198$
  3 Tl-202      12.23d  1.000E+00 Hg-202$

Pb-210
                        -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1      Nuclide    f2       Nuclide    f3
Nuclide   f4       Nuclide
  1 Pb-210      22.20y  1.000E+00 Bi-210  1.900E-08 Hg-206
  2 Bi-210      5.013d  1.000E+00 Po-210  1.320E-06 Tl-206
  3 Hg-206       8.15m  1.000E+00 Tl-206
  4 Po-210    138.376d  1.000E+00 Pb-206$
  5 Tl-206      4.200m  1.000E+00 Pb-206$

Pb-211
                        -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1      Nuclide    f2       Nuclide    f3
Nuclide   f4       Nuclide
  1 Pb-211       36.1m  1.000E+00 Bi-211
  2 Bi-211       2.14m  9.972E-01 Tl-207  2.760E-03 Po-211
  3 Tl-207       4.77m  1.000E+00 Pb-207$
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  4 Po-211     0.516s  1.000E+00 Pb-207$

Pb-212
                            -------------------------  Daughter
Products -------------------------
    Nuclide  Halflife    f1      Nuclide    f2       Nuclide    f3
Nuclide   f4       Nuclide
  1 Pb-212      10.64h  1.000E+00 Bi-212
  2 Bi-212      60.55m  6.406E-01 Po-212  3.594E-01 Tl-208
  3 Po-212  2.99E-7s  1.000E+00 Pb-208$
  4 Tl-208     3.053m  1.000E+00 Pb-208$

Pb-214
                            -------------------------  Daughter
Products -------------------------
    Nuclide  Halflife    f1      Nuclide    f2       Nuclide    f3
Nuclide   f4       Nuclide
  1 Pb-214       26.8m  1.000E+00 Bi-214
  2 Bi-214       19.9m  9.998E-01 Po-214  2.100E-04 Tl-210
  3 Po-214  1.643E-4s  1.000E+00 Pb-210
  4 Tl-210       1.30m  1.000E+00 Pb-210
  5 Pb-210      22.20y  1.000E+00 Bi-210  1.900E-08 Hg-206
  6 Bi-210      5.013d  1.000E+00 Po-210  1.320E-06 Tl-206
  7 Hg-206       8.15m  1.000E+00 Tl-206
  8 Po-210   138.376d  1.000E+00 Pb-206$
  9 Tl-206      4.200m  1.000E+00 Pb-206$

Bi-197
                            -------------------------  Daughter
Products -------------------------
    Nuclide  Halflife    f1      Nuclide    f2       Nuclide    f3
Nuclide   f4       Nuclide
  1 Bi-197        9.3m  4.390E-01 Pb-197m 5.610E-01 Pb-197
  2 Pb-197m        43m  1.900E-01 Pb-197  8.100E-01 Tl-197
  3 Pb-197          8m  1.000E+00 Tl-197
  4 Tl-197       2.84h  1.000E+00 Hg-197
  5 Hg-197      64.94h  1.000E+00 Au-197$

Bi-200
                            -------------------------  Daughter
Products -------------------------
    Nuclide  Halflife    f1      Nuclide    f2       Nuclide    f3
Nuclide   f4       Nuclide
  1 Bi-200       36.4m  1.000E+00 Pb-200
  2 Pb-200       21.5h  1.000E+00 Tl-200
  3 Tl-200       26.1h  1.000E+00 Hg-200$

Bi-201
                            -------------------------  Daughter
Products -------------------------
    Nuclide  Halflife    f1      Nuclide    f2       Nuclide    f3
Nuclide   f4       Nuclide
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  1 Bi-201        108m  4.517E-01 Pb-201m 5.483E-01 Pb-201
  2 Pb-201m        61s  1.000E+00 Pb-201
  3 Pb-201       9.33h  1.000E+00 Tl-201
  4 Tl-201     72.912h  1.000E+00 Hg-201$

Bi-202
                        -------------------------  Daughter
Products -------------------------
    Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
Nuclide   f4       Nuclide
  1 Bi-202       1.72h  1.000E+00 Pb-202
  2 Pb-202    5.25E+4y  9.900E-01 Tl-202  1.000E-02 Hg-198$
  3 Tl-202      12.23d  1.000E+00 Hg-202$

Bi-203
                        -------------------------  Daughter
Products -------------------------
    Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
Nuclide   f4       Nuclide
  1 Bi-203      11.76h  1.000E+00 Pb-203
  2 Pb-203     51.873h  1.000E+00 Tl-203$

Bi-204
                        -------------------------  Daughter
Products -------------------------
    Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
Nuclide   f4       Nuclide
  1 Bi-204      11.22h  9.853E-02 Pb-204m 9.015E-01 Pb-204$
  2 Pb-204m      67.2m  1.000E+00 Pb-204$

Bi-205
                        -------------------------  Daughter
Products -------------------------
    Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
Nuclide   f4       Nuclide
  1 Bi-205      15.31d  1.000E+00 Pb-205
  2 Pb-205    1.53E+7y  1.000E+00 Tl-205$

Bi-210
                        -------------------------  Daughter
Products -------------------------
    Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
Nuclide   f4       Nuclide
  1 Bi-210      5.013d  1.000E+00 Po-210  1.320E-06 Tl-206
  2 Po-210    138.376d  1.000E+00 Pb-206$
  3 Tl-206      4.200m  1.000E+00 Pb-206$

Bi-210m
                        -------------------------  Daughter
Products -------------------------
    Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
Nuclide   f4       Nuclide
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  1 Bi-210m  3.04E+6y  1.000E+00 Tl-206
  2 Tl-206     4.200m  1.000E+00 Pb-206$

Bi-211
                                -------------------------  Daughter
Products -------------------------
    Nuclide  Halflife    f1       Nuclide    f2       Nuclide    f3
Nuclide   f4       Nuclide
  1 Bi-211      2.14m  9.972E-01 Tl-207  2.760E-03 Po-211
  2 Tl-207      4.77m  1.000E+00 Pb-207$
  3 Po-211     0.516s  1.000E+00 Pb-207$

Bi-212
                                -------------------------  Daughter
Products -------------------------
    Nuclide  Halflife    f1       Nuclide    f2       Nuclide    f3
Nuclide   f4       Nuclide
  1 Bi-212     60.55m  6.406E-01 Po-212  3.594E-01 Tl-208
  2 Po-212   2.99E-7s  1.000E+00 Pb-208$
  3 Tl-208     3.053m  1.000E+00 Pb-208$

Bi-212n
                                -------------------------  Daughter
Products -------------------------
    Nuclide  Halflife    f1       Nuclide    f2       Nuclide    f3
Nuclide   f4       Nuclide
  1 Bi-212n      7.0m  1.000E+00 Po-212m
  2 Po-212m     45.1s  9.993E-01 Pb-208$

Bi-213
                                -------------------------  Daughter
Products -------------------------
    Nuclide  Halflife    f1       Nuclide    f2       Nuclide    f3
Nuclide   f4       Nuclide
  1 Bi-213     45.59m  9.791E-01 Po-213  2.090E-02 Tl-209
  2 Po-213    4.2E-6s  1.000E+00 Pb-209
  3 Tl-209     2.161m  1.000E+00 Pb-209
  4 Pb-209     3.253h  1.000E+00 Bi-209$

Bi-214
                                -------------------------  Daughter
Products -------------------------
    Nuclide  Halflife    f1       Nuclide    f2       Nuclide    f3
Nuclide   f4       Nuclide
  1 Bi-214      19.9m  9.998E-01 Po-214  2.100E-04 Tl-210
  2 Po-214 1.643E-4s  1.000E+00 Pb-210
  3 Tl-210      1.30m  1.000E+00 Pb-210
  4 Pb-210     22.20y  1.000E+00 Bi-210  1.900E-08 Hg-206
  5 Bi-210     5.013d  1.000E+00 Po-210  1.320E-06 Tl-206
  6 Hg-206      8.15m  1.000E+00 Tl-206
  7 Po-210   138.376d  1.000E+00 Pb-206$
  8 Tl-206     4.200m  1.000E+00 Pb-206$
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Bi-215

Daughter Products

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	Bi-215	7.6m	1.000E+00	Po-215						
2	Po-215	1.781E-3s	1.000E+00	Pb-211						
3	Pb-211	36.1m	1.000E+00	Bi-211						
4	Bi-211	2.14m	9.972E-01	Tl-207	2.760E-03	Po-211				
5	Tl-207	4.77m	1.000E+00	Pb-207$						
6	Po-211	0.516s	1.000E+00	Pb-207$						

Bi-216

Daughter Products

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	Bi-216	2.17m	1.000E+00	Po-216						
2	Po-216	0.145s	1.000E+00	Pb-212						
3	Pb-212	10.64h	1.000E+00	Bi-212						
4	Bi-212	60.55m	6.406E-01	Po-212	3.594E-01	Tl-208				
5	Po-212	2.99E-7s	1.000E+00	Pb-208$						
6	Tl-208	3.053m	1.000E+00	Pb-208$						

Po-203

Daughter Products

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	Po-203	36.7m	9.989E-01	Bi-203	1.100E-03	Pb-199				
2	Bi-203	11.76h	1.000E+00	Pb-203						
3	Pb-199	90m	1.000E+00	Tl-199						
4	Pb-203	51.873h	1.000E+00	Tl-203$						
5	Tl-199	7.42h	1.000E+00	Hg-199$						

Po-204

Daughter Products

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	Po-204	3.53h	9.934E-01	Bi-204	6.600E-03	Pb-200				
2	Bi-204	11.22h	9.853E-02	Pb-204m	9.015E-01	Pb-204$				
3	Pb-200	21.5h	1.000E+00	Tl-200						
4	Pb-204m	67.2m	1.000E+00	Pb-204$						
5	Tl-200	26.1h	1.000E+00	Hg-200$						

Po-205

Daughter Products

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	Po-205	1.66h	9.990E-01	Bi-205	4.000E-04	Pb-201				
2	Bi-205	15.31d	1.000E+00	Pb-205						
3	Pb-201	9.33h	1.000E+00	Tl-201						
4	Pb-205	1.53E+7y	1.000E+00	Tl-205$						
5	Tl-201	72.912h	1.000E+00	Hg-201$						

Po-206

------------------------- Daughter Products -------------------------

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	Po-206	8.8d	9.455E-01	Bi-206	5.450E-02	Pb-202				
2	Bi-206	6.243d	1.000E+00	Pb-206$						
3	Pb-202	5.25E+4y	9.900E-01	Tl-202	1.000E-02	Hg-198$				
4	Tl-202	12.23d	1.000E+00	Hg-202$						

Po-207

------------------------- Daughter Products -------------------------

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	Po-207	5.80h	9.998E-01	Bi-207	2.100E-04	Pb-203				
2	Bi-207	32.9y	1.000E+00	Pb-207$						
3	Pb-203	51.873h	1.000E+00	Tl-203$						

Po-208

------------------------- Daughter Products -------------------------

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	Po-208	2.898y	2.230E-05	Bi-208	1.000E+00	Pb-204$				
2	Bi-208	3.68E+5y	1.000E+00	Pb-208$						

Po-209

------------------------- Daughter Products -------------------------

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	Po-209	102y	9.952E-01	Pb-205	4.800E-03	Bi-209$				
2	Pb-205	1.53E+7y	1.000E+00	Tl-205$						

Po-213

------------------------- Daughter Products -------------------------

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	Po-213	4.2E-6s	1.000E+00	Pb-209						
2	Pb-209	3.253h	1.000E+00	Bi-209$						

Po-214

------------------------- Daughter Products -------------------------

```
    Nuclide  Halflife     f1      Nuclide    f2      Nuclide    f3
Nuclide   f4       Nuclide
  1 Po-214  1.643E-4s  1.000E+00 Pb-210
  2 Pb-210     22.20y  1.000E+00 Bi-210  1.900E-08 Hg-206
  3 Bi-210     5.013d  1.000E+00 Po-210  1.320E-06 Tl-206
  4 Hg-206      8.15m  1.000E+00 Tl-206
  5 Po-210   138.376d  1.000E+00 Pb-206$
  6 Tl-206     4.200m  1.000E+00 Pb-206$

Po-215
                         -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife     f1      Nuclide    f2      Nuclide    f3
Nuclide   f4       Nuclide
  1 Po-215  1.781E-3s  1.000E+00 Pb-211
  2 Pb-211      36.1m  1.000E+00 Bi-211
  3 Bi-211      2.14m  9.972E-01 Tl-207  2.760E-03 Po-211
  4 Tl-207      4.77m  1.000E+00 Pb-207$
  5 Po-211     0.516s  1.000E+00 Pb-207$

Po-216
                         -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife     f1      Nuclide    f2      Nuclide    f3
Nuclide   f4       Nuclide
  1 Po-216     0.145s  1.000E+00 Pb-212
  2 Pb-212     10.64h  1.000E+00 Bi-212
  3 Bi-212     60.55m  6.406E-01 Po-212  3.594E-01 Tl-208
  4 Po-212   2.99E-7s  1.000E+00 Pb-208$
  5 Tl-208     3.053m  1.000E+00 Pb-208$

Po-218
                         -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife     f1      Nuclide    f2      Nuclide    f3
Nuclide   f4       Nuclide
  1 Po-218      3.10m  9.998E-01 Pb-214  2.000E-04 At-218
  2 Pb-214      26.8m  1.000E+00 Bi-214
  3 At-218       1.5s  9.990E-01 Bi-214  1.000E-03 Rn-218
  4 Bi-214      19.9m  9.998E-01 Po-214  2.100E-04 Tl-210
  5 Rn-218    3.5E-2s  1.000E+00 Po-214
  6 Po-214  1.643E-4s  1.000E+00 Pb-210
  7 Tl-210      1.30m  1.000E+00 Pb-210
  8 Pb-210     22.20y  1.000E+00 Bi-210  1.900E-08 Hg-206
  9 Bi-210     5.013d  1.000E+00 Po-210  1.320E-06 Tl-206
 10 Hg-206      8.15m  1.000E+00 Tl-206
 11 Po-210   138.376d  1.000E+00 Pb-206$
 12 Tl-206     4.200m  1.000E+00 Pb-206$

At-204
                         -------------------------  Daughter
Products  -------------------------
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	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	At-204	9.2m	9.620E-01	Po-204	3.800E-02	Bi-200				
2	Po-204	3.53h	9.934E-01	Bi-204	6.600E-03	Pb-200				
3	Bi-200	36.4m	1.000E+00	Pb-200						
4	Bi-204	11.22h	9.853E-02	Pb-204m	9.015E-01	Pb-204$				
5	Pb-200	21.5h	1.000E+00	Tl-200						
6	Pb-204m	67.2m	1.000E+00	Pb-204$						
7	Tl-200	26.1h	1.000E+00	Hg-200$						

At-205

------------------------- Daughter Products -------------------------

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	At-205	26.2m	9.000E-01	Po-205	1.000E-01	Bi-201				
2	Po-205	1.66h	9.990E-01	Bi-205	4.000E-04	Pb-201				
3	Bi-201	108m	4.517E-01	Pb-201m	5.483E-01	Pb-201				
4	Bi-205	15.31d	1.000E+00	Pb-205						
5	Pb-201m	61s	1.000E+00	Pb-201						
6	Pb-201	9.33h	1.000E+00	Tl-201						
7	Pb-205	1.53E+7y	1.000E+00	Tl-205$						
8	Tl-201	72.912h	1.000E+00	Hg-201$						

At-206

------------------------- Daughter Products -------------------------

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	At-206	30.6m	9.911E-01	Po-206	8.900E-03	Bi-202				
2	Po-206	8.8d	9.455E-01	Bi-206	5.450E-02	Pb-202				
3	Bi-202	1.72h	1.000E+00	Pb-202						
4	Bi-206	6.243d	1.000E+00	Pb-206$						
5	Pb-202	5.25E+4y	9.900E-01	Tl-202	1.000E-02	Hg-198$				
6	Tl-202	12.23d	1.000E+00	Hg-202$						

At-207

------------------------- Daughter Products -------------------------

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	At-207	1.80h	9.140E-01	Po-207	8.600E-02	Bi-203				
2	Po-207	5.80h	9.998E-01	Bi-207	2.100E-04	Pb-203				
3	Bi-203	11.76h	1.000E+00	Pb-203						
4	Bi-207	32.9y	1.000E+00	Pb-207$						
5	Pb-203	51.873h	1.000E+00	Tl-203$						

At-208

------------------------- Daughter Products -------------------------

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide

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  1 At-208      1.63h  9.945E-01 Po-208  5.500E-03 Bi-204
  2 Po-208     2.898y  2.230E-05 Bi-208  1.000E+00 Pb-204$
  3 Bi-204     11.22h  9.853E-02 Pb-204m 9.015E-01 Pb-204$
  4 Bi-208   3.68E+5y  1.000E+00 Pb-208$
  5 Pb-204m     67.2m  1.000E+00 Pb-204$

At-209
                                 -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife     f1       Nuclide    f2       Nuclide    f3
Nuclide   f4       Nuclide
  1 At-209      5.41h  9.590E-01 Po-209  4.100E-02 Bi-205
  2 Po-209       102y  9.952E-01 Pb-205  4.800E-03 Bi-209$
  3 Bi-205     15.31d  1.000E+00 Pb-205
  4 Pb-205   1.53E+7y  1.000E+00 Tl-205$

At-210
                                 -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife     f1       Nuclide    f2       Nuclide    f3
Nuclide   f4       Nuclide
  1 At-210       8.1h  9.982E-01 Po-210  1.750E-03 Bi-206
  2 Po-210   138.376d  1.000E+00 Pb-206$
  3 Bi-206     6.243d  1.000E+00 Pb-206$

At-211
                                 -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife     f1       Nuclide    f2       Nuclide    f3
Nuclide   f4       Nuclide
  1 At-211     7.214h  5.820E-01 Po-211  4.180E-01 Bi-207
  2 Po-211     0.516s  1.000E+00 Pb-207$
  3 Bi-207      32.9y  1.000E+00 Pb-207$

At-215
                                 -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife     f1       Nuclide    f2       Nuclide    f3
Nuclide   f4       Nuclide
  1 At-215   1.00E-4s  1.000E+00 Bi-211
  2 Bi-211      2.14m  9.972E-01 Tl-207  2.760E-03 Po-211
  3 Tl-207      4.77m  1.000E+00 Pb-207$
  4 Po-211     0.516s  1.000E+00 Pb-207$

At-216
                                 -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife     f1       Nuclide    f2       Nuclide    f3
Nuclide   f4       Nuclide
  1 At-216   3.00E-4s  1.000E+00 Bi-212
  2 Bi-212     60.55m  6.406E-01 Po-212  3.594E-01 Tl-208
  3 Po-212   2.99E-7s  1.000E+00 Pb-208$
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4	Tl-208	3.053m	1.000E+00	Pb-208$						

At-217

------------------------- Daughter Products -------------------------

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	At-217	3.23E-2s	9.999E-01	Bi-213						
2	Bi-213	45.59m	9.791E-01	Po-213	2.090E-02	Tl-209				
3	Po-213	4.2E-6s	1.000E+00	Pb-209						
4	Tl-209	2.161m	1.000E+00	Pb-209						
5	Pb-209	3.253h	1.000E+00	Bi-209$						

At-218

------------------------- Daughter Products -------------------------

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	At-218	1.5s	9.990E-01	Bi-214	1.000E-03	Rn-218				
2	Bi-214	19.9m	9.998E-01	Po-214	2.100E-04	Tl-210				
3	Rn-218	3.5E-2s	1.000E+00	Po-214						
4	Po-214	1.643E-4s	1.000E+00	Pb-210						
5	Tl-210	1.30m	1.000E+00	Pb-210						
6	Pb-210	22.20y	1.000E+00	Bi-210	1.900E-08	Hg-206				
7	Bi-210	5.013d	1.000E+00	Po-210	1.320E-06	Tl-206				
8	Hg-206	8.15m	1.000E+00	Tl-206						
9	Po-210	138.376d	1.000E+00	Pb-206$						
10	Tl-206	4.200m	1.000E+00	Pb-206$						

At-219

------------------------- Daughter Products -------------------------

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	At-219	56s	9.700E-01	Bi-215						
2	Bi-215	7.6m	1.000E+00	Po-215						
3	Po-215	1.781E-3s	1.000E+00	Pb-211						
4	Pb-211	36.1m	1.000E+00	Bi-211						
5	Bi-211	2.14m	9.972E-01	Tl-207	2.760E-03	Po-211				
6	Tl-207	4.77m	1.000E+00	Pb-207$						
7	Po-211	0.516s	1.000E+00	Pb-207$						

At-220

------------------------- Daughter Products -------------------------

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	At-220	3.71m	9.200E-01	Rn-220	8.000E-02	Bi-216				
2	Rn-220	55.6s	1.000E+00	Po-216						
3	Bi-216	2.17m	1.000E+00	Po-216						
4	Po-216	0.145s	1.000E+00	Pb-212						
5	Pb-212	10.64h	1.000E+00	Bi-212						

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   6 Bi-212      60.55m  6.406E-01 Po-212  3.594E-01 Tl-208
   7 Po-212    2.99E-7s  1.000E+00 Pb-208$
   8 Tl-208      3.053m  1.000E+00 Pb-208$

Rn-207
                                   -------------------------  Daughter
Products -------------------------
    Nuclide  Halflife     f1       Nuclide    f2       Nuclide    f3
Nuclide   f4       Nuclide
   1 Rn-207       9.25m  7.900E-01 At-207  2.100E-01 Po-203
   2 At-207       1.80h  9.140E-01 Po-207  8.600E-02 Bi-203
   3 Po-203       36.7m  9.989E-01 Bi-203  1.100E-03 Pb-199
   4 Po-207       5.80h  9.998E-01 Bi-207  2.100E-04 Pb-203
   5 Bi-203      11.76h  1.000E+00 Pb-203
   6 Bi-207       32.9y  1.000E+00 Pb-207$
   7 Pb-203     51.873h  1.000E+00 Tl-203$
   8 Pb-199         90m  1.000E+00 Tl-199
   9 Tl-199       7.42h  1.000E+00 Hg-199$

Rn-209
                                   -------------------------  Daughter
Products -------------------------
    Nuclide  Halflife     f1       Nuclide    f2       Nuclide    f3
Nuclide   f4       Nuclide
   1 Rn-209       28.5m  8.300E-01 At-209  1.700E-01 Po-205
   2 At-209       5.41h  9.590E-01 Po-209  4.100E-02 Bi-205
   3 Po-205       1.66h  9.990E-01 Bi-205  4.000E-04 Pb-201
   4 Po-209        102y  9.952E-01 Pb-205  4.800E-03 Bi-209$
   5 Bi-205      15.31d  1.000E+00 Pb-205
   6 Pb-205    1.53E+7y  1.000E+00 Tl-205$
   7 Pb-201       9.33h  1.000E+00 Tl-201
   8 Tl-201     72.912h  1.000E+00 Hg-201$

Rn-210
                                   -------------------------  Daughter
Products -------------------------
    Nuclide  Halflife     f1       Nuclide    f2       Nuclide    f3
Nuclide   f4       Nuclide
   1 Rn-210        2.4h  9.600E-01 Po-206  4.000E-02 At-210
   2 Po-206        8.8d  9.455E-01 Bi-206  5.450E-02 Pb-202
   3 At-210        8.1h  1.750E-03 Bi-206  9.982E-01 Po-210
   4 Bi-206      6.243d  1.000E+00 Pb-206$
   5 Pb-202    5.25E+4y  9.900E-01 Tl-202  1.000E-02 Hg-198$
   6 Tl-202      12.23d  1.000E+00 Hg-202$
   7 Po-210    138.376d  1.000E+00 Pb-206$

Rn-211
                                   -------------------------  Daughter
Products -------------------------
    Nuclide  Halflife     f1       Nuclide    f2       Nuclide    f3
Nuclide   f4       Nuclide
   1 Rn-211       14.6h  7.260E-01 At-211  2.740E-01 Po-207
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  2 At-211       7.214h  5.820E-01 Po-211   4.180E-01 Bi-207
  3 Po-207        5.80h  9.998E-01 Bi-207   2.100E-04 Pb-203
  4 Po-211       0.516s  1.000E+00 Pb-207$
  5 Bi-207        32.9y  1.000E+00 Pb-207$
  6 Pb-203     51.873h  1.000E+00 Tl-203$

Rn-212
                         -------------------------  Daughter
Products -------------------------
    Nuclide  Halflife    f1       Nuclide    f2       Nuclide    f3
Nuclide   f4       Nuclide
  1 Rn-212        23.9m  1.000E+00 Po-208
  2 Po-208       2.898y  2.230E-05 Bi-208   1.000E+00 Pb-204$
  3 Bi-208     3.68E+5y  1.000E+00 Pb-208$

Rn-215
                         -------------------------  Daughter
Products -------------------------
    Nuclide  Halflife    f1       Nuclide    f2       Nuclide    f3
Nuclide   f4       Nuclide
  1 Rn-215       2.30us  1.000E+00 Po-211
  2 Po-211       0.516s  1.000E+00 Pb-207$

Rn-216
                         -------------------------  Daughter
Products -------------------------
    Nuclide  Halflife    f1       Nuclide    f2       Nuclide    f3
Nuclide   f4       Nuclide
  1 Rn-216      4.5E-5s  1.000E+00 Po-212
  2 Po-212     2.99E-7s  1.000E+00 Pb-208$

Rn-217
                         -------------------------  Daughter
Products -------------------------
    Nuclide  Halflife    f1       Nuclide    f2       Nuclide    f3
Nuclide   f4       Nuclide
  1 Rn-217     5.40E-4s  1.000E+00 Po-213
  2 Po-213      4.2E-6s  1.000E+00 Pb-209
  3 Pb-209       3.253h  1.000E+00 Bi-209$

Rn-218
                         -------------------------  Daughter
Products -------------------------
    Nuclide  Halflife    f1       Nuclide    f2       Nuclide    f3
Nuclide   f4       Nuclide
  1 Rn-218      3.5E-2s  1.000E+00 Po-214
  2 Po-214   1.643E-4s   1.000E+00 Pb-210
  3 Pb-210       22.20y  1.000E+00 Bi-210   1.900E-08 Hg-206
  4 Bi-210       5.013d  1.000E+00 Po-210   1.320E-06 Tl-206
  5 Hg-206        8.15m  1.000E+00 Tl-206
  6 Po-210     138.376d  1.000E+00 Pb-206$
  7 Tl-206       4.200m  1.000E+00 Pb-206$
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Rn-219

			Daughter Products							
	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	Rn-219	3.96s	1.000E+00	Po-215						
2	Po-215	1.781E-3s	1.000E+00	Pb-211						
3	Pb-211	36.1m	1.000E+00	Bi-211						
4	Bi-211	2.14m	9.972E-01	Tl-207	2.760E-03	Po-211				
5	Tl-207	4.77m	1.000E+00	Pb-207$						
6	Po-211	0.516s	1.000E+00	Pb-207$						

Rn-220

			Daughter Products							
	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	Rn-220	55.6s	1.000E+00	Po-216						
2	Po-216	0.145s	1.000E+00	Pb-212						
3	Pb-212	10.64h	1.000E+00	Bi-212						
4	Bi-212	60.55m	6.406E-01	Po-212	3.594E-01	Tl-208				
5	Po-212	2.99E-7s	1.000E+00	Pb-208$						
6	Tl-208	3.053m	1.000E+00	Pb-208$						

Rn-222

			Daughter Products							
	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	Rn-222	3.8235d	1.000E+00	Po-218						
2	Po-218	3.10m	9.998E-01	Pb-214	2.000E-04	At-218				
3	Pb-214	26.8m	1.000E+00	Bi-214						
4	At-218	1.5s	9.990E-01	Bi-214	1.000E-03	Rn-218				
5	Bi-214	19.9m	9.998E-01	Po-214	2.100E-04	Tl-210				
6	Rn-218	3.5E-2s	1.000E+00	Po-214						
7	Po-214	1.643E-4s	1.000E+00	Pb-210						
8	Tl-210	1.30m	1.000E+00	Pb-210						
9	Pb-210	22.20y	1.000E+00	Bi-210	1.900E-08	Hg-206				
10	Bi-210	5.013d	1.000E+00	Po-210	1.320E-06	Tl-206				
11	Hg-206	8.15m	1.000E+00	Tl-206						
12	Po-210	138.376d	1.000E+00	Pb-206$						
13	Tl-206	4.200m	1.000E+00	Pb-206$						

Rn-223

			Daughter Products							
	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	Rn-223	24.3m	1.000E+00	Fr-223						
2	Fr-223	22.00m	1.000E+00	Ra-223	6.000E-05	At-219				
3	Ra-223	11.43d	1.000E+00	Rn-219						

4	At-219	56s	9.700E-01	Bi-215		
5	Rn-219	3.96s	1.000E+00	Po-215		
6	Bi-215	7.6m	1.000E+00	Po-215		
7	Po-215	1.781E-3s	1.000E+00	Pb-211		
8	Pb-211	36.1m	1.000E+00	Bi-211		
9	Bi-211	2.14m	9.972E-01	Tl-207	2.760E-03	Po-211
10	Tl-207	4.77m	1.000E+00	Pb-207$		
11	Po-211	0.516s	1.000E+00	Pb-207$		

Fr-212

				Daughter Products						
	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	Fr-212	20.0m	5.700E-01	Rn-212	4.300E-01	At-208				
2	Rn-212	23.9m	1.000E+00	Po-208						
3	At-208	1.63h	9.945E-01	Po-208	5.500E-03	Bi-204				
4	Po-208	2.898y	2.230E-05	Bi-208	1.000E+00	Pb-204$				
5	Bi-208	3.68E+5y	1.000E+00	Pb-208$						
6	Bi-204	11.22h	9.853E-02	Pb-204m	9.015E-01	Pb-204$				
7	Pb-204m	67.2m	1.000E+00	Pb-204$						

Fr-219

				Daughter Products						
	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	Fr-219	2.0E-2s	1.000E+00	At-215						
2	At-215	1.00E-4s	1.000E+00	Bi-211						
3	Bi-211	2.14m	9.972E-01	Tl-207	2.760E-03	Po-211				
4	Tl-207	4.77m	1.000E+00	Pb-207$						
5	Po-211	0.516s	1.000E+00	Pb-207$						

Fr-220

				Daughter Products						
	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	Fr-220	27.4s	9.965E-01	At-216	3.500E-03	Ra-220				
2	At-216	3.00E-4s	1.000E+00	Bi-212						
3	Ra-220	1.79E-2s	1.000E+00	Rn-216						
4	Bi-212	60.55m	6.406E-01	Po-212	3.594E-01	Tl-208				
5	Rn-216	4.5E-5s	1.000E+00	Po-212						
6	Po-212	2.99E-7s	1.000E+00	Pb-208$						
7	Tl-208	3.053m	1.000E+00	Pb-208$						

Fr-221

				Daughter Products						
	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	Fr-221	4.9m	1.000E+00	At-217						

2	At-217	3.23E-2s	9.999E-01	Bi-213		
3	Bi-213	45.59m	9.791E-01	Po-213	2.090E-02	Tl-209
4	Po-213	4.2E-6s	1.000E+00	Pb-209		
5	Tl-209	2.161m	1.000E+00	Pb-209		
6	Pb-209	3.253h	1.000E+00	Bi-209$		

Fr-222

------------------------- Daughter Products -------------------------

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	Fr-222	14.2m	1.000E+00	Ra-222						
2	Ra-222	38.0s	1.000E+00	Rn-218						
3	Rn-218	3.5E-2s	1.000E+00	Po-214						
4	Po-214	1.643E-4s	1.000E+00	Pb-210						
5	Pb-210	22.20y	1.000E+00	Bi-210	1.900E-08	Hg-206				
6	Bi-210	5.013d	1.000E+00	Po-210	1.320E-06	Tl-206				
7	Hg-206	8.15m	1.000E+00	Tl-206						
8	Po-210	138.376d	1.000E+00	Pb-206$						
9	Tl-206	4.200m	1.000E+00	Pb-206$						

Fr-223

------------------------- Daughter Products -------------------------

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	Fr-223	22.00m	1.000E+00	Ra-223	6.000E-05	At-219				
2	Ra-223	11.43d	1.000E+00	Rn-219						
3	At-219	56s	9.700E-01	Bi-215						
4	Rn-219	3.96s	1.000E+00	Po-215						
5	Bi-215	7.6m	1.000E+00	Po-215						
6	Po-215	1.781E-3s	1.000E+00	Pb-211						
7	Pb-211	36.1m	1.000E+00	Bi-211						
8	Bi-211	2.14m	9.972E-01	Tl-207	2.760E-03	Po-211				
9	Tl-207	4.77m	1.000E+00	Pb-207$						
10	Po-211	0.516s	1.000E+00	Pb-207$						

Fr-224

------------------------- Daughter Products -------------------------

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	Fr-224	3.33m	1.000E+00	Ra-224						
2	Ra-224	3.66d	1.000E+00	Rn-220						
3	Rn-220	55.6s	1.000E+00	Po-216						
4	Po-216	0.145s	1.000E+00	Pb-212						
5	Pb-212	10.64h	1.000E+00	Bi-212						
6	Bi-212	60.55m	6.406E-01	Po-212	3.594E-01	Tl-208				
7	Po-212	2.99E-7s	1.000E+00	Pb-208$						
8	Tl-208	3.053m	1.000E+00	Pb-208$						

Fr-227

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                          -------------------------  Daughter
Products -------------------------
    Nuclide  Halflife     f1       Nuclide    f2       Nuclide    f3
Nuclide   f4       Nuclide
  1 Fr-227       2.47m  1.000E+00 Ra-227
  2 Ra-227       42.2m  1.000E+00 Ac-227
  3 Ac-227     21.772y  9.862E-01 Th-227  1.380E-02 Fr-223
  4 Th-227      18.68d  1.000E+00 Ra-223
  5 Fr-223      22.00m  1.000E+00 Ra-223  6.000E-05 At-219
  6 Ra-223      11.43d  1.000E+00 Rn-219
  7 Rn-219       3.96s  1.000E+00 Po-215
  8 At-219         56s  9.700E-01 Bi-215
  9 Bi-215        7.6m  1.000E+00 Po-215
 10 Po-215  1.781E-3s  1.000E+00 Pb-211
 11 Pb-211       36.1m  1.000E+00 Bi-211
 12 Bi-211       2.14m  9.972E-01 Tl-207  2.760E-03 Po-211
 13 Tl-207       4.77m  1.000E+00 Pb-207$
 14 Po-211      0.516s  1.000E+00 Pb-207$
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Ra-219

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                          -------------------------  Daughter
Products -------------------------
    Nuclide  Halflife     f1       Nuclide    f2       Nuclide    f3
Nuclide   f4       Nuclide
  1 Ra-219        10ms 1.000E+00 Rn-215
  2 Rn-215      2.30us 1.000E+00 Po-211
  3 Po-211      0.516s  1.000E+00 Pb-207$
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Ra-220

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                          -------------------------  Daughter
Products -------------------------
    Nuclide  Halflife     f1       Nuclide    f2       Nuclide    f3
Nuclide   f4       Nuclide
  1 Ra-220   1.79E-2s  1.000E+00 Rn-216
  2 Rn-216    4.5E-5s  1.000E+00 Po-212
  3 Po-212   2.99E-7s  1.000E+00 Pb-208$
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Ra-221

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                          -------------------------  Daughter
Products -------------------------
    Nuclide  Halflife     f1       Nuclide    f2       Nuclide    f3
Nuclide   f4       Nuclide
  1 Ra-221         28s  1.000E+00 Rn-217
  2 Rn-217   5.40E-4s  1.000E+00 Po-213
  3 Po-213    4.2E-6s  1.000E+00 Pb-209
  4 Pb-209     3.253h  1.000E+00 Bi-209$
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Ra-222

```
                          -------------------------  Daughter
Products -------------------------
    Nuclide  Halflife     f1       Nuclide    f2       Nuclide    f3
Nuclide   f4       Nuclide
```

```
  1 Ra-222       38.0s  1.000E+00 Rn-218
  2 Rn-218     3.5E-2s  1.000E+00 Po-214
  3 Po-214   1.643E-4s  1.000E+00 Pb-210
  4 Pb-210      22.20y  1.000E+00 Bi-210  1.900E-08 Hg-206
  5 Bi-210      5.013d  1.000E+00 Po-210  1.320E-06 Tl-206
  6 Hg-206       8.15m  1.000E+00 Tl-206
  7 Po-210    138.376d  1.000E+00 Pb-206$
  8 Tl-206      4.200m  1.000E+00 Pb-206$

Ra-223
                       -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife     f1       Nuclide    f2       Nuclide    f3
Nuclide   f4       Nuclide
  1 Ra-223      11.43d  1.000E+00 Rn-219
  2 Rn-219       3.96s  1.000E+00 Po-215
  3 Po-215   1.781E-3s  1.000E+00 Pb-211
  4 Pb-211       36.1m  1.000E+00 Bi-211
  5 Bi-211       2.14m  9.972E-01 Tl-207  2.760E-03 Po-211
  6 Tl-207       4.77m  1.000E+00 Pb-207$
  7 Po-211      0.516s  1.000E+00 Pb-207$

Ra-224
                       -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife     f1       Nuclide    f2       Nuclide    f3
Nuclide   f4       Nuclide
  1 Ra-224       3.66d  1.000E+00 Rn-220
  2 Rn-220       55.6s  1.000E+00 Po-216
  3 Po-216      0.145s  1.000E+00 Pb-212
  4 Pb-212      10.64h  1.000E+00 Bi-212
  5 Bi-212      60.55m  6.406E-01 Po-212  3.594E-01 Tl-208
  6 Po-212    2.99E-7s  1.000E+00 Pb-208$
  7 Tl-208      3.053m  1.000E+00 Pb-208$

Ra-225
                       -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife     f1       Nuclide    f2       Nuclide    f3
Nuclide   f4       Nuclide
  1 Ra-225       14.9d  1.000E+00 Ac-225
  2 Ac-225       10.0d  1.000E+00 Fr-221
  3 Fr-221        4.9m  1.000E+00 At-217
  4 At-217    3.23E-2s  9.999E-01 Bi-213
  5 Bi-213      45.59m  9.791E-01 Po-213  2.090E-02 Tl-209
  6 Po-213     4.2E-6s  1.000E+00 Pb-209
  7 Tl-209      2.161m  1.000E+00 Pb-209
  8 Pb-209      3.253h  1.000E+00 Bi-209$

Ra-226
                       -------------------------  Daughter
Products  -------------------------
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	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	Ra-226	1600y	1.000E+00	Rn-222						
2	Rn-222	3.8235d	1.000E+00	Po-218						
3	Po-218	3.10m	9.998E-01	Pb-214	2.000E-04	At-218				
4	Pb-214	26.8m	1.000E+00	Bi-214						
5	At-218	1.5s	9.990E-01	Bi-214	1.000E-03	Rn-218				
6	Bi-214	19.9m	9.998E-01	Po-214	2.100E-04	Tl-210				
7	Rn-218	3.5E-2s	1.000E+00	Po-214						
8	Po-214	1.643E-4s	1.000E+00	Pb-210						
9	Tl-210	1.30m	1.000E+00	Pb-210						
10	Pb-210	22.20y	1.000E+00	Bi-210	1.900E-08	Hg-206				
11	Bi-210	5.013d	1.000E+00	Po-210	1.320E-06	Tl-206				
12	Hg-206	8.15m	1.000E+00	Tl-206						
13	Po-210	138.376d	1.000E+00	Pb-206$						
14	Tl-206	4.200m	1.000E+00	Pb-206$						

Ra-227

------------------------- Daughter Products -------------------------

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	Ra-227	42.2m	1.000E+00	Ac-227						
2	Ac-227	21.772y	9.862E-01	Th-227	1.380E-02	Fr-223				
3	Th-227	18.68d	1.000E+00	Ra-223						
4	Fr-223	22.00m	1.000E+00	Ra-223	6.000E-05	At-219				
5	Ra-223	11.43d	1.000E+00	Rn-219						
6	Rn-219	3.96s	1.000E+00	Po-215						
7	At-219	56s	9.700E-01	Bi-215						
8	Bi-215	7.6m	1.000E+00	Po-215						
9	Po-215	1.781E-3s	1.000E+00	Pb-211						
10	Pb-211	36.1m	1.000E+00	Bi-211						
11	Bi-211	2.14m	9.972E-01	Tl-207	2.760E-03	Po-211				
12	Tl-207	4.77m	1.000E+00	Pb-207$						
13	Po-211	0.516s	1.000E+00	Pb-207$						

Ra-228

------------------------- Daughter Products -------------------------

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	Ra-228	5.75y	1.000E+00	Ac-228						
2	Ac-228	6.15h	1.000E+00	Th-228						
3	Th-228	1.9116y	1.000E+00	Ra-224						
4	Ra-224	3.66d	1.000E+00	Rn-220						
5	Rn-220	55.6s	1.000E+00	Po-216						
6	Po-216	0.145s	1.000E+00	Pb-212						
7	Pb-212	10.64h	1.000E+00	Bi-212						
8	Bi-212	60.55m	6.406E-01	Po-212	3.594E-01	Tl-208				
9	Po-212	2.99E-7s	1.000E+00	Pb-208$						
10	Tl-208	3.053m	1.000E+00	Pb-208$						

Ra-230

------------------------- Daughter Products -------------------------

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	Ra-230	93m	1.000E+00	Ac-230						
2	Ac-230	122s	1.000E+00	Th-230						
3	Th-230	7.538E+4y	1.000E+00	Ra-226						
4	Ra-226	1600y	1.000E+00	Rn-222						
5	Rn-222	3.8235d	1.000E+00	Po-218						
6	Po-218	3.10m	9.998E-01	Pb-214	2.000E-04	At-218				
7	Pb-214	26.8m	1.000E+00	Bi-214						
8	At-218	1.5s	9.990E-01	Bi-214	1.000E-03	Rn-218				
9	Bi-214	19.9m	9.998E-01	Po-214	2.100E-04	Tl-210				
10	Rn-218	3.5E-2s	1.000E+00	Po-214						
11	Po-214	1.643E-4s	1.000E+00	Pb-210						
12	Tl-210	1.30m	1.000E+00	Pb-210						
13	Pb-210	22.20y	1.000E+00	Bi-210	1.900E-08	Hg-206				
14	Bi-210	5.013d	1.000E+00	Po-210	1.320E-06	Tl-206				
15	Hg-206	8.15m	1.000E+00	Tl-206						
16	Po-210	138.376d	1.000E+00	Pb-206$						
17	Tl-206	4.200m	1.000E+00	Pb-206$						

Ac-223

------------------------- Daughter Products -------------------------

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	Ac-223	2.10m	9.900E-01	Fr-219						
2	Fr-219	2.0E-2s	1.000E+00	At-215						
3	At-215	1.00E-4s	1.000E+00	Bi-211						
4	Bi-211	2.14m	9.972E-01	Tl-207	2.760E-03	Po-211				
5	Tl-207	4.77m	1.000E+00	Pb-207$						
6	Po-211	0.516s	1.000E+00	Pb-207$						

Ac-224

------------------------- Daughter Products -------------------------

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	Ac-224	2.78h	9.090E-01	Ra-224	9.100E-02	Fr-220				
2	Ra-224	3.66d	1.000E+00	Rn-220						
3	Fr-220	27.4s	9.965E-01	At-216	3.500E-03	Ra-220				
4	Rn-220	55.6s	1.000E+00	Po-216						
5	Po-216	0.145s	1.000E+00	Pb-212						
6	Pb-212	10.64h	1.000E+00	Bi-212						
7	At-216	3.00E-4s	1.000E+00	Bi-212						
8	Bi-212	60.55m	6.406E-01	Po-212	3.594E-01	Tl-208				
9	Ra-220	1.79E-2s	1.000E+00	Rn-216						
10	Rn-216	4.5E-5s	1.000E+00	Po-212						
11	Po-212	2.99E-7s	1.000E+00	Pb-208$						
12	Tl-208	3.053m	1.000E+00	Pb-208$						

Ac-225

Daughter Products

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	Ac-225	10.0d	1.000E+00	Fr-221						
2	Fr-221	4.9m	1.000E+00	At-217						
3	At-217	3.23E-2s	9.999E-01	Bi-213						
4	Bi-213	45.59m	9.791E-01	Po-213	2.090E-02	Tl-209				
5	Po-213	4.2E-6s	1.000E+00	Pb-209						
6	Tl-209	2.161m	1.000E+00	Pb-209						
7	Pb-209	3.253h	1.000E+00	Bi-209$						

Ac-226

Daughter Products

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	Ac-226	29.37h	8.300E-01	Th-226	1.700E-01	Ra-226	6.000E-05	Fr-222		
2	Th-226	30.57m	1.000E+00	Ra-222						
3	Ra-226	1600y	1.000E+00	Rn-222						
4	Fr-222	14.2m	1.000E+00	Ra-222						
5	Ra-222	38.0s	1.000E+00	Rn-218						
6	Rn-222	3.8235d	1.000E+00	Po-218						
7	Po-218	3.10m	2.000E-04	At-218	9.998E-01	Pb-214				
8	At-218	1.5s	1.000E-03	Rn-218	9.990E-01	Bi-214				
9	Rn-218	3.5E-2s	1.000E+00	Po-214						
10	Pb-214	26.8m	1.000E+00	Bi-214						
11	Bi-214	19.9m	9.998E-01	Po-214	2.100E-04	Tl-210				
12	Po-214	1.643E-4s	1.000E+00	Pb-210						
13	Tl-210	1.30m	1.000E+00	Pb-210						
14	Pb-210	22.20y	1.000E+00	Bi-210	1.900E-08	Hg-206				
15	Bi-210	5.013d	1.000E+00	Po-210	1.320E-06	Tl-206				
16	Hg-206	8.15m	1.000E+00	Tl-206						
17	Po-210	138.376d	1.000E+00	Pb-206$						
18	Tl-206	4.200m	1.000E+00	Pb-206$						

Ac-227

Daughter Products

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	Ac-227	21.772y	9.862E-01	Th-227	1.380E-02	Fr-223				
2	Th-227	18.68d	1.000E+00	Ra-223						
3	Fr-223	22.00m	1.000E+00	Ra-223	6.000E-05	At-219				
4	Ra-223	11.43d	1.000E+00	Rn-219						
5	Rn-219	3.96s	1.000E+00	Po-215						
6	At-219	56s	9.700E-01	Bi-215						
7	Bi-215	7.6m	1.000E+00	Po-215						
8	Po-215	1.781E-3s	1.000E+00	Pb-211						

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  9 Pb-211       36.1m  1.000E+00 Bi-211
 10 Bi-211       2.14m  9.972E-01 Tl-207   2.760E-03 Po-211
 11 Tl-207       4.77m  1.000E+00 Pb-207$
 12 Po-211      0.516s  1.000E+00 Pb-207$

Ac-228
                        -------------------------  Daughter
Products -------------------------
    Nuclide  Halflife    f1       Nuclide   f2       Nuclide    f3
Nuclide   f4       Nuclide
  1 Ac-228       6.15h  1.000E+00 Th-228
  2 Th-228     1.9116y  1.000E+00 Ra-224
  3 Ra-224       3.66d  1.000E+00 Rn-220
  4 Rn-220       55.6s  1.000E+00 Po-216
  5 Po-216      0.145s  1.000E+00 Pb-212
  6 Pb-212      10.64h  1.000E+00 Bi-212
  7 Bi-212      60.55m  6.406E-01 Po-212   3.594E-01 Tl-208
  8 Po-212    2.99E-7s  1.000E+00 Pb-208$
  9 Tl-208      3.053m  1.000E+00 Pb-208$

Ac-230
                        -------------------------  Daughter
Products -------------------------
    Nuclide  Halflife    f1       Nuclide   f2       Nuclide    f3
Nuclide   f4       Nuclide
  1 Ac-230        122s  1.000E+00 Th-230
  2 Th-230   7.538E+4y  1.000E+00 Ra-226
  3 Ra-226       1600y  1.000E+00 Rn-222
  4 Rn-222     3.8235d  1.000E+00 Po-218
  5 Po-218       3.10m  9.998E-01 Pb-214   2.000E-04 At-218
  6 Pb-214       26.8m  1.000E+00 Bi-214
  7 At-218        1.5s  9.990E-01 Bi-214   1.000E-03 Rn-218
  8 Bi-214       19.9m  9.998E-01 Po-214   2.100E-04 Tl-210
  9 Rn-218     3.5E-2s  1.000E+00 Po-214
 10 Po-214   1.643E-4s  1.000E+00 Pb-210
 11 Tl-210       1.30m  1.000E+00 Pb-210
 12 Pb-210      22.20y  1.000E+00 Bi-210   1.900E-08 Hg-206
 13 Bi-210      5.013d  1.000E+00 Po-210   1.320E-06 Tl-206
 14 Hg-206       8.15m  1.000E+00 Tl-206
 15 Po-210    138.376d  1.000E+00 Pb-206$
 16 Tl-206      4.200m  1.000E+00 Pb-206$

Ac-231
                        -------------------------  Daughter
Products -------------------------
    Nuclide  Halflife    f1       Nuclide   f2       Nuclide    f3
Nuclide   f4       Nuclide
  1 Ac-231        7.5m  1.000E+00 Th-231
  2 Th-231      25.52h  1.000E+00 Pa-231
  3 Pa-231   3.276E+4y  1.000E+00 Ac-227
  4 Ac-227     21.772y  9.862E-01 Th-227   1.380E-02 Fr-223
  5 Th-227      18.68d  1.000E+00 Ra-223
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6	Fr-223	22.00m	1.000E+00	Ra-223	6.000E-05	At-219
7	Ra-223	11.43d	1.000E+00	Rn-219		
8	Rn-219	3.96s	1.000E+00	Po-215		
9	At-219	56s	9.700E-01	Bi-215		
10	Bi-215	7.6m	1.000E+00	Po-215		
11	Po-215	1.781E-3s	1.000E+00	Pb-211		
12	Pb-211	36.1m	1.000E+00	Bi-211		
13	Bi-211	2.14m	9.972E-01	Tl-207	2.760E-03	Po-211
14	Tl-207	4.77m	1.000E+00	Pb-207$		
15	Po-211	0.516s	1.000E+00	Pb-207$		

Ac-232

------------------------- Daughter Products -------------------------

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	Ac-232	119s	1.000E+00	Th-232						
2	Th-232	1.405E10y	1.000E+00	Ra-228						
3	Ra-228	5.75y	1.000E+00	Ac-228						
4	Ac-228	6.15h	1.000E+00	Th-228						
5	Th-228	1.9116y	1.000E+00	Ra-224						
6	Ra-224	3.66d	1.000E+00	Rn-220						
7	Rn-220	55.6s	1.000E+00	Po-216						
8	Po-216	0.145s	1.000E+00	Pb-212						
9	Pb-212	10.64h	1.000E+00	Bi-212						
10	Bi-212	60.55m	6.406E-01	Po-212	3.594E-01	Tl-208				
11	Po-212	2.99E-7s	1.000E+00	Pb-208$						
12	Tl-208	3.053m	1.000E+00	Pb-208$						

Ac-233

------------------------- Daughter Products -------------------------

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	Ac-233	145s	1.000E+00	Th-233						
2	Th-233	22.3m	1.000E+00	Pa-233						
3	Pa-233	26.967d	1.000E+00	U-233						
4	U-233	1.592E+5y	1.000E+00	Th-229						
5	Th-229	7.34E+3y	1.000E+00	Ra-225						
6	Ra-225	14.9d	1.000E+00	Ac-225						
7	Ac-225	10.0d	1.000E+00	Fr-221						
8	Fr-221	4.9m	1.000E+00	At-217						
9	At-217	3.23E-2s	9.999E-01	Bi-213						
10	Bi-213	45.59m	9.791E-01	Po-213	2.090E-02	Tl-209				
11	Po-213	4.2E-6s	1.000E+00	Pb-209						
12	Tl-209	2.161m	1.000E+00	Pb-209						
13	Pb-209	3.253h	1.000E+00	Bi-209$						

Th-223

------------------------- Daughter Products -------------------------

Nuclide Halflife f1 Nuclide f2 Nuclide f3

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	Th-223	0.60s	1.000E+00	Ra-219						
2	Ra-219	10ms	1.000E+00	Rn-215						
3	Rn-215	2.30us	1.000E+00	Po-211						
4	Po-211	0.516s	1.000E+00	Pb-207$						

Th-224

------------------------- Daughter Products -------------------------

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	Th-224	1.05s	1.000E+00	Ra-220						
2	Ra-220	1.79E-2s	1.000E+00	Rn-216						
3	Rn-216	4.5E-5s	1.000E+00	Po-212						
4	Po-212	2.99E-7s	1.000E+00	Pb-208$						

Th-226

------------------------- Daughter Products -------------------------

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	Th-226	30.57m	1.000E+00	Ra-222						
2	Ra-222	38.0s	1.000E+00	Rn-218						
3	Rn-218	3.5E-2s	1.000E+00	Po-214						
4	Po-214	1.643E-4s	1.000E+00	Pb-210						
5	Pb-210	22.20y	1.000E+00	Bi-210	1.900E-08	Hg-206				
6	Bi-210	5.013d	1.000E+00	Po-210	1.320E-06	Tl-206				
7	Hg-206	8.15m	1.000E+00	Tl-206						
8	Po-210	138.376d	1.000E+00	Pb-206$						
9	Tl-206	4.200m	1.000E+00	Pb-206$						

Th-227

------------------------- Daughter Products -------------------------

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	Th-227	18.68d	1.000E+00	Ra-223						
2	Ra-223	11.43d	1.000E+00	Rn-219						
3	Rn-219	3.96s	1.000E+00	Po-215						
4	Po-215	1.781E-3s	1.000E+00	Pb-211						
5	Pb-211	36.1m	1.000E+00	Bi-211						
6	Bi-211	2.14m	9.972E-01	Tl-207	2.760E-03	Po-211				
7	Tl-207	4.77m	1.000E+00	Pb-207$						
8	Po-211	0.516s	1.000E+00	Pb-207$						

Th-228

------------------------- Daughter Products -------------------------

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	Th-228	1.9116y	1.000E+00	Ra-224						
2	Ra-224	3.66d	1.000E+00	Rn-220						

3	Rn-220	55.6s	1.000E+00	Po-216		
4	Po-216	0.145s	1.000E+00	Pb-212		
5	Pb-212	10.64h	1.000E+00	Bi-212		
6	Bi-212	60.55m	6.406E-01	Po-212	3.594E-01	Tl-208
7	Po-212	2.99E-7s	1.000E+00	Pb-208$		
8	Tl-208	3.053m	1.000E+00	Pb-208$		

Th-229

			------------------------- Daughter Products -------------------------							
	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	Th-229	7.34E+3y	1.000E+00	Ra-225						
2	Ra-225	14.9d	1.000E+00	Ac-225						
3	Ac-225	10.0d	1.000E+00	Fr-221						
4	Fr-221	4.9m	1.000E+00	At-217						
5	At-217	3.23E-2s	9.999E-01	Bi-213						
6	Bi-213	45.59m	9.791E-01	Po-213	2.090E-02	Tl-209				
7	Po-213	4.2E-6s	1.000E+00	Pb-209						
8	Tl-209	2.161m	1.000E+00	Pb-209						
9	Pb-209	3.253h	1.000E+00	Bi-209$						

Th-230

			------------------------- Daughter Products -------------------------							
	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	Th-230	7.538E+4y	1.000E+00	Ra-226						
2	Ra-226	1600y	1.000E+00	Rn-222						
3	Rn-222	3.8235d	1.000E+00	Po-218						
4	Po-218	3.10m	9.998E-01	Pb-214	2.000E-04	At-218				
5	Pb-214	26.8m	1.000E+00	Bi-214						
6	At-218	1.5s	9.990E-01	Bi-214	1.000E-03	Rn-218				
7	Bi-214	19.9m	9.998E-01	Po-214	2.100E-04	Tl-210				
8	Rn-218	3.5E-2s	1.000E+00	Po-214						
9	Po-214	1.643E-4s	1.000E+00	Pb-210						
10	Tl-210	1.30m	1.000E+00	Pb-210						
11	Pb-210	22.20y	1.000E+00	Bi-210	1.900E-08	Hg-206				
12	Bi-210	5.013d	1.000E+00	Po-210	1.320E-06	Tl-206				
13	Hg-206	8.15m	1.000E+00	Tl-206						
14	Po-210	138.376d	1.000E+00	Pb-206$						
15	Tl-206	4.200m	1.000E+00	Pb-206$						

Th-231

			------------------------- Daughter Products -------------------------							
	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	Th-231	25.52h	1.000E+00	Pa-231						
2	Pa-231	3.276E+4y	1.000E+00	Ac-227						
3	Ac-227	21.772y	9.862E-01	Th-227	1.380E-02	Fr-223				
4	Th-227	18.68d	1.000E+00	Ra-223						

5	Fr-223	22.00m	1.000E+00	Ra-223	6.000E-05	At-219
6	Ra-223	11.43d	1.000E+00	Rn-219		
7	Rn-219	3.96s	1.000E+00	Po-215		
8	At-219	56s	9.700E-01	Bi-215		
9	Bi-215	7.6m	1.000E+00	Po-215		
10	Po-215	1.781E-3s	1.000E+00	Pb-211		
11	Pb-211	36.1m	1.000E+00	Bi-211		
12	Bi-211	2.14m	9.972E-01	Tl-207	2.760E-03	Po-211
13	Tl-207	4.77m	1.000E+00	Pb-207$		
14	Po-211	0.516s	1.000E+00	Pb-207$		

Th-232

------------------------ Daughter Products ------------------------

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	Th-232	1.405E10y	1.000E+00	Ra-228						
2	Ra-228	5.75y	1.000E+00	Ac-228						
3	Ac-228	6.15h	1.000E+00	Th-228						
4	Th-228	1.9116y	1.000E+00	Ra-224						
5	Ra-224	3.66d	1.000E+00	Rn-220						
6	Rn-220	55.6s	1.000E+00	Po-216						
7	Po-216	0.145s	1.000E+00	Pb-212						
8	Pb-212	10.64h	1.000E+00	Bi-212						
9	Bi-212	60.55m	6.406E-01	Po-212	3.594E-01	Tl-208				
10	Po-212	2.99E-7s	1.000E+00	Pb-208$						
11	Tl-208	3.053m	1.000E+00	Pb-208$						

Th-233

------------------------ Daughter Products ------------------------

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	Th-233	22.3m	1.000E+00	Pa-233						
2	Pa-233	26.967d	1.000E+00	U-233						
3	U-233	1.592E+5y	1.000E+00	Th-229						
4	Th-229	7.34E+3y	1.000E+00	Ra-225						
5	Ra-225	14.9d	1.000E+00	Ac-225						
6	Ac-225	10.0d	1.000E+00	Fr-221						
7	Fr-221	4.9m	1.000E+00	At-217						
8	At-217	3.23E-2s	9.999E-01	Bi-213						
9	Bi-213	45.59m	9.791E-01	Po-213	2.090E-02	Tl-209				
10	Po-213	4.2E-6s	1.000E+00	Pb-209						
11	Tl-209	2.161m	1.000E+00	Pb-209						
12	Pb-209	3.253h	1.000E+00	Bi-209$						

Th-234

------------------------ Daughter Products ------------------------

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	Th-234	24.10d	1.000E+00	Pa-234m						

2	Pa-234m	1.17m	1.600E-03	Pa-234	9.984E-01	U-234	
3	Pa-234	6.70h	1.000E+00	U-234			
4	U-234	2.455E+5y	1.000E+00	Th-230			
5	Th-230	7.538E+4y	1.000E+00	Ra-226			
6	Ra-226	1600y	1.000E+00	Rn-222			
7	Rn-222	3.8235d	1.000E+00	Po-218			
8	Po-218	3.10m	9.998E-01	Pb-214	2.000E-04	At-218	
9	Pb-214	26.8m	1.000E+00	Bi-214			
10	At-218	1.5s	9.990E-01	Bi-214	1.000E-03	Rn-218	
11	Bi-214	19.9m	9.998E-01	Po-214	2.100E-04	Tl-210	
12	Rn-218	3.5E-2s	1.000E+00	Po-214			
13	Po-214	1.643E-4s	1.000E+00	Pb-210			
14	Tl-210	1.30m	1.000E+00	Pb-210			
15	Pb-210	22.20y	1.000E+00	Bi-210	1.900E-08	Hg-206	
16	Bi-210	5.013d	1.000E+00	Po-210	1.320E-06	Tl-206	
17	Hg-206	8.15m	1.000E+00	Tl-206			
18	Po-210	138.376d	1.000E+00	Pb-206$			
19	Tl-206	4.200m	1.000E+00	Pb-206$			

Th-235

------------------------- Daughter Products -------------------------

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	Th-235	7.1m	1.000E+00	Pa-235						
2	Pa-235	24.5m	9.999E-01	U-235m	1.011E-04	U-235				
3	U-235m	26m	1.000E+00	U-235						
4	U-235	7.04E+8y	1.000E+00	Th-231						
5	Th-231	25.52h	1.000E+00	Pa-231						
6	Pa-231	3.276E+4y	1.000E+00	Ac-227						
7	Ac-227	21.772y	9.862E-01	Th-227	1.380E-02	Fr-223				
8	Th-227	18.68d	1.000E+00	Ra-223						
9	Fr-223	22.00m	1.000E+00	Ra-223	6.000E-05	At-219				
10	Ra-223	11.43d	1.000E+00	Rn-219						
11	Rn-219	3.96s	1.000E+00	Po-215						
12	At-219	56s	9.700E-01	Bi-215						
13	Bi-215	7.6m	1.000E+00	Po-215						
14	Po-215	1.781E-3s	1.000E+00	Pb-211						
15	Pb-211	36.1m	1.000E+00	Bi-211						
16	Bi-211	2.14m	9.972E-01	Tl-207	2.760E-03	Po-211				
17	Tl-207	4.77m	1.000E+00	Pb-207$						
18	Po-211	0.516s	1.000E+00	Pb-207$						

Th-236

------------------------- Daughter Products -------------------------

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	Th-236	37.5m	1.000E+00	Pa-236						
2	Pa-236	9.1m	1.000E+00	U-236						
3	U-236	2.342E+7y	1.000E+00	Th-232						
4	Th-232	1.405E10y	1.000E+00	Ra-228						

5	Ra-228	5.75y	1.000E+00	Ac-228		
6	Ac-228	6.15h	1.000E+00	Th-228		
7	Th-228	1.9116y	1.000E+00	Ra-224		
8	Ra-224	3.66d	1.000E+00	Rn-220		
9	Rn-220	55.6s	1.000E+00	Po-216		
10	Po-216	0.145s	1.000E+00	Pb-212		
11	Pb-212	10.64h	1.000E+00	Bi-212		
12	Bi-212	60.55m	6.406E-01	Po-212	3.594E-01	Tl-208
13	Po-212	2.99E-7s	1.000E+00	Pb-208$		
14	Tl-208	3.053m	1.000E+00	Pb-208$		

Pa-227

------------------------- Daughter Products -------------------------

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	Pa-227	38.3m	8.500E-01	Ac-223	1.500E-01	Th-227				
2	Ac-223	2.10m	9.900E-01	Fr-219						
3	Th-227	18.68d	1.000E+00	Ra-223						
4	Fr-219	2.0E-2s	1.000E+00	At-215						
5	At-215	1.00E-4s	1.000E+00	Bi-211						
6	Ra-223	11.43d	1.000E+00	Rn-219						
7	Rn-219	3.96s	1.000E+00	Po-215						
8	Po-215	1.781E-3s	1.000E+00	Pb-211						
9	Pb-211	36.1m	1.000E+00	Bi-211						
10	Bi-211	2.14m	9.972E-01	Tl-207	2.760E-03	Po-211				
11	Tl-207	4.77m	1.000E+00	Pb-207$						
12	Po-211	0.516s	1.000E+00	Pb-207$						

Pa-228

------------------------- Daughter Products -------------------------

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	Pa-228	22h	9.800E-01	Th-228	2.000E-02	Ac-224				
2	Th-228	1.9116y	1.000E+00	Ra-224						
3	Ac-224	2.78h	9.090E-01	Ra-224	9.100E-02	Fr-220				
4	Ra-224	3.66d	1.000E+00	Rn-220						
5	Rn-220	55.6s	1.000E+00	Po-216						
6	Po-216	0.145s	1.000E+00	Pb-212						
7	Pb-212	10.64h	1.000E+00	Bi-212						
8	Fr-220	27.4s	9.965E-01	At-216	3.500E-03	Ra-220				
9	At-216	3.00E-4s	1.000E+00	Bi-212						
10	Bi-212	60.55m	6.406E-01	Po-212	3.594E-01	Tl-208				
11	Ra-220	1.79E-2s	1.000E+00	Rn-216						
12	Rn-216	4.5E-5s	1.000E+00	Po-212						
13	Po-212	2.99E-7s	1.000E+00	Pb-208$						
14	Tl-208	3.053m	1.000E+00	Pb-208$						

Pa-229

------------------------- Daughter Products -------------------------

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	Pa-229	1.50d	9.952E-01	Th-229	4.800E-03	Ac-225				
2	Th-229	7.34E+3y	1.000E+00	Ra-225						
3	Ra-225	14.9d	1.000E+00	Ac-225						
4	Ac-225	10.0d	1.000E+00	Fr-221						
5	Fr-221	4.9m	1.000E+00	At-217						
6	At-217	3.23E-2s	9.999E-01	Bi-213						
7	Bi-213	45.59m	9.791E-01	Po-213	2.090E-02	Tl-209				
8	Po-213	4.2E-6s	1.000E+00	Pb-209						
9	Tl-209	2.161m	1.000E+00	Pb-209						
10	Pb-209	3.253h	1.000E+00	Bi-209$						

Pa-230

------------------------- Daughter Products -------------------------

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	Pa-230	17.4d	9.160E-01	Th-230	8.400E-02	U-230	3.200E-05	Ac-226		
2	Th-230	7.538E+4y	1.000E+00	Ra-226						
3	U-230	20.8d	1.000E+00	Th-226						
4	Ac-226	29.37h	1.700E-01	Ra-226	8.300E-01	Th-226	6.000E-05	Fr-222		
5	Ra-226	1600y	1.000E+00	Rn-222						
6	Rn-222	3.8235d	1.000E+00	Po-218						
7	Po-218	3.10m	9.998E-01	Pb-214	2.000E-04	At-218				
8	Pb-214	26.8m	1.000E+00	Bi-214						
9	At-218	1.5s	9.990E-01	Bi-214	1.000E-03	Rn-218				
10	Bi-214	19.9m	9.998E-01	Po-214	2.100E-04	Tl-210				
11	Th-226	30.57m	1.000E+00	Ra-222						
12	Fr-222	14.2m	1.000E+00	Ra-222						
13	Ra-222	38.0s	1.000E+00	Rn-218						
14	Rn-218	3.5E-2s	1.000E+00	Po-214						
15	Po-214	1.643E-4s	1.000E+00	Pb-210						
16	Tl-210	1.30m	1.000E+00	Pb-210						
17	Pb-210	22.20y	1.000E+00	Bi-210	1.900E-08	Hg-206				
18	Bi-210	5.013d	1.000E+00	Po-210	1.320E-06	Tl-206				
19	Hg-206	8.15m	1.000E+00	Tl-206						
20	Po-210	138.376d	1.000E+00	Pb-206$						
21	Tl-206	4.200m	1.000E+00	Pb-206$						

Pa-231

------------------------- Daughter Products -------------------------

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	Pa-231	3.276E+4y	1.000E+00	Ac-227						
2	Ac-227	21.772y	9.862E-01	Th-227	1.380E-02	Fr-223				
3	Th-227	18.68d	1.000E+00	Ra-223						
4	Fr-223	22.00m	1.000E+00	Ra-223	6.000E-05	At-219				
5	Ra-223	11.43d	1.000E+00	Rn-219						

6	Rn-219	3.96s	1.000E+00	Po-215		
7	At-219	56s	9.700E-01	Bi-215		
8	Bi-215	7.6m	1.000E+00	Po-215		
9	Po-215	1.781E-3s	1.000E+00	Pb-211		
10	Pb-211	36.1m	1.000E+00	Bi-211		
11	Bi-211	2.14m	9.972E-01	Tl-207	2.760E-03	Po-211
12	Tl-207	4.77m	1.000E+00	Pb-207$		
13	Po-211	0.516s	1.000E+00	Pb-207$		

Pa-232

------------------------- Daughter Products -------------------------

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	Pa-232	1.31d	1.000E+00	U-232	3.000E-05	Th-232				
2	U-232	68.9y	1.000E+00	Th-228						
3	Th-232	1.405E10y	1.000E+00	Ra-228						
4	Ra-228	5.75y	1.000E+00	Ac-228						
5	Ac-228	6.15h	1.000E+00	Th-228						
6	Th-228	1.9116y	1.000E+00	Ra-224						
7	Ra-224	3.66d	1.000E+00	Rn-220						
8	Rn-220	55.6s	1.000E+00	Po-216						
9	Po-216	0.145s	1.000E+00	Pb-212						
10	Pb-212	10.64h	1.000E+00	Bi-212						
11	Bi-212	60.55m	6.406E-01	Po-212	3.594E-01	Tl-208				
12	Po-212	2.99E-7s	1.000E+00	Pb-208$						
13	Tl-208	3.053m	1.000E+00	Pb-208$						

Pa-233

------------------------- Daughter Products -------------------------

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	Pa-233	26.967d	1.000E+00	U-233						
2	U-233	1.592E+5y	1.000E+00	Th-229						
3	Th-229	7.34E+3y	1.000E+00	Ra-225						
4	Ra-225	14.9d	1.000E+00	Ac-225						
5	Ac-225	10.0d	1.000E+00	Fr-221						
6	Fr-221	4.9m	1.000E+00	At-217						
7	At-217	3.23E-2s	9.999E-01	Bi-213						
8	Bi-213	45.59m	9.791E-01	Po-213	2.090E-02	Tl-209				
9	Po-213	4.2E-6s	1.000E+00	Pb-209						
10	Tl-209	2.161m	1.000E+00	Pb-209						
11	Pb-209	3.253h	1.000E+00	Bi-209$						

Pa-234

------------------------- Daughter Products -------------------------

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	Pa-234	6.70h	1.000E+00	U-234						
2	U-234	2.455E+5y	1.000E+00	Th-230						

3	Th-230	7.538E+4y	1.000E+00	Ra-226		
4	Ra-226	1600y	1.000E+00	Rn-222		
5	Rn-222	3.8235d	1.000E+00	Po-218		
6	Po-218	3.10m	9.998E-01	Pb-214	2.000E-04	At-218
7	Pb-214	26.8m	1.000E+00	Bi-214		
8	At-218	1.5s	9.990E-01	Bi-214	1.000E-03	Rn-218
9	Bi-214	19.9m	9.998E-01	Po-214	2.100E-04	Tl-210
10	Rn-218	3.5E-2s	1.000E+00	Po-214		
11	Po-214	1.643E-4s	1.000E+00	Pb-210		
12	Tl-210	1.30m	1.000E+00	Pb-210		
13	Pb-210	22.20y	1.000E+00	Bi-210	1.900E-08	Hg-206
14	Bi-210	5.013d	1.000E+00	Po-210	1.320E-06	Tl-206
15	Hg-206	8.15m	1.000E+00	Tl-206		
16	Po-210	138.376d	1.000E+00	Pb-206$		
17	Tl-206	4.200m	1.000E+00	Pb-206$		

Pa-234m

------------------------- Daughter
Products -------------------------
Nuclide Halflife f1 Nuclide f2 Nuclide f3
Nuclide f4 Nuclide

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide
1	Pa-234m	1.17m	1.600E-03	Pa-234	9.984E-01	U-234
2	Pa-234	6.70h	1.000E+00	U-234		
3	U-234	2.455E+5y	1.000E+00	Th-230		
4	Th-230	7.538E+4y	1.000E+00	Ra-226		
5	Ra-226	1600y	1.000E+00	Rn-222		
6	Rn-222	3.8235d	1.000E+00	Po-218		
7	Po-218	3.10m	9.998E-01	Pb-214	2.000E-04	At-218
8	Pb-214	26.8m	1.000E+00	Bi-214		
9	At-218	1.5s	9.990E-01	Bi-214	1.000E-03	Rn-218
10	Bi-214	19.9m	9.998E-01	Po-214	2.100E-04	Tl-210
11	Rn-218	3.5E-2s	1.000E+00	Po-214		
12	Po-214	1.643E-4s	1.000E+00	Pb-210		
13	Tl-210	1.30m	1.000E+00	Pb-210		
14	Pb-210	22.20y	1.000E+00	Bi-210	1.900E-08	Hg-206
15	Bi-210	5.013d	1.000E+00	Po-210	1.320E-06	Tl-206
16	Hg-206	8.15m	1.000E+00	Tl-206		
17	Po-210	138.376d	1.000E+00	Pb-206$		
18	Tl-206	4.200m	1.000E+00	Pb-206$		

Pa-235

------------------------- Daughter
Products -------------------------
Nuclide Halflife f1 Nuclide f2 Nuclide f3
Nuclide f4 Nuclide

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide
1	Pa-235	24.5m	9.999E-01	U-235m	1.011E-04	U-235
2	U-235m	26m	1.000E+00	U-235		
3	U-235	7.04E+8y	1.000E+00	Th-231		
4	Th-231	25.52h	1.000E+00	Pa-231		
5	Pa-231	3.276E+4y	1.000E+00	Ac-227		
6	Ac-227	21.772y	9.862E-01	Th-227	1.380E-02	Fr-223
7	Th-227	18.68d	1.000E+00	Ra-223		

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  8 Fr-223      22.00m  1.000E+00 Ra-223  6.000E-05 At-219
  9 Ra-223      11.43d  1.000E+00 Rn-219
 10 Rn-219       3.96s  1.000E+00 Po-215
 11 At-219         56s  9.700E-01 Bi-215
 12 Bi-215        7.6m  1.000E+00 Po-215
 13 Po-215   1.781E-3s  1.000E+00 Pb-211
 14 Pb-211      36.1m   1.000E+00 Bi-211
 15 Bi-211       2.14m  9.972E-01 Tl-207  2.760E-03 Po-211
 16 Tl-207       4.77m  1.000E+00 Pb-207$
 17 Po-211      0.516s  1.000E+00 Pb-207$

Pa-236
                          -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife     f1      Nuclide    f2       Nuclide    f3
Nuclide    f4       Nuclide
  1 Pa-236        9.1m  1.000E+00 U-236
  2 U-236    2.342E+7y  1.000E+00 Th-232
  3 Th-232   1.405E10y  1.000E+00 Ra-228
  4 Ra-228       5.75y  1.000E+00 Ac-228
  5 Ac-228       6.15h  1.000E+00 Th-228
  6 Th-228     1.9116y  1.000E+00 Ra-224
  7 Ra-224       3.66d  1.000E+00 Rn-220
  8 Rn-220       55.6s  1.000E+00 Po-216
  9 Po-216      0.145s  1.000E+00 Pb-212
 10 Pb-212      10.64h  1.000E+00 Bi-212
 11 Bi-212      60.55m  6.406E-01 Po-212  3.594E-01 Tl-208
 12 Po-212    2.99E-7s  1.000E+00 Pb-208$
 13 Tl-208      3.053m  1.000E+00 Pb-208$

Pa-237
                          -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife     f1      Nuclide    f2       Nuclide    f3
Nuclide    f4       Nuclide
  1 Pa-237        8.7m  1.000E+00 U-237
  2 U-237        6.75d  1.000E+00 Np-237
  3 Np-237   2.144E+6y  1.000E+00 Pa-233
  4 Pa-233     26.967d  1.000E+00 U-233
  5 U-233    1.592E+5y  1.000E+00 Th-229
  6 Th-229    7.34E+3y  1.000E+00 Ra-225
  7 Ra-225       14.9d  1.000E+00 Ac-225
  8 Ac-225       10.0d  1.000E+00 Fr-221
  9 Fr-221        4.9m  1.000E+00 At-217
 10 At-217    3.23E-2s  9.999E-01 Bi-213
 11 Bi-213      45.59m  9.791E-01 Po-213  2.090E-02 Tl-209
 12 Po-213     4.2E-6s  1.000E+00 Pb-209
 13 Tl-209      2.161m  1.000E+00 Pb-209
 14 Pb-209      3.253h  1.000E+00 Bi-209$

U-227
                          -------------------------  Daughter
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------------------------- Daughter Products -------------------------

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	U-227	1.1m	1.000E+00	Th-223						
2	Th-223	0.60s	1.000E+00	Ra-219						
3	Ra-219	10ms	1.000E+00	Rn-215						
4	Rn-215	2.30us	1.000E+00	Po-211						
5	Po-211	0.516s	1.000E+00	Pb-207$						

U-228

------------------------- Daughter Products -------------------------

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	U-228	9.1m	9.750E-01	Th-224						
2	Th-224	1.05s	1.000E+00	Ra-220						
3	Ra-220	1.79E-2s	1.000E+00	Rn-216						
4	Rn-216	4.5E-5s	1.000E+00	Po-212						
5	Po-212	2.99E-7s	1.000E+00	Pb-208$						

U-230

------------------------- Daughter Products -------------------------

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	U-230	20.8d	1.000E+00	Th-226						
2	Th-226	30.57m	1.000E+00	Ra-222						
3	Ra-222	38.0s	1.000E+00	Rn-218						
4	Rn-218	3.5E-2s	1.000E+00	Po-214						
5	Po-214	1.643E-4s	1.000E+00	Pb-210						
6	Pb-210	22.20y	1.000E+00	Bi-210	1.900E-08	Hg-206				
7	Bi-210	5.013d	1.000E+00	Po-210	1.320E-06	Tl-206				
8	Hg-206	8.15m	1.000E+00	Tl-206						
9	Po-210	138.376d	1.000E+00	Pb-206$						
10	Tl-206	4.200m	1.000E+00	Pb-206$						

U-231

------------------------- Daughter Products -------------------------

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	U-231	4.2d	1.000E+00	Pa-231	4.000E-05	Th-227				
2	Pa-231	3.276E+4y	1.000E+00	Ac-227						
3	Ac-227	21.772y	9.862E-01	Th-227	1.380E-02	Fr-223				
4	Th-227	18.68d	1.000E+00	Ra-223						
5	Fr-223	22.00m	1.000E+00	Ra-223	6.000E-05	At-219				
6	Ra-223	11.43d	1.000E+00	Rn-219						
7	Rn-219	3.96s	1.000E+00	Po-215						
8	At-219	56s	9.700E-01	Bi-215						
9	Bi-215	7.6m	1.000E+00	Po-215						
10	Po-215	1.781E-3s	1.000E+00	Pb-211						
11	Pb-211	36.1m	1.000E+00	Bi-211						

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 12 Bi-211      2.14m  9.972E-01 Tl-207  2.760E-03 Po-211
 13 Tl-207      4.77m  1.000E+00 Pb-207$
 14 Po-211     0.516s  1.000E+00 Pb-207$

U-232
                       -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
Nuclide  f4       Nuclide
  1 U-232       68.9y  1.000E+00 Th-228
  2 Th-228    1.9116y  1.000E+00 Ra-224
  3 Ra-224      3.66d  1.000E+00 Rn-220
  4 Rn-220      55.6s  1.000E+00 Po-216
  5 Po-216     0.145s  1.000E+00 Pb-212
  6 Pb-212     10.64h  1.000E+00 Bi-212
  7 Bi-212     60.55m  6.406E-01 Po-212  3.594E-01 Tl-208
  8 Po-212   2.99E-7s  1.000E+00 Pb-208$
  9 Tl-208     3.053m  1.000E+00 Pb-208$

U-233
                       -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
Nuclide  f4       Nuclide
  1 U-233   1.592E+5y  1.000E+00 Th-229
  2 Th-229   7.34E+3y  1.000E+00 Ra-225
  3 Ra-225      14.9d  1.000E+00 Ac-225
  4 Ac-225      10.0d  1.000E+00 Fr-221
  5 Fr-221       4.9m  1.000E+00 At-217
  6 At-217   3.23E-2s  9.999E-01 Bi-213
  7 Bi-213     45.59m  9.791E-01 Po-213  2.090E-02 Tl-209
  8 Po-213    4.2E-6s  1.000E+00 Pb-209
  9 Tl-209     2.161m  1.000E+00 Pb-209
 10 Pb-209     3.253h  1.000E+00 Bi-209$

U-234
                       -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
Nuclide  f4       Nuclide
  1 U-234   2.455E+5y  1.000E+00 Th-230
  2 Th-230  7.538E+4y  1.000E+00 Ra-226
  3 Ra-226      1600y  1.000E+00 Rn-222
  4 Rn-222    3.8235d  1.000E+00 Po-218
  5 Po-218      3.10m  9.998E-01 Pb-214  2.000E-04 At-218
  6 Pb-214      26.8m  1.000E+00 Bi-214
  7 At-218       1.5s  9.990E-01 Bi-214  1.000E-03 Rn-218
  8 Bi-214      19.9m  9.998E-01 Po-214  2.100E-04 Tl-210
  9 Rn-218    3.5E-2s  1.000E+00 Po-214
 10 Po-214  1.643E-4s  1.000E+00 Pb-210
 11 Tl-210      1.30m  1.000E+00 Pb-210
 12 Pb-210     22.20y  1.000E+00 Bi-210  1.900E-08 Hg-206
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13	Bi-210	5.013d	1.000E+00	Po-210	1.320E-06	Tl-206	
14	Hg-206	8.15m	1.000E+00	Tl-206			
15	Po-210	138.376d	1.000E+00	Pb-206$			
16	Tl-206	4.200m	1.000E+00	Pb-206$			

U-235

------------------------- Daughter Products -------------------------

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	U-235	7.04E+8y	1.000E+00	Th-231						
2	Th-231	25.52h	1.000E+00	Pa-231						
3	Pa-231	3.276E+4y	1.000E+00	Ac-227						
4	Ac-227	21.772y	9.862E-01	Th-227	1.380E-02	Fr-223				
5	Th-227	18.68d	1.000E+00	Ra-223						
6	Fr-223	22.00m	1.000E+00	Ra-223	6.000E-05	At-219				
7	Ra-223	11.43d	1.000E+00	Rn-219						
8	Rn-219	3.96s	1.000E+00	Po-215						
9	At-219	56s	9.700E-01	Bi-215						
10	Bi-215	7.6m	1.000E+00	Po-215						
11	Po-215	1.781E-3s	1.000E+00	Pb-211						
12	Pb-211	36.1m	1.000E+00	Bi-211						
13	Bi-211	2.14m	9.972E-01	Tl-207	2.760E-03	Po-211				
14	Tl-207	4.77m	1.000E+00	Pb-207$						
15	Po-211	0.516s	1.000E+00	Pb-207$						

U-235m

------------------------- Daughter Products -------------------------

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	U-235m	26m	1.000E+00	U-235						
2	U-235	7.04E+8y	1.000E+00	Th-231						
3	Th-231	25.52h	1.000E+00	Pa-231						
4	Pa-231	3.276E+4y	1.000E+00	Ac-227						
5	Ac-227	21.772y	9.862E-01	Th-227	1.380E-02	Fr-223				
6	Th-227	18.68d	1.000E+00	Ra-223						
7	Fr-223	22.00m	1.000E+00	Ra-223	6.000E-05	At-219				
8	Ra-223	11.43d	1.000E+00	Rn-219						
9	Rn-219	3.96s	1.000E+00	Po-215						
10	At-219	56s	9.700E-01	Bi-215						
11	Bi-215	7.6m	1.000E+00	Po-215						
12	Po-215	1.781E-3s	1.000E+00	Pb-211						
13	Pb-211	36.1m	1.000E+00	Bi-211						
14	Bi-211	2.14m	9.972E-01	Tl-207	2.760E-03	Po-211				
15	Tl-207	4.77m	1.000E+00	Pb-207$						
16	Po-211	0.516s	1.000E+00	Pb-207$						

U-236

------------------------- Daughter Products -------------------------

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3

Nuclide f4 Nuclide

1	U-236	2.342E+7y	1.000E+00	Th-232		
2	Th-232	1.405E10y	1.000E+00	Ra-228		
3	Ra-228	5.75y	1.000E+00	Ac-228		
4	Ac-228	6.15h	1.000E+00	Th-228		
5	Th-228	1.9116y	1.000E+00	Ra-224		
6	Ra-224	3.66d	1.000E+00	Rn-220		
7	Rn-220	55.6s	1.000E+00	Po-216		
8	Po-216	0.145s	1.000E+00	Pb-212		
9	Pb-212	10.64h	1.000E+00	Bi-212		
10	Bi-212	60.55m	6.406E-01	Po-212	3.594E-01	Tl-208
11	Po-212	2.99E-7s	1.000E+00	Pb-208$		
12	Tl-208	3.053m	1.000E+00	Pb-208$		

U-237

			------------------------- Daughter Products -------------------------							
	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	U-237	6.75d	1.000E+00	Np-237						
2	Np-237	2.144E+6y	1.000E+00	Pa-233						
3	Pa-233	26.967d	1.000E+00	U-233						
4	U-233	1.592E+5y	1.000E+00	Th-229						
5	Th-229	7.34E+3y	1.000E+00	Ra-225						
6	Ra-225	14.9d	1.000E+00	Ac-225						
7	Ac-225	10.0d	1.000E+00	Fr-221						
8	Fr-221	4.9m	1.000E+00	At-217						
9	At-217	3.23E-2s	9.999E-01	Bi-213						
10	Bi-213	45.59m	9.791E-01	Po-213	2.090E-02	Tl-209				
11	Po-213	4.2E-6s	1.000E+00	Pb-209						
12	Tl-209	2.161m	1.000E+00	Pb-209						
13	Pb-209	3.253h	1.000E+00	Bi-209$						

U-238

			------------------------- Daughter Products -------------------------							
	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	U-238	4.468E+9y	1.000E+00	Th-234	5.450E-07	SF				
2	Th-234	24.10d	1.000E+00	Pa-234m						
3	Pa-234m	1.17m	1.600E-03	Pa-234	9.984E-01	U-234				
4	Pa-234	6.70h	1.000E+00	U-234						
5	U-234	2.455E+5y	1.000E+00	Th-230						
6	Th-230	7.538E+4y	1.000E+00	Ra-226						
7	Ra-226	1600y	1.000E+00	Rn-222						
8	Rn-222	3.8235d	1.000E+00	Po-218						
9	Po-218	3.10m	9.998E-01	Pb-214	2.000E-04	At-218				
10	Pb-214	26.8m	1.000E+00	Bi-214						
11	At-218	1.5s	9.990E-01	Bi-214	1.000E-03	Rn-218				
12	Bi-214	19.9m	9.998E-01	Po-214	2.100E-04	Tl-210				
13	Rn-218	3.5E-2s	1.000E+00	Po-214						
14	Po-214	1.643E-4s	1.000E+00	Pb-210						

15	Tl-210	1.30m	1.000E+00	Pb-210		
16	Pb-210	22.20y	1.000E+00	Bi-210	1.900E-08	Hg-206
17	Bi-210	5.013d	1.000E+00	Po-210	1.320E-06	Tl-206
18	Hg-206	8.15m	1.000E+00	Tl-206		
19	Po-210	138.376d	1.000E+00	Pb-206$		
20	Tl-206	4.200m	1.000E+00	Pb-206$		

U-239

------------------------- Daughter Products -------------------------

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	U-239	23.45m	1.000E+00	Np-239						
2	Np-239	2.3565d	1.000E+00	Pu-239						
3	Pu-239	2.411E+4y	9.994E-01	U-235m	6.000E-04	U-235				
4	U-235m	26m	1.000E+00	U-235						
5	U-235	7.04E+8y	1.000E+00	Th-231						
6	Th-231	25.52h	1.000E+00	Pa-231						
7	Pa-231	3.276E+4y	1.000E+00	Ac-227						
8	Ac-227	21.772y	9.862E-01	Th-227	1.380E-02	Fr-223				
9	Th-227	18.68d	1.000E+00	Ra-223						
10	Fr-223	22.00m	1.000E+00	Ra-223	6.000E-05	At-219				
11	Ra-223	11.43d	1.000E+00	Rn-219						
12	Rn-219	3.96s	1.000E+00	Po-215						
13	At-219	56s	9.700E-01	Bi-215						
14	Bi-215	7.6m	1.000E+00	Po-215						
15	Po-215	1.781E-3s	1.000E+00	Pb-211						
16	Pb-211	36.1m	1.000E+00	Bi-211						
17	Bi-211	2.14m	9.972E-01	Tl-207	2.760E-03	Po-211				
18	Tl-207	4.77m	1.000E+00	Pb-207$						
19	Po-211	0.516s	1.000E+00	Pb-207$						

U-240

------------------------- Daughter Products -------------------------

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	U-240	14.1h	1.000E+00	Np-240m						
2	Np-240m	7.22m	1.100E-03	Np-240	9.989E-01	Pu-240				
3	Np-240	61.9m	1.000E+00	Pu-240						
4	Pu-240	6564y	1.000E+00	U-236	5.750E-08	SF				
5	U-236	2.342E+7y	1.000E+00	Th-232						
6	Th-232	1.405E10y	1.000E+00	Ra-228						
7	Ra-228	5.75y	1.000E+00	Ac-228						
8	Ac-228	6.15h	1.000E+00	Th-228						
9	Th-228	1.9116y	1.000E+00	Ra-224						
10	Ra-224	3.66d	1.000E+00	Rn-220						
11	Rn-220	55.6s	1.000E+00	Po-216						
12	Po-216	0.145s	1.000E+00	Pb-212						
13	Pb-212	10.64h	1.000E+00	Bi-212						
14	Bi-212	60.55m	6.406E-01	Po-212	3.594E-01	Tl-208				
15	Po-212	2.99E-7s	1.000E+00	Pb-208$						

16	Tl-208	3.053m	1.000E+00	Pb-208$

U-242

------------------------- Daughter Products -------------------------

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	U-242	16.8m	1.000E+00	Np-242						
2	Np-242	2.2m	1.000E+00	Pu-242						
3	Pu-242	3.75E+5y	1.000E+00	U-238	5.540E-06	SF				
4	U-238	4.468E+9y	1.000E+00	Th-234	5.450E-07	SF				
5	Th-234	24.10d	1.000E+00	Pa-234m						
6	Pa-234m	1.17m	1.600E-03	Pa-234	9.984E-01	U-234				
7	Pa-234	6.70h	1.000E+00	U-234						
8	U-234	2.455E+5y	1.000E+00	Th-230						
9	Th-230	7.538E+4y	1.000E+00	Ra-226						
10	Ra-226	1600y	1.000E+00	Rn-222						
11	Rn-222	3.8235d	1.000E+00	Po-218						
12	Po-218	3.10m	9.998E-01	Pb-214	2.000E-04	At-218				
13	Pb-214	26.8m	1.000E+00	Bi-214						
14	At-218	1.5s	9.990E-01	Bi-214	1.000E-03	Rn-218				
15	Bi-214	19.9m	9.998E-01	Po-214	2.100E-04	Tl-210				
16	Rn-218	3.5E-2s	1.000E+00	Po-214						
17	Po-214	1.643E-4s	1.000E+00	Pb-210						
18	Tl-210	1.30m	1.000E+00	Pb-210						
19	Pb-210	22.20y	1.000E+00	Bi-210	1.900E-08	Hg-206				
20	Bi-210	5.013d	1.000E+00	Po-210	1.320E-06	Tl-206				
21	Hg-206	8.15m	1.000E+00	Tl-206						
22	Po-210	138.376d	1.000E+00	Pb-206$						
23	Tl-206	4.200m	1.000E+00	Pb-206$						

Np-232

------------------------- Daughter Products -------------------------

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	Np-232	14.7m	1.000E+00	U-232						
2	U-232	68.9y	1.000E+00	Th-228						
3	Th-228	1.9116y	1.000E+00	Ra-224						
4	Ra-224	3.66d	1.000E+00	Rn-220						
5	Rn-220	55.6s	1.000E+00	Po-216						
6	Po-216	0.145s	1.000E+00	Pb-212						
7	Pb-212	10.64h	1.000E+00	Bi-212						
8	Bi-212	60.55m	6.406E-01	Po-212	3.594E-01	Tl-208				
9	Po-212	2.99E-7s	1.000E+00	Pb-208$						
10	Tl-208	3.053m	1.000E+00	Pb-208$						

Np-233

------------------------- Daughter Products -------------------------

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide

1	Np-233	36.2m	1.000E+00	U-233	1.000E-05	Pa-229				
2	U-233	1.592E+5y	1.000E+00	Th-229						
3	Pa-229	1.50d	9.952E-01	Th-229	4.800E-03	Ac-225				
4	Th-229	7.34E+3y	1.000E+00	Ra-225						
5	Ra-225	14.9d	1.000E+00	Ac-225						
6	Ac-225	10.0d	1.000E+00	Fr-221						
7	Fr-221	4.9m	1.000E+00	At-217						
8	At-217	3.23E-2s	9.999E-01	Bi-213						
9	Bi-213	45.59m	9.791E-01	Po-213	2.090E-02	Tl-209				
10	Po-213	4.2E-6s	1.000E+00	Pb-209						
11	Tl-209	2.161m	1.000E+00	Pb-209						
12	Pb-209	3.253h	1.000E+00	Bi-209$						

Np-234

			-------------------------- Daughter Products --------------------------							
	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	Np-234	4.4d	1.000E+00	U-234						
2	U-234	2.455E+5y	1.000E+00	Th-230						
3	Th-230	7.538E+4y	1.000E+00	Ra-226						
4	Ra-226	1600y	1.000E+00	Rn-222						
5	Rn-222	3.8235d	1.000E+00	Po-218						
6	Po-218	3.10m	9.998E-01	Pb-214	2.000E-04	At-218				
7	Pb-214	26.8m	1.000E+00	Bi-214						
8	At-218	1.5s	9.990E-01	Bi-214	1.000E-03	Rn-218				
9	Bi-214	19.9m	9.998E-01	Po-214	2.100E-04	Tl-210				
10	Rn-218	3.5E-2s	1.000E+00	Po-214						
11	Po-214	1.643E-4s	1.000E+00	Pb-210						
12	Tl-210	1.30m	1.000E+00	Pb-210						
13	Pb-210	22.20y	1.000E+00	Bi-210	1.900E-08	Hg-206				
14	Bi-210	5.013d	1.000E+00	Po-210	1.320E-06	Tl-206				
15	Hg-206	8.15m	1.000E+00	Tl-206						
16	Po-210	138.376d	1.000E+00	Pb-206$						
17	Tl-206	4.200m	1.000E+00	Pb-206$						

Np-235

			-------------------------- Daughter Products --------------------------							
	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	Np-235	396.1d	3.993E-03	U-235m	9.960E-01	U-235	2.600E-05	Pa-231		
2	U-235m	26m	1.000E+00	U-235						
3	U-235	7.04E+8y	1.000E+00	Th-231						
4	Th-231	25.52h	1.000E+00	Pa-231						
5	Pa-231	3.276E+4y	1.000E+00	Ac-227						
6	Ac-227	21.772y	9.862E-01	Th-227	1.380E-02	Fr-223				
7	Th-227	18.68d	1.000E+00	Ra-223						
8	Fr-223	22.00m	1.000E+00	Ra-223	6.000E-05	At-219				
9	Ra-223	11.43d	1.000E+00	Rn-219						
10	Rn-219	3.96s	1.000E+00	Po-215						

11	At-219	56s	9.700E-01	Bi-215						
12	Bi-215	7.6m	1.000E+00	Po-215						
13	Po-215	1.781E-3s	1.000E+00	Pb-211						
14	Pb-211	36.1m	1.000E+00	Bi-211						
15	Bi-211	2.14m	9.972E-01	Tl-207	2.760E-03	Po-211				
16	Tl-207	4.77m	1.000E+00	Pb-207$						
17	Po-211	0.516s	1.000E+00	Pb-207$						

Np-236

				Daughter Products						
	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	Np-236	1.54E+5y	8.730E-01	U-236	1.250E-01	Pu-236	1.600E-03	Pa-232		
2	U-236	2.342E+7y	1.000E+00	Th-232						
3	Pu-236	2.858y	1.000E+00	U-232	1.370E-09	SF				
4	Pa-232	1.31d	3.000E-05	Th-232	1.000E+00	U-232				
5	Th-232	1.405E10y	1.000E+00	Ra-228						
6	Ra-228	5.75y	1.000E+00	Ac-228						
7	Ac-228	6.15h	1.000E+00	Th-228						
8	U-232	68.9y	1.000E+00	Th-228						
9	Th-228	1.9116y	1.000E+00	Ra-224						
10	Ra-224	3.66d	1.000E+00	Rn-220						
11	Rn-220	55.6s	1.000E+00	Po-216						
12	Po-216	0.145s	1.000E+00	Pb-212						
13	Pb-212	10.64h	1.000E+00	Bi-212						
14	Bi-212	60.55m	6.406E-01	Po-212	3.594E-01	Tl-208				
15	Po-212	2.99E-7s	1.000E+00	Pb-208$						
16	Tl-208	3.053m	1.000E+00	Pb-208$						

Np-236m

				Daughter Products						
	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	Np-236m	22.5h	5.200E-01	U-236	4.800E-01	Pu-236				
2	U-236	2.342E+7y	1.000E+00	Th-232						
3	Pu-236	2.858y	1.000E+00	U-232	1.370E-09	SF				
4	Th-232	1.405E10y	1.000E+00	Ra-228						
5	Ra-228	5.75y	1.000E+00	Ac-228						
6	Ac-228	6.15h	1.000E+00	Th-228						
7	U-232	68.9y	1.000E+00	Th-228						
8	Th-228	1.9116y	1.000E+00	Ra-224						
9	Ra-224	3.66d	1.000E+00	Rn-220						
10	Rn-220	55.6s	1.000E+00	Po-216						
11	Po-216	0.145s	1.000E+00	Pb-212						
12	Pb-212	10.64h	1.000E+00	Bi-212						
13	Bi-212	60.55m	6.406E-01	Po-212	3.594E-01	Tl-208				
14	Po-212	2.99E-7s	1.000E+00	Pb-208$						
15	Tl-208	3.053m	1.000E+00	Pb-208$						

Np-237

------------------------- Daughter Products -------------------------

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	Np-237	2.144E+6y	1.000E+00	Pa-233						
2	Pa-233	26.967d	1.000E+00	U-233						
3	U-233	1.592E+5y	1.000E+00	Th-229						
4	Th-229	7.34E+3y	1.000E+00	Ra-225						
5	Ra-225	14.9d	1.000E+00	Ac-225						
6	Ac-225	10.0d	1.000E+00	Fr-221						
7	Fr-221	4.9m	1.000E+00	At-217						
8	At-217	3.23E-2s	9.999E-01	Bi-213						
9	Bi-213	45.59m	9.791E-01	Po-213	2.090E-02	Tl-209				
10	Po-213	4.2E-6s	1.000E+00	Pb-209						
11	Tl-209	2.161m	1.000E+00	Pb-209						
12	Pb-209	3.253h	1.000E+00	Bi-209$						

Np-238

------------------------- Daughter Products -------------------------

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	Np-238	2.117d	1.000E+00	Pu-238						
2	Pu-238	87.7y	1.000E+00	U-234	1.850E-09	SF				
3	U-234	2.455E+5y	1.000E+00	Th-230						
4	Th-230	7.538E+4y	1.000E+00	Ra-226						
5	Ra-226	1600y	1.000E+00	Rn-222						
6	Rn-222	3.8235d	1.000E+00	Po-218						
7	Po-218	3.10m	9.998E-01	Pb-214	2.000E-04	At-218				
8	Pb-214	26.8m	1.000E+00	Bi-214						
9	At-218	1.5s	9.990E-01	Bi-214	1.000E-03	Rn-218				
10	Bi-214	19.9m	9.998E-01	Po-214	2.100E-04	Tl-210				
11	Rn-218	3.5E-2s	1.000E+00	Po-214						
12	Po-214	1.643E-4s	1.000E+00	Pb-210						
13	Tl-210	1.30m	1.000E+00	Pb-210						
14	Pb-210	22.20y	1.000E+00	Bi-210	1.900E-08	Hg-206				
15	Bi-210	5.013d	1.000E+00	Po-210	1.320E-06	Tl-206				
16	Hg-206	8.15m	1.000E+00	Tl-206						
17	Po-210	138.376d	1.000E+00	Pb-206$						
18	Tl-206	4.200m	1.000E+00	Pb-206$						

Np-239

------------------------- Daughter Products -------------------------

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	Np-239	2.3565d	1.000E+00	Pu-239						
2	Pu-239	2.411E+4y	9.994E-01	U-235m	6.000E-04	U-235				
3	U-235m	26m	1.000E+00	U-235						
4	U-235	7.04E+8y	1.000E+00	Th-231						
5	Th-231	25.52h	1.000E+00	Pa-231						

6	Pa-231	3.276E+4y	1.000E+00	Ac-227						
7	Ac-227	21.772y	9.862E-01	Th-227	1.380E-02	Fr-223				
8	Th-227	18.68d	1.000E+00	Ra-223						
9	Fr-223	22.00m	1.000E+00	Ra-223	6.000E-05	At-219				
10	Ra-223	11.43d	1.000E+00	Rn-219						
11	Rn-219	3.96s	1.000E+00	Po-215						
12	At-219	56s	9.700E-01	Bi-215						
13	Bi-215	7.6m	1.000E+00	Po-215						
14	Po-215	1.781E-3s	1.000E+00	Pb-211						
15	Pb-211	36.1m	1.000E+00	Bi-211						
16	Bi-211	2.14m	9.972E-01	Tl-207	2.760E-03	Po-211				
17	Tl-207	4.77m	1.000E+00	Pb-207$						
18	Po-211	0.516s	1.000E+00	Pb-207$						

Np-240

			------------------------- Daughter Products -------------------------							
	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	Np-240	61.9m	1.000E+00	Pu-240						
2	Pu-240	6564y	1.000E+00	U-236	5.750E-08	SF				
3	U-236	2.342E+7y	1.000E+00	Th-232						
4	Th-232	1.405E10y	1.000E+00	Ra-228						
5	Ra-228	5.75y	1.000E+00	Ac-228						
6	Ac-228	6.15h	1.000E+00	Th-228						
7	Th-228	1.9116y	1.000E+00	Ra-224						
8	Ra-224	3.66d	1.000E+00	Rn-220						
9	Rn-220	55.6s	1.000E+00	Po-216						
10	Po-216	0.145s	1.000E+00	Pb-212						
11	Pb-212	10.64h	1.000E+00	Bi-212						
12	Bi-212	60.55m	6.406E-01	Po-212	3.594E-01	Tl-208				
13	Po-212	2.99E-7s	1.000E+00	Pb-208$						
14	Tl-208	3.053m	1.000E+00	Pb-208$						

Np-240m

			------------------------- Daughter Products -------------------------							
	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	Np-240m	7.22m	1.100E-03	Np-240	9.989E-01	Pu-240				
2	Np-240	61.9m	1.000E+00	Pu-240						
3	Pu-240	6564y	1.000E+00	U-236	5.750E-08	SF				
4	U-236	2.342E+7y	1.000E+00	Th-232						
5	Th-232	1.405E10y	1.000E+00	Ra-228						
6	Ra-228	5.75y	1.000E+00	Ac-228						
7	Ac-228	6.15h	1.000E+00	Th-228						
8	Th-228	1.9116y	1.000E+00	Ra-224						
9	Ra-224	3.66d	1.000E+00	Rn-220						
10	Rn-220	55.6s	1.000E+00	Po-216						
11	Po-216	0.145s	1.000E+00	Pb-212						
12	Pb-212	10.64h	1.000E+00	Bi-212						
13	Bi-212	60.55m	6.406E-01	Po-212	3.594E-01	Tl-208				

14	Po-212	2.99E-7s	1.000E+00	Pb-208$
15	Tl-208	3.053m	1.000E+00	Pb-208$

Np-241

	Nuclide	Halflife	f1	Daughter Products Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	Np-241	13.9m	1.000E+00	Pu-241						
2	Pu-241	14.35y	1.000E+00	Am-241	2.450E-05	U-237				
3	Am-241	432.2y	1.000E+00	Np-237						
4	U-237	6.75d	1.000E+00	Np-237						
5	Np-237	2.144E+6y	1.000E+00	Pa-233						
6	Pa-233	26.967d	1.000E+00	U-233						
7	U-233	1.592E+5y	1.000E+00	Th-229						
8	Th-229	7.34E+3y	1.000E+00	Ra-225						
9	Ra-225	14.9d	1.000E+00	Ac-225						
10	Ac-225	10.0d	1.000E+00	Fr-221						
11	Fr-221	4.9m	1.000E+00	At-217						
12	At-217	3.23E-2s	9.999E-01	Bi-213						
13	Bi-213	45.59m	9.791E-01	Po-213	2.090E-02	Tl-209				
14	Po-213	4.2E-6s	1.000E+00	Pb-209						
15	Tl-209	2.161m	1.000E+00	Pb-209						
16	Pb-209	3.253h	1.000E+00	Bi-209$						

Np-242

	Nuclide	Halflife	f1	Daughter Products Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	Np-242	2.2m	1.000E+00	Pu-242						
2	Pu-242	3.75E+5y	1.000E+00	U-238	5.540E-06	SF				
3	U-238	4.468E+9y	1.000E+00	Th-234	5.450E-07	SF				
4	Th-234	24.10d	1.000E+00	Pa-234m						
5	Pa-234m	1.17m	1.600E-03	Pa-234	9.984E-01	U-234				
6	Pa-234	6.70h	1.000E+00	U-234						
7	U-234	2.455E+5y	1.000E+00	Th-230						
8	Th-230	7.538E+4y	1.000E+00	Ra-226						
9	Ra-226	1600y	1.000E+00	Rn-222						
10	Rn-222	3.8235d	1.000E+00	Po-218						
11	Po-218	3.10m	9.998E-01	Pb-214	2.000E-04	At-218				
12	Pb-214	26.8m	1.000E+00	Bi-214						
13	At-218	1.5s	9.990E-01	Bi-214	1.000E-03	Rn-218				
14	Bi-214	19.9m	9.998E-01	Po-214	2.100E-04	Tl-210				
15	Rn-218	3.5E-2s	1.000E+00	Po-214						
16	Po-214	1.643E-4s	1.000E+00	Pb-210						
17	Tl-210	1.30m	1.000E+00	Pb-210						
18	Pb-210	22.20y	1.000E+00	Bi-210	1.900E-08	Hg-206				
19	Bi-210	5.013d	1.000E+00	Po-210	1.320E-06	Tl-206				
20	Hg-206	8.15m	1.000E+00	Tl-206						
21	Po-210	138.376d	1.000E+00	Pb-206$						
22	Tl-206	4.200m	1.000E+00	Pb-206$						

Np-242m

Daughter Products

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	Np-242m	5.5m	1.000E+00	Pu-242						
2	Pu-242	3.75E+5y	1.000E+00	U-238	5.540E-06	SF				
3	U-238	4.468E+9y	1.000E+00	Th-234	5.450E-07	SF				
4	Th-234	24.10d	1.000E+00	Pa-234m						
5	Pa-234m	1.17m	1.600E-03	Pa-234	9.984E-01	U-234				
6	Pa-234	6.70h	1.000E+00	U-234						
7	U-234	2.455E+5y	1.000E+00	Th-230						
8	Th-230	7.538E+4y	1.000E+00	Ra-226						
9	Ra-226	1600y	1.000E+00	Rn-222						
10	Rn-222	3.8235d	1.000E+00	Po-218						
11	Po-218	3.10m	9.998E-01	Pb-214	2.000E-04	At-218				
12	Pb-214	26.8m	1.000E+00	Bi-214						
13	At-218	1.5s	9.990E-01	Bi-214	1.000E-03	Rn-218				
14	Bi-214	19.9m	9.998E-01	Po-214	2.100E-04	Tl-210				
15	Rn-218	3.5E-2s	1.000E+00	Po-214						
16	Po-214	1.643E-4s	1.000E+00	Pb-210						
17	Tl-210	1.30m	1.000E+00	Pb-210						
18	Pb-210	22.20y	1.000E+00	Bi-210	1.900E-08	Hg-206				
19	Bi-210	5.013d	1.000E+00	Po-210	1.320E-06	Tl-206				
20	Hg-206	8.15m	1.000E+00	Tl-206						
21	Po-210	138.376d	1.000E+00	Pb-206$						
22	Tl-206	4.200m	1.000E+00	Pb-206$						

Pu-232

Daughter Products

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	Pu-232	33.7m	7.700E-01	Np-232	2.300E-01	U-228				
2	Np-232	14.7m	1.000E+00	U-232						
3	U-228	9.1m	9.750E-01	Th-224						
4	U-232	68.9y	1.000E+00	Th-228						
5	Th-228	1.9116y	1.000E+00	Ra-224						
6	Ra-224	3.66d	1.000E+00	Rn-220						
7	Rn-220	55.6s	1.000E+00	Po-216						
8	Po-216	0.145s	1.000E+00	Pb-212						
9	Pb-212	10.64h	1.000E+00	Bi-212						
10	Bi-212	60.55m	6.406E-01	Po-212	3.594E-01	Tl-208				
11	Th-224	1.05s	1.000E+00	Ra-220						
12	Ra-220	1.79E-2s	1.000E+00	Rn-216						
13	Rn-216	4.5E-5s	1.000E+00	Po-212						
14	Po-212	2.99E-7s	1.000E+00	Pb-208$						
15	Tl-208	3.053m	1.000E+00	Pb-208$						

Pu-234

------------------------- Daughter

Products -------------------------

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	Pu-234	8.8h	9.400E-01	Np-234	6.000E-02	U-230				
2	Np-234	4.4d	1.000E+00	U-234						
3	U-230	20.8d	1.000E+00	Th-226						
4	U-234	2.455E+5y	1.000E+00	Th-230						
5	Th-230	7.538E+4y	1.000E+00	Ra-226						
6	Ra-226	1600y	1.000E+00	Rn-222						
7	Rn-222	3.8235d	1.000E+00	Po-218						
8	Po-218	3.10m	9.998E-01	Pb-214	2.000E-04	At-218				
9	Pb-214	26.8m	1.000E+00	Bi-214						
10	At-218	1.5s	9.990E-01	Bi-214	1.000E-03	Rn-218				
11	Bi-214	19.9m	9.998E-01	Po-214	2.100E-04	Tl-210				
12	Th-226	30.57m	1.000E+00	Ra-222						
13	Ra-222	38.0s	1.000E+00	Rn-218						
14	Rn-218	3.5E-2s	1.000E+00	Po-214						
15	Po-214	1.643E-4s	1.000E+00	Pb-210						
16	Tl-210	1.30m	1.000E+00	Pb-210						
17	Pb-210	22.20y	1.000E+00	Bi-210	1.900E-08	Hg-206				
18	Bi-210	5.013d	1.000E+00	Po-210	1.320E-06	Tl-206				
19	Hg-206	8.15m	1.000E+00	Tl-206						
20	Po-210	138.376d	1.000E+00	Pb-206$						
21	Tl-206	4.200m	1.000E+00	Pb-206$						

Pu-235

------------------------- Daughter

Products -------------------------

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	Pu-235	25.3m	1.000E+00	Np-235	2.700E-05	U-231				
2	Np-235	396.1d	3.993E-03	U-235m	9.960E-01	U-235	2.600E-05	Pa-231		
3	U-231	4.2d	1.000E+00	Pa-231	4.000E-05	Th-227				
4	U-235m	26m	1.000E+00	U-235						
5	U-235	7.04E+8y	1.000E+00	Th-231						
6	Th-231	25.52h	1.000E+00	Pa-231						
7	Pa-231	3.276E+4y	1.000E+00	Ac-227						
8	Ac-227	21.772y	9.862E-01	Th-227	1.380E-02	Fr-223				
9	Th-227	18.68d	1.000E+00	Ra-223						
10	Fr-223	22.00m	1.000E+00	Ra-223	6.000E-05	At-219				
11	Ra-223	11.43d	1.000E+00	Rn-219						
12	Rn-219	3.96s	1.000E+00	Po-215						
13	At-219	56s	9.700E-01	Bi-215						
14	Bi-215	7.6m	1.000E+00	Po-215						
15	Po-215	1.781E-3s	1.000E+00	Pb-211						
16	Pb-211	36.1m	1.000E+00	Bi-211						
17	Bi-211	2.14m	9.972E-01	Tl-207	2.760E-03	Po-211				
18	Tl-207	4.77m	1.000E+00	Pb-207$						
19	Po-211	0.516s	1.000E+00	Pb-207$						

Pu-236

------------------------- Daughter Products -------------------------

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	Pu-236	2.858y	1.000E+00	U-232	1.370E-09	SF				
2	U-232	68.9y	1.000E+00	Th-228						
3	Th-228	1.9116y	1.000E+00	Ra-224						
4	Ra-224	3.66d	1.000E+00	Rn-220						
5	Rn-220	55.6s	1.000E+00	Po-216						
6	Po-216	0.145s	1.000E+00	Pb-212						
7	Pb-212	10.64h	1.000E+00	Bi-212						
8	Bi-212	60.55m	6.406E-01	Po-212	3.594E-01	Tl-208				
9	Po-212	2.99E-7s	1.000E+00	Pb-208$						
10	Tl-208	3.053m	1.000E+00	Pb-208$						

Pu-237

------------------------- Daughter Products -------------------------

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	Pu-237	45.2d	1.000E+00	Np-237	4.200E-05	U-233				
2	Np-237	2.144E+6y	1.000E+00	Pa-233						
3	Pa-233	26.967d	1.000E+00	U-233						
4	U-233	1.592E+5y	1.000E+00	Th-229						
5	Th-229	7.34E+3y	1.000E+00	Ra-225						
6	Ra-225	14.9d	1.000E+00	Ac-225						
7	Ac-225	10.0d	1.000E+00	Fr-221						
8	Fr-221	4.9m	1.000E+00	At-217						
9	At-217	3.23E-2s	9.999E-01	Bi-213						
10	Bi-213	45.59m	9.791E-01	Po-213	2.090E-02	Tl-209				
11	Po-213	4.2E-6s	1.000E+00	Pb-209						
12	Tl-209	2.161m	1.000E+00	Pb-209						
13	Pb-209	3.253h	1.000E+00	Bi-209$						

Pu-238

------------------------- Daughter Products -------------------------

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	Pu-238	87.7y	1.000E+00	U-234	1.850E-09	SF				
2	U-234	2.455E+5y	1.000E+00	Th-230						
3	Th-230	7.538E+4y	1.000E+00	Ra-226						
4	Ra-226	1600y	1.000E+00	Rn-222						
5	Rn-222	3.8235d	1.000E+00	Po-218						
6	Po-218	3.10m	9.998E-01	Pb-214	2.000E-04	At-218				
7	Pb-214	26.8m	1.000E+00	Bi-214						
8	At-218	1.5s	9.990E-01	Bi-214	1.000E-03	Rn-218				
9	Bi-214	19.9m	9.998E-01	Po-214	2.100E-04	Tl-210				
10	Rn-218	3.5E-2s	1.000E+00	Po-214						
11	Po-214	1.643E-4s	1.000E+00	Pb-210						
12	Tl-210	1.30m	1.000E+00	Pb-210						
13	Pb-210	22.20y	1.000E+00	Bi-210	1.900E-08	Hg-206				

14	Bi-210	5.013d	1.000E+00	Po-210	1.320E-06	Tl-206				
15	Hg-206	8.15m	1.000E+00	Tl-206						
16	Po-210	138.376d	1.000E+00	Pb-206$						
17	Tl-206	4.200m	1.000E+00	Pb-206$						

Pu-239

------------------------- Daughter Products -------------------------

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	Pu-239	2.411E+4y	9.994E-01	U-235m	6.000E-04	U-235				
2	U-235m	26m	1.000E+00	U-235						
3	U-235	7.04E+8y	1.000E+00	Th-231						
4	Th-231	25.52h	1.000E+00	Pa-231						
5	Pa-231	3.276E+4y	1.000E+00	Ac-227						
6	Ac-227	21.772y	9.862E-01	Th-227	1.380E-02	Fr-223				
7	Th-227	18.68d	1.000E+00	Ra-223						
8	Fr-223	22.00m	1.000E+00	Ra-223	6.000E-05	At-219				
9	Ra-223	11.43d	1.000E+00	Rn-219						
10	Rn-219	3.96s	1.000E+00	Po-215						
11	At-219	56s	9.700E-01	Bi-215						
12	Bi-215	7.6m	1.000E+00	Po-215						
13	Po-215	1.781E-3s	1.000E+00	Pb-211						
14	Pb-211	36.1m	1.000E+00	Bi-211						
15	Bi-211	2.14m	9.972E-01	Tl-207	2.760E-03	Po-211				
16	Tl-207	4.77m	1.000E+00	Pb-207$						
17	Po-211	0.516s	1.000E+00	Pb-207$						

Pu-240

------------------------- Daughter Products -------------------------

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	Pu-240	6564y	1.000E+00	U-236	5.750E-08	SF				
2	U-236	2.342E+7y	1.000E+00	Th-232						
3	Th-232	1.405E10y	1.000E+00	Ra-228						
4	Ra-228	5.75y	1.000E+00	Ac-228						
5	Ac-228	6.15h	1.000E+00	Th-228						
6	Th-228	1.9116y	1.000E+00	Ra-224						
7	Ra-224	3.66d	1.000E+00	Rn-220						
8	Rn-220	55.6s	1.000E+00	Po-216						
9	Po-216	0.145s	1.000E+00	Pb-212						
10	Pb-212	10.64h	1.000E+00	Bi-212						
11	Bi-212	60.55m	6.406E-01	Po-212	3.594E-01	Tl-208				
12	Po-212	2.99E-7s	1.000E+00	Pb-208$						
13	Tl-208	3.053m	1.000E+00	Pb-208$						

Pu-241

------------------------- Daughter Products -------------------------

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide

1	Pu-241	14.35y	1.000E+00	Am-241	2.450E-05	U-237
2	Am-241	432.2y	1.000E+00	Np-237		
3	U-237	6.75d	1.000E+00	Np-237		
4	Np-237	2.144E+6y	1.000E+00	Pa-233		
5	Pa-233	26.967d	1.000E+00	U-233		
6	U-233	1.592E+5y	1.000E+00	Th-229		
7	Th-229	7.34E+3y	1.000E+00	Ra-225		
8	Ra-225	14.9d	1.000E+00	Ac-225		
9	Ac-225	10.0d	1.000E+00	Fr-221		
10	Fr-221	4.9m	1.000E+00	At-217		
11	At-217	3.23E-2s	9.999E-01	Bi-213		
12	Bi-213	45.59m	9.791E-01	Po-213	2.090E-02	Tl-209
13	Po-213	4.2E-6s	1.000E+00	Pb-209		
14	Tl-209	2.161m	1.000E+00	Pb-209		
15	Pb-209	3.253h	1.000E+00	Bi-209$		

Pu-242

------------------------- Daughter Products -------------------------

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	Pu-242	3.75E+5y	1.000E+00	U-238	5.540E-06	SF				
2	U-238	4.468E+9y	1.000E+00	Th-234	5.450E-07	SF				
3	Th-234	24.10d	1.000E+00	Pa-234m						
4	Pa-234m	1.17m	1.600E-03	Pa-234	9.984E-01	U-234				
5	Pa-234	6.70h	1.000E+00	U-234						
6	U-234	2.455E+5y	1.000E+00	Th-230						
7	Th-230	7.538E+4y	1.000E+00	Ra-226						
8	Ra-226	1600y	1.000E+00	Rn-222						
9	Rn-222	3.8235d	1.000E+00	Po-218						
10	Po-218	3.10m	9.998E-01	Pb-214	2.000E-04	At-218				
11	Pb-214	26.8m	1.000E+00	Bi-214						
12	At-218	1.5s	9.990E-01	Bi-214	1.000E-03	Rn-218				
13	Bi-214	19.9m	9.998E-01	Po-214	2.100E-04	Tl-210				
14	Rn-218	3.5E-2s	1.000E+00	Po-214						
15	Po-214	1.643E-4s	1.000E+00	Pb-210						
16	Tl-210	1.30m	1.000E+00	Pb-210						
17	Pb-210	22.20y	1.000E+00	Bi-210	1.900E-08	Hg-206				
18	Bi-210	5.013d	1.000E+00	Po-210	1.320E-06	Tl-206				
19	Hg-206	8.15m	1.000E+00	Tl-206						
20	Po-210	138.376d	1.000E+00	Pb-206$						
21	Tl-206	4.200m	1.000E+00	Pb-206$						

Pu-243

------------------------- Daughter Products -------------------------

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	Pu-243	4.956h	1.000E+00	Am-243						
2	Am-243	7.37E+3y	1.000E+00	Np-239						
3	Np-239	2.3565d	1.000E+00	Pu-239						
4	Pu-239	2.411E+4y	9.994E-01	U-235m	6.000E-04	U-235				

5	U-235m	26m	1.000E+00	U-235		
6	U-235	7.04E+8y	1.000E+00	Th-231		
7	Th-231	25.52h	1.000E+00	Pa-231		
8	Pa-231	3.276E+4y	1.000E+00	Ac-227		
9	Ac-227	21.772y	9.862E-01	Th-227	1.380E-02	Fr-223
10	Th-227	18.68d	1.000E+00	Ra-223		
11	Fr-223	22.00m	1.000E+00	Ra-223	6.000E-05	At-219
12	Ra-223	11.43d	1.000E+00	Rn-219		
13	Rn-219	3.96s	1.000E+00	Po-215		
14	At-219	56s	9.700E-01	Bi-215		
15	Bi-215	7.6m	1.000E+00	Po-215		
16	Po-215	1.781E-3s	1.000E+00	Pb-211		
17	Pb-211	36.1m	1.000E+00	Bi-211		
18	Bi-211	2.14m	9.972E-01	Tl-207	2.760E-03	Po-211
19	Tl-207	4.77m	1.000E+00	Pb-207$		
20	Po-211	0.516s	1.000E+00	Pb-207$		

Pu-244

-------------------------- Daughter Products --------------------------

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	Pu-244	8.00E+7y	9.988E-01	U-240	1.210E-03	SF				
2	U-240	14.1h	1.000E+00	Np-240m						
3	Np-240m	7.22m	1.100E-03	Np-240	9.989E-01	Pu-240				
4	Np-240	61.9m	1.000E+00	Pu-240						
5	Pu-240	6564y	1.000E+00	U-236	5.750E-08	SF				
6	U-236	2.342E+7y	1.000E+00	Th-232						
7	Th-232	1.405E10y	1.000E+00	Ra-228						
8	Ra-228	5.75y	1.000E+00	Ac-228						
9	Ac-228	6.15h	1.000E+00	Th-228						
10	Th-228	1.9116y	1.000E+00	Ra-224						
11	Ra-224	3.66d	1.000E+00	Rn-220						
12	Rn-220	55.6s	1.000E+00	Po-216						
13	Po-216	0.145s	1.000E+00	Pb-212						
14	Pb-212	10.64h	1.000E+00	Bi-212						
15	Bi-212	60.55m	6.406E-01	Po-212	3.594E-01	Tl-208				
16	Po-212	2.99E-7s	1.000E+00	Pb-208$						
17	Tl-208	3.053m	1.000E+00	Pb-208$						

Pu-245

-------------------------- Daughter Products --------------------------

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	Pu-245	10.5h	1.000E+00	Am-245						
2	Am-245	2.05h	1.000E+00	Cm-245						
3	Cm-245	8.5E+3y	1.000E+00	Pu-241	6.100E-09	SF				
4	Pu-241	14.35y	1.000E+00	Am-241	2.450E-05	U-237				
5	Am-241	432.2y	1.000E+00	Np-237						
6	U-237	6.75d	1.000E+00	Np-237						
7	Np-237	2.144E+6y	1.000E+00	Pa-233						

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  8 Pa-233     26.967d  1.000E+00 U-233
  9 U-233    1.592E+5y  1.000E+00 Th-229
 10 Th-229    7.34E+3y  1.000E+00 Ra-225
 11 Ra-225       14.9d  1.000E+00 Ac-225
 12 Ac-225       10.0d  1.000E+00 Fr-221
 13 Fr-221        4.9m  1.000E+00 At-217
 14 At-217    3.23E-2s  9.999E-01 Bi-213
 15 Bi-213      45.59m  9.791E-01 Po-213   2.090E-02 Tl-209
 16 Po-213     4.2E-6s  1.000E+00 Pb-209
 17 Tl-209      2.161m  1.000E+00 Pb-209
 18 Pb-209      3.253h  1.000E+00 Bi-209$

Pu-246
                        -------------------------  Daughter
Products -------------------------
    Nuclide  Halflife     f1       Nuclide    f2       Nuclide    f3
Nuclide   f4       Nuclide
  1 Pu-246      10.84d  1.000E+00 Am-246m
  2 Am-246m      25.0m  1.000E+00 Cm-246
  3 Cm-246    4.76E+3y  9.997E-01 Pu-242   2.630E-04 SF
  4 Pu-242    3.75E+5y  1.000E+00 U-238    5.540E-06 SF
  5 U-238    4.468E+9y  1.000E+00 Th-234   5.450E-07 SF
  6 Th-234      24.10d  1.000E+00 Pa-234m
  7 Pa-234m      1.17m  1.600E-03 Pa-234   9.984E-01 U-234
  8 Pa-234       6.70h  1.000E+00 U-234
  9 U-234    2.455E+5y  1.000E+00 Th-230
 10 Th-230   7.538E+4y  1.000E+00 Ra-226
 11 Ra-226       1600y  1.000E+00 Rn-222
 12 Rn-222     3.8235d  1.000E+00 Po-218
 13 Po-218       3.10m  9.998E-01 Pb-214   2.000E-04 At-218
 14 Pb-214       26.8m  1.000E+00 Bi-214
 15 At-218        1.5s  9.990E-01 Bi-214   1.000E-03 Rn-218
 16 Bi-214       19.9m  9.998E-01 Po-214   2.100E-04 Tl-210
 17 Rn-218     3.5E-2s  1.000E+00 Po-214
 18 Po-214   1.643E-4s  1.000E+00 Pb-210
 19 Tl-210       1.30m  1.000E+00 Pb-210
 20 Pb-210      22.20y  1.000E+00 Bi-210   1.900E-08 Hg-206
 21 Bi-210      5.013d  1.000E+00 Po-210   1.320E-06 Tl-206
 22 Hg-206       8.15m  1.000E+00 Tl-206
 23 Po-210    138.376d  1.000E+00 Pb-206$
 24 Tl-206      4.200m  1.000E+00 Pb-206$

Am-237
                        -------------------------  Daughter
Products -------------------------
    Nuclide  Halflife     f1       Nuclide    f2       Nuclide    f3
Nuclide   f4       Nuclide
  1 Am-237       73.0m  9.998E-01 Pu-237   2.500E-04 Np-233
  2 Pu-237       45.2d  1.000E+00 Np-237   4.200E-05 U-233
  3 Np-233       36.2m  1.000E+00 U-233    1.000E-05 Pa-229
  4 Np-237   2.144E+6y  1.000E+00 Pa-233
  5 Pa-233     26.967d  1.000E+00 U-233
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   6 U-233   1.592E+5y  1.000E+00 Th-229
   7 Pa-229       1.50d  9.952E-01 Th-229   4.800E-03 Ac-225
   8 Th-229   7.34E+3y  1.000E+00 Ra-225
   9 Ra-225      14.9d  1.000E+00 Ac-225
  10 Ac-225      10.0d  1.000E+00 Fr-221
  11 Fr-221       4.9m  1.000E+00 At-217
  12 At-217   3.23E-2s  9.999E-01 Bi-213
  13 Bi-213     45.59m  9.791E-01 Po-213   2.090E-02 Tl-209
  14 Po-213    4.2E-6s  1.000E+00 Pb-209
  15 Tl-209     2.161m  1.000E+00 Pb-209
  16 Pb-209     3.253h  1.000E+00 Bi-209$

Am-238
                        -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife     f1      Nuclide    f2       Nuclide    f3
Nuclide   f4       Nuclide
   1 Am-238        98m  1.000E+00 Pu-238   1.000E-06 Np-234
   2 Pu-238      87.7y  1.000E+00 U-234    1.850E-09 SF
   3 Np-234       4.4d  1.000E+00 U-234
   4 U-234   2.455E+5y  1.000E+00 Th-230
   5 Th-230  7.538E+4y  1.000E+00 Ra-226
   6 Ra-226      1600y  1.000E+00 Rn-222
   7 Rn-222    3.8235d  1.000E+00 Po-218
   8 Po-218      3.10m  9.998E-01 Pb-214   2.000E-04 At-218
   9 Pb-214      26.8m  1.000E+00 Bi-214
  10 At-218       1.5s  9.990E-01 Bi-214   1.000E-03 Rn-218
  11 Bi-214      19.9m  9.998E-01 Po-214   2.100E-04 Tl-210
  12 Rn-218    3.5E-2s  1.000E+00 Po-214
  13 Po-214  1.643E-4s  1.000E+00 Pb-210
  14 Tl-210      1.30m  1.000E+00 Pb-210
  15 Pb-210     22.20y  1.000E+00 Bi-210   1.900E-08 Hg-206
  16 Bi-210     5.013d  1.000E+00 Po-210   1.320E-06 Tl-206
  17 Hg-206      8.15m  1.000E+00 Tl-206
  18 Po-210   138.376d  1.000E+00 Pb-206$
  19 Tl-206     4.200m  1.000E+00 Pb-206$

Am-239
                        -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife     f1      Nuclide    f2       Nuclide    f3
Nuclide   f4       Nuclide
   1 Am-239      11.9h  9.999E-01 Pu-239   1.000E-04 Np-235
   2 Pu-239  2.411E+4y  9.994E-01 U-235m   6.000E-04 U-235
   3 Np-235     396.1d  3.993E-03 U-235m   9.960E-01 U-235
2.600E-05 Pa-231
   4 U-235m        26m  1.000E+00 U-235
   5 U-235    7.04E+8y  1.000E+00 Th-231
   6 Th-231     25.52h  1.000E+00 Pa-231
   7 Pa-231  3.276E+4y  1.000E+00 Ac-227
   8 Ac-227    21.772y  9.862E-01 Th-227   1.380E-02 Fr-223
   9 Th-227     18.68d  1.000E+00 Ra-223
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10	Fr-223	22.00m	1.000E+00	Ra-223	6.000E-05	At-219				
11	Ra-223	11.43d	1.000E+00	Rn-219						
12	Rn-219	3.96s	1.000E+00	Po-215						
13	At-219	56s	9.700E-01	Bi-215						
14	Bi-215	7.6m	1.000E+00	Po-215						
15	Po-215	1.781E-3s	1.000E+00	Pb-211						
16	Pb-211	36.1m	1.000E+00	Bi-211						
17	Bi-211	2.14m	9.972E-01	Tl-207	2.760E-03	Po-211				
18	Tl-207	4.77m	1.000E+00	Pb-207$						
19	Po-211	0.516s	1.000E+00	Pb-207$						

Am-240

------------------------- Daughter Products -------------------------

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	Am-240	50.8h	1.000E+00	Pu-240	1.900E-06	Np-236				
2	Pu-240	6564y	1.000E+00	U-236	5.750E-08	SF				
3	Np-236	1.54E+5y	8.730E-01	U-236	1.600E-03	Pa-232	1.250E-01	Pu-236		
4	U-236	2.342E+7y	1.000E+00	Th-232						
5	Pa-232	1.31d	3.000E-05	Th-232	1.000E+00	U-232				
6	Th-232	1.405E10y	1.000E+00	Ra-228						
7	Ra-228	5.75y	1.000E+00	Ac-228						
8	Ac-228	6.15h	1.000E+00	Th-228						
9	Pu-236	2.858y	1.000E+00	U-232	1.370E-09	SF				
10	U-232	68.9y	1.000E+00	Th-228						
11	Th-228	1.9116y	1.000E+00	Ra-224						
12	Ra-224	3.66d	1.000E+00	Rn-220						
13	Rn-220	55.6s	1.000E+00	Po-216						
14	Po-216	0.145s	1.000E+00	Pb-212						
15	Pb-212	10.64h	1.000E+00	Bi-212						
16	Bi-212	60.55m	6.406E-01	Po-212	3.594E-01	Tl-208				
17	Po-212	2.99E-7s	1.000E+00	Pb-208$						
18	Tl-208	3.053m	1.000E+00	Pb-208$						

Am-241

------------------------- Daughter Products -------------------------

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	Am-241	432.2y	1.000E+00	Np-237						
2	Np-237	2.144E+6y	1.000E+00	Pa-233						
3	Pa-233	26.967d	1.000E+00	U-233						
4	U-233	1.592E+5y	1.000E+00	Th-229						
5	Th-229	7.34E+3y	1.000E+00	Ra-225						
6	Ra-225	14.9d	1.000E+00	Ac-225						
7	Ac-225	10.0d	1.000E+00	Fr-221						
8	Fr-221	4.9m	1.000E+00	At-217						
9	At-217	3.23E-2s	9.999E-01	Bi-213						
10	Bi-213	45.59m	9.791E-01	Po-213	2.090E-02	Tl-209				
11	Po-213	4.2E-6s	1.000E+00	Pb-209						

12	Tl-209	2.161m	1.000E+00	Pb-209
13	Pb-209	3.253h	1.000E+00	Bi-209$

Am-242

------------------------- Daughter Products -------------------------

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	Am-242	16.02h	8.270E-01	Cm-242	1.730E-01	Pu-242				
2	Cm-242	162.8d	1.000E+00	Pu-238	6.370E-08	SF				
3	Pu-242	3.75E+5y	1.000E+00	U-238	5.540E-06	SF				
4	Pu-238	87.7y	1.000E+00	U-234	1.850E-09	SF				
5	U-238	4.468E+9y	1.000E+00	Th-234	5.450E-07	SF				
6	Th-234	24.10d	1.000E+00	Pa-234m						
7	Pa-234m	1.17m	1.600E-03	Pa-234	9.984E-01	U-234				
8	Pa-234	6.70h	1.000E+00	U-234						
9	U-234	2.455E+5y	1.000E+00	Th-230						
10	Th-230	7.538E+4y	1.000E+00	Ra-226						
11	Ra-226	1600y	1.000E+00	Rn-222						
12	Rn-222	3.8235d	1.000E+00	Po-218						
13	Po-218	3.10m	9.998E-01	Pb-214	2.000E-04	At-218				
14	Pb-214	26.8m	1.000E+00	Bi-214						
15	At-218	1.5s	9.990E-01	Bi-214	1.000E-03	Rn-218				
16	Bi-214	19.9m	9.998E-01	Po-214	2.100E-04	Tl-210				
17	Rn-218	3.5E-2s	1.000E+00	Po-214						
18	Po-214	1.643E-4s	1.000E+00	Pb-210						
19	Tl-210	1.30m	1.000E+00	Pb-210						
20	Pb-210	22.20y	1.000E+00	Bi-210	1.900E-08	Hg-206				
21	Bi-210	5.013d	1.000E+00	Po-210	1.320E-06	Tl-206				
22	Hg-206	8.15m	1.000E+00	Tl-206						
23	Po-210	138.376d	1.000E+00	Pb-206$						
24	Tl-206	4.200m	1.000E+00	Pb-206$						

Am-242m

------------------------- Daughter Products -------------------------

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	Am-242m	141y	9.955E-01	Am-242	4.500E-03	Np-238				
2	Am-242	16.02h	8.270E-01	Cm-242	1.730E-01	Pu-242				
3	Np-238	2.117d	1.000E+00	Pu-238						
4	Cm-242	162.8d	1.000E+00	Pu-238	6.370E-08	SF				
5	Pu-242	3.75E+5y	1.000E+00	U-238	5.540E-06	SF				
6	Pu-238	87.7y	1.000E+00	U-234	1.850E-09	SF				
7	U-238	4.468E+9y	1.000E+00	Th-234	5.450E-07	SF				
8	Th-234	24.10d	1.000E+00	Pa-234m						
9	Pa-234m	1.17m	1.600E-03	Pa-234	9.984E-01	U-234				
10	Pa-234	6.70h	1.000E+00	U-234						
11	U-234	2.455E+5y	1.000E+00	Th-230						
12	Th-230	7.538E+4y	1.000E+00	Ra-226						
13	Ra-226	1600y	1.000E+00	Rn-222						
14	Rn-222	3.8235d	1.000E+00	Po-218						

15	Po-218	3.10m	9.998E-01	Pb-214	2.000E-04	At-218
16	Pb-214	26.8m	1.000E+00	Bi-214		
17	At-218	1.5s	9.990E-01	Bi-214	1.000E-03	Rn-218
18	Bi-214	19.9m	9.998E-01	Po-214	2.100E-04	Tl-210
19	Rn-218	3.5E-2s	1.000E+00	Po-214		
20	Po-214	1.643E-4s	1.000E+00	Pb-210		
21	Tl-210	1.30m	1.000E+00	Pb-210		
22	Pb-210	22.20y	1.000E+00	Bi-210	1.900E-08	Hg-206
23	Bi-210	5.013d	1.000E+00	Po-210	1.320E-06	Tl-206
24	Hg-206	8.15m	1.000E+00	Tl-206		
25	Po-210	138.376d	1.000E+00	Pb-206$		
26	Tl-206	4.200m	1.000E+00	Pb-206$		

Am-243

------------------------- Daughter Products -------------------------

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	Am-243	7.37E+3y	1.000E+00	Np-239						
2	Np-239	2.3565d	1.000E+00	Pu-239						
3	Pu-239	2.411E+4y	9.994E-01	U-235m	6.000E-04	U-235				
4	U-235m	26m	1.000E+00	U-235						
5	U-235	7.04E+8y	1.000E+00	Th-231						
6	Th-231	25.52h	1.000E+00	Pa-231						
7	Pa-231	3.276E+4y	1.000E+00	Ac-227						
8	Ac-227	21.772y	9.862E-01	Th-227	1.380E-02	Fr-223				
9	Th-227	18.68d	1.000E+00	Ra-223						
10	Fr-223	22.00m	1.000E+00	Ra-223	6.000E-05	At-219				
11	Ra-223	11.43d	1.000E+00	Rn-219						
12	Rn-219	3.96s	1.000E+00	Po-215						
13	At-219	56s	9.700E-01	Bi-215						
14	Bi-215	7.6m	1.000E+00	Po-215						
15	Po-215	1.781E-3s	1.000E+00	Pb-211						
16	Pb-211	36.1m	1.000E+00	Bi-211						
17	Bi-211	2.14m	9.972E-01	Tl-207	2.760E-03	Po-211				
18	Tl-207	4.77m	1.000E+00	Pb-207$						
19	Po-211	0.516s	1.000E+00	Pb-207$						

Am-244

------------------------- Daughter Products -------------------------

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	Am-244	10.1h	1.000E+00	Cm-244						
2	Cm-244	18.10y	1.000E+00	Pu-240	1.371E-06	SF				
3	Pu-240	6564y	1.000E+00	U-236	5.750E-08	SF				
4	U-236	2.342E+7y	1.000E+00	Th-232						
5	Th-232	1.405E10y	1.000E+00	Ra-228						
6	Ra-228	5.75y	1.000E+00	Ac-228						
7	Ac-228	6.15h	1.000E+00	Th-228						
8	Th-228	1.9116y	1.000E+00	Ra-224						
9	Ra-224	3.66d	1.000E+00	Rn-220						

10	Rn-220	55.6s	1.000E+00	Po-216		
11	Po-216	0.145s	1.000E+00	Pb-212		
12	Pb-212	10.64h	1.000E+00	Bi-212		
13	Bi-212	60.55m	6.406E-01	Po-212	3.594E-01	Tl-208
14	Po-212	2.99E-7s	1.000E+00	Pb-208$		
15	Tl-208	3.053m	1.000E+00	Pb-208$		

Am-244m

------------------------- Daughter Products -------------------------

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	Am-244m	26m	9.996E-01	Cm-244						
2	Cm-244	18.10y	1.000E+00	Pu-240	1.371E-06	SF				
3	Pu-240	6564y	1.000E+00	U-236	5.750E-08	SF				
4	U-236	2.342E+7y	1.000E+00	Th-232						
5	Th-232	1.405E10y	1.000E+00	Ra-228						
6	Ra-228	5.75y	1.000E+00	Ac-228						
7	Ac-228	6.15h	1.000E+00	Th-228						
8	Th-228	1.9116y	1.000E+00	Ra-224						
9	Ra-224	3.66d	1.000E+00	Rn-220						
10	Rn-220	55.6s	1.000E+00	Po-216						
11	Po-216	0.145s	1.000E+00	Pb-212						
12	Pb-212	10.64h	1.000E+00	Bi-212						
13	Bi-212	60.55m	6.406E-01	Po-212	3.594E-01	Tl-208				
14	Po-212	2.99E-7s	1.000E+00	Pb-208$						
15	Tl-208	3.053m	1.000E+00	Pb-208$						

Am-245

------------------------- Daughter Products -------------------------

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	Am-245	2.05h	1.000E+00	Cm-245						
2	Cm-245	8.5E+3y	1.000E+00	Pu-241	6.100E-09	SF				
3	Pu-241	14.35y	1.000E+00	Am-241	2.450E-05	U-237				
4	Am-241	432.2y	1.000E+00	Np-237						
5	U-237	6.75d	1.000E+00	Np-237						
6	Np-237	2.144E+6y	1.000E+00	Pa-233						
7	Pa-233	26.967d	1.000E+00	U-233						
8	U-233	1.592E+5y	1.000E+00	Th-229						
9	Th-229	7.34E+3y	1.000E+00	Ra-225						
10	Ra-225	14.9d	1.000E+00	Ac-225						
11	Ac-225	10.0d	1.000E+00	Fr-221						
12	Fr-221	4.9m	1.000E+00	At-217						
13	At-217	3.23E-2s	9.999E-01	Bi-213						
14	Bi-213	45.59m	9.791E-01	Po-213	2.090E-02	Tl-209				
15	Po-213	4.2E-6s	1.000E+00	Pb-209						
16	Tl-209	2.161m	1.000E+00	Pb-209						
17	Pb-209	3.253h	1.000E+00	Bi-209$						

Am-246

------------------------- Daughter Products -------------------------

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	Am-246	39m	1.000E+00	Cm-246						
2	Cm-246	4.76E+3y	9.997E-01	Pu-242	2.630E-04	SF				
3	Pu-242	3.75E+5y	1.000E+00	U-238	5.540E-06	SF				
4	U-238	4.468E+9y	1.000E+00	Th-234	5.450E-07	SF				
5	Th-234	24.10d	1.000E+00	Pa-234m						
6	Pa-234m	1.17m	1.600E-03	Pa-234	9.984E-01	U-234				
7	Pa-234	6.70h	1.000E+00	U-234						
8	U-234	2.455E+5y	1.000E+00	Th-230						
9	Th-230	7.538E+4y	1.000E+00	Ra-226						
10	Ra-226	1600y	1.000E+00	Rn-222						
11	Rn-222	3.8235d	1.000E+00	Po-218						
12	Po-218	3.10m	9.998E-01	Pb-214	2.000E-04	At-218				
13	Pb-214	26.8m	1.000E+00	Bi-214						
14	At-218	1.5s	9.990E-01	Bi-214	1.000E-03	Rn-218				
15	Bi-214	19.9m	9.998E-01	Po-214	2.100E-04	Tl-210				
16	Rn-218	3.5E-2s	1.000E+00	Po-214						
17	Po-214	1.643E-4s	1.000E+00	Pb-210						
18	Tl-210	1.30m	1.000E+00	Pb-210						
19	Pb-210	22.20y	1.000E+00	Bi-210	1.900E-08	Hg-206				
20	Bi-210	5.013d	1.000E+00	Po-210	1.320E-06	Tl-206				
21	Hg-206	8.15m	1.000E+00	Tl-206						
22	Po-210	138.376d	1.000E+00	Pb-206$						
23	Tl-206	4.200m	1.000E+00	Pb-206$						

Am-246m

------------------------- Daughter Products -------------------------

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	Am-246m	25.0m	1.000E+00	Cm-246						
2	Cm-246	4.76E+3y	9.997E-01	Pu-242	2.630E-04	SF				
3	Pu-242	3.75E+5y	1.000E+00	U-238	5.540E-06	SF				
4	U-238	4.468E+9y	1.000E+00	Th-234	5.450E-07	SF				
5	Th-234	24.10d	1.000E+00	Pa-234m						
6	Pa-234m	1.17m	1.600E-03	Pa-234	9.984E-01	U-234				
7	Pa-234	6.70h	1.000E+00	U-234						
8	U-234	2.455E+5y	1.000E+00	Th-230						
9	Th-230	7.538E+4y	1.000E+00	Ra-226						
10	Ra-226	1600y	1.000E+00	Rn-222						
11	Rn-222	3.8235d	1.000E+00	Po-218						
12	Po-218	3.10m	9.998E-01	Pb-214	2.000E-04	At-218				
13	Pb-214	26.8m	1.000E+00	Bi-214						
14	At-218	1.5s	9.990E-01	Bi-214	1.000E-03	Rn-218				
15	Bi-214	19.9m	9.998E-01	Po-214	2.100E-04	Tl-210				
16	Rn-218	3.5E-2s	1.000E+00	Po-214						
17	Po-214	1.643E-4s	1.000E+00	Pb-210						
18	Tl-210	1.30m	1.000E+00	Pb-210						
19	Pb-210	22.20y	1.000E+00	Bi-210	1.900E-08	Hg-206				

20	Bi-210	5.013d	1.000E+00	Po-210	1.320E-06	Tl-206
21	Hg-206	8.15m	1.000E+00	Tl-206		
22	Po-210	138.376d	1.000E+00	Pb-206$		
23	Tl-206	4.200m	1.000E+00	Pb-206$		

Am-247

------------------------- Daughter Products -------------------------

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	Am-247	23.0m	1.000E+00	Cm-247						
2	Cm-247	1.56E+7y	1.000E+00	Pu-243						
3	Pu-243	4.956h	1.000E+00	Am-243						
4	Am-243	7.37E+3y	1.000E+00	Np-239						
5	Np-239	2.3565d	1.000E+00	Pu-239						
6	Pu-239	2.411E+4y	9.994E-01	U-235m	6.000E-04	U-235				
7	U-235m	26m	1.000E+00	U-235						
8	U-235	7.04E+8y	1.000E+00	Th-231						
9	Th-231	25.52h	1.000E+00	Pa-231						
10	Pa-231	3.276E+4y	1.000E+00	Ac-227						
11	Ac-227	21.772y	9.862E-01	Th-227	1.380E-02	Fr-223				
12	Th-227	18.68d	1.000E+00	Ra-223						
13	Fr-223	22.00m	1.000E+00	Ra-223	6.000E-05	At-219				
14	Ra-223	11.43d	1.000E+00	Rn-219						
15	Rn-219	3.96s	1.000E+00	Po-215						
16	At-219	56s	9.700E-01	Bi-215						
17	Bi-215	7.6m	1.000E+00	Po-215						
18	Po-215	1.781E-3s	1.000E+00	Pb-211						
19	Pb-211	36.1m	1.000E+00	Bi-211						
20	Bi-211	2.14m	9.972E-01	Tl-207	2.760E-03	Po-211				
21	Tl-207	4.77m	1.000E+00	Pb-207$						
22	Po-211	0.516s	1.000E+00	Pb-207$						

Cm-238

------------------------- Daughter Products -------------------------

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	Cm-238	2.4h	9.616E-01	Am-238	3.840E-02	Pu-234				
2	Am-238	98m	1.000E+00	Pu-238	1.000E-06	Np-234				
3	Pu-234	8.8h	9.400E-01	Np-234	6.000E-02	U-230				
4	Pu-238	87.7y	1.000E+00	U-234	1.850E-09	SF				
5	Np-234	4.4d	1.000E+00	U-234						
6	U-234	2.455E+5y	1.000E+00	Th-230						
7	Th-230	7.538E+4y	1.000E+00	Ra-226						
8	Ra-226	1600y	1.000E+00	Rn-222						
9	Rn-222	3.8235d	1.000E+00	Po-218						
10	Po-218	3.10m	9.998E-01	Pb-214	2.000E-04	At-218				
11	Pb-214	26.8m	1.000E+00	Bi-214						
12	At-218	1.5s	9.990E-01	Bi-214	1.000E-03	Rn-218				
13	Bi-214	19.9m	9.998E-01	Po-214	2.100E-04	Tl-210				
14	U-230	20.8d	1.000E+00	Th-226						

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 15 Th-226      30.57m  1.000E+00 Ra-222
 16 Ra-222       38.0s  1.000E+00 Rn-218
 17 Rn-218     3.5E-2s  1.000E+00 Po-214
 18 Po-214   1.643E-4s  1.000E+00 Pb-210
 19 Tl-210       1.30m  1.000E+00 Pb-210
 20 Pb-210      22.20y  1.000E+00 Bi-210  1.900E-08 Hg-206
 21 Bi-210      5.013d  1.000E+00 Po-210  1.320E-06 Tl-206
 22 Hg-206       8.15m  1.000E+00 Tl-206
 23 Po-210    138.376d  1.000E+00 Pb-206$
 24 Tl-206      4.200m  1.000E+00 Pb-206$

Cm-239
                                  -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife     f1      Nuclide    f2      Nuclide    f3
Nuclide    f4      Nuclide
  1 Cm-239        2.9h  1.000E+00 Am-239
  2 Am-239       11.9h  9.999E-01 Pu-239  1.000E-04 Np-235
  3 Pu-239   2.411E+4y  9.994E-01 U-235m  6.000E-04 U-235
  4 Np-235      396.1d  3.993E-03 U-235m  9.960E-01 U-235
2.600E-05 Pa-231
  5 U-235m         26m  1.000E+00 U-235
  6 U-235     7.04E+8y  1.000E+00 Th-231
  7 Th-231      25.52h  1.000E+00 Pa-231
  8 Pa-231   3.276E+4y  1.000E+00 Ac-227
  9 Ac-227     21.772y  9.862E-01 Th-227  1.380E-02 Fr-223
 10 Th-227      18.68d  1.000E+00 Ra-223
 11 Fr-223      22.00m  1.000E+00 Ra-223  6.000E-05 At-219
 12 Ra-223      11.43d  1.000E+00 Rn-219
 13 Rn-219       3.96s  1.000E+00 Po-215
 14 At-219         56s  9.700E-01 Bi-215
 15 Bi-215        7.6m  1.000E+00 Po-215
 16 Po-215   1.781E-3s  1.000E+00 Pb-211
 17 Pb-211       36.1m  1.000E+00 Bi-211
 18 Bi-211       2.14m  9.972E-01 Tl-207  2.760E-03 Po-211
 19 Tl-207       4.77m  1.000E+00 Pb-207$
 20 Po-211      0.516s  1.000E+00 Pb-207$

Cm-240
                                  -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife     f1      Nuclide    f2      Nuclide    f3
Nuclide    f4      Nuclide
  1 Cm-240         27d  9.970E-01 Pu-236  3.900E-08 SF
  2 Pu-236      2.858y  1.000E+00 U-232   1.370E-09 SF
  3 U-232        68.9y  1.000E+00 Th-228
  4 Th-228     1.9116y  1.000E+00 Ra-224
  5 Ra-224       3.66d  1.000E+00 Rn-220
  6 Rn-220       55.6s  1.000E+00 Po-216
  7 Po-216      0.145s  1.000E+00 Pb-212
  8 Pb-212      10.64h  1.000E+00 Bi-212
  9 Bi-212      60.55m  6.406E-01 Po-212  3.594E-01 Tl-208
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 10 Po-212   2.99E-7s  1.000E+00 Pb-208$
 11 Tl-208     3.053m  1.000E+00 Pb-208$

Cm-241
                                 ------------------------  Daughter
Products  ------------------------
    Nuclide  Halflife    f1       Nuclide    f2       Nuclide    f3
Nuclide    f4       Nuclide
  1 Cm-241      32.8d  9.900E-01 Am-241  1.000E-02 Pu-237
  2 Am-241     432.2y  1.000E+00 Np-237
  3 Pu-237      45.2d  1.000E+00 Np-237  4.200E-05 U-233
  4 Np-237  2.144E+6y  1.000E+00 Pa-233
  5 Pa-233   26.967d   1.000E+00 U-233
  6 U-233   1.592E+5y  1.000E+00 Th-229
  7 Th-229   7.34E+3y  1.000E+00 Ra-225
  8 Ra-225      14.9d  1.000E+00 Ac-225
  9 Ac-225      10.0d  1.000E+00 Fr-221
 10 Fr-221       4.9m  1.000E+00 At-217
 11 At-217   3.23E-2s  9.999E-01 Bi-213
 12 Bi-213     45.59m  9.791E-01 Po-213  2.090E-02 Tl-209
 13 Po-213    4.2E-6s  1.000E+00 Pb-209
 14 Tl-209     2.161m  1.000E+00 Pb-209
 15 Pb-209     3.253h  1.000E+00 Bi-209$

Cm-242
                                 ------------------------  Daughter
Products  ------------------------
    Nuclide  Halflife    f1       Nuclide    f2       Nuclide    f3
Nuclide    f4       Nuclide
  1 Cm-242     162.8d  1.000E+00 Pu-238  6.370E-08 SF
  2 Pu-238      87.7y  1.000E+00 U-234   1.850E-09 SF
  3 U-234   2.455E+5y  1.000E+00 Th-230
  4 Th-230  7.538E+4y  1.000E+00 Ra-226
  5 Ra-226      1600y  1.000E+00 Rn-222
  6 Rn-222    3.8235d  1.000E+00 Po-218
  7 Po-218      3.10m  9.998E-01 Pb-214  2.000E-04 At-218
  8 Pb-214      26.8m  1.000E+00 Bi-214
  9 At-218       1.5s  9.990E-01 Bi-214  1.000E-03 Rn-218
 10 Bi-214      19.9m  9.998E-01 Po-214  2.100E-04 Tl-210
 11 Rn-218    3.5E-2s  1.000E+00 Po-214
 12 Po-214  1.643E-4s  1.000E+00 Pb-210
 13 Tl-210      1.30m  1.000E+00 Pb-210
 14 Pb-210     22.20y  1.000E+00 Bi-210  1.900E-08 Hg-206
 15 Bi-210     5.013d  1.000E+00 Po-210  1.320E-06 Tl-206
 16 Hg-206      8.15m  1.000E+00 Tl-206
 17 Po-210   138.376d  1.000E+00 Pb-206$
 18 Tl-206     4.200m  1.000E+00 Pb-206$

Cm-243
                                 ------------------------  Daughter
Products  ------------------------
    Nuclide  Halflife    f1       Nuclide    f2       Nuclide    f3
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Nuclide f4 Nuclide

1	Cm-243	29.1y	2.400E-03	Am-243	9.976E-01	Pu-239
2	Am-243	7.37E+3y	1.000E+00	Np-239		
3	Np-239	2.3565d	1.000E+00	Pu-239		
4	Pu-239	2.411E+4y	9.994E-01	U-235m	6.000E-04	U-235
5	U-235m	26m	1.000E+00	U-235		
6	U-235	7.04E+8y	1.000E+00	Th-231		
7	Th-231	25.52h	1.000E+00	Pa-231		
8	Pa-231	3.276E+4y	1.000E+00	Ac-227		
9	Ac-227	21.772y	9.862E-01	Th-227	1.380E-02	Fr-223
10	Th-227	18.68d	1.000E+00	Ra-223		
11	Fr-223	22.00m	1.000E+00	Ra-223	6.000E-05	At-219
12	Ra-223	11.43d	1.000E+00	Rn-219		
13	Rn-219	3.96s	1.000E+00	Po-215		
14	At-219	56s	9.700E-01	Bi-215		
15	Bi-215	7.6m	1.000E+00	Po-215		
16	Po-215	1.781E-3s	1.000E+00	Pb-211		
17	Pb-211	36.1m	1.000E+00	Bi-211		
18	Bi-211	2.14m	9.972E-01	Tl-207	2.760E-03	Po-211
19	Tl-207	4.77m	1.000E+00	Pb-207$		
20	Po-211	0.516s	1.000E+00	Pb-207$		

Cm-244

------------------------- Daughter Products -------------------------

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	Cm-244	18.10y	1.000E+00	Pu-240	1.371E-06	SF				
2	Pu-240	6564y	1.000E+00	U-236	5.750E-08	SF				
3	U-236	2.342E+7y	1.000E+00	Th-232						
4	Th-232	1.405E10y	1.000E+00	Ra-228						
5	Ra-228	5.75y	1.000E+00	Ac-228						
6	Ac-228	6.15h	1.000E+00	Th-228						
7	Th-228	1.9116y	1.000E+00	Ra-224						
8	Ra-224	3.66d	1.000E+00	Rn-220						
9	Rn-220	55.6s	1.000E+00	Po-216						
10	Po-216	0.145s	1.000E+00	Pb-212						
11	Pb-212	10.64h	1.000E+00	Bi-212						
12	Bi-212	60.55m	6.406E-01	Po-212	3.594E-01	Tl-208				
13	Po-212	2.99E-7s	1.000E+00	Pb-208$						
14	Tl-208	3.053m	1.000E+00	Pb-208$						

Cm-245

------------------------- Daughter Products -------------------------

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	Cm-245	8.5E+3y	1.000E+00	Pu-241	6.100E-09	SF				
2	Pu-241	14.35y	1.000E+00	Am-241	2.450E-05	U-237				
3	Am-241	432.2y	1.000E+00	Np-237						
4	U-237	6.75d	1.000E+00	Np-237						
5	Np-237	2.144E+6y	1.000E+00	Pa-233						

6	Pa-233	26.967d	1.000E+00	U-233		
7	U-233	1.592E+5y	1.000E+00	Th-229		
8	Th-229	7.34E+3y	1.000E+00	Ra-225		
9	Ra-225	14.9d	1.000E+00	Ac-225		
10	Ac-225	10.0d	1.000E+00	Fr-221		
11	Fr-221	4.9m	1.000E+00	At-217		
12	At-217	3.23E-2s	9.999E-01	Bi-213		
13	Bi-213	45.59m	9.791E-01	Po-213	2.090E-02	Tl-209
14	Po-213	4.2E-6s	1.000E+00	Pb-209		
15	Tl-209	2.161m	1.000E+00	Pb-209		
16	Pb-209	3.253h	1.000E+00	Bi-209$		

Cm-246

------------------------- Daughter Products -------------------------

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	Cm-246	4.76E+3y	9.997E-01	Pu-242	2.630E-04	SF				
2	Pu-242	3.75E+5y	1.000E+00	U-238	5.540E-06	SF				
3	U-238	4.468E+9y	1.000E+00	Th-234	5.450E-07	SF				
4	Th-234	24.10d	1.000E+00	Pa-234m						
5	Pa-234m	1.17m	1.600E-03	Pa-234	9.984E-01	U-234				
6	Pa-234	6.70h	1.000E+00	U-234						
7	U-234	2.455E+5y	1.000E+00	Th-230						
8	Th-230	7.538E+4y	1.000E+00	Ra-226						
9	Ra-226	1600y	1.000E+00	Rn-222						
10	Rn-222	3.8235d	1.000E+00	Po-218						
11	Po-218	3.10m	9.998E-01	Pb-214	2.000E-04	At-218				
12	Pb-214	26.8m	1.000E+00	Bi-214						
13	At-218	1.5s	9.990E-01	Bi-214	1.000E-03	Rn-218				
14	Bi-214	19.9m	9.998E-01	Po-214	2.100E-04	Tl-210				
15	Rn-218	3.5E-2s	1.000E+00	Po-214						
16	Po-214	1.643E-4s	1.000E+00	Pb-210						
17	Tl-210	1.30m	1.000E+00	Pb-210						
18	Pb-210	22.20y	1.000E+00	Bi-210	1.900E-08	Hg-206				
19	Bi-210	5.013d	1.000E+00	Po-210	1.320E-06	Tl-206				
20	Hg-206	8.15m	1.000E+00	Tl-206						
21	Po-210	138.376d	1.000E+00	Pb-206$						
22	Tl-206	4.200m	1.000E+00	Pb-206$						

Cm-247

------------------------- Daughter Products -------------------------

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	Cm-247	1.56E+7y	1.000E+00	Pu-243						
2	Pu-243	4.956h	1.000E+00	Am-243						
3	Am-243	7.37E+3y	1.000E+00	Np-239						
4	Np-239	2.3565d	1.000E+00	Pu-239						
5	Pu-239	2.411E+4y	9.994E-01	U-235m	6.000E-04	U-235				
6	U-235m	26m	1.000E+00	U-235						
7	U-235	7.04E+8y	1.000E+00	Th-231						

8	Th-231	25.52h	1.000E+00	Pa-231		
9	Pa-231	3.276E+4y	1.000E+00	Ac-227		
10	Ac-227	21.772y	9.862E-01	Th-227	1.380E-02	Fr-223
11	Th-227	18.68d	1.000E+00	Ra-223		
12	Fr-223	22.00m	1.000E+00	Ra-223	6.000E-05	At-219
13	Ra-223	11.43d	1.000E+00	Rn-219		
14	Rn-219	3.96s	1.000E+00	Po-215		
15	At-219	56s	9.700E-01	Bi-215		
16	Bi-215	7.6m	1.000E+00	Po-215		
17	Po-215	1.781E-3s	1.000E+00	Pb-211		
18	Pb-211	36.1m	1.000E+00	Bi-211		
19	Bi-211	2.14m	9.972E-01	Tl-207	2.760E-03	Po-211
20	Tl-207	4.77m	1.000E+00	Pb-207$		
21	Po-211	0.516s	1.000E+00	Pb-207$		

Cm-248

			------------------------- Daughter Products -------------------------							
	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	Cm-248	3.48E+5y	9.161E-01	Pu-244	8.390E-02	SF				
2	Pu-244	8.00E+7y	9.988E-01	U-240	1.210E-03	SF				
3	U-240	14.1h	1.000E+00	Np-240m						
4	Np-240m	7.22m	1.100E-03	Np-240	9.989E-01	Pu-240				
5	Np-240	61.9m	1.000E+00	Pu-240						
6	Pu-240	6564y	1.000E+00	U-236	5.750E-08	SF				
7	U-236	2.342E+7y	1.000E+00	Th-232						
8	Th-232	1.405E10y	1.000E+00	Ra-228						
9	Ra-228	5.75y	1.000E+00	Ac-228						
10	Ac-228	6.15h	1.000E+00	Th-228						
11	Th-228	1.9116y	1.000E+00	Ra-224						
12	Ra-224	3.66d	1.000E+00	Rn-220						
13	Rn-220	55.6s	1.000E+00	Po-216						
14	Po-216	0.145s	1.000E+00	Pb-212						
15	Pb-212	10.64h	1.000E+00	Bi-212						
16	Bi-212	60.55m	6.406E-01	Po-212	3.594E-01	Tl-208				
17	Po-212	2.99E-7s	1.000E+00	Pb-208$						
18	Tl-208	3.053m	1.000E+00	Pb-208$						

Cm-249

			------------------------- Daughter Products -------------------------							
	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	Cm-249	64.15m	1.000E+00	Bk-249						
2	Bk-249	330d	1.000E+00	Cf-249	1.450E-05	Am-245				
3	Cf-249	351y	1.000E+00	Cm-245	5.020E-09	SF				
4	Am-245	2.05h	1.000E+00	Cm-245						
5	Cm-245	8.5E+3y	1.000E+00	Pu-241	6.100E-09	SF				
6	Pu-241	14.35y	1.000E+00	Am-241	2.450E-05	U-237				
7	Am-241	432.2y	1.000E+00	Np-237						
8	U-237	6.75d	1.000E+00	Np-237						

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  9 Np-237  2.144E+6y  1.000E+00 Pa-233
 10 Pa-233    26.967d  1.000E+00 U-233
 11 U-233   1.592E+5y  1.000E+00 Th-229
 12 Th-229   7.34E+3y  1.000E+00 Ra-225
 13 Ra-225      14.9d  1.000E+00 Ac-225
 14 Ac-225      10.0d  1.000E+00 Fr-221
 15 Fr-221       4.9m  1.000E+00 At-217
 16 At-217   3.23E-2s  9.999E-01 Bi-213
 17 Bi-213     45.59m  9.791E-01 Po-213  2.090E-02 Tl-209
 18 Po-213    4.2E-6s  1.000E+00 Pb-209
 19 Tl-209     2.161m  1.000E+00 Pb-209
 20 Pb-209     3.253h  1.000E+00 Bi-209$

Cm-250
                       ------------------------- Daughter
Products  -------------------------
    Nuclide  Halflife     f1       Nuclide    f2       Nuclide    f3
Nuclide    f4       Nuclide
  1 Cm-250      8300y  1.800E-01 Pu-246  8.000E-02 Bk-250
7.400E-01 SF
  2 Pu-246     10.84d  1.000E+00 Am-246m
  3 Bk-250     3.212h  1.000E+00 Cf-250
  4 Am-246m     25.0m  1.000E+00 Cm-246
  5 Cf-250     13.08y  9.992E-01 Cm-246  7.700E-04 SF
  6 Cm-246   4.76E+3y  9.997E-01 Pu-242  2.630E-04 SF
  7 Pu-242   3.75E+5y  1.000E+00 U-238   5.540E-06 SF
  8 U-238   4.468E+9y  1.000E+00 Th-234  5.450E-07 SF
  9 Th-234     24.10d  1.000E+00 Pa-234m
 10 Pa-234m     1.17m  1.600E-03 Pa-234  9.984E-01 U-234
 11 Pa-234      6.70h  1.000E+00 U-234
 12 U-234   2.455E+5y  1.000E+00 Th-230
 13 Th-230  7.538E+4y  1.000E+00 Ra-226
 14 Ra-226      1600y  1.000E+00 Rn-222
 15 Rn-222    3.8235d  1.000E+00 Po-218
 16 Po-218      3.10m  9.998E-01 Pb-214  2.000E-04 At-218
 17 Pb-214      26.8m  1.000E+00 Bi-214
 18 At-218       1.5s  9.990E-01 Bi-214  1.000E-03 Rn-218
 19 Bi-214      19.9m  9.998E-01 Po-214  2.100E-04 Tl-210
 20 Rn-218    3.5E-2s  1.000E+00 Po-214
 21 Po-214  1.643E-4s  1.000E+00 Pb-210
 22 Tl-210      1.30m  1.000E+00 Pb-210
 23 Pb-210     22.20y  1.000E+00 Bi-210  1.900E-08 Hg-206
 24 Bi-210     5.013d  1.000E+00 Po-210  1.320E-06 Tl-206
 25 Hg-206      8.15m  1.000E+00 Tl-206
 26 Po-210   138.376d  1.000E+00 Pb-206$
 27 Tl-206     4.200m  1.000E+00 Pb-206$

Cm-251
                       ------------------------- Daughter
Products  -------------------------
    Nuclide  Halflife     f1       Nuclide    f2       Nuclide    f3
Nuclide    f4       Nuclide
```

1	Cm-251	16.8m	1.000E+00	Bk-251		
2	Bk-251	55.6m	1.000E+00	Cf-251		
3	Cf-251	900y	1.000E+00	Cm-247		
4	Cm-247	1.56E+7y	1.000E+00	Pu-243		
5	Pu-243	4.956h	1.000E+00	Am-243		
6	Am-243	7.37E+3y	1.000E+00	Np-239		
7	Np-239	2.3565d	1.000E+00	Pu-239		
8	Pu-239	2.411E+4y	9.994E-01	U-235m	6.000E-04	U-235
9	U-235m	26m	1.000E+00	U-235		
10	U-235	7.04E+8y	1.000E+00	Th-231		
11	Th-231	25.52h	1.000E+00	Pa-231		
12	Pa-231	3.276E+4y	1.000E+00	Ac-227		
13	Ac-227	21.772y	9.862E-01	Th-227	1.380E-02	Fr-223
14	Th-227	18.68d	1.000E+00	Ra-223		
15	Fr-223	22.00m	1.000E+00	Ra-223	6.000E-05	At-219
16	Ra-223	11.43d	1.000E+00	Rn-219		
17	Rn-219	3.96s	1.000E+00	Po-215		
18	At-219	56s	9.700E-01	Bi-215		
19	Bi-215	7.6m	1.000E+00	Po-215		
20	Po-215	1.781E-3s	1.000E+00	Pb-211		
21	Pb-211	36.1m	1.000E+00	Bi-211		
22	Bi-211	2.14m	9.972E-01	Tl-207	2.760E-03	Po-211
23	Tl-207	4.77m	1.000E+00	Pb-207$		
24	Po-211	0.516s	1.000E+00	Pb-207$		

Bk-245

------------------------- Daughter Products -------------------------

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	Bk-245	4.94d	9.988E-01	Cm-245	1.200E-03	Am-241				
2	Cm-245	8.5E+3y	1.000E+00	Pu-241	6.100E-09	SF				
3	Pu-241	14.35y	1.000E+00	Am-241	2.450E-05	U-237				
4	Am-241	432.2y	1.000E+00	Np-237						
5	U-237	6.75d	1.000E+00	Np-237						
6	Np-237	2.144E+6y	1.000E+00	Pa-233						
7	Pa-233	26.967d	1.000E+00	U-233						
8	U-233	1.592E+5y	1.000E+00	Th-229						
9	Th-229	7.34E+3y	1.000E+00	Ra-225						
10	Ra-225	14.9d	1.000E+00	Ac-225						
11	Ac-225	10.0d	1.000E+00	Fr-221						
12	Fr-221	4.9m	1.000E+00	At-217						
13	At-217	3.23E-2s	9.999E-01	Bi-213						
14	Bi-213	45.59m	9.791E-01	Po-213	2.090E-02	Tl-209				
15	Po-213	4.2E-6s	1.000E+00	Pb-209						
16	Tl-209	2.161m	1.000E+00	Pb-209						
17	Pb-209	3.253h	1.000E+00	Bi-209$						

Bk-246

------------------------- Daughter Products -------------------------

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3

Nuclide f4 Nuclide

1	Bk-246	1.80d	1.000E+00	Cm-246		
2	Cm-246	4.76E+3y	9.997E-01	Pu-242	2.630E-04	SF
3	Pu-242	3.75E+5y	1.000E+00	U-238	5.540E-06	SF
4	U-238	4.468E+9y	1.000E+00	Th-234	5.450E-07	SF
5	Th-234	24.10d	1.000E+00	Pa-234m		
6	Pa-234m	1.17m	1.600E-03	Pa-234	9.984E-01	U-234
7	Pa-234	6.70h	1.000E+00	U-234		
8	U-234	2.455E+5y	1.000E+00	Th-230		
9	Th-230	7.538E+4y	1.000E+00	Ra-226		
10	Ra-226	1600y	1.000E+00	Rn-222		
11	Rn-222	3.8235d	1.000E+00	Po-218		
12	Po-218	3.10m	9.998E-01	Pb-214	2.000E-04	At-218
13	Pb-214	26.8m	1.000E+00	Bi-214		
14	At-218	1.5s	9.990E-01	Bi-214	1.000E-03	Rn-218
15	Bi-214	19.9m	9.998E-01	Po-214	2.100E-04	Tl-210
16	Rn-218	3.5E-2s	1.000E+00	Po-214		
17	Po-214	1.643E-4s	1.000E+00	Pb-210		
18	Tl-210	1.30m	1.000E+00	Pb-210		
19	Pb-210	22.20y	1.000E+00	Bi-210	1.900E-08	Hg-206
20	Bi-210	5.013d	1.000E+00	Po-210	1.320E-06	Tl-206
21	Hg-206	8.15m	1.000E+00	Tl-206		
22	Po-210	138.376d	1.000E+00	Pb-206$		
23	Tl-206	4.200m	1.000E+00	Pb-206$		

Bk-247

------------------------- Daughter Products -------------------------

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	Bk-247	1.38E+3y	1.000E+00	Am-243						
2	Am-243	7.37E+3y	1.000E+00	Np-239						
3	Np-239	2.3565d	1.000E+00	Pu-239						
4	Pu-239	2.411E+4y	9.994E-01	U-235m	6.000E-04	U-235				
5	U-235m	26m	1.000E+00	U-235						
6	U-235	7.04E+8y	1.000E+00	Th-231						
7	Th-231	25.52h	1.000E+00	Pa-231						
8	Pa-231	3.276E+4y	1.000E+00	Ac-227						
9	Ac-227	21.772y	9.862E-01	Th-227	1.380E-02	Fr-223				
10	Th-227	18.68d	1.000E+00	Ra-223						
11	Fr-223	22.00m	1.000E+00	Ra-223	6.000E-05	At-219				
12	Ra-223	11.43d	1.000E+00	Rn-219						
13	Rn-219	3.96s	1.000E+00	Po-215						
14	At-219	56s	9.700E-01	Bi-215						
15	Bi-215	7.6m	1.000E+00	Po-215						
16	Po-215	1.781E-3s	1.000E+00	Pb-211						
17	Pb-211	36.1m	1.000E+00	Bi-211						
18	Bi-211	2.14m	9.972E-01	Tl-207	2.760E-03	Po-211				
19	Tl-207	4.77m	1.000E+00	Pb-207$						
20	Po-211	0.516s	1.000E+00	Pb-207$						

Bk-248m

			---------------- Daughter Products ----------------							
	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	Bk-248m	23.7h	7.000E-01	Cf-248	3.000E-01	Cm-248				
2	Cf-248	334d	1.000E+00	Cm-244	2.900E-05	SF				
3	Cm-248	3.48E+5y	9.161E-01	Pu-244	8.390E-02	SF				
4	Cm-244	18.10y	1.000E+00	Pu-240	1.371E-06	SF				
5	Pu-244	8.00E+7y	9.988E-01	U-240	1.210E-03	SF				
6	U-240	14.1h	1.000E+00	Np-240m						
7	Np-240m	7.22m	1.100E-03	Np-240	9.989E-01	Pu-240				
8	Np-240	61.9m	1.000E+00	Pu-240						
9	Pu-240	6564y	1.000E+00	U-236	5.750E-08	SF				
10	U-236	2.342E+7y	1.000E+00	Th-232						
11	Th-232	1.405E10y	1.000E+00	Ra-228						
12	Ra-228	5.75y	1.000E+00	Ac-228						
13	Ac-228	6.15h	1.000E+00	Th-228						
14	Th-228	1.9116y	1.000E+00	Ra-224						
15	Ra-224	3.66d	1.000E+00	Rn-220						
16	Rn-220	55.6s	1.000E+00	Po-216						
17	Po-216	0.145s	1.000E+00	Pb-212						
18	Pb-212	10.64h	1.000E+00	Bi-212						
19	Bi-212	60.55m	6.406E-01	Po-212	3.594E-01	Tl-208				
20	Po-212	2.99E-7s	1.000E+00	Pb-208$						
21	Tl-208	3.053m	1.000E+00	Pb-208$						

Bk-249

			---------------- Daughter Products ----------------							
	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	Bk-249	330d	1.000E+00	Cf-249	1.450E-05	Am-245				
2	Cf-249	351y	1.000E+00	Cm-245	5.020E-09	SF				
3	Am-245	2.05h	1.000E+00	Cm-245						
4	Cm-245	8.5E+3y	1.000E+00	Pu-241	6.100E-09	SF				
5	Pu-241	14.35y	1.000E+00	Am-241	2.450E-05	U-237				
6	Am-241	432.2y	1.000E+00	Np-237						
7	U-237	6.75d	1.000E+00	Np-237						
8	Np-237	2.144E+6y	1.000E+00	Pa-233						
9	Pa-233	26.967d	1.000E+00	U-233						
10	U-233	1.592E+5y	1.000E+00	Th-229						
11	Th-229	7.34E+3y	1.000E+00	Ra-225						
12	Ra-225	14.9d	1.000E+00	Ac-225						
13	Ac-225	10.0d	1.000E+00	Fr-221						
14	Fr-221	4.9m	1.000E+00	At-217						
15	At-217	3.23E-2s	9.999E-01	Bi-213						
16	Bi-213	45.59m	9.791E-01	Po-213	2.090E-02	Tl-209				
17	Po-213	4.2E-6s	1.000E+00	Pb-209						
18	Tl-209	2.161m	1.000E+00	Pb-209						
19	Pb-209	3.253h	1.000E+00	Bi-209$						

Bk-250

------------------------ Daughter Products ------------------------

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	Bk-250	3.212h	1.000E+00	Cf-250						
2	Cf-250	13.08y	9.992E-01	Cm-246	7.700E-04	SF				
3	Cm-246	4.76E+3y	9.997E-01	Pu-242	2.630E-04	SF				
4	Pu-242	3.75E+5y	1.000E+00	U-238	5.540E-06	SF				
5	U-238	4.468E+9y	1.000E+00	Th-234	5.450E-07	SF				
6	Th-234	24.10d	1.000E+00	Pa-234m						
7	Pa-234m	1.17m	1.600E-03	Pa-234	9.984E-01	U-234				
8	Pa-234	6.70h	1.000E+00	U-234						
9	U-234	2.455E+5y	1.000E+00	Th-230						
10	Th-230	7.538E+4y	1.000E+00	Ra-226						
11	Ra-226	1600y	1.000E+00	Rn-222						
12	Rn-222	3.8235d	1.000E+00	Po-218						
13	Po-218	3.10m	9.998E-01	Pb-214	2.000E-04	At-218				
14	Pb-214	26.8m	1.000E+00	Bi-214						
15	At-218	1.5s	9.990E-01	Bi-214	1.000E-03	Rn-218				
16	Bi-214	19.9m	9.998E-01	Po-214	2.100E-04	Tl-210				
17	Rn-218	3.5E-2s	1.000E+00	Po-214						
18	Po-214	1.643E-4s	1.000E+00	Pb-210						
19	Tl-210	1.30m	1.000E+00	Pb-210						
20	Pb-210	22.20y	1.000E+00	Bi-210	1.900E-08	Hg-206				
21	Bi-210	5.013d	1.000E+00	Po-210	1.320E-06	Tl-206				
22	Hg-206	8.15m	1.000E+00	Tl-206						
23	Po-210	138.376d	1.000E+00	Pb-206$						
24	Tl-206	4.200m	1.000E+00	Pb-206$						

Bk-251

------------------------ Daughter Products ------------------------

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	Bk-251	55.6m	1.000E+00	Cf-251						
2	Cf-251	900y	1.000E+00	Cm-247						
3	Cm-247	1.56E+7y	1.000E+00	Pu-243						
4	Pu-243	4.956h	1.000E+00	Am-243						
5	Am-243	7.37E+3y	1.000E+00	Np-239						
6	Np-239	2.3565d	1.000E+00	Pu-239						
7	Pu-239	2.411E+4y	9.994E-01	U-235m	6.000E-04	U-235				
8	U-235m	26m	1.000E+00	U-235						
9	U-235	7.04E+8y	1.000E+00	Th-231						
10	Th-231	25.52h	1.000E+00	Pa-231						
11	Pa-231	3.276E+4y	1.000E+00	Ac-227						
12	Ac-227	21.772y	9.862E-01	Th-227	1.380E-02	Fr-223				
13	Th-227	18.68d	1.000E+00	Ra-223						
14	Fr-223	22.00m	1.000E+00	Ra-223	6.000E-05	At-219				
15	Ra-223	11.43d	1.000E+00	Rn-219						
16	Rn-219	3.96s	1.000E+00	Po-215						
17	At-219	56s	9.700E-01	Bi-215						
18	Bi-215	7.6m	1.000E+00	Po-215						

19	Po-215	1.781E-3s	1.000E+00	Pb-211		
20	Pb-211	36.1m	1.000E+00	Bi-211		
21	Bi-211	2.14m	9.972E-01	Tl-207	2.760E-03	Po-211
22	Tl-207	4.77m	1.000E+00	Pb-207$		
23	Po-211	0.516s	1.000E+00	Pb-207$		

Cf-244

------------------------- Daughter Products -------------------------

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	Cf-244	19.4m	1.000E+00	Cm-240						
2	Cm-240	27d	9.970E-01	Pu-236	3.900E-08	SF				
3	Pu-236	2.858y	1.000E+00	U-232	1.370E-09	SF				
4	U-232	68.9y	1.000E+00	Th-228						
5	Th-228	1.9116y	1.000E+00	Ra-224						
6	Ra-224	3.66d	1.000E+00	Rn-220						
7	Rn-220	55.6s	1.000E+00	Po-216						
8	Po-216	0.145s	1.000E+00	Pb-212						
9	Pb-212	10.64h	1.000E+00	Bi-212						
10	Bi-212	60.55m	6.406E-01	Po-212	3.594E-01	Tl-208				
11	Po-212	2.99E-7s	1.000E+00	Pb-208$						
12	Tl-208	3.053m	1.000E+00	Pb-208$						

Cf-246

------------------------- Daughter Products -------------------------

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	Cf-246	35.7h	1.000E+00	Cm-242	2.500E-06	SF				
2	Cm-242	162.8d	1.000E+00	Pu-238	6.370E-08	SF				
3	Pu-238	87.7y	1.000E+00	U-234	1.850E-09	SF				
4	U-234	2.455E+5y	1.000E+00	Th-230						
5	Th-230	7.538E+4y	1.000E+00	Ra-226						
6	Ra-226	1600y	1.000E+00	Rn-222						
7	Rn-222	3.8235d	1.000E+00	Po-218						
8	Po-218	3.10m	9.998E-01	Pb-214	2.000E-04	At-218				
9	Pb-214	26.8m	1.000E+00	Bi-214						
10	At-218	1.5s	9.990E-01	Bi-214	1.000E-03	Rn-218				
11	Bi-214	19.9m	9.998E-01	Po-214	2.100E-04	Tl-210				
12	Rn-218	3.5E-2s	1.000E+00	Po-214						
13	Po-214	1.643E-4s	1.000E+00	Pb-210						
14	Tl-210	1.30m	1.000E+00	Pb-210						
15	Pb-210	22.20y	1.000E+00	Bi-210	1.900E-08	Hg-206				
16	Bi-210	5.013d	1.000E+00	Po-210	1.320E-06	Tl-206				
17	Hg-206	8.15m	1.000E+00	Tl-206						
18	Po-210	138.376d	1.000E+00	Pb-206$						
19	Tl-206	4.200m	1.000E+00	Pb-206$						

Cf-247

------------------------- Daughter Products -------------------------

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	Cf-247	3.11h	9.997E-01	Bk-247	3.500E-04	Cm-243				
2	Bk-247	1.38E+3y	1.000E+00	Am-243						
3	Cm-243	29.1y	2.400E-03	Am-243	9.976E-01	Pu-239				
4	Am-243	7.37E+3y	1.000E+00	Np-239						
5	Np-239	2.3565d	1.000E+00	Pu-239						
6	Pu-239	2.411E+4y	9.994E-01	U-235m	6.000E-04	U-235				
7	U-235m	26m	1.000E+00	U-235						
8	U-235	7.04E+8y	1.000E+00	Th-231						
9	Th-231	25.52h	1.000E+00	Pa-231						
10	Pa-231	3.276E+4y	1.000E+00	Ac-227						
11	Ac-227	21.772y	9.862E-01	Th-227	1.380E-02	Fr-223				
12	Th-227	18.68d	1.000E+00	Ra-223						
13	Fr-223	22.00m	1.000E+00	Ra-223	6.000E-05	At-219				
14	Ra-223	11.43d	1.000E+00	Rn-219						
15	Rn-219	3.96s	1.000E+00	Po-215						
16	At-219	56s	9.700E-01	Bi-215						
17	Bi-215	7.6m	1.000E+00	Po-215						
18	Po-215	1.781E-3s	1.000E+00	Pb-211						
19	Pb-211	36.1m	1.000E+00	Bi-211						
20	Bi-211	2.14m	9.972E-01	Tl-207	2.760E-03	Po-211				
21	Tl-207	4.77m	1.000E+00	Pb-207$						
22	Po-211	0.516s	1.000E+00	Pb-207$						

Cf-248

------------------------- Daughter Products -------------------------

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	Cf-248	334d	1.000E+00	Cm-244	2.900E-05	SF				
2	Cm-244	18.10y	1.000E+00	Pu-240	1.371E-06	SF				
3	Pu-240	6564y	1.000E+00	U-236	5.750E-08	SF				
4	U-236	2.342E+7y	1.000E+00	Th-232						
5	Th-232	1.405E10y	1.000E+00	Ra-228						
6	Ra-228	5.75y	1.000E+00	Ac-228						
7	Ac-228	6.15h	1.000E+00	Th-228						
8	Th-228	1.9116y	1.000E+00	Ra-224						
9	Ra-224	3.66d	1.000E+00	Rn-220						
10	Rn-220	55.6s	1.000E+00	Po-216						
11	Po-216	0.145s	1.000E+00	Pb-212						
12	Pb-212	10.64h	1.000E+00	Bi-212						
13	Bi-212	60.55m	6.406E-01	Po-212	3.594E-01	Tl-208				
14	Po-212	2.99E-7s	1.000E+00	Pb-208$						
15	Tl-208	3.053m	1.000E+00	Pb-208$						

Cf-249

------------------------- Daughter Products -------------------------

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	Cf-249	351y	1.000E+00	Cm-245	5.020E-09	SF				

2	Cm-245	8.5E+3y	1.000E+00	Pu-241	6.100E-09	SF
3	Pu-241	14.35y	1.000E+00	Am-241	2.450E-05	U-237
4	Am-241	432.2y	1.000E+00	Np-237		
5	U-237	6.75d	1.000E+00	Np-237		
6	Np-237	2.144E+6y	1.000E+00	Pa-233		
7	Pa-233	26.967d	1.000E+00	U-233		
8	U-233	1.592E+5y	1.000E+00	Th-229		
9	Th-229	7.34E+3y	1.000E+00	Ra-225		
10	Ra-225	14.9d	1.000E+00	Ac-225		
11	Ac-225	10.0d	1.000E+00	Fr-221		
12	Fr-221	4.9m	1.000E+00	At-217		
13	At-217	3.23E-2s	9.999E-01	Bi-213		
14	Bi-213	45.59m	9.791E-01	Po-213	2.090E-02	Tl-209
15	Po-213	4.2E-6s	1.000E+00	Pb-209		
16	Tl-209	2.161m	1.000E+00	Pb-209		
17	Pb-209	3.253h	1.000E+00	Bi-209$		

Cf-250

------------------------- Daughter Products -------------------------

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	Cf-250	13.08y	9.992E-01	Cm-246	7.700E-04	SF				
2	Cm-246	4.76E+3y	9.997E-01	Pu-242	2.630E-04	SF				
3	Pu-242	3.75E+5y	1.000E+00	U-238	5.540E-06	SF				
4	U-238	4.468E+9y	1.000E+00	Th-234	5.450E-07	SF				
5	Th-234	24.10d	1.000E+00	Pa-234m						
6	Pa-234m	1.17m	1.600E-03	Pa-234	9.984E-01	U-234				
7	Pa-234	6.70h	1.000E+00	U-234						
8	U-234	2.455E+5y	1.000E+00	Th-230						
9	Th-230	7.538E+4y	1.000E+00	Ra-226						
10	Ra-226	1600y	1.000E+00	Rn-222						
11	Rn-222	3.8235d	1.000E+00	Po-218						
12	Po-218	3.10m	9.998E-01	Pb-214	2.000E-04	At-218				
13	Pb-214	26.8m	1.000E+00	Bi-214						
14	At-218	1.5s	9.990E-01	Bi-214	1.000E-03	Rn-218				
15	Bi-214	19.9m	9.998E-01	Po-214	2.100E-04	Tl-210				
16	Rn-218	3.5E-2s	1.000E+00	Po-214						
17	Po-214	1.643E-4s	1.000E+00	Pb-210						
18	Tl-210	1.30m	1.000E+00	Pb-210						
19	Pb-210	22.20y	1.000E+00	Bi-210	1.900E-08	Hg-206				
20	Bi-210	5.013d	1.000E+00	Po-210	1.320E-06	Tl-206				
21	Hg-206	8.15m	1.000E+00	Tl-206						
22	Po-210	138.376d	1.000E+00	Pb-206$						
23	Tl-206	4.200m	1.000E+00	Pb-206$						

Cf-251

------------------------- Daughter Products -------------------------

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	Cf-251	900y	1.000E+00	Cm-247						

2	Cm-247	1.56E+7y	1.000E+00	Pu-243		
3	Pu-243	4.956h	1.000E+00	Am-243		
4	Am-243	7.37E+3y	1.000E+00	Np-239		
5	Np-239	2.3565d	1.000E+00	Pu-239		
6	Pu-239	2.411E+4y	9.994E-01	U-235m	6.000E-04	U-235
7	U-235m	26m	1.000E+00	U-235		
8	U-235	7.04E+8y	1.000E+00	Th-231		
9	Th-231	25.52h	1.000E+00	Pa-231		
10	Pa-231	3.276E+4y	1.000E+00	Ac-227		
11	Ac-227	21.772y	9.862E-01	Th-227	1.380E-02	Fr-223
12	Th-227	18.68d	1.000E+00	Ra-223		
13	Fr-223	22.00m	1.000E+00	Ra-223	6.000E-05	At-219
14	Ra-223	11.43d	1.000E+00	Rn-219		
15	Rn-219	3.96s	1.000E+00	Po-215		
16	At-219	56s	9.700E-01	Bi-215		
17	Bi-215	7.6m	1.000E+00	Po-215		
18	Po-215	1.781E-3s	1.000E+00	Pb-211		
19	Pb-211	36.1m	1.000E+00	Bi-211		
20	Bi-211	2.14m	9.972E-01	Tl-207	2.760E-03	Po-211
21	Tl-207	4.77m	1.000E+00	Pb-207$		
22	Po-211	0.516s	1.000E+00	Pb-207$		

Cf-252

------------------------- Daughter Products -------------------------

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	Cf-252	2.645y	9.691E-01	Cm-248	3.092E-02	SF				
2	Cm-248	3.48E+5y	9.161E-01	Pu-244	8.390E-02	SF				
3	Pu-244	8.00E+7y	9.988E-01	U-240	1.210E-03	SF				
4	U-240	14.1h	1.000E+00	Np-240m						
5	Np-240m	7.22m	1.100E-03	Np-240	9.989E-01	Pu-240				
6	Np-240	61.9m	1.000E+00	Pu-240						
7	Pu-240	6564y	1.000E+00	U-236	5.750E-08	SF				
8	U-236	2.342E+7y	1.000E+00	Th-232						
9	Th-232	1.405E10y	1.000E+00	Ra-228						
10	Ra-228	5.75y	1.000E+00	Ac-228						
11	Ac-228	6.15h	1.000E+00	Th-228						
12	Th-228	1.9116y	1.000E+00	Ra-224						
13	Ra-224	3.66d	1.000E+00	Rn-220						
14	Rn-220	55.6s	1.000E+00	Po-216						
15	Po-216	0.145s	1.000E+00	Pb-212						
16	Pb-212	10.64h	1.000E+00	Bi-212						
17	Bi-212	60.55m	6.406E-01	Po-212	3.594E-01	Tl-208				
18	Po-212	2.99E-7s	1.000E+00	Pb-208$						
19	Tl-208	3.053m	1.000E+00	Pb-208$						

Cf-253

------------------------- Daughter Products -------------------------

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide

1	Cf-253	17.81d	9.969E-01	Es-253	3.100E-03	Cm-249
2	Es-253	20.47d	1.000E+00	Bk-249	8.900E-08	SF
3	Cm-249	64.15m	1.000E+00	Bk-249		
4	Bk-249	330d	1.000E+00	Cf-249	1.450E-05	Am-245
5	Cf-249	351y	1.000E+00	Cm-245	5.020E-09	SF
6	Am-245	2.05h	1.000E+00	Cm-245		
7	Cm-245	8.5E+3y	1.000E+00	Pu-241	6.100E-09	SF
8	Pu-241	14.35y	1.000E+00	Am-241	2.450E-05	U-237
9	Am-241	432.2y	1.000E+00	Np-237		
10	U-237	6.75d	1.000E+00	Np-237		
11	Np-237	2.144E+6y	1.000E+00	Pa-233		
12	Pa-233	26.967d	1.000E+00	U-233		
13	U-233	1.592E+5y	1.000E+00	Th-229		
14	Th-229	7.34E+3y	1.000E+00	Ra-225		
15	Ra-225	14.9d	1.000E+00	Ac-225		
16	Ac-225	10.0d	1.000E+00	Fr-221		
17	Fr-221	4.9m	1.000E+00	At-217		
18	At-217	3.23E-2s	9.999E-01	Bi-213		
19	Bi-213	45.59m	9.791E-01	Po-213	2.090E-02	Tl-209
20	Po-213	4.2E-6s	1.000E+00	Pb-209		
21	Tl-209	2.161m	1.000E+00	Pb-209		
22	Pb-209	3.253h	1.000E+00	Bi-209$		

Cf-254

------------------------- Daughter Products -------------------------

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	Cf-254	60.5d	3.100E-03	Cm-250	9.969E-01	SF				
2	Cm-250	8300y	1.800E-01	Pu-246	8.000E-02	Bk-250	7.400E-01	SF		
3	Pu-246	10.84d	1.000E+00	Am-246m						
4	Bk-250	3.212h	1.000E+00	Cf-250						
5	Am-246m	25.0m	1.000E+00	Cm-246						
6	Cf-250	13.08y	9.992E-01	Cm-246	7.700E-04	SF				
7	Cm-246	4.76E+3y	9.997E-01	Pu-242	2.630E-04	SF				
8	Pu-242	3.75E+5y	1.000E+00	U-238	5.540E-06	SF				
9	U-238	4.468E+9y	1.000E+00	Th-234	5.450E-07	SF				
10	Th-234	24.10d	1.000E+00	Pa-234m						
11	Pa-234m	1.17m	1.600E-03	Pa-234	9.984E-01	U-234				
12	Pa-234	6.70h	1.000E+00	U-234						
13	U-234	2.455E+5y	1.000E+00	Th-230						
14	Th-230	7.538E+4y	1.000E+00	Ra-226						
15	Ra-226	1600y	1.000E+00	Rn-222						
16	Rn-222	3.8235d	1.000E+00	Po-218						
17	Po-218	3.10m	9.998E-01	Pb-214	2.000E-04	At-218				
18	Pb-214	26.8m	1.000E+00	Bi-214						
19	At-218	1.5s	9.990E-01	Bi-214	1.000E-03	Rn-218				
20	Bi-214	19.9m	9.998E-01	Po-214	2.100E-04	Tl-210				
21	Rn-218	3.5E-2s	1.000E+00	Po-214						
22	Po-214	1.643E-4s	1.000E+00	Pb-210						
23	Tl-210	1.30m	1.000E+00	Pb-210						

24	Pb-210	22.20y	1.000E+00	Bi-210	1.900E-08	Hg-206
25	Bi-210	5.013d	1.000E+00	Po-210	1.320E-06	Tl-206
26	Hg-206	8.15m	1.000E+00	Tl-206		
27	Po-210	138.376d	1.000E+00	Pb-206$		
28	Tl-206	4.200m	1.000E+00	Pb-206$		

Cf-255

------------------------ Daughter Products ------------------------

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	Cf-255	85m	1.000E+00	Es-255						
2	Es-255	39.8d	9.200E-01	Fm-255	8.000E-02	Bk-251	4.500E-05	SF		
3	Fm-255	20.07h	1.000E+00	Cf-251	2.300E-07	SF				
4	Bk-251	55.6m	1.000E+00	Cf-251						
5	Cf-251	900y	1.000E+00	Cm-247						
6	Cm-247	1.56E+7y	1.000E+00	Pu-243						
7	Pu-243	4.956h	1.000E+00	Am-243						
8	Am-243	7.37E+3y	1.000E+00	Np-239						
9	Np-239	2.3565d	1.000E+00	Pu-239						
10	Pu-239	2.411E+4y	9.994E-01	U-235m	6.000E-04	U-235				
11	U-235m	26m	1.000E+00	U-235						
12	U-235	7.04E+8y	1.000E+00	Th-231						
13	Th-231	25.52h	1.000E+00	Pa-231						
14	Pa-231	3.276E+4y	1.000E+00	Ac-227						
15	Ac-227	21.772y	9.862E-01	Th-227	1.380E-02	Fr-223				
16	Th-227	18.68d	1.000E+00	Ra-223						
17	Fr-223	22.00m	1.000E+00	Ra-223	6.000E-05	At-219				
18	Ra-223	11.43d	1.000E+00	Rn-219						
19	Rn-219	3.96s	1.000E+00	Po-215						
20	At-219	56s	9.700E-01	Bi-215						
21	Bi-215	7.6m	1.000E+00	Po-215						
22	Po-215	1.781E-3s	1.000E+00	Pb-211						
23	Pb-211	36.1m	1.000E+00	Bi-211						
24	Bi-211	2.14m	9.972E-01	Tl-207	2.760E-03	Po-211				
25	Tl-207	4.77m	1.000E+00	Pb-207$						
26	Po-211	0.516s	1.000E+00	Pb-207$						

Es-249

------------------------ Daughter Products ------------------------

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	Es-249	102.2m	9.943E-01	Cf-249	5.700E-03	Bk-245				
2	Cf-249	351y	1.000E+00	Cm-245	5.020E-09	SF				
3	Bk-245	4.94d	9.988E-01	Cm-245	1.200E-03	Am-241				
4	Cm-245	8.5E+3y	1.000E+00	Pu-241	6.100E-09	SF				
5	Pu-241	14.35y	1.000E+00	Am-241	2.450E-05	U-237				
6	Am-241	432.2y	1.000E+00	Np-237						
7	U-237	6.75d	1.000E+00	Np-237						
8	Np-237	2.144E+6y	1.000E+00	Pa-233						

9	Pa-233	26.967d	1.000E+00	U-233		
10	U-233	1.592E+5y	1.000E+00	Th-229		
11	Th-229	7.34E+3y	1.000E+00	Ra-225		
12	Ra-225	14.9d	1.000E+00	Ac-225		
13	Ac-225	10.0d	1.000E+00	Fr-221		
14	Fr-221	4.9m	1.000E+00	At-217		
15	At-217	3.23E-2s	9.999E-01	Bi-213		
16	Bi-213	45.59m	9.791E-01	Po-213	2.090E-02	Tl-209
17	Po-213	4.2E-6s	1.000E+00	Pb-209		
18	Tl-209	2.161m	1.000E+00	Pb-209		
19	Pb-209	3.253h	1.000E+00	Bi-209$		

Es-250

-------------------------- Daughter Products --------------------------

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	Es-250	8.6h	9.850E-01	Cf-250						
2	Cf-250	13.08y	9.992E-01	Cm-246	7.700E-04	SF				
3	Cm-246	4.76E+3y	9.997E-01	Pu-242	2.630E-04	SF				
4	Pu-242	3.75E+5y	1.000E+00	U-238	5.540E-06	SF				
5	U-238	4.468E+9y	1.000E+00	Th-234	5.450E-07	SF				
6	Th-234	24.10d	1.000E+00	Pa-234m						
7	Pa-234m	1.17m	1.600E-03	Pa-234	9.984E-01	U-234				
8	Pa-234	6.70h	1.000E+00	U-234						
9	U-234	2.455E+5y	1.000E+00	Th-230						
10	Th-230	7.538E+4y	1.000E+00	Ra-226						
11	Ra-226	1600y	1.000E+00	Rn-222						
12	Rn-222	3.8235d	1.000E+00	Po-218						
13	Po-218	3.10m	9.998E-01	Pb-214	2.000E-04	At-218				
14	Pb-214	26.8m	1.000E+00	Bi-214						
15	At-218	1.5s	9.990E-01	Bi-214	1.000E-03	Rn-218				
16	Bi-214	19.9m	9.998E-01	Po-214	2.100E-04	Tl-210				
17	Rn-218	3.5E-2s	1.000E+00	Po-214						
18	Po-214	1.643E-4s	1.000E+00	Pb-210						
19	Tl-210	1.30m	1.000E+00	Pb-210						
20	Pb-210	22.20y	1.000E+00	Bi-210	1.900E-08	Hg-206				
21	Bi-210	5.013d	1.000E+00	Po-210	1.320E-06	Tl-206				
22	Hg-206	8.15m	1.000E+00	Tl-206						
23	Po-210	138.376d	1.000E+00	Pb-206$						
24	Tl-206	4.200m	1.000E+00	Pb-206$						

Es-250m

-------------------------- Daughter Products --------------------------

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	Es-250m	2.22h	1.000E+00	Cf-250						
2	Cf-250	13.08y	9.992E-01	Cm-246	7.700E-04	SF				
3	Cm-246	4.76E+3y	9.997E-01	Pu-242	2.630E-04	SF				
4	Pu-242	3.75E+5y	1.000E+00	U-238	5.540E-06	SF				
5	U-238	4.468E+9y	1.000E+00	Th-234	5.450E-07	SF				

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  6 Th-234      24.10d  1.000E+00 Pa-234m
  7 Pa-234m      1.17m  1.600E-03 Pa-234   9.984E-01 U-234
  8 Pa-234       6.70h  1.000E+00 U-234
  9 U-234    2.455E+5y  1.000E+00 Th-230
 10 Th-230   7.538E+4y  1.000E+00 Ra-226
 11 Ra-226       1600y  1.000E+00 Rn-222
 12 Rn-222     3.8235d  1.000E+00 Po-218
 13 Po-218       3.10m  9.998E-01 Pb-214   2.000E-04 At-218
 14 Pb-214       26.8m  1.000E+00 Bi-214
 15 At-218        1.5s  9.990E-01 Bi-214   1.000E-03 Rn-218
 16 Bi-214       19.9m  9.998E-01 Po-214   2.100E-04 Tl-210
 17 Rn-218     3.5E-2s  1.000E+00 Po-214
 18 Po-214   1.643E-4s  1.000E+00 Pb-210
 19 Tl-210       1.30m  1.000E+00 Pb-210
 20 Pb-210      22.20y  1.000E+00 Bi-210   1.900E-08 Hg-206
 21 Bi-210      5.013d  1.000E+00 Po-210   1.320E-06 Tl-206
 22 Hg-206       8.15m  1.000E+00 Tl-206
 23 Po-210    138.376d  1.000E+00 Pb-206$
 24 Tl-206      4.200m  1.000E+00 Pb-206$

Es-251
                        -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife     f1       Nuclide    f2       Nuclide    f3
Nuclide    f4       Nuclide
  1 Es-251         33h  9.950E-01 Cf-251   5.000E-03 Bk-247
  2 Cf-251        900y  1.000E+00 Cm-247
  3 Bk-247     1.38E+3y  1.000E+00 Am-243
  4 Cm-247     1.56E+7y  1.000E+00 Pu-243
  5 Pu-243      4.956h  1.000E+00 Am-243
  6 Am-243    7.37E+3y  1.000E+00 Np-239
  7 Np-239     2.3565d  1.000E+00 Pu-239
  8 Pu-239   2.411E+4y  9.994E-01 U-235m   6.000E-04 U-235
  9 U-235m         26m  1.000E+00 U-235
 10 U-235     7.04E+8y  1.000E+00 Th-231
 11 Th-231      25.52h  1.000E+00 Pa-231
 12 Pa-231   3.276E+4y  1.000E+00 Ac-227
 13 Ac-227     21.772y  9.862E-01 Th-227   1.380E-02 Fr-223
 14 Th-227      18.68d  1.000E+00 Ra-223
 15 Fr-223      22.00m  1.000E+00 Ra-223   6.000E-05 At-219
 16 Ra-223      11.43d  1.000E+00 Rn-219
 17 Rn-219       3.96s  1.000E+00 Po-215
 18 At-219         56s  9.700E-01 Bi-215
 19 Bi-215        7.6m  1.000E+00 Po-215
 20 Po-215   1.781E-3s  1.000E+00 Pb-211
 21 Pb-211       36.1m  1.000E+00 Bi-211
 22 Bi-211       2.14m  9.972E-01 Tl-207   2.760E-03 Po-211
 23 Tl-207       4.77m  1.000E+00 Pb-207$
 24 Po-211      0.516s  1.000E+00 Pb-207$

Es-253
                        -------------------------  Daughter
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Products  -------------------------
    Nuclide  Halflife    f1       Nuclide    f2       Nuclide    f3
Nuclide   f4      Nuclide
  1 Es-253     20.47d  1.000E+00 Bk-249   8.900E-08 SF
  2 Bk-249       330d  1.000E+00 Cf-249   1.450E-05 Am-245
  3 Cf-249       351y  1.000E+00 Cm-245   5.020E-09 SF
  4 Am-245      2.05h  1.000E+00 Cm-245
  5 Cm-245    8.5E+3y  1.000E+00 Pu-241   6.100E-09 SF
  6 Pu-241     14.35y  1.000E+00 Am-241   2.450E-05 U-237
  7 Am-241     432.2y  1.000E+00 Np-237
  8 U-237       6.75d  1.000E+00 Np-237
  9 Np-237  2.144E+6y  1.000E+00 Pa-233
 10 Pa-233    26.967d  1.000E+00 U-233
 11 U-233   1.592E+5y  1.000E+00 Th-229
 12 Th-229   7.34E+3y  1.000E+00 Ra-225
 13 Ra-225      14.9d  1.000E+00 Ac-225
 14 Ac-225      10.0d  1.000E+00 Fr-221
 15 Fr-221       4.9m  1.000E+00 At-217
 16 At-217   3.23E-2s  9.999E-01 Bi-213
 17 Bi-213     45.59m  9.791E-01 Po-213   2.090E-02 Tl-209
 18 Po-213    4.2E-6s  1.000E+00 Pb-209
 19 Tl-209     2.161m  1.000E+00 Pb-209
 20 Pb-209     3.253h  1.000E+00 Bi-209$

Es-254
                         -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1       Nuclide    f2       Nuclide    f3
Nuclide   f4      Nuclide
  1 Es-254     275.7d  1.000E+00 Bk-250   1.740E-06 Fm-254
3.000E-08 SF
  2 Bk-250     3.212h  1.000E+00 Cf-250
  3 Fm-254     3.240h  9.994E-01 Cf-250   5.920E-04 SF
  4 Cf-250     13.08y  9.992E-01 Cm-246   7.700E-04 SF
  5 Cm-246   4.76E+3y  9.997E-01 Pu-242   2.630E-04 SF
  6 Pu-242   3.75E+5y  1.000E+00 U-238    5.540E-06 SF
  7 U-238   4.468E+9y  1.000E+00 Th-234   5.450E-07 SF
  8 Th-234     24.10d  1.000E+00 Pa-234m
  9 Pa-234m     1.17m  1.600E-03 Pa-234   9.984E-01 U-234
 10 Pa-234      6.70h  1.000E+00 U-234
 11 U-234   2.455E+5y  1.000E+00 Th-230
 12 Th-230  7.538E+4y  1.000E+00 Ra-226
 13 Ra-226      1600y  1.000E+00 Rn-222
 14 Rn-222    3.8235d  1.000E+00 Po-218
 15 Po-218      3.10m  9.998E-01 Pb-214   2.000E-04 At-218
 16 Pb-214      26.8m  1.000E+00 Bi-214
 17 At-218       1.5s  9.990E-01 Bi-214   1.000E-03 Rn-218
 18 Bi-214      19.9m  9.998E-01 Po-214   2.100E-04 Tl-210
 19 Rn-218    3.5E-2s  1.000E+00 Po-214
 20 Po-214  1.643E-4s  1.000E+00 Pb-210
 21 Tl-210      1.30m  1.000E+00 Pb-210
 22 Pb-210     22.20y  1.000E+00 Bi-210   1.900E-08 Hg-206
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 23 Bi-210      5.013d  1.000E+00 Po-210  1.320E-06 Tl-206
 24 Hg-206       8.15m  1.000E+00 Tl-206
 25 Po-210    138.376d  1.000E+00 Pb-206$
 26 Tl-206      4.200m  1.000E+00 Pb-206$

Es-254m
                       -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
Nuclide    f4      Nuclide
  1 Es-254m      39.3h  9.800E-01 Fm-254  7.600E-04 Cf-254
3.200E-03 Bk-250  4.500E-04 SF
  2 Fm-254      3.240h  9.994E-01 Cf-250  5.920E-04 SF
  3 Cf-254       60.5d  3.100E-03 Cm-250  9.969E-01 SF
  4 Cm-250       8300y  8.000E-02 Bk-250  1.800E-01 Pu-246
7.400E-01 SF
  5 Bk-250      3.212h  1.000E+00 Cf-250
  6 Cf-250      13.08y  9.992E-01 Cm-246  7.700E-04 SF
  7 Pu-246      10.84d  1.000E+00 Am-246m
  8 Am-246m      25.0m  1.000E+00 Cm-246
  9 Cm-246    4.76E+3y  9.997E-01 Pu-242  2.630E-04 SF
 10 Pu-242    3.75E+5y  1.000E+00 U-238   5.540E-06 SF
 11 U-238    4.468E+9y  1.000E+00 Th-234  5.450E-07 SF
 12 Th-234      24.10d  1.000E+00 Pa-234m
 13 Pa-234m      1.17m  1.600E-03 Pa-234  9.984E-01 U-234
 14 Pa-234       6.70h  1.000E+00 U-234
 15 U-234    2.455E+5y  1.000E+00 Th-230
 16 Th-230   7.538E+4y  1.000E+00 Ra-226
 17 Ra-226       1600y  1.000E+00 Rn-222
 18 Rn-222     3.8235d  1.000E+00 Po-218
 19 Po-218       3.10m  9.998E-01 Pb-214  2.000E-04 At-218
 20 Pb-214       26.8m  1.000E+00 Bi-214
 21 At-218        1.5s  9.990E-01 Bi-214  1.000E-03 Rn-218
 22 Bi-214       19.9m  9.998E-01 Po-214  2.100E-04 Tl-210
 23 Rn-218     3.5E-2s  1.000E+00 Po-214
 24 Po-214   1.643E-4s  1.000E+00 Pb-210
 25 Tl-210       1.30m  1.000E+00 Pb-210
 26 Pb-210      22.20y  1.000E+00 Bi-210  1.900E-08 Hg-206
 27 Bi-210      5.013d  1.000E+00 Po-210  1.320E-06 Tl-206
 28 Hg-206       8.15m  1.000E+00 Tl-206
 29 Po-210    138.376d  1.000E+00 Pb-206$
 30 Tl-206      4.200m  1.000E+00 Pb-206$

Es-255
                       -------------------------  Daughter
Products  -------------------------
    Nuclide  Halflife    f1      Nuclide    f2      Nuclide    f3
Nuclide    f4      Nuclide
  1 Es-255       39.8d  9.200E-01 Fm-255  8.000E-02 Bk-251
4.500E-05 SF
  2 Fm-255      20.07h  1.000E+00 Cf-251  2.300E-07 SF
  3 Bk-251       55.6m  1.000E+00 Cf-251
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4	Cf-251	900y	1.000E+00	Cm-247		
5	Cm-247	1.56E+7y	1.000E+00	Pu-243		
6	Pu-243	4.956h	1.000E+00	Am-243		
7	Am-243	7.37E+3y	1.000E+00	Np-239		
8	Np-239	2.3565d	1.000E+00	Pu-239		
9	Pu-239	2.411E+4y	9.994E-01	U-235m	6.000E-04	U-235
10	U-235m	26m	1.000E+00	U-235		
11	U-235	7.04E+8y	1.000E+00	Th-231		
12	Th-231	25.52h	1.000E+00	Pa-231		
13	Pa-231	3.276E+4y	1.000E+00	Ac-227		
14	Ac-227	21.772y	9.862E-01	Th-227	1.380E-02	Fr-223
15	Th-227	18.68d	1.000E+00	Ra-223		
16	Fr-223	22.00m	1.000E+00	Ra-223	6.000E-05	At-219
17	Ra-223	11.43d	1.000E+00	Rn-219		
18	Rn-219	3.96s	1.000E+00	Po-215		
19	At-219	56s	9.700E-01	Bi-215		
20	Bi-215	7.6m	1.000E+00	Po-215		
21	Po-215	1.781E-3s	1.000E+00	Pb-211		
22	Pb-211	36.1m	1.000E+00	Bi-211		
23	Bi-211	2.14m	9.972E-01	Tl-207	2.760E-03	Po-211
24	Tl-207	4.77m	1.000E+00	Pb-207$		
25	Po-211	0.516s	1.000E+00	Pb-207$		

Es-256

------------------------- Daughter

Products -------------------------

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	Es-256	25.4m	1.000E+00	Fm-256						
2	Fm-256	157.6m	8.100E-02	Cf-252	9.190E-01	SF				
3	Cf-252	2.645y	9.691E-01	Cm-248	3.092E-02	SF				
4	Cm-248	3.48E+5y	9.161E-01	Pu-244	8.390E-02	SF				
5	Pu-244	8.00E+7y	9.988E-01	U-240	1.210E-03	SF				
6	U-240	14.1h	1.000E+00	Np-240m						
7	Np-240m	7.22m	1.100E-03	Np-240	9.989E-01	Pu-240				
8	Np-240	61.9m	1.000E+00	Pu-240						
9	Pu-240	6564y	1.000E+00	U-236	5.750E-08	SF				
10	U-236	2.342E+7y	1.000E+00	Th-232						
11	Th-232	1.405E10y	1.000E+00	Ra-228						
12	Ra-228	5.75y	1.000E+00	Ac-228						
13	Ac-228	6.15h	1.000E+00	Th-228						
14	Th-228	1.9116y	1.000E+00	Ra-224						
15	Ra-224	3.66d	1.000E+00	Rn-220						
16	Rn-220	55.6s	1.000E+00	Po-216						
17	Po-216	0.145s	1.000E+00	Pb-212						
18	Pb-212	10.64h	1.000E+00	Bi-212						
19	Bi-212	60.55m	6.406E-01	Po-212	3.594E-01	Tl-208				
20	Po-212	2.99E-7s	1.000E+00	Pb-208$						
21	Tl-208	3.053m	1.000E+00	Pb-208$						

Fm-251

------------------------- Daughter

Products -------------------------

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	Fm-251	5.30h	9.820E-01	Es-251	1.800E-02	Cf-247				
2	Es-251	33h	9.950E-01	Cf-251	5.000E-03	Bk-247				
3	Cf-247	3.11h	9.997E-01	Bk-247	3.500E-04	Cm-243				
4	Cf-251	900y	1.000E+00	Cm-247						
5	Bk-247	1.38E+3y	1.000E+00	Am-243						
6	Cm-247	1.56E+7y	1.000E+00	Pu-243						
7	Pu-243	4.956h	1.000E+00	Am-243						
8	Cm-243	29.1y	2.400E-03	Am-243	9.976E-01	Pu-239				
9	Am-243	7.37E+3y	1.000E+00	Np-239						
10	Np-239	2.3565d	1.000E+00	Pu-239						
11	Pu-239	2.411E+4y	9.994E-01	U-235m	6.000E-04	U-235				
12	U-235m	26m	1.000E+00	U-235						
13	U-235	7.04E+8y	1.000E+00	Th-231						
14	Th-231	25.52h	1.000E+00	Pa-231						
15	Pa-231	3.276E+4y	1.000E+00	Ac-227						
16	Ac-227	21.772y	9.862E-01	Th-227	1.380E-02	Fr-223				
17	Th-227	18.68d	1.000E+00	Ra-223						
18	Fr-223	22.00m	1.000E+00	Ra-223	6.000E-05	At-219				
19	Ra-223	11.43d	1.000E+00	Rn-219						
20	Rn-219	3.96s	1.000E+00	Po-215						
21	At-219	56s	9.700E-01	Bi-215						
22	Bi-215	7.6m	1.000E+00	Po-215						
23	Po-215	1.781E-3s	1.000E+00	Pb-211						
24	Pb-211	36.1m	1.000E+00	Bi-211						
25	Bi-211	2.14m	9.972E-01	Tl-207	2.760E-03	Po-211				
26	Tl-207	4.77m	1.000E+00	Pb-207$						
27	Po-211	0.516s	1.000E+00	Pb-207$						

Fm-252

------------------------- Daughter

Products -------------------------

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	Fm-252	25.39h	1.000E+00	Cf-248	2.300E-05	SF				
2	Cf-248	334d	1.000E+00	Cm-244	2.900E-05	SF				
3	Cm-244	18.10y	1.000E+00	Pu-240	1.371E-06	SF				
4	Pu-240	6564y	1.000E+00	U-236	5.750E-08	SF				
5	U-236	2.342E+7y	1.000E+00	Th-232						
6	Th-232	1.405E10y	1.000E+00	Ra-228						
7	Ra-228	5.75y	1.000E+00	Ac-228						
8	Ac-228	6.15h	1.000E+00	Th-228						
9	Th-228	1.9116y	1.000E+00	Ra-224						
10	Ra-224	3.66d	1.000E+00	Rn-220						
11	Rn-220	55.6s	1.000E+00	Po-216						
12	Po-216	0.145s	1.000E+00	Pb-212						
13	Pb-212	10.64h	1.000E+00	Bi-212						
14	Bi-212	60.55m	6.406E-01	Po-212	3.594E-01	Tl-208				
15	Po-212	2.99E-7s	1.000E+00	Pb-208$						
16	Tl-208	3.053m	1.000E+00	Pb-208$						

Fm-253

Daughter Products

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	Fm-253	3.00d	8.800E-01	Es-253	1.200E-01	Cf-249				
2	Es-253	20.47d	1.000E+00	Bk-249	8.900E-08	SF				
3	Bk-249	330d	1.000E+00	Cf-249	1.450E-05	Am-245				
4	Cf-249	351y	1.000E+00	Cm-245	5.020E-09	SF				
5	Am-245	2.05h	1.000E+00	Cm-245						
6	Cm-245	8.5E+3y	1.000E+00	Pu-241	6.100E-09	SF				
7	Pu-241	14.35y	1.000E+00	Am-241	2.450E-05	U-237				
8	Am-241	432.2y	1.000E+00	Np-237						
9	U-237	6.75d	1.000E+00	Np-237						
10	Np-237	2.144E+6y	1.000E+00	Pa-233						
11	Pa-233	26.967d	1.000E+00	U-233						
12	U-233	1.592E+5y	1.000E+00	Th-229						
13	Th-229	7.34E+3y	1.000E+00	Ra-225						
14	Ra-225	14.9d	1.000E+00	Ac-225						
15	Ac-225	10.0d	1.000E+00	Fr-221						
16	Fr-221	4.9m	1.000E+00	At-217						
17	At-217	3.23E-2s	9.999E-01	Bi-213						
18	Bi-213	45.59m	9.791E-01	Po-213	2.090E-02	Tl-209				
19	Po-213	4.2E-6s	1.000E+00	Pb-209						
20	Tl-209	2.161m	1.000E+00	Pb-209						
21	Pb-209	3.253h	1.000E+00	Bi-209$						

Fm-254

Daughter Products

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	Fm-254	3.240h	9.994E-01	Cf-250	5.920E-04	SF				
2	Cf-250	13.08y	9.992E-01	Cm-246	7.700E-04	SF				
3	Cm-246	4.76E+3y	9.997E-01	Pu-242	2.630E-04	SF				
4	Pu-242	3.75E+5y	1.000E+00	U-238	5.540E-06	SF				
5	U-238	4.468E+9y	1.000E+00	Th-234	5.450E-07	SF				
6	Th-234	24.10d	1.000E+00	Pa-234m						
7	Pa-234m	1.17m	1.600E-03	Pa-234	9.984E-01	U-234				
8	Pa-234	6.70h	1.000E+00	U-234						
9	U-234	2.455E+5y	1.000E+00	Th-230						
10	Th-230	7.538E+4y	1.000E+00	Ra-226						
11	Ra-226	1600y	1.000E+00	Rn-222						
12	Rn-222	3.8235d	1.000E+00	Po-218						
13	Po-218	3.10m	9.998E-01	Pb-214	2.000E-04	At-218				
14	Pb-214	26.8m	1.000E+00	Bi-214						
15	At-218	1.5s	9.990E-01	Bi-214	1.000E-03	Rn-218				
16	Bi-214	19.9m	9.998E-01	Po-214	2.100E-04	Tl-210				
17	Rn-218	3.5E-2s	1.000E+00	Po-214						
18	Po-214	1.643E-4s	1.000E+00	Pb-210						
19	Tl-210	1.30m	1.000E+00	Pb-210						

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide
20	Pb-210	22.20y	1.000E+00	Bi-210	1.900E-08	Hg-206
21	Bi-210	5.013d	1.000E+00	Po-210	1.320E-06	Tl-206
22	Hg-206	8.15m	1.000E+00	Tl-206		
23	Po-210	138.376d	1.000E+00	Pb-206$		
24	Tl-206	4.200m	1.000E+00	Pb-206$		

Fm-255

------------------------- Daughter Products -------------------------

f3 Nuclide f4 Nuclide

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide
1	Fm-255	20.07h	1.000E+00	Cf-251	2.300E-07	SF
2	Cf-251	900y	1.000E+00	Cm-247		
3	Cm-247	1.56E+7y	1.000E+00	Pu-243		
4	Pu-243	4.956h	1.000E+00	Am-243		
5	Am-243	7.37E+3y	1.000E+00	Np-239		
6	Np-239	2.3565d	1.000E+00	Pu-239		
7	Pu-239	2.411E+4y	9.994E-01	U-235m	6.000E-04	U-235
8	U-235m	26m	1.000E+00	U-235		
9	U-235	7.04E+8y	1.000E+00	Th-231		
10	Th-231	25.52h	1.000E+00	Pa-231		
11	Pa-231	3.276E+4y	1.000E+00	Ac-227		
12	Ac-227	21.772y	9.862E-01	Th-227	1.380E-02	Fr-223
13	Th-227	18.68d	1.000E+00	Ra-223		
14	Fr-223	22.00m	1.000E+00	Ra-223	6.000E-05	At-219
15	Ra-223	11.43d	1.000E+00	Rn-219		
16	Rn-219	3.96s	1.000E+00	Po-215		
17	At-219	56s	9.700E-01	Bi-215		
18	Bi-215	7.6m	1.000E+00	Po-215		
19	Po-215	1.781E-3s	1.000E+00	Pb-211		
20	Pb-211	36.1m	1.000E+00	Bi-211		
21	Bi-211	2.14m	9.972E-01	Tl-207	2.760E-03	Po-211
22	Tl-207	4.77m	1.000E+00	Pb-207$		
23	Po-211	0.516s	1.000E+00	Pb-207$		

Fm-256

------------------------- Daughter Products -------------------------

f3 Nuclide f4 Nuclide

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide
1	Fm-256	157.6m	8.100E-02	Cf-252	9.190E-01	SF
2	Cf-252	2.645y	9.691E-01	Cm-248	3.092E-02	SF
3	Cm-248	3.48E+5y	9.161E-01	Pu-244	8.390E-02	SF
4	Pu-244	8.00E+7y	9.988E-01	U-240	1.210E-03	SF
5	U-240	14.1h	1.000E+00	Np-240m		
6	Np-240m	7.22m	1.100E-03	Np-240	9.989E-01	Pu-240
7	Np-240	61.9m	1.000E+00	Pu-240		
8	Pu-240	6564y	1.000E+00	U-236	5.750E-08	SF
9	U-236	2.342E+7y	1.000E+00	Th-232		
10	Th-232	1.405E10y	1.000E+00	Ra-228		
11	Ra-228	5.75y	1.000E+00	Ac-228		
12	Ac-228	6.15h	1.000E+00	Th-228		

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide
13	Th-228	1.9116y	1.000E+00	Ra-224		
14	Ra-224	3.66d	1.000E+00	Rn-220		
15	Rn-220	55.6s	1.000E+00	Po-216		
16	Po-216	0.145s	1.000E+00	Pb-212		
17	Pb-212	10.64h	1.000E+00	Bi-212		
18	Bi-212	60.55m	6.406E-01	Po-212	3.594E-01	Tl-208
19	Po-212	2.99E-7s	1.000E+00	Pb-208$		
20	Tl-208	3.053m	1.000E+00	Pb-208$		

Fm-257

------------------------- Daughter Products -------------------------

	Nuclide	Halflife	f1	Nuclide	f2	Nuclide	f3	Nuclide	f4	Nuclide
1	Fm-257	100.5d	9.979E-01	Cf-253	2.100E-03	SF				
2	Cf-253	17.81d	9.969E-01	Es-253	3.100E-03	Cm-249				
3	Es-253	20.47d	1.000E+00	Bk-249	8.900E-08	SF				
4	Cm-249	64.15m	1.000E+00	Bk-249						
5	Bk-249	330d	1.000E+00	Cf-249	1.450E-05	Am-245				
6	Cf-249	351y	1.000E+00	Cm-245	5.020E-09	SF				
7	Am-245	2.05h	1.000E+00	Cm-245						
8	Cm-245	8.5E+3y	1.000E+00	Pu-241	6.100E-09	SF				
9	Pu-241	14.35y	1.000E+00	Am-241	2.450E-05	U-237				
10	Am-241	432.2y	1.000E+00	Np-237						
11	U-237	6.75d	1.000E+00	Np-237						
12	Np-237	2.144E+6y	1.000E+00	Pa-233						
13	Pa-233	26.967d	1.000E+00	U-233						
14	U-233	1.592E+5y	1.000E+00	Th-229						
15	Th-229	7.34E+3y	1.000E+00	Ra-225						
16	Ra-225	14.9d	1.000E+00	Ac-225						
17	Ac-225	10.0d	1.000E+00	Fr-221						
18	Fr-221	4.9m	1.000E+00	At-217						
19	At-217	3.23E-2s	9.999E-01	Bi-213						
20	Bi-213	45.59m	9.791E-01	Po-213	2.090E-02	Tl-209				
21	Po-213	4.2E-6s	1.000E+00	Pb-209						
22	Tl-209	2.161m	1.000E+00	Pb-209						
23	Pb-209	3.253h	1.000E+00	Bi-209$						

$ stable nucleus.

Dose Equivalent Rate (Sv/s) per Unit Concentration (Bq/m3) - Water Immersion

Nuclide	Skin	Effective
H-3	0.00E+00	0.00E+00
Be-7	6.03E-18	4.81E-18
Be-10	1.37E-17	1.55E-19
C-10	2.68E-16	1.71E-16
C-11	1.47E-16	9.90E-17
C-14	2.55E-19	2.89E-21
N-13	1.56E-16	9.91E-17
N-16	8.19E-16	5.63E-16
O-14	4.70E-16	3.52E-16
O-15	1.75E-16	9.95E-17
O-19	2.49E-16	9.83E-17
F-17	1.75E-16	9.95E-17
F-18	1.33E-16	9.58E-17
Ne-19	1.92E-16	9.98E-17
Ne-24	1.22E-16	5.33E-17
Na-22	2.78E-16	2.20E-16
Na-24	5.59E-16	4.51E-16
Mg-27	1.57E-16	8.98E-17
Mg-28	1.74E-16	1.38E-16
Al-26	3.61E-16	2.78E-16
Al-28	3.14E-16	1.91E-16
Al-29	2.41E-16	1.44E-16
Si-31	4.03E-17	6.14E-19
Si-32	1.05E-18	1.14E-20
P-30	2.30E-16	1.01E-16
P-32	4.79E-17	6.45E-19
P-33	1.45E-18	1.57E-20
S-35	3.03E-19	3.40E-21
S-37	4.34E-16	3.34E-16
S-38	2.46E-16	1.83E-16
Cl-34	2.81E-16	1.02E-16
Cl-34m	2.97E-16	2.24E-16
Cl-36	1.56E-17	1.94E-19
Cl-38	2.99E-16	1.58E-16
Cl-39	2.37E-16	1.50E-16
Cl-40	6.34E-16	4.53E-16
Ar-37	0.00E+00	0.00E+00
Ar-39	1.13E-17	1.28E-19
Ar-41	1.88E-16	1.33E-16
Ar-42	1.24E-17	1.41E-19
Ar-43	2.91E-16	1.62E-16
Ar-44	2.77E-16	2.04E-16
K-38	4.86E-16	3.36E-16
K-40	5.45E-17	1.68E-17
K-42	1.41E-16	3.11E-17

K-43	1.35E-16	9.39E-17
K-44	4.09E-16	2.57E-16
K-45	3.01E-16	1.95E-16
K-46	5.43E-16	3.17E-16
Ca-41	0.00E+00	0.00E+00
Ca-45	1.53E-18	1.66E-20
Ca-47	1.51E-16	1.08E-16
Ca-49	4.70E-16	3.61E-16
Sc-42m	6.08E-16	4.28E-16
Sc-43	1.46E-16	9.55E-17
Sc-44	3.01E-16	2.14E-16
Sc-44m	3.52E-17	2.66E-17
Sc-46	2.49E-16	2.03E-16
Sc-47	2.04E-17	1.03E-17
Sc-48	4.22E-16	3.42E-16
Sc-49	5.77E-17	9.20E-19
Sc-50	5.18E-16	3.32E-16
Ti-44	1.61E-17	1.10E-17
Ti-45	1.29E-16	8.45E-17
Ti-51	1.06E-16	3.66E-17
Ti-52	6.69E-17	1.22E-17
V-47	1.77E-16	9.72E-17
V-48	3.66E-16	2.95E-16
V-49	0.00E+00	0.00E+00
V-50	1.77E-16	1.49E-16
V-52	2.56E-16	1.52E-16
V-53	1.99E-16	1.06E-16
Cr-48	5.29E-17	4.12E-17
Cr-49	1.68E-16	1.02E-16
Cr-51	3.86E-18	3.05E-18
Cr-55	7.98E-17	1.30E-18
Cr-56	5.01E-17	7.36E-18
Mn-50m	6.82E-16	4.71E-16
Mn-51	1.87E-16	9.76E-17
Mn-52m	3.78E-16	2.45E-16
Mn-52	4.27E-16	3.51E-16
Mn-53	0.00E+00	0.00E+00
Mn-54	1.01E-16	8.30E-17
Mn-56	2.68E-16	1.76E-16
Mn-57	9.07E-17	1.07E-17
Mn-58m	4.25E-16	2.47E-16
Fe-52	1.01E-16	7.13E-17
Fe-53	2.23E-16	1.15E-16
Fe-53m	3.76E-16	3.12E-16
Fe-55	1.96E-26	1.49E-26
Fe-59	1.50E-16	1.22E-16
Fe-60	6.91E-19	7.59E-21

Fe-61	2.50E-16	1.44E-16
Fe-62	1.19E-16	4.98E-17
Co-54m	6.38E-16	3.99E-16
Co-55	2.72E-16	1.99E-16
Co-56	4.60E-16	3.82E-16
Co-57	1.48E-17	1.11E-17
Co-58	1.20E-16	9.63E-17
Co-58m	7.22E-22	1.43E-22
Co-60	3.11E-16	2.58E-16
Co-60m	6.34E-19	4.23E-19
Co-61	4.11E-17	8.67E-18
Co-62	3.22E-16	1.70E-16
Co-62m	4.12E-16	2.81E-16
Ni-56	2.09E-16	1.70E-16
Ni-57	2.48E-16	1.99E-16
Ni-59	1.88E-21	1.50E-21
Ni-63	0.00E+00	0.00E+00
Ni-65	1.12E-16	5.83E-17
Ni-66	1.36E-18	1.48E-20
Cu-57	4.27E-16	1.19E-16
Cu-59	2.87E-16	1.44E-16
Cu-60	5.48E-16	4.06E-16
Cu-61	1.20E-16	8.02E-17
Cu-62	2.16E-16	9.90E-17
Cu-64	2.86E-17	1.80E-17
Cu-66	8.90E-17	1.11E-17
Cu-67	1.94E-17	1.08E-17
Cu-69	1.27E-16	5.41E-17
Zn-60	2.67E-16	1.49E-16
Zn-61	3.28E-16	1.55E-16
Zn-62	5.42E-17	4.21E-17
Zn-63	1.99E-16	1.08E-16
Zn-65	7.09E-17	5.88E-17
Zn-69m	5.18E-17	4.01E-17
Zn-69	1.92E-17	2.28E-19
Zn-71m	2.25E-16	1.53E-16
Zn-71	1.14E-16	3.22E-17
Zn-72	2.00E-17	1.37E-17
Ga-64	5.49E-16	3.55E-16
Ga-65	1.97E-16	1.13E-16
Ga-66	3.86E-16	2.69E-16
Ga-67	1.89E-17	1.45E-17
Ga-68	1.67E-16	9.27E-17
Ga-70	4.49E-17	1.32E-18
Ga-72	3.70E-16	2.83E-16
Ga-73	7.07E-17	3.37E-17
Ga-74	4.66E-16	3.35E-16

Ge-66	8.63E-17	6.46E-17
Ge-67	2.59E-16	1.41E-16
Ge-68	1.36E-20	2.05E-22
Ge-69	1.23E-16	9.49E-17
Ge-71	1.38E-20	2.08E-22
Ge-75	3.10E-17	3.71E-18
Ge-77	1.76E-16	1.07E-16
Ge-78	4.58E-17	2.68E-17
As-68	6.09E-16	3.80E-16
As-69	2.28E-16	1.13E-16
As-70	5.85E-16	4.32E-16
As-71	7.60E-17	5.56E-17
As-72	2.92E-16	1.77E-16
As-73	6.39E-19	3.55E-19
As-74	1.08E-16	7.38E-17
As-76	1.28E-16	4.25E-17
As-77	1.29E-17	9.34E-19
As-78	2.53E-16	1.35E-16
As-79	6.62E-17	4.20E-18
Se-70	9.89E-17	6.83E-17
Se-71	2.98E-16	1.60E-16
Se-72	2.92E-18	1.41E-18
Se-73	1.57E-16	1.05E-16
Se-73m	4.18E-17	2.55E-17
Se-75	4.69E-17	3.64E-17
Se-77m	1.30E-17	8.13E-18
Se-79	2.99E-19	3.38E-21
Se-79m	1.57E-18	8.01E-19
Se-81	4.24E-17	1.33E-18
Se-81m	2.45E-18	1.23E-18
Se-83	3.52E-16	2.68E-16
Se-83m	2.14E-16	1.02E-16
Se-84	8.76E-17	4.09E-17
Br-72	5.81E-16	3.03E-16
Br-73	2.72E-16	1.41E-16
Br-74	6.59E-16	4.98E-16
Br-74m	6.10E-16	4.33E-16
Br-75	1.81E-16	1.16E-16
Br-76	3.94E-16	2.91E-16
Br-76m	4.20E-18	2.19E-18
Br-77	3.85E-17	3.05E-17
Br-77m	2.69E-18	1.32E-18
Br-78	1.99E-16	1.01E-16
Br-80	5.98E-17	8.09E-18
Br-80m	1.67E-18	5.56E-19
Br-82	3.28E-16	2.64E-16
Br-82m	2.80E-18	3.19E-19

Br-83	2.04E-17	8.98E-19
Br-84	3.13E-16	1.92E-16
Br-84m	4.04E-16	2.83E-16
Br-85	8.29E-17	7.81E-18
Kr-74	1.68E-16	1.02E-16
Kr-75	2.70E-16	1.26E-16
Kr-76	5.11E-17	4.00E-17
Kr-77	1.73E-16	1.00E-16
Kr-79	3.14E-17	2.42E-17
Kr-81	3.21E-19	8.39E-20
Kr-81m	1.82E-17	1.22E-17
Kr-83m	7.65E-20	2.57E-21
Kr-85	1.41E-17	3.75E-19
Kr-85m	3.37E-17	1.49E-17
Kr-87	1.97E-16	8.51E-17
Kr-88	2.69E-16	2.10E-16
Kr-89	3.43E-16	2.06E-16
Rb-77	3.14E-16	1.53E-16
Rb-78	6.12E-16	4.41E-16
Rb-78m	5.08E-16	3.28E-16
Rb-79	2.31E-16	1.41E-16
Rb-80	3.00E-16	1.19E-16
Rb-81	6.86E-17	4.89E-17
Rb-81m	3.64E-18	2.33E-18
Rb-82	2.39E-16	1.09E-16
Rb-82m	3.61E-16	2.91E-16
Rb-83	5.89E-17	4.69E-17
Rb-84	1.20E-16	8.95E-17
Rb-84m	5.02E-17	3.66E-17
Rb-86	5.74E-17	1.01E-17
Rb-86m	6.67E-17	5.30E-17
Rb-87	3.59E-18	3.90E-20
Rb-88	2.39E-16	7.12E-17
Rb-89	3.47E-16	2.36E-16
Rb-90	4.19E-16	2.33E-16
Rb-90m	5.13E-16	3.51E-16
Sr-79	2.82E-16	1.16E-16
Sr-80	5.46E-17	4.17E-17
Sr-81	2.38E-16	1.35E-16
Sr-82	3.23E-19	1.10E-20
Sr-83	1.08E-16	8.02E-17
Sr-85	6.01E-17	4.77E-17
Sr-85m	2.67E-17	2.07E-17
Sr-87m	4.27E-17	3.07E-17
Sr-89	3.95E-17	5.26E-19
Sr-90	9.71E-18	1.09E-19
Sr-91	1.31E-16	7.14E-17

Sr-92	1.75E-16	1.39E-16
Sr-93	3.34E-16	2.31E-16
Sr-94	2.36E-16	1.49E-16
Y-81	2.87E-16	1.15E-16
Y-83	2.59E-16	1.33E-16
Y-83m	1.59E-16	8.15E-17
Y-84m	5.75E-16	3.98E-16
Y-85	1.64E-16	1.05E-16
Y-85m	2.03E-16	1.34E-16
Y-86	4.54E-16	3.64E-16
Y-86m	2.75E-17	2.10E-17
Y-87	5.34E-17	4.23E-17
Y-87m	4.19E-17	2.94E-17
Y-88	3.34E-16	2.82E-16
Y-89m	1.10E-16	9.02E-17
Y-90	6.65E-17	9.86E-19
Y-90m	7.98E-17	6.10E-17
Y-91	4.12E-17	8.61E-19
Y-91m	6.57E-17	5.13E-17
Y-92	1.39E-16	2.74E-17
Y-93	9.74E-17	1.13E-17
Y-94	2.32E-16	8.12E-17
Y-95	2.47E-16	1.23E-16
Zr-85	2.77E-16	1.45E-16
Zr-86	3.48E-17	2.63E-17
Zr-87	1.71E-16	9.10E-17
Zr-88	4.74E-17	3.68E-17
Zr-89	1.46E-16	1.15E-16
Zr-89m	7.91E-17	6.24E-17
Zr-93	6.75E-23	6.75E-25
Zr-95	9.30E-17	7.23E-17
Zr-97	1.57E-16	8.79E-17
Nb-87	2.75E-16	1.19E-16
Nb-88	6.18E-16	4.20E-16
Nb-88m	6.11E-16	4.13E-16
Nb-89	2.49E-16	1.40E-16
Nb-89m	2.14E-16	1.27E-16
Nb-90	5.51E-16	4.44E-16
Nb-91	7.11E-19	1.86E-19
Nb-91m	4.20E-18	2.59E-18
Nb-92	1.82E-16	1.48E-16
Nb-92m	1.17E-16	9.63E-17
Nb-93m	1.01E-19	7.13E-21
Nb-94	1.97E-16	1.55E-16
Nb-94m	1.06E-18	4.67E-19
Nb-95	9.30E-17	7.56E-17
Nb-95m	1.70E-17	6.10E-18

Nb-96	3.14E-16	2.45E-16
Nb-97	1.11E-16	6.56E-17
Nb-98m	3.98E-16	2.86E-16
Nb-99	1.29E-16	1.72E-17
Nb-99m	2.00E-16	8.26E-17
Mo-89	2.98E-16	1.22E-16
Mo-90	1.11E-16	7.98E-17
Mo-91	2.26E-16	9.66E-17
Mo-91m	2.10E-16	1.40E-16
Mo-93	5.66E-19	3.99E-20
Mo-93m	2.90E-16	2.36E-16
Mo-99	4.25E-17	1.48E-17
Mo-101	2.17E-16	1.51E-16
Mo-102	2.37E-17	2.01E-18
Tc-91	4.37E-16	2.60E-16
Tc-91m	3.16E-16	1.42E-16
Tc-92	6.04E-16	3.88E-16
Tc-93	1.96E-16	1.62E-16
Tc-93m	1.26E-16	1.01E-16
Tc-94	3.25E-16	2.63E-16
Tc-94m	2.93E-16	1.97E-16
Tc-95	9.60E-17	7.78E-17
Tc-95m	8.33E-17	6.64E-17
Tc-96	3.04E-16	2.48E-16
Tc-96m	5.44E-18	4.21E-18
Tc-97	6.30E-19	5.20E-20
Tc-97m	8.98E-19	8.10E-20
Tc-98	1.77E-16	1.39E-16
Tc-99	2.88E-18	3.14E-20
Tc-99m	1.56E-17	1.17E-17
Tc-101	7.15E-17	3.28E-17
Tc-102	1.58E-16	1.10E-17
Tc-102m	3.61E-16	2.56E-16
Tc-104	4.00E-16	2.37E-16
Tc-105	1.89E-16	8.10E-17
Ru-92	3.05E-16	2.05E-16
Ru-94	6.24E-17	4.96E-17
Ru-95	1.56E-16	1.23E-16
Ru-97	2.88E-17	2.18E-17
Ru-103	6.12E-17	4.80E-17
Ru-105	1.17E-16	7.34E-17
Ru-106	0.00E+00	0.00E+00
Ru-107	1.20E-16	3.57E-17
Ru-108	3.81E-17	6.10E-18
Rh-94	6.92E-16	3.89E-16
Rh-95	3.80E-16	2.62E-16
Rh-95m	1.25E-16	9.31E-17

Rh-96	5.32E-16	3.93E-16
Rh-96m	1.97E-16	1.30E-16
Rh-97	2.12E-16	1.43E-16
Rh-97m	2.88E-16	2.31E-16
Rh-98	3.20E-16	1.80E-16
Rh-99	6.81E-17	5.28E-17
Rh-99m	8.02E-17	6.28E-17
Rh-100	3.43E-16	2.85E-16
Rh-100m	6.78E-18	4.43E-18
Rh-101	3.46E-17	2.58E-17
Rh-101m	3.46E-17	2.64E-17
Rh-102	7.16E-17	4.86E-17
Rh-102m	2.61E-16	2.11E-16
Rh-103m	9.87E-20	1.32E-20
Rh-104	7.19E-17	2.26E-18
Rh-104m	4.18E-18	2.09E-18
Rh-105	1.61E-17	7.49E-18
Rh-106	1.30E-16	2.20E-17
Rh-106m	3.69E-16	2.86E-16
Rh-107	6.62E-17	3.05E-17
Rh-108	1.76E-16	3.34E-17
Rh-109	1.02E-16	2.95E-17
Pd-96	1.89E-16	1.41E-16
Pd-97	3.48E-16	2.43E-16
Pd-98	5.04E-17	3.85E-17
Pd-99	1.87E-16	1.28E-16
Pd-100	1.30E-17	8.19E-18
Pd-101	4.24E-17	3.22E-17
Pd-103	9.18E-19	1.24E-19
Pd-107	0.00E+00	0.00E+00
Pd-109	2.34E-17	6.88E-19
Pd-109m	1.62E-17	1.01E-17
Pd-111	6.51E-17	5.62E-18
Pd-112	1.85E-18	4.33E-20
Pd-114	3.84E-17	2.89E-18
Ag-99	3.80E-16	2.33E-16
Ag-100m	4.92E-16	2.87E-16
Ag-101	2.52E-16	1.56E-16
Ag-102	4.80E-16	3.47E-16
Ag-102m	2.77E-16	2.10E-16
Ag-103	1.15E-16	8.23E-17
Ag-104	3.35E-16	2.70E-16
Ag-104m	2.75E-16	1.83E-16
Ag-105	6.16E-17	4.81E-17
Ag-105m	1.24E-19	9.63E-20
Ag-106	1.19E-16	6.77E-17
Ag-106m	3.42E-16	2.79E-16

Ag-108	4.35E-17	2.32E-18
Ag-108m	1.96E-16	1.57E-16
Ag-109m	1.08E-18	3.56E-19
Ag-110	8.99E-17	4.38E-18
Ag-110m	3.40E-16	2.77E-16
Ag-111	2.49E-17	2.80E-18
Ag-111m	7.80E-19	3.71E-19
Ag-112	1.86E-16	7.24E-17
Ag-113	6.18E-17	7.75E-18
Ag-113m	3.90E-17	2.07E-17
Ag-114	1.94E-16	2.97E-17
Ag-115	1.39E-16	5.12E-17
Ag-116	4.01E-16	2.29E-16
Ag-117	2.57E-16	1.40E-16
Cd-101	3.82E-16	2.53E-16
Cd-102	1.05E-16	8.10E-17
Cd-103	2.83E-16	2.17E-16
Cd-104	2.92E-17	2.21E-17
Cd-105	1.75E-16	1.33E-16
Cd-107	3.03E-18	1.09E-18
Cd-109	2.11E-18	5.20E-19
Cd-111m	3.73E-17	2.64E-17
Cd-113	2.49E-18	2.72E-20
Cd-113m	8.91E-18	1.06E-19
Cd-115	4.22E-17	1.88E-17
Cd-115m	4.50E-17	3.87E-18
Cd-117	1.61E-16	1.10E-16
Cd-117m	2.66E-16	2.14E-16
Cd-118	7.19E-18	8.02E-20
Cd-119	2.61E-16	1.72E-16
Cd-119m	3.33E-16	2.41E-16
In-103	4.55E-16	2.82E-16
In-105	3.12E-16	1.94E-16
In-106m	4.69E-16	2.92E-16
In-106	5.12E-16	3.53E-16
In-107	2.11E-16	1.56E-16
In-108m	3.97E-16	2.92E-16
In-108	4.89E-16	3.93E-16
In-109m	7.64E-17	5.95E-17
In-109	7.92E-17	6.23E-17
In-110m	2.37E-16	1.57E-16
In-110	3.76E-16	3.06E-16
In-111m	6.12E-17	4.55E-17
In-111	4.95E-17	3.70E-17
In-112m	6.82E-18	2.15E-18
In-112	4.72E-17	2.56E-17
In-113m	3.95E-17	2.46E-17

In-114m	1.51E-17	7.07E-18
In-114	5.45E-17	9.87E-19
In-115m	2.94E-17	1.50E-17
In-115	6.56E-18	7.29E-20
In-116m	3.23E-16	2.55E-16
In-117m	3.94E-17	8.63E-18
In-117	9.81E-17	6.69E-17
In-118m	3.86E-16	2.83E-16
In-118	1.53E-16	1.08E-17
In-119m	8.11E-17	7.63E-18
In-119	1.33E-16	7.63E-17
In-121m	1.20E-16	7.29E-18
In-121	1.83E-16	9.37E-17
Sn-106	1.53E-16	1.17E-16
Sn-108	8.27E-17	6.45E-17
Sn-109	2.76E-16	2.28E-16
Sn-110	3.50E-17	2.65E-17
Sn-111	7.20E-17	4.79E-17
Sn-113m	1.02E-18	2.38E-19
Sn-113	1.97E-18	7.73E-19
Sn-117m	2.29E-17	1.35E-17
Sn-119m	1.06E-18	2.17E-19
Sn-121m	1.36E-18	1.12E-19
Sn-121	3.98E-18	4.36E-20
Sn-123m	4.72E-17	1.34E-17
Sn-123	3.55E-17	1.15E-18
Sn-125m	9.86E-17	3.42E-17
Sn-125	9.78E-17	3.49E-17
Sn-126	8.08E-18	4.09E-18
Sn-127m	1.50E-16	5.72E-17
Sn-127	2.69E-16	1.95E-16
Sn-128	8.07E-17	5.49E-17
Sn-129	2.15E-16	1.02E-16
Sn-130m	2.10E-16	8.99E-17
Sn-130	1.40E-16	9.04E-17
Sb-111	2.81E-16	1.46E-16
Sb-113	2.05E-16	1.24E-16
Sb-114	4.20E-16	2.74E-16
Sb-115	1.23E-16	8.55E-17
Sb-116	3.17E-16	2.33E-16
Sb-116m	3.84E-16	3.11E-16
Sb-117	2.24E-17	1.59E-17
Sb-118	1.61E-16	7.86E-17
Sb-118m	3.19E-16	2.61E-16
Sb-119	1.68E-18	3.55E-19
Sb-120	7.53E-17	4.32E-17
Sb-120m	3.01E-16	2.46E-16

Sb-122	9.17E-17	4.39E-17
Sb-122m	7.17E-18	4.04E-18
Sb-124	2.53E-16	1.90E-16
Sb-124m	6.01E-17	4.30E-17
Sb-124n	6.04E-23	1.32E-23
Sb-125	5.53E-17	4.12E-17
Sb-126	3.56E-16	2.71E-16
Sb-126m	2.31E-16	1.52E-16
Sb-127	1.03E-16	6.80E-17
Sb-128	4.08E-16	3.05E-16
Sb-128m	3.00E-16	1.89E-16
Sb-129	2.04E-16	1.48E-16
Sb-130	4.51E-16	3.26E-16
Sb-130m	4.03E-16	2.72E-16
Sb-131	2.95E-16	2.13E-16
Sb-133	3.87E-16	2.87E-16
Te-113	4.02E-16	2.27E-16
Te-114	1.64E-16	1.28E-16
Te-115	3.34E-16	2.26E-16
Te-115m	3.70E-16	2.65E-16
Te-116	1.23E-17	8.08E-18
Te-117	2.05E-16	1.57E-16
Te-118	1.49E-18	3.56E-19
Te-119	9.29E-17	7.44E-17
Te-119m	1.84E-16	1.51E-16
Te-121	6.91E-17	5.45E-17
Te-121m	2.65E-17	1.98E-17
Te-123	2.59E-21	6.19E-22
Te-123m	1.81E-17	1.28E-17
Te-125m	3.60E-18	7.78E-19
Te-127	1.25E-17	6.02E-19
Te-127m	1.38E-18	2.55E-19
Te-129	4.18E-17	6.13E-18
Te-129m	1.89E-17	3.26E-18
Te-131	9.90E-17	4.14E-17
Te-131m	1.85E-16	1.45E-16
Te-132	2.94E-17	2.05E-17
Te-133	1.95E-16	1.23E-16
Te-133m	2.51E-16	1.87E-16
Te-134	1.15E-16	8.42E-17
I-118	3.96E-16	2.02E-16
I-118m	5.37E-16	3.71E-16
I-119	1.46E-16	8.79E-17
I-120	4.17E-16	2.76E-16
I-120m	4.97E-16	3.53E-16
I-121	5.12E-17	3.70E-17
I-122	1.98E-16	9.45E-17

I-123	2.05E-17	1.45E-17
I-124	1.49E-16	1.11E-16
I-125	3.32E-18	8.88E-19
I-126	6.17E-17	4.17E-17
I-128	6.04E-17	7.16E-18
I-129	2.35E-18	6.68E-19
I-130	2.75E-16	2.10E-16
I-130m	2.37E-17	1.05E-17
I-131	5.55E-17	3.69E-17
I-132	3.08E-16	2.26E-16
I-132m	4.57E-17	3.26E-17
I-133	1.00E-16	6.02E-17
I-134	3.55E-16	2.61E-16
I-134m	3.82E-17	2.60E-17
I-135	2.16E-16	1.64E-16
Xe-120	4.74E-17	3.60E-17
Xe-121	2.22E-16	1.50E-16
Xe-122	7.37E-18	4.81E-18
Xe-123	8.85E-17	6.20E-17
Xe-125	3.25E-17	2.37E-17
Xe-127	3.39E-17	2.48E-17
Xe-127m	2.33E-17	1.45E-17
Xe-129m	1.12E-17	2.01E-18
Xe-131m	6.17E-18	7.64E-19
Xe-133	8.01E-18	3.06E-18
Xe-133m	1.32E-17	2.75E-18
Xe-135	4.89E-17	2.39E-17
Xe-135m	5.78E-17	4.09E-17
Xe-137	1.51E-16	2.12E-17
Xe-138	1.84E-16	1.18E-16
Cs-121	2.73E-16	1.16E-16
Cs-121m	2.43E-16	1.16E-16
Cs-123	1.99E-16	1.06E-16
Cs-124	2.94E-16	1.16E-16
Cs-125	1.15E-16	7.31E-17
Cs-126	2.39E-16	1.14E-16
Cs-127	5.26E-17	4.01E-17
Cs-128	1.72E-16	8.71E-17
Cs-129	3.29E-17	2.46E-17
Cs-130	8.74E-17	4.83E-17
Cs-130m	7.67E-18	4.53E-18
Cs-131	1.86E-18	5.63E-19
Cs-132	8.62E-17	6.85E-17
Cs-134	1.97E-16	1.53E-16
Cs-134m	4.55E-18	1.77E-18
Cs-135	2.18E-18	2.37E-20
Cs-135m	1.96E-16	1.59E-16

Cs-136	2.65E-16	2.13E-16
Cs-137	9.22E-18	1.05E-19
Cs-138	3.84E-16	2.48E-16
Cs-138m	7.00E-17	4.14E-17
Cs-139	1.63E-16	3.45E-17
Cs-140	3.70E-16	1.91E-16
Ba-124	7.92E-17	5.46E-17
Ba-126	7.02E-17	5.57E-17
Ba-127	1.29E-16	7.08E-17
Ba-128	7.22E-18	4.67E-18
Ba-129	4.76E-17	3.13E-17
Ba-129m	1.94E-16	1.56E-16
Ba-131	5.73E-17	4.36E-17
Ba-131m	8.83E-18	5.93E-18
Ba-133	4.77E-17	3.56E-17
Ba-133m	1.86E-17	5.36E-18
Ba-135m	1.72E-17	4.65E-18
Ba-137m	7.65E-17	5.83E-17
Ba-139	6.91E-17	5.17E-18
Ba-140	3.84E-17	1.74E-17
Ba-141	1.81E-16	9.32E-17
Ba-142	1.53E-16	1.05E-16
La-128	4.44E-16	2.82E-16
La-129	1.54E-16	8.90E-17
La-130	3.55E-16	2.23E-16
La-131	9.13E-17	6.26E-17
La-132	2.86E-16	2.02E-16
La-132m	8.46E-17	6.42E-17
La-133	2.06E-17	1.39E-17
La-134	1.42E-16	7.02E-17
La-135	3.41E-18	1.73E-18
La-136	6.90E-17	3.86E-17
La-137	2.09E-18	7.20E-19
La-138	1.52E-16	1.26E-16
La-140	3.21E-16	2.39E-16
La-141	7.41E-17	3.86E-18
La-142	3.61E-16	2.56E-16
La-143	1.28E-16	2.91E-17
Ce-130	6.17E-17	4.66E-17
Ce-131	2.40E-16	1.61E-16
Ce-132	3.24E-17	2.40E-17
Ce-133	8.67E-17	4.96E-17
Ce-133m	2.15E-16	1.73E-16
Ce-134	2.46E-18	9.72E-19
Ce-135	9.99E-17	7.85E-17
Ce-137	3.65E-18	1.90E-18
Ce-137m	1.62E-17	4.18E-18

Ce-139	1.92E-17	1.32E-17
Ce-141	1.56E-17	6.87E-18
Ce-143	5.92E-17	2.58E-17
Ce-144	4.28E-18	1.61E-18
Ce-145	1.42E-16	7.87E-17
Pr-134	4.63E-16	3.12E-16
Pr-134m	3.99E-16	2.34E-16
Pr-135	1.45E-16	8.42E-17
Pr-136	3.18E-16	2.15E-16
Pr-137	5.73E-17	3.50E-17
Pr-138	1.85E-16	8.02E-17
Pr-138m	3.15E-16	2.45E-16
Pr-139	1.76E-17	1.11E-17
Pr-140	1.05E-16	5.27E-17
Pr-142	6.42E-17	6.94E-18
Pr-142m	0.00E+00	0.00E+00
Pr-143	1.87E-17	2.22E-19
Pr-144	9.20E-17	4.45E-18
Pr-144m	1.22E-18	5.76E-19
Pr-145	4.87E-17	2.46E-18
Pr-146	2.23E-16	1.06E-16
Pr-147	1.17E-16	4.69E-17
Pr-148	2.47E-16	1.03E-16
Pr-148m	2.40E-16	9.36E-17
Nd-134	7.54E-17	5.06E-17
Nd-135	2.25E-16	1.22E-16
Nd-136	3.37E-17	2.41E-17
Nd-137	1.64E-16	1.16E-16
Nd-138	4.41E-18	2.44E-18
Nd-139	6.73E-17	4.22E-17
Nd-139m	1.94E-16	1.56E-16
Nd-140	2.55E-18	1.04E-18
Nd-141	8.96E-18	5.79E-18
Nd-141m	8.84E-17	6.85E-17
Nd-144	0.00E+00	0.00E+00
Nd-147	2.92E-17	1.25E-17
Nd-149	7.53E-17	3.53E-17
Nd-151	1.45E-16	8.49E-17
Nd-152	3.90E-17	1.57E-17
Pm-136	4.95E-16	2.69E-16
Pm-137m	2.94E-16	1.74E-16
Pm-139	1.91E-16	9.24E-17
Pm-140	2.85E-16	1.05E-16
Pm-140m	4.41E-16	3.01E-16
Pm-141	1.33E-16	7.24E-17
Pm-142	2.02E-16	8.48E-17
Pm-143	3.74E-17	2.93E-17

Pm-144	1.89E-16	1.51E-16
Pm-145	2.88E-18	1.28E-18
Pm-146	9.54E-17	7.23E-17
Pm-147	8.51E-19	9.64E-21
Pm-148	1.21E-16	5.93E-17
Pm-148m	2.49E-16	1.95E-16
Pm-149	2.39E-17	1.41E-18
Pm-150	2.38E-16	1.50E-16
Pm-151	5.58E-17	3.12E-17
Pm-152	1.32E-16	3.04E-17
Pm-152m	2.46E-16	1.53E-16
Pm-153	5.45E-17	7.02E-18
Pm-154	2.81E-16	1.88E-16
Pm-154m	2.84E-16	1.84E-16
Sm-139	2.57E-16	1.44E-16
Sm-140	7.93E-17	5.49E-17
Sm-141	2.24E-16	1.40E-16
Sm-141m	2.64E-16	1.93E-16
Sm-142	1.50E-17	9.11E-18
Sm-143	9.93E-17	5.11E-17
Sm-143m	8.78E-17	6.75E-17
Sm-145	6.06E-18	2.86E-18
Sm-146	0.00E+00	0.00E+00
Sm-147	0.00E+00	0.00E+00
Sm-148	0.00E+00	0.00E+00
Sm-151	4.64E-22	6.20E-23
Sm-153	1.89E-17	4.65E-18
Sm-155	4.91E-17	9.44E-18
Sm-156	2.24E-17	1.04E-17
Sm-157	1.11E-16	4.09E-17
Eu-142	3.64E-16	1.23E-16
Eu-142m	5.50E-16	3.42E-16
Eu-143	2.40E-16	1.13E-16
Eu-144	2.93E-16	1.11E-16
Eu-145	1.58E-16	1.29E-16
Eu-146	2.95E-16	2.40E-16
Eu-147	5.69E-17	4.42E-17
Eu-148	2.71E-16	2.19E-16
Eu-149	7.11E-18	4.53E-18
Eu-150	1.89E-16	1.51E-16
Eu-150m	2.49E-17	4.88E-18
Eu-152	1.49E-16	1.17E-16
Eu-152m	7.00E-17	2.94E-17
Eu-152n	8.53E-18	5.92E-18
Eu-154	1.65E-16	1.25E-16
Eu-154m	7.55E-18	4.87E-18
Eu-155	7.41E-18	4.87E-18

Eu-156	1.81E-16	1.28E-16
Eu-157	5.76E-17	2.67E-17
Eu-158	2.19E-16	1.32E-16
Eu-159	9.60E-17	2.83E-17
Gd-142	1.81E-16	1.03E-16
Gd-143m	3.50E-16	2.11E-16
Gd-144	1.54E-16	9.19E-17
Gd-145	3.27E-16	2.55E-16
Gd-145m	9.44E-17	6.67E-17
Gd-146	2.93E-17	1.95E-17
Gd-147	1.73E-16	1.37E-16
Gd-148	0.00E+00	0.00E+00
Gd-149	6.51E-17	4.89E-17
Gd-150	0.00E+00	0.00E+00
Gd-151	7.88E-18	4.81E-18
Gd-152	0.00E+00	0.00E+00
Gd-153	1.14E-17	7.05E-18
Gd-159	2.42E-17	4.95E-18
Gd-162	6.97E-17	4.02E-17
Tb-146	5.60E-16	3.77E-16
Tb-147	2.86E-16	2.20E-16
Tb-147m	2.59E-16	1.97E-16
Tb-148	3.52E-16	2.40E-16
Tb-148m	4.02E-16	3.09E-16
Tb-149	1.71E-16	1.36E-16
Tb-149m	1.80E-16	1.34E-16
Tb-150	3.24E-16	2.54E-16
Tb-150m	3.12E-16	2.44E-16
Tb-151	1.22E-16	9.47E-17
Tb-151m	9.31E-18	6.99E-18
Tb-152	2.01E-16	1.51E-16
Tb-152m	9.60E-17	7.16E-17
Tb-153	3.93E-17	2.97E-17
Tb-154	2.87E-16	2.40E-16
Tb-155	2.06E-17	1.40E-17
Tb-156	2.37E-16	1.93E-16
Tb-156m	3.81E-18	2.13E-18
Tb-156n	5.95E-19	2.25E-19
Tb-157	4.55E-19	2.28E-19
Tb-158	9.98E-17	7.84E-17
Tb-160	1.48E-16	1.13E-16
Tb-161	1.02E-17	2.01E-18
Tb-162	1.67E-16	1.09E-16
Tb-163	1.16E-16	7.62E-17
Tb-164	3.53E-16	2.47E-16
Tb-165	1.65E-16	8.67E-17
Dy-148	8.73E-17	6.85E-17

Dy-149	2.03E-16	1.63E-16
Dy-150	3.33E-17	2.57E-17
Dy-151	1.69E-16	1.36E-16
Dy-152	3.43E-17	2.59E-17
Dy-153	1.06E-16	8.34E-17
Dy-154	0.00E+00	0.00E+00
Dy-155	8.13E-17	6.45E-17
Dy-157	4.14E-17	3.15E-17
Dy-159	4.46E-18	2.32E-18
Dy-165	3.15E-17	2.73E-18
Dy-165m	3.60E-18	1.55E-18
Dy-166	8.88E-18	2.91E-18
Dy-167	1.12E-16	5.17E-17
Dy-168	7.07E-17	3.74E-17
Ho-150	3.82E-16	1.88E-16
Ho-153	1.62E-16	9.99E-17
Ho-153m	1.75E-16	1.02E-16
Ho-154	3.10E-16	1.87E-16
Ho-154m	3.34E-16	2.37E-16
Ho-155	8.61E-17	5.89E-17
Ho-156	3.03E-16	2.12E-16
Ho-157	7.24E-17	5.38E-17
Ho-159	4.58E-17	3.36E-17
Ho-160	2.06E-16	1.66E-16
Ho-161	5.67E-18	3.06E-18
Ho-162	2.03E-17	1.43E-17
Ho-162m	6.80E-17	5.40E-17
Ho-163	0.00E+00	0.00E+00
Ho-164	1.04E-17	1.76E-18
Ho-164m	4.48E-18	2.44E-18
Ho-166	4.93E-17	3.34E-18
Ho-166m	2.00E-16	1.59E-16
Ho-167	5.50E-17	3.48E-17
Ho-168	1.60E-16	8.74E-17
Ho-168m	6.29E-19	3.46E-19
Ho-170	2.59E-16	1.69E-16
Er-154	8.69E-18	5.00E-18
Er-156	6.71E-18	3.89E-18
Er-159	1.20E-16	9.47E-17
Er-161	1.21E-16	9.70E-17
Er-163	4.05E-18	2.26E-18
Er-165	3.78E-18	2.08E-18
Er-167m	1.61E-17	8.83E-18
Er-169	2.95E-18	3.24E-20
Er-171	6.75E-17	3.50E-17
Er-172	6.62E-17	4.88E-17
Er-173	1.45E-16	8.08E-17

Tm-161	1.68E-16	1.28E-16
Tm-162	2.75E-16	1.98E-16
Tm-163	1.62E-16	1.31E-16
Tm-164	1.37E-16	7.70E-17
Tm-165	6.85E-17	5.23E-17
Tm-166	2.45E-16	2.02E-16
Tm-167	2.15E-17	1.21E-17
Tm-168	1.51E-16	1.20E-16
Tm-170	1.93E-17	5.14E-19
Tm-171	6.70E-20	3.89E-20
Tm-172	9.12E-17	4.92E-17
Tm-173	6.48E-17	3.74E-17
Tm-174	2.43E-16	1.75E-16
Tm-175	1.64E-16	1.07E-16
Tm-176	3.09E-16	2.03E-16
Yb-162	2.98E-17	2.21E-17
Yb-163	1.06E-16	7.13E-17
Yb-164	5.77E-18	3.64E-18
Yb-165	4.28E-17	3.01E-17
Yb-166	9.05E-18	5.42E-18
Yb-167	3.09E-17	2.14E-17
Yb-169	3.92E-17	2.65E-17
Yb-175	9.77E-18	3.73E-18
Yb-177	5.07E-17	1.95E-17
Yb-178	1.40E-17	3.74E-18
Yb-179	1.65E-16	9.52E-17
Lu-165	1.57E-16	1.09E-16
Lu-167	2.13E-16	1.72E-16
Lu-169	1.61E-16	1.32E-16
Lu-169m	3.48E-21	5.83E-23
Lu-170	3.20E-16	2.71E-16
Lu-171	7.73E-17	6.09E-17
Lu-171m	4.09E-20	2.24E-20
Lu-172	2.39E-16	1.94E-16
Lu-172m	1.31E-21	9.04E-23
Lu-173	2.08E-17	1.44E-17
Lu-174	1.33E-17	9.84E-18
Lu-174m	6.49E-18	4.04E-18
Lu-176	6.90E-17	4.52E-17
Lu-176m	2.98E-17	1.41E-18
Lu-177	9.73E-18	3.25E-18
Lu-177m	1.25E-16	9.29E-17
Lu-178	6.64E-17	1.34E-17
Lu-178m	1.51E-16	9.89E-17
Lu-179	3.54E-17	3.23E-18
Lu-180	2.25E-16	1.53E-16
Lu-181	1.23E-16	5.57E-17

Hf-167	1.10E-16	5.91E-17
Hf-169	8.50E-17	6.05E-17
Hf-170	5.24E-17	4.01E-17
Hf-172	1.12E-17	7.02E-18
Hf-173	4.76E-17	3.57E-17
Hf-174	0.00E+00	0.00E+00
Hf-175	4.36E-17	3.22E-17
Hf-177m	2.92E-16	2.15E-16
Hf-178m	2.76E-16	2.13E-16
Hf-179m	1.14E-16	8.59E-17
Hf-180m	1.22E-16	9.33E-17
Hf-181	7.04E-17	5.05E-17
Hf-182	3.02E-17	2.27E-17
Hf-182m	1.18E-16	8.69E-17
Hf-183	1.22E-16	7.58E-17
Hf-184	4.73E-17	2.15E-17
Ta-170	2.47E-16	1.05E-16
Ta-172	2.42E-16	1.69E-16
Ta-173	7.65E-17	5.58E-17
Ta-174	1.47E-16	9.68E-17
Ta-175	1.37E-16	1.11E-16
Ta-176	2.78E-16	2.32E-16
Ta-177	7.54E-18	4.90E-18
Ta-178	1.44E-17	1.04E-17
Ta-178m	1.42E-16	1.08E-16
Ta-179	2.59E-18	1.59E-18
Ta-180	6.71E-18	3.22E-18
Ta-182	1.63E-16	1.30E-16
Ta-182m	3.78E-17	2.31E-17
Ta-183	4.61E-17	2.63E-17
Ta-184	2.19E-16	1.54E-16
Ta-185	6.32E-17	1.43E-17
Ta-186	2.46E-16	1.39E-16
W-177	1.11E-16	8.70E-17
W-178	1.59E-18	9.89E-19
W-179	5.54E-18	3.32E-18
W-179m	1.27E-17	4.39E-18
W-181	4.21E-18	2.63E-18
W-185	4.77E-18	5.67E-20
W-185m	5.23E-18	2.05E-18
W-187	7.02E-17	4.33E-17
W-188	3.18E-18	2.08E-19
W-190	3.82E-17	1.26E-17
Re-178	2.52E-16	1.77E-16
Re-179	1.34E-16	1.07E-16
Re-180	1.53E-16	1.18E-16
Re-181	1.02E-16	7.66E-17

Re-182	2.21E-16	1.76E-16
Re-182m	1.50E-16	1.22E-16
Re-183	1.84E-17	1.24E-17
Re-184	1.08E-16	8.68E-17
Re-184m	4.65E-17	3.58E-17
Re-186	2.22E-17	1.99E-18
Re-186m	1.67E-18	9.72E-19
Re-187	0.00E+00	0.00E+00
Re-188	6.10E-17	6.60E-18
Re-188m	7.83E-18	5.12E-18
Re-189	2.52E-17	5.40E-18
Re-190	2.08E-16	1.31E-16
Re-190m	1.38E-16	8.96E-17
Os-180	1.45E-17	1.03E-17
Os-181	1.70E-16	1.37E-16
Os-182	5.25E-17	3.98E-17
Os-183	7.58E-17	5.83E-17
Os-183m	1.23E-16	1.00E-16
Os-185	8.36E-17	6.65E-17
Os-186	0.00E+00	0.00E+00
Os-189m	1.40E-20	2.38E-22
Os-190m	1.96E-16	1.53E-16
Os-191	9.97E-18	6.62E-18
Os-191m	6.63E-19	4.15E-19
Os-193	2.97E-17	6.41E-18
Os-194	2.67E-19	1.18E-19
Os-196	3.23E-17	7.73E-18
Ir-180	2.83E-16	1.56E-16
Ir-182	2.46E-16	1.39E-16
Ir-183	1.52E-16	1.19E-16
Ir-184	2.58E-16	1.96E-16
Ir-185	1.07E-16	8.59E-17
Ir-186	2.09E-16	1.66E-16
Ir-186m	1.59E-16	1.26E-16
Ir-187	3.99E-17	3.07E-17
Ir-188	2.62E-16	2.19E-16
Ir-189	8.86E-18	5.99E-18
Ir-190	1.81E-16	1.42E-16
Ir-190m	1.46E-20	2.65E-22
Ir-190n	6.62E-18	4.12E-18
Ir-191m	8.89E-18	5.96E-18
Ir-192	1.10E-16	7.86E-17
Ir-192m	6.07E-20	5.92E-21
Ir-192n	4.88E-18	9.60E-20
Ir-193m	8.95E-20	2.32E-20
Ir-194	6.80E-17	9.74E-18
Ir-194m	2.87E-16	2.26E-16

Ir-195	2.66E-17	4.72E-18
Ir-195m	5.66E-17	3.56E-17
Ir-196	1.14E-16	2.42E-17
Ir-196m	3.18E-16	2.39E-16
Pt-184	8.87E-17	6.63E-17
Pt-186	8.29E-17	6.51E-17
Pt-187	7.90E-17	5.81E-17
Pt-188	2.52E-17	1.78E-17
Pt-189	5.92E-17	4.51E-17
Pt-190	0.00E+00	0.00E+00
Pt-191	3.56E-17	2.60E-17
Pt-193	3.37E-20	6.57E-22
Pt-193m	3.86E-18	8.04E-19
Pt-195m	1.06E-17	5.52E-18
Pt-197	1.27E-17	2.10E-18
Pt-197m	2.47E-17	7.05E-18
Pt-199	5.96E-17	1.97E-17
Pt-200	1.48E-17	5.09E-18
Pt-202	4.49E-17	6.05E-19
Au-186	2.61E-16	1.49E-16
Au-187	1.37E-16	1.08E-16
Au-190	3.12E-16	2.51E-16
Au-191	7.32E-17	5.58E-17
Au-192	2.46E-16	2.02E-16
Au-193	2.03E-17	1.42E-17
Au-193m	2.61E-17	1.83E-17
Au-194	1.29E-16	1.05E-16
Au-195	9.18E-18	6.10E-18
Au-195m	2.67E-17	1.87E-17
Au-196	5.81E-17	4.42E-17
Au-196m	3.64E-17	2.14E-17
Au-198	6.82E-17	3.90E-17
Au-198m	6.97E-17	4.87E-17
Au-199	1.50E-17	8.74E-18
Au-200	8.43E-17	2.84E-17
Au-200m	2.51E-16	1.92E-16
Au-201	3.09E-17	3.62E-18
Au-202	9.88E-17	1.85E-17
Hg-190	2.38E-17	1.72E-17
Hg-191m	1.87E-16	1.46E-16
Hg-192	3.29E-17	2.44E-17
Hg-193	1.03E-16	8.29E-17
Hg-193m	1.26E-16	1.01E-16
Hg-194	4.46E-20	1.04E-21
Hg-195	2.38E-17	1.81E-17
Hg-195m	2.63E-17	1.83E-17
Hg-197	8.06E-18	5.41E-18

Hg-197m	1.69E-17	8.28E-18
Hg-199m	3.96E-17	1.65E-17
Hg-203	3.14E-17	2.27E-17
Hg-205	3.65E-17	9.63E-19
Hg-206	4.07E-17	1.19E-17
Hg-207	3.86E-16	2.77E-16
Tl-190	2.74E-16	1.28E-16
Tl-190m	3.57E-16	2.41E-16
Tl-194	1.55E-16	8.87E-17
Tl-194m	3.22E-16	2.46E-16
Tl-195	1.53E-16	1.25E-16
Tl-196	2.43E-16	1.91E-16
Tl-197	5.68E-17	4.40E-17
Tl-198	2.50E-16	2.06E-16
Tl-198m	1.55E-16	1.17E-16
Tl-199	3.15E-17	2.27E-17
Tl-200	1.61E-16	1.30E-16
Tl-201	1.08E-17	7.32E-18
Tl-202	5.65E-17	4.36E-17
Tl-204	1.32E-17	2.44E-19
Tl-206	3.60E-17	4.75E-19
Tl-206m	3.05E-16	2.37E-16
Tl-207	3.28E-17	6.50E-19
Tl-208	4.65E-16	3.64E-16
Tl-209	3.11E-16	2.20E-16
Tl-210	4.30E-16	2.85E-16
Pb-194	1.35E-16	1.07E-16
Pb-195m	2.15E-16	1.61E-16
Pb-196	6.29E-17	4.60E-17
Pb-197	1.93E-16	1.55E-16
Pb-197m	1.53E-16	1.14E-16
Pb-198	5.52E-17	4.07E-17
Pb-199	1.30E-16	1.04E-16
Pb-200	2.67E-17	1.81E-17
Pb-201	9.39E-17	7.28E-17
Pb-201m	6.13E-17	3.54E-17
Pb-202	6.24E-20	1.12E-21
Pb-202m	2.49E-16	1.97E-16
Pb-203	3.95E-17	2.88E-17
Pb-204m	2.58E-16	2.05E-16
Pb-205	6.32E-20	1.14E-21
Pb-209	9.87E-18	1.12E-19
Pb-210	3.03E-19	1.09E-19
Pb-211	3.71E-17	6.68E-18
Pb-212	2.32E-17	1.34E-17
Pb-214	4.53E-17	2.41E-17
Bi-197	2.25E-16	1.70E-16

Bi-200	3.10E-16	2.39E-16
Bi-201	2.15E-16	1.76E-16
Bi-202	3.44E-16	2.74E-16
Bi-203	2.98E-16	2.44E-16
Bi-204	3.59E-16	2.92E-16
Bi-205	2.10E-16	1.73E-16
Bi-206	4.06E-16	3.28E-16
Bi-207	1.95E-16	1.53E-16
Bi-208	3.38E-16	2.93E-16
Bi-210	2.44E-17	2.98E-19
Bi-210m	3.39E-17	2.49E-17
Bi-211	6.25E-18	4.51E-18
Bi-212	4.72E-17	1.08E-17
Bi-212n	3.56E-17	4.61E-19
Bi-213	4.38E-17	1.26E-17
Bi-214	2.28E-16	1.54E-16
Bi-215	7.52E-17	2.52E-17
Bi-216	1.87E-16	7.31E-17
Po-203	2.08E-16	1.64E-16
Po-204	1.44E-16	1.12E-16
Po-205	1.96E-16	1.59E-16
Po-206	1.49E-16	1.16E-16
Po-207	1.58E-16	1.27E-16
Po-208	2.69E-21	2.04E-21
Po-209	7.82E-19	6.01E-19
Po-210	1.19E-21	9.65E-22
Po-211	1.00E-18	8.08E-19
Po-212	0.00E+00	0.00E+00
Po-212m	1.01E-17	8.65E-18
Po-213	4.63E-21	3.71E-21
Po-214	1.01E-20	8.23E-21
Po-215	2.17E-20	1.70E-20
Po-216	1.87E-21	1.52E-21
Po-218	2.62E-22	2.86E-24
At-204	3.12E-16	2.26E-16
At-205	1.56E-16	1.13E-16
At-206	3.24E-16	2.44E-16
At-207	2.53E-16	2.03E-16
At-208	3.78E-16	3.03E-16
At-209	2.80E-16	2.24E-16
At-210	3.67E-16	3.03E-16
At-211	4.11E-18	2.86E-18
At-215	2.25E-20	1.64E-20
At-216	3.10E-19	2.12E-19
At-217	3.28E-20	2.31E-20
At-218	7.94E-20	1.25E-21
At-219	0.00E+00	0.00E+00

At-220	1.42E-16	4.46E-17
Rn-207	1.34E-16	9.59E-17
Rn-209	1.53E-16	1.19E-16
Rn-210	7.62E-18	5.89E-18
Rn-211	2.31E-16	1.87E-16
Rn-212	4.13E-20	3.32E-20
Rn-215	0.00E+00	0.00E+00
Rn-216	0.00E+00	0.00E+00
Rn-217	0.00E+00	0.00E+00
Rn-218	9.26E-20	7.39E-20
Rn-219	7.41E-18	5.60E-18
Rn-220	7.70E-20	6.10E-20
Rn-222	4.77E-20	3.76E-20
Rn-223	7.86E-17	3.35E-17
Fr-212	1.45E-16	1.14E-16
Fr-219	4.48E-19	3.41E-19
Fr-220	1.26E-18	7.85E-19
Fr-221	3.86E-18	2.75E-18
Fr-222	6.51E-17	1.74E-17
Fr-223	2.79E-17	4.55E-18
Fr-224	1.27E-16	5.63E-17
Fr-227	1.06E-16	4.32E-17
Ra-219	2.34E-17	1.61E-17
Ra-220	5.76E-19	4.51E-19
Ra-221	5.23E-18	3.24E-18
Ra-222	1.16E-18	8.81E-19
Ra-223	1.85E-17	1.27E-17
Ra-224	1.36E-18	9.87E-19
Ra-225	3.69E-18	5.43E-19
Ra-226	1.02E-18	6.84E-19
Ra-227	4.29E-17	1.37E-17
Ra-228	1.22E-19	6.78E-21
Ra-230	1.88E-17	7.23E-18
Ac-223	2.25E-18	1.60E-18
Ac-224	2.76E-17	2.06E-17
Ac-225	1.84E-18	1.26E-18
Ac-226	3.13E-17	1.23E-17
Ac-227	3.66E-20	8.25E-21
Ac-228	1.30E-16	8.67E-17
Ac-230	1.31E-16	5.70E-17
Ac-231	8.92E-17	3.98E-17
Ac-232	2.10E-16	1.22E-16
Ac-233	1.18E-16	4.92E-17
Th-223	9.07E-18	6.18E-18
Th-224	3.19E-18	2.14E-18
Th-226	1.18E-18	7.08E-19
Th-227	1.62E-17	1.15E-17

Th-228	3.24E-19	1.84E-19
Th-229	1.12E-17	7.40E-18
Th-230	1.02E-19	3.42E-20
Th-231	3.73E-18	1.02E-18
Th-232	7.41E-20	1.80E-20
Th-233	2.93E-17	3.63E-18
Th-234	1.45E-18	7.22E-19
Th-235	5.25E-17	5.86E-18
Th-236	2.57E-17	3.44E-18
Pa-227	2.43E-18	1.61E-18
Pa-228	1.68E-16	1.35E-16
Pa-229	7.40E-18	5.22E-18
Pa-230	8.19E-17	6.50E-17
Pa-231	4.91E-18	3.18E-18
Pa-232	1.17E-16	9.25E-17
Pa-233	3.26E-17	2.03E-17
Pa-234	1.92E-16	1.45E-16
Pa-234m	5.94E-17	2.45E-18
Pa-235	3.10E-17	3.93E-19
Pa-236	1.66E-16	9.38E-17
Pa-237	1.12E-16	6.07E-17
U-227	1.67E-17	1.07E-17
U-228	6.00E-19	3.53E-19
U-230	2.29E-19	1.02E-19
U-231	9.05E-18	5.96E-18
U-232	1.18E-19	2.43E-20
U-233	7.45E-20	2.35E-20
U-234	9.48E-20	1.40E-20
U-235	2.00E-17	1.51E-17
U-235m	0.00E+00	0.00E+00
U-236	7.90E-20	8.69E-21
U-237	1.92E-17	1.17E-17
U-238	6.39E-20	7.32E-21
U-239	3.07E-17	4.41E-18
U-240	3.67E-18	4.30E-19
U-242	2.87E-17	4.03E-18
Np-232	1.47E-16	1.16E-16
Np-233	1.05E-17	7.52E-18
Np-234	1.38E-16	1.13E-16
Np-235	3.30E-19	6.43E-20
Np-236	2.06E-17	1.23E-17
Np-236m	9.11E-18	4.18E-18
Np-237	3.31E-18	1.93E-18
Np-238	8.33E-17	5.88E-17
Np-239	2.85E-17	1.62E-17
Np-240	1.49E-16	1.03E-16
Np-240m	8.33E-17	3.20E-17

Np-241	3.07E-17	3.67E-18
Np-242	9.66E-17	2.82E-17
Np-242m	1.51E-16	8.99E-17
Pu-232	7.20E-18	5.16E-18
Pu-234	7.81E-18	5.58E-18
Pu-235	1.08E-17	7.70E-18
Pu-236	1.03E-19	1.00E-20
Pu-237	5.77E-18	4.00E-18
Pu-238	9.22E-20	7.81E-21
Pu-239	4.63E-20	8.51E-21
Pu-240	8.74E-20	7.66E-21
Pu-241	2.07E-22	1.37E-22
Pu-242	8.71E-20	1.43E-20
Pu-243	1.01E-17	2.08E-18
Pu-244	3.46E-18	2.09E-18
Pu-245	6.56E-17	3.92E-17
Pu-246	1.75E-17	1.20E-17
Am-237	4.56E-17	3.41E-17
Am-238	1.10E-16	8.88E-17
Am-239	3.14E-17	2.07E-17
Am-240	1.26E-16	1.02E-16
Am-241	2.75E-18	1.54E-18
Am-242	9.71E-18	1.27E-18
Am-242m	2.85E-19	4.53E-20
Am-243	6.52E-18	4.34E-18
Am-244	1.05E-16	7.77E-17
Am-244m	3.53E-17	1.89E-18
Am-245	1.91E-17	3.03E-18
Am-246	1.20E-16	7.09E-17
Am-246m	1.50E-16	9.86E-17
Am-247	4.89E-17	1.25E-17
Cm-238	9.44E-18	6.80E-18
Cm-239	3.09E-17	2.32E-17
Cm-240	1.07E-19	1.06E-20
Cm-241	6.40E-17	4.63E-17
Cm-242	9.54E-20	9.09E-21
Cm-243	1.85E-17	1.17E-17
Cm-244	8.39E-20	9.22E-21
Cm-245	1.32E-17	8.90E-18
Cm-246	6.52E-19	3.87E-19
Cm-247	3.85E-17	3.01E-17
Cm-248	2.20E-16	1.39E-16
Cm-249	1.80E-17	2.04E-18
Cm-250	2.29E-15	1.41E-15
Cm-251	4.21E-17	1.10E-17
Bk-245	3.10E-17	2.05E-17
Bk-246	1.03E-16	8.30E-17

Bk-247	1.97E-17	1.32E-17
Bk-248m	1.63E-17	4.91E-18
Bk-249	3.73E-20	5.42E-22
Bk-250	1.25E-16	9.03E-17
Bk-251	2.81E-17	7.70E-18
Cf-244	1.02E-19	1.01E-20
Cf-246	7.73E-20	1.12E-20
Cf-247	1.16E-17	7.95E-18
Cf-248	1.37E-19	4.40E-20
Cf-249	4.01E-17	3.11E-17
Cf-250	1.63E-18	1.04E-18
Cf-251	1.91E-17	1.07E-17
Cf-252	7.50E-17	4.81E-17
Cf-253	1.64E-18	5.64E-20
Cf-254	2.85E-15	1.78E-15
Cf-255	1.14E-17	1.30E-19
Es-249	5.00E-17	3.86E-17
Es-250	1.49E-16	1.14E-16
Es-250m	6.76E-17	5.42E-17
Es-251	1.16E-17	7.96E-18
Es-253	7.31E-20	3.30E-20
Es-254	1.18E-18	3.33E-19
Es-254m	6.81E-17	4.61E-17
Es-255	1.74E-18	8.96E-20
Es-256	3.85E-17	5.29E-19
Fm-251	1.88E-17	1.40E-17
Fm-252	1.24E-19	3.78E-20
Fm-253	8.26E-18	5.15E-18
Fm-254	1.18E-18	7.50E-19
Fm-255	9.72E-19	2.16E-19
Fm-256	2.01E-15	1.31E-15
Fm-257	2.06E-17	1.32E-17

From: OST02 HOC
Sent: Saturday, March 26, 2011 2:06 PM
To: Costa, Arlon; PMT03 Hoc; Chowdhury, Prosanta
Cc: OST01 HOC
Subject: RE: PMT Coordinator

The 3-11 PM shift is already staffed. 11:00 PM – 7:00 AM 4/1-4/2 is available as well as 7:00 – 3:00, and 11:00 PM – 7:00 AM 4/2-4/3.

OST02
NRC Operations Center
301-816-5100

From: Costa, Arlon
Sent: Saturday, March 26, 2011 1:56 PM
To: PMT03 Hoc; Chowdhury, Prosanta
Cc: OST02 HOC; OST01 HOC
Subject: RE: PMT Coordinator

I signed in for the 3-11PM.

From: PMT03 Hoc
Sent: Saturday, March 26, 2011 1:22 AM
To: Costa, Arlon; Chowdhury, Prosanta
Cc: OST02 HOC; OST01 HOC
Subject: PMT Coordinator

Arlon, Prosanta,

We're almost complete on the PMT Coordinator roster for next week, but there are two slots needing filled next Saturday, April 2nd, if you're available. The slots are 7am-3pm and 3pm-11pm (and actually 11pm-7am Sunday which I will take if it remains unfilled). If each of you can fill one of these slots, that would be great. Please respond by copying OST01 and OST02, to be placed on the roster.

Hope to see you then.

Thanks.

Lou

BBBB/ 183

Releas[e]

Lee, Richard

From: Lee, Richard
Sent: Sunday, March 27, 2011 10:47 PM
To: Dana Powers
Subject: RE: long term storage of wastage

Thx, Dana:
Richard

From: Dana Powers [danapowers@msn.com]
Sent: Sunday, March 27, 2011 7:28 PM
To: Lee, Richard
Subject: RE: long term storage of wastage

Richard, The Hanford tanks are mild steel tanks - even the double walled tanks. They can hold waste only by making the waste extremely basic (pH>10). Just making the waste water basic may not be enough for the waste water from Fukushima. The waste water is heavily contaminated with chloride and will be aggressive toward mild steel. The Hanford waste did not have a lot of sodium chloride in it.

The problem tanks at Hanford were those that had precipitated solids. Water from the Fukushima reactors will come in hot and will precipitate sodium chloride. Over time iron hydroxide and carbonates of various types will precipitate from the waste water. Over the long term, weird and unwonderful things can happen in the liquids trapped between the precipitated solids and the tank walls - crevice corrosion. I would think that they would want to use tanks better suited for the long term storage of the waste water. Steels with a little copper in it might work better. Plastic coated interiors will work for a while, but eventually the radiation dose will embrittle the plastic and cause it to flake off. They may also want to make sure that they can stir up the waste every once in a while so that concentrations at interfaces get dissipated. The second most readily attacked area of the tanks is the interface with the atmosphere.

On another score. If they inject water sparged with nitrogen into the core, they will start getting nitric acid formation in the gas phase. The nitric acid will begin to acidify the water in the core. It is not clear to me that they have enough buffer solution to stand up to the acidification. They may want to make sure that sparged water is well borated with sodium tetraborate or similar material.

I would expect that if there is precipitated sodium chloride in the vessel bottom, that some fraction of the cesium will ion exchange with sodium in the precipitated sodium chloride. I don't know how much or whether it will significantly reduce the amount of cesium in solution. It should reduce it some. I would expect some ion exchange also with barium and strontium - again, I don't know how much, probably not a lot. Dana

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From: Richard.Lee@nrc.gov
To: danapowers@msn.com; dapower@sandia.gov
Date: Sun, 27 Mar 2011 18:13:53 -0400
Subject: long term storage of wastage

Dana:

BBBB/184

Form your experience with the Hanford Water tanks, is there lesson-learned what to do better from the start so one does not have to go through what DOE did (spending $Bs and none got clean up).

Richard

Relr...

Lee, Richard

From: Lee, Richard
Sent: Sunday, March 27, 2011 10:55 PM
To: Dana Powers
Subject: RE: long term storage of wastage

Dear Dana:

Tomorrow, I will forward these messages to DOE Science Council w/- cc: to you at Sandia.

Richard

From: Dana Powers [danapowers@msn.com]
Sent: Sunday, March 27, 2011 7:28 PM
To: Lee, Richard
Subject: RE: long term storage of wastage

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From: Richard.Lee@nrc.gov
To: danapowers@msn.com; dapower@sandia.gov
Date: Sun, 27 Mar 2011 18:13:53 -0400
Subject: long term storage of wastage

BBBB/ 185

Dana:

Form your experience with the Hanford Water tanks, is there lesson-learned what to do better from the start so one does not have to go through what DOE did (spending $Bs and none got clean up).

Richard

From: OST01 HOC
Sent: Monday, March 28, 2011 2:47 PM
To: Giitter, Joseph
Cc: Evans, Michele; OST02 HOC; OST01 HOC
Subject: RE: Updated ET Response Advisor Schedule for Pay Period 8

Joe,

You have been added to the ERO Staffing Roster in the ET Response Advisor for Thursday, 7am to 3pm.

Tony McMurtray
EST Coordinator

From: Giitter, Joseph
Sent: Monday, March 28, 2011 2:33 PM
To: McDermott, Brian; Miller, Chris; McGinty, Tim; Morris, Scott; Blount, Tom; Thaggard, Mark; Ross-Lee, MaryJane
Cc: Evans, Michele; OST01 HOC
Subject: RE: Updated ET Response Advisor Schedule for Pay Period 8

I can cover the Thursday dayshift since Allen will be back off shift then.

From: McDermott, Brian
Sent: Monday, March 28, 2011 8:19 AM
To: Miller, Chris; McGinty, Tim; Giitter, Joseph; Morris, Scott; Blount, Tom; Thaggard, Mark; Ross-Lee, MaryJane
Cc: Evans, Michele; OST01 HOC
Subject: RE: Updated ET Response Advisor Schedule for Pay Period 8

Everyone - We still have three shifts to fill later in the week – 2 dayshifts and one swing shift. Please check to see if you can fill in. Please reply to the group and OST01.HOC if you are able to cover.

Regarding our plan to reduce staffing, the EDO and DEDOs are working to align on the approach. I am hopeful that we will be able to implement sometime this week.

Thanks,
Brian

From: OST01 HOC
Sent: Monday, March 28, 2011 5:29 AM
To: McDermott, Brian; Miller, Chris; McGinty, Tim; Giitter, Joseph; Morris, Scott; Blount, Tom; Thaggard, Mark
Subject: Updated ET Response Advisor Schedule for Pay Period 8

Hello,

Attached is the most recent schedule for the ET Response Advisor for pay period 8. There have been some changes. Please verify that this information is correct.

Thank you.

EST Coordinator

BBBB/186

Operations Center
301-816-5100

Franovich, Mike

From: Franovich, Mike
Sent: Monday, March 28, 2011 12:06 PM
To: Franovich, Rani
Subject: FW: 50 Mile EPZ justification response

This may have been intended for you. The TAs received the info in a separate e-mail.

From: LIA08 Hoc
Sent: Monday, March 28, 2011 11:58 AM
To: Franovich, Mike; Blount, Tom
Subject: FW: 50 Mile EPZ justification response

For your info. Jeff Temple

From: LIA08 Hoc
Sent: Monday, March 28, 2011 11:56 AM
To: Franovich, Mike; Orders, William; Snodderly, Michael; Castleman, Patrick; Marshall, Michael; Batkin, Joshua; Hipschman, Thomas
Cc: LIA06 Hoc
Subject: FW: 50 Mile EPZ justification response

Attached for your info is an email sent by the Ops Center Liaison Team to Mr. Takashi regarding questions he raised about the 50 mile evacuation recommendation we made for US Citizens in Japan. Please let me know if you have any questions or would like additional information about this.

Jeff Temple
Response Program Manager
Liaison Team/Interagency Response Team/Corporate Support Response Team
301-816-5185

From: LIA03 Hoc
Sent: Monday, March 28, 2011 11:07 AM
To: takashi.inutsuka@mofa.go.jp
Cc: Doane, Margaret; Mamish, Nader; LIA02 Hoc; LIA08 Hoc; Borchardt, Bill; LIA03 Hoc
Subject: 50 Mile EPZ justification response

On behalf of Bill Borchardt, we are responding to your questions:

1. In the NRC NEWS, March 16, 2011, there are attachments of the results of two sets of computer calculations. One, 15 March 2010 02:51am (EDT), has a hypothetical, single-reactor site, 2350 MWt, Boiling Water Reactor. On the other hand, 16 March 2010 12:24pm (EDT), has a hypothetical, four-reactor site. But in these attachments there is no detailed assumption for calculations about
(1) the power and type of reactor for the four-reactor site,
(2) weather, wind direction and speed, and the status of the problem at the reactors (for example: Source Term).

Q1: Are these sentences correct?

A1: These sentences are correct. Although the press release identified one of the computer calculations being based on a hypothetical four-reactor site, the source term used in

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the calculation was the approximate activity available for release from one reactor and two spent fuel pools.

Q2: Have you ever explained these detailed assumptions to the public?

A2: The assumptions have been generally described in press releases, interviews, and congressional testimony.

Q3: Could you explain the relation between the number of Total EDE and 1rem (PAGs)? For example 8.1rem (15 March calculation) and 9.9rem (16 March calculation), 50 mi, and 1rem? Could you also explain the relation between the number of Thyroid CDE and 5rem (PAGs)? For example 23rem (15 March calculation) and 48rem (16 March calculation), 50 mi, and 5rem? Is there no need to calculate this for distances greater than 50 mi?

A3: As stated in the press release, these two computer calculations are hypothetical, rough estimates that would not necessarily characterize an actual release. Although the calculation references have TEDE and CDE doses exceeding PAGs beyond 50 miles, these were only two of several cases run. Given that other cases projected PAG doses less than 50 miles and there would be time to extend our recommendations beyond 50 miles, if necessary, the 50 mile recommendation was considered appropriate to protect US citizens.

2. At the White House Regular Briefing, March 17, 2011, Chairman Jaczko said, "We have a team of 11, some of our best technical experts in Tokyo, and they are working with counterparts from the utility in Tokyo as well as other individuals with the government. So that is one of the sources. We are collecting data from as many places as we can to make the best judgments we can with the information available. But I would stress that this is a very difficult situation. There is often conflicting information. And so we made what we thought was a prudent decision."

Q4: Does this statement accurately reflect the NRC's decisionmaking process that led to the recommendation (50 miles)?

A4: Yes.

Q5: Did NRC have evidence to suggest that radiation levels around Fukushima were higher than what Japanese officials had said?

A5: No. The NRC had very limited radiation level information at this time. The computer calculations and subsequent protective action decisions were based on conservative assumptions based on limited information and the deteriorating state of several reactors and spent fuel pools.

3. At the meeting of NRC, March 21, 2011, you said, "the situation that led to the 50 mile guidance in Japan was based upon what we understood and still believe had existed that there were degraded conditions in two spent-fuel pools at the site and, in all likelihood, some core damage in three of the reactor units. Based on the situation as we understood it at that time, we thought it was prudent to provide the recommendation to the ambassador to evacuate out to 50 miles in Japan."

Q6: Does this statement accurately reflect the NRC's decisonmaking process that led to the recommendation (50 miles)?

A6: Yes.

Q7: There are some differences on the basis for making recommendation between 1. and 3. Could you explain the basis for making the recommendation (50 miles) again?

A7: The comments made by NRC Chairman Jaczko and Mr. Borchardt were consistent in that seriously degrading conditions at several Daiichi units supported a need to take pre-emptive protective action. The computer calculations helped to provide perspective on possible impacts.

Q8: I understand the recommendation is prudent. How do you define "prudent" in the assumptions for your calculations? in the decision about the distance?

A8: Since communications were limited and there was a large degree of uncertainty about plant conditions at the time, it was difficult to accurately assess the radiological hazard. Computer models used meteorological model data appropriate for the Fukushima Daiichi vicinity. Source terms were based on hypothetical, but not unreasonable estimates of fuel damage, containment, and other release conditions. Subsequent modeling can be correlated with the ground deposition as observed in flyover and other monitoring data. Therefore, prudent (reasonable conservative protective actions made with a predictive approach to limit radiation exposure to US citizens) can be substantiated based on the conditions present and the information known at the time.

If you have additional questions please contact Mr. Borchardt at the email address above.

Tracking:

From:	OST01 HOC
Sent:	Monday, March 28, 2011 7:23 PM
To:	Miller, Chris
Cc:	McDermott, Brian
Subject:	RE: Updated ET Response Advisor Schedule for Pay Period 8

Thanks Chris. You are on the schedule for April 9 from 7am-3pm.

Rebecca Stone
EST Coordinator

From: McDermott, Brian
Sent: Monday, March 28, 2011 7:21 PM
To: OST01 HOC
Subject: FW: Updated ET Response Advisor Schedule for Pay Period 8

From: Miller, Chris
Sent: Monday, March 28, 2011 8:30 AM
To: McDermott, Brian
Subject: Re: Updated ET Response Advisor Schedule for Pay Period 8

I could pick up day shift on 4-9.

From: McDermott, Brian
To: Miller, Chris; McGinty, Tim; Giitter, Joseph; Morris, Scott; Blount, Tom; Thaggard, Mark; Ross-Lee, MaryJane
Cc: Evans, Michele; OST01 HOC
Sent: Mon Mar 28 08:18:37 2011
Subject: RE: Updated ET Response Advisor Schedule for Pay Period 8

Everyone - We still have three shifts to fill later in the week – 2 dayshifts and one swing shift. Please check to see if you can fill in. Please reply to the group and OST01.HOC if you are able to cover.

Regarding our plan to reduce staffing, the EDO and DEDOs are working to align on the approach. I am hopeful that we will be able to implement sometime this week.

Thanks,
Brian

From: OST01 HOC
Sent: Monday, March 28, 2011 5:29 AM
To: McDermott, Brian; Miller, Chris; McGinty, Tim; Giitter, Joseph; Morris, Scott; Blount, Tom; Thaggard, Mark
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Hello,

Attached is the most recent schedule for the ET Response Advisor for pay period 8. There have been some changes. Please verify that this information is correct.

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Thank you.

EST Coordinator
Operations Center
301-816-5100

From:	PMT03 Hoc
Sent:	Monday, March 28, 2011 7:55 PM
To:	Hoc, PMT12
Subject:	US Nuclear Plant Reported Measurements 03282011.xlsx
Attachments:	US Nuclear Plant Reported Measurements 03282011.xlsx

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Date	Plant	Isotope	Concentration
3/18/2011	San Onofre	I-131	1.4E-13 uCi/cc
3/18/2011	Diablo Canyon	I-131	3.8 to 6E-13 uCi/cc
3/19/2011	San Onofre	I-131	6.5E-13 to 7.0E-13 uCi/cc
3/19/2011	Palo Verde	Cs-134	2.22E-13 uCi/cc
3/19/2011	Palo Verde	Cs-137	3.58E-13 uCi/cc
3/19/2011	Palo Verde	I-131	1.54E-12 uCi/cc
3/20/2011	San Onofre	I-131	2.0E-12 uCi/cc
3/20/2011	Palo Verde	Cs-134	3.87E-13 uCi/cc
3/20/2011	Palo Verde	I-131	2.50E-12 uCi/cc
3/21/2011	Nine Mile Point	I-131	19.1 pCi/L (rainwater)
3/21/2011	Palo Verde	I-131	6.70E-13 uCi/cc
3/21/2011	Palo Verde	Cs-134	2.06E-13 uCi/cc,
3/21/2011	Palo Verde	Cs-137	2.71E-13 uCi/cc
3/22/2011	San Onofre	I-131	7.0 to 8.0E-13 uCi/cc
3/22/2011	San Onofre	Cs-137	1.25E-13 uCi/cc
3/22/2011	Columbia	I-131	6.74E-13 uCi/cc
3/22/2011	Nine Mile Point	I-131	18 pCi/L (rainwater)
3/22/2011	Ginna	I-131	26.8 pCi/L (rainwater)
3/22/2011	Palo Verde	I-131	2.01E-12 uCi/cc
3/22/2011	Palo Verde	Cs-137	2.93E-13 uCi/cc
3/22/2011	Palo Verde	Cs-134	2.76E-13 uCi/cc
3/23/2011	Millstone	I-131	25.6 pCi/L (rainwater)
3/23/2011	San Onofre	I-131	5E-13 to 6E-13 uCi/cc
3/23/2011	San Onofre	Cs-137	7E-14 uCi/cc
3/23/2011	Palo Verde	I-131	7.42E-13 uCi/cc
3/23/2011	TMI	I-131	95 pCi/L (rainwater)
3/24/2011	Palo Verde	I-131	6.30E-13 uCi/cc
3/24/2011	Oyster Creek	I-131	127 pCi/L (rainwater)
3/24/2011	San Onofre	I-131	3.0E-13 to 6.0E-13 uCi/cc
3/24/2011	Limerick	I-131	47 pCi/L (rainwater)
3/25/2011	South Texas	I-131	2.6E-13 uCi/cc
3/25/2011	San Onofre	I-131	9.0E-13 to 1E-12 uCi/cc
3/25/2011	San Onofre	Cs-137	1E-13 to 3E-13 uCi/cc
3/25/2011	Palo Verde	I-131	1.25E-12 uCi/cc
3/25/2011	Palo Verde	Cs-134	3.50E-13 uCi/cc
3/25/2011	Palo Verde	Cs-137	2.62E-13 uCi/cc
3/26/2011	Palo Verde	I-131	5.561E-13 uCi/cc
3/27/2011	Palo Verde	I-131	2.2181E-13 uCi/cc
3/27/2011	San Onofre	I-131	2E-13 to 3E-13 uCi/cc
3/28/2011	Beaver Valley	I-131	14.98 pCi/L (standing water)
3/28/2011	San Onofre	I-131	2.0 to 3E-13 uCi/cc

I-131 Reporting Levels
NUREG-1301 and NUREG-1302

	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/m3	9.00E-13	uCi/cc

from 2E-13 to 3E-13 microcuries/cc

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From: LIA07 Hoc
Sent: Tuesday, March 29, 2011 6:35 PM
To: Borchardt, Bill; Bradford, Anna; Cohen, Shari; Collins, Elmo; Cooper, LaToya; Dyer, Jim; ET07 Hoc; Flory, Shirley; Gibbs, Catina; Haney, Catherine; Hudson, Sharon; Jaczko, Gregory; Johnson, Michael; Leeds, Eric; Loyd, Susan; Pace, Patti; Schwarz, Sherry; Sheron, Brian; Speiser, Herald; Sprogeris, Patricia; Taylor, Renee; Virgilio, Martin; Walker, Dwight; Walls, Lorena; Weber, Michael
Subject: Go Book Update - 1800 EDT, March 29, 2011
Attachments: TEPCO Press Release 211.pdf; TEPCO Press Release 208.pdf; TEPCO Press Release 209.pdf; TEPCO Press Release 210.pdf; ET Chronology 3-29-11 1500.pdf; March 29 1500 EDT one pager .docx; USNRC Earthquake-Tsunami Update.032911.1800EDT.pdf

Attached, please find updated information for the "Go Books".

The updates include:

- The 1800 EDT, 03/29/11 Status Update
- The latest ET Chronology
- The latest "One Pager" (1500 EDT, 03/29/11)
- TEPCO Press Releases (208-211)

Please let me know if you have any questions or concerns.

-Sara

Sara Mroz
Communications and Outreach
Office of Nuclear Security & Incident Response
US Nuclear Regulatory Commission
Sara.Mroz@nrc.gov
LIA07.HOC@nrc.gov (Operations Center)

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Search

Press Releases

Press Release (Mar 29,2011)
Status of TEPCO's Facilities and its services after the Tohoku-Taiheiyou-Oki Earthquake (as of 4:00PM)

Due to the Tohoku-Taiheiyou-Oki Earthquake which occurred on March 11th 2011, TEPCO's facilities including our nuclear power stations have been severely damaged. We deeply apologize for the anxiety and inconvenience caused.

Below is the status of TEPCO's major facilities.
*new items are underlined

[Nuclear Power Station]
Fukushima Daiichi Nuclear Power Station:
Units 1 to 3: shutdown due to the earthquake
(Units 4 to 6: outage due to regular inspections)

*The national government has instructed the public to evacuate for those local residents within 20km radius of the site periphery and to evacuate voluntarily for those local residents between 20km and 30km radius of the site periphery.

*Off-site power was connected to Unit 1 to 6.

*Unit 1
-The explosive sound and white smoke was confirmed near Unit 1 when the big quake occurred at 3:36pm, March 12th.
-We started injection of sea water at 8:20 pm, March 12th, and then boric acid which absorbs neutron into the reactor afterwards.
-At approximately 2:30 am, March 23rd, we started the injection of sea water into the reactor from feed water system. After that, the injection of freshwater was started from 3:37 pm on March 25th (switched from the seawater injection). At 8:32 am, Mar 29th, transfer from the fire fighting pump to a temporary motor driven pump was made.
-At approximately 10:50 am on March 24th, white smoke was confirmed arising from the top of the reactor building.
-At approximately 11:30 am, March 24th, lights in the main control room were restored.

*Unit2
-At 1:25 pm, March 14th, since the Reactor Core Isolation Cooling System has failed, it was determined that a specific incident stipulated in Clause 1, Article 15 of Act on Special Measures Concerning Nuclear Emergency Preparedness occurred (failure of reactor cooling function). At 5:17 pm, March 14th, while the water level in the reactor reached the top of the fuel rod, we have restarted the water injection with the valve operation.
-At approximately 6:14 am, March 15th, the abnormal sound was confirmed near the suppression chamber and the pressure inside the chamber decreased afterwards. It was determined that there is a possibility that something happened in the suppression chamber. While sea water injection to the reactor continued, TEPCO employees and workers from other companies not in charge of injection work started tentative evacuation to a safe location.
Sea water injection to the reactor continued.
-On March 18th, power was delivered up to substation for backup power through offsite transmission line. We completed laying cable further to unit receiving facility in the building, and at 3:46 pm, March 20th the load-side power panel of the receiving facility started to be energized.
-From 3:05 pm to 5:20 pm on March 20th, about 40 tons of seawater was injected into Unit 2 by TEPCO employees.
-At approximately 6:20 pm on March 21st, white smoke was confirmed arising from the top of the reactor building. As of 7:11 am on March 22nd, smoke decreased to the level where we could hardly confirm.
-From around 4 pm to 5 pm on March 22nd, approximately 18 tons of sea water was injected into the spent fuel pool by TEPCO employees.
-From 10:30 am on March 25th, seawater injection through Fuel Pool Cooling

and Filtering System was initiated. The work finished at 0:19 pm on March 25th.
-From 10:10 am on March 26th, freshwater (with boric acid) injection was initiated. (switched from the seawater injection) At 06:31pm, Mar 27th, transfer from the fire fighting pump to a temporary motor driven pump was made.
-At approximately 4:46 pm, March 26th, lights in the main control room were restored.

*Unit 3
-At 6:50 am, March 14th, while water injection to the reactor was under operation (injection of boric acid was done on Mar 13th), the pressure in the reactor containment vessel increased to 530 kPa. As a result, at 7:44 am, it was determined that a specific incident stipulated in article 15, clause 1 occurred (abnormal increase of the pressure of reactor containment vessel). Afterwards, the pressure gradually decreased (as of 9:05 am, 490 kPa).
-At approximately 11:01 am, March 14th, an explosion followed by white smoke occurred near Unit 3. 4 TEPCO employees and 3 workers from other companies (all of them were conscious) sustained injuries and were taken to the hospital by ambulances.
-As the temperature of water in the spent fuel pool rose, spraying water by helicopters with the support of the Self Defense Force was considered. However the operation on March 16th was cancelled.
-At 6:15 am, March 17th, the pressure of the Suppression Chamber temporarily increased, but currently it is stable within a certain range. On March 20th, we were preparing to implement measures to reduce the pressure of the reactor containment vessel (partial discharge of air containing radioactive material to outside) in order to fully secure safety. However, at present, it is not a situation to immediately implement measures and discharge air containing radioactive material to outside. We will continue to monitor the status of the pressure of the reactor containment vessel.
-In order to cool spent fuel pool, water was sprayed by helicopters on March 17th with the cooperation of Self-Defense Forces.
-At approximately past 7:00 pm, March 17th, Self-Defense Forces and the police started spraying water by water cannon trucks upon our request for the cooperation. At 8:09 pm, March 17th, they finished the operation.
-At 2:00 pm, March 18th, spraying water by fire engines was started with the cooperation of Self-Defense Forces and the United States Armed Forces. At 2:45 pm, March 18th, the operation was finished.
-At approximately 12:30 am, March 19th, spraying water was started with the cooperation of Fire Rescue Task Forces of Tokyo Fire Department. At approximately 1:10 am, March 19th, the operation was finished. They resumed spraying water at 2:10 pm and finished at approximately 3:40 am, March 20th.
-At approximately 9:30 pm, March 20th, spraying water was started with the cooperation of Fire Rescue Task Forces of Tokyo Fire Department. At approximately 3:58 am, March 21th, they the operation was finished.
-At approximately 3:55 pm, March 21st, light gray smoke was confirmed arising from the southeast side of the 5th floor roof of the Unit 3 building. The situation was reported to the fire department at approximately 4:21 pm. The parameters of reactor pressure vessel, reactor containment vessel, and monitored environmental data remained stable without significant change. However, employees working around Unit 3 evacuated to a safe location. On March 22nd, the color of smoke changed to somewhat white and it is slowly dissipating.
-At approximately 3:10 pm on March 22nd, spraying water to Unit 3 by Tokyo Fire Department's Hyper Rescue and Osaka City Fire Department was conducted, and completed at approximately 4:00 PM on the same day.
-At approximately 10:45 pm on March 22nd, lights in the main control room were restored.
-At 11:00 am on March 23rd, the injection of sea water to spent fuel pool was conducted, and finished approximately at 1:20 pm on the same day.
-At 4:20 pm on March 23rd, light gray smoke was observed belching from Unit 3 building. The situation was reported to the fire department at 4:25 pm on March 23rd. The parameters of the reactor, the reactor containment vessel of Unit 3, and monitored figures around the site's immediate surroundings remained stable without significant change. To be safe, workers in the main control room of Unit 3 and around Unit 3 evacuated to a safe location. At approximately 11:30 pm on March 23rd and 4:50 am on March 24th, TEPCO employees confirmed the smoke has disappeared. Accordingly, workers evacuation was lifted.
-From approximately 5:35 am on March 24th, sea water injection through Fuel Pool Cooling and Filtering System was initiated, and finished at approximately 4:05 pm on the same day.
-From 1:28 pm on March 25th, Hyper Rescue team started water spray. The work finished at 4:00 pm on March 25th.
-From 6:02 pm on March 25th, the injection of freshwater to the reactor was started (switched from the seawater injection). At 8:30 pm on March 28th, the injection of fresh water is switched to temporary electricity pumps from the fire engine pumps.
-At approximately 12:34pm March 27th , the injection of water by the concrete pump truck was started. At approximately 2:36 pm, March 27th, the operation was finished.
-At approximately 2:17pm March 29th, the injection of fresh water by the concrete pump truck was started. (Sea water had been injected so far and

transfer from seawater to freshwater was made)

* Unit 4
-At approximately 6:00 am, March 15th, an explosive sound was heard and the damage in the 5th floor roof of Unit 4 reactor building was confirmed. At 9:38 am, the fire near the north-west part of 4th floor of Unit 4 reactor building was confirmed. At approximately 11:00 am, TEPCO employees confirmed that the fire was out.
-At approximately 5:45 am on March 16th, a TEPCO employee discovered a fire at the northwest corner of the Nuclear Reactor Building. TEPCO immediately reported this incident to the fire department and the local government and proceeded with the extinction of fire. At approximately 6:15 am, TEPCO staff confirmed at the site that there are no signs of fire.
-At approximately 8:21 am on March 20th, spraying water by fire engines was started with the cooperation of Self-Defense Forces and they finished the operation at approximately 9:40 am. At approximately 6:45 pm spraying water was started by Self-Defenses' water cannon trucks and finished at approximately 7:45 pm.
-At approximately 6:30 am, March 21st, spraying water by fire engines was started with the cooperation of Self-Defense Forces and the United States Armed Forces. At approximately 8:40 am, March 21, they had finished the operation.
-On March 21st, cabling has been completed from temporary substation to the main power center.
-From approximately 5:20 pm on March 22nd, spraying water from the concrete pumping vehicle was conducted and ended at approximately 8:30 pm on the same day.
-From approximately 10:00 am on March 23rd, spraying water from the concrete pumping vehicle was conducted and ended at approximately 1:00 pm on the same day.
-From approximately 2:35 pm on March 24th, spraying water by the concrete pumping vehicle was conducted and ended at approximately 5:30 pm on the same day.
-From 6:05 am on March 25th, seawater injection through Fuel Pool Cooling and Filtering System was initiated and finished at approximately 10:20 am on the same day.
-From 7:05 pm on March 25th, water spray by the concrete pumping vehicle was started and finished at 10:07 pm on March 25th.
-From 4:55 pm on March 27th, water spray by the concrete pumping vehicle was started and finished at 7:25 pm on March 27th.
-At approximately 11:50 am on March 29th, lights in the main control room were restored.

*Unit 5 and 6
-At 5 am on March 19th, we started the Residual Heat Removal System Pump (C) of Unit 5 in order to cool the spent fuel pool. At 10:14 pm, we started the Residual Heat Removal System Pump (B) of Unit 6 in order to cool the spent fuel pool.
-Unit 5 has been in reactor cold shutdown since 2:30 pm on March 20th. Unit 6 has been in reactor cold shutdown since 7:27 pm on March 20th.
-At Units 5 and 6, in order to prevent hydrogen gas from accumulating within the buildings, we have made three holes on the roof of the reactor building for each unit.
-At approximately 5:24 pm on March 23rd, the temporary Residual Heat Removal System Seawater Pump automatically stopped when its power source was switched. We restarted the pump at around 4:14 pm, March 24th, and resumed cooling of reactor at around 4:35 pm.

*On March 18th, regarding the spent fuel in the common spent fuel pool, we have confirmed that the water level of the pool is secured. At around 10:37 am March 21st, water spraying to common spent fuel pool and finished at 3:30 pm. At around 6:05 pm, fuel pool cooling pump was started to cool the pool.
  *common spent fuel pool: a spent fuel pool for common use set in a separate building in a plant site in order to preserve spent fuel which are transferred from the spent fuel pool in each Unit building.

*On March 17th, we patrolled buildings for dry casks and found no signs of abnormal situation for the casks by visual observation. A detailed inspection is under preparation.
  *dry cask: a measure to store spent fuel in a dry storage casks in storages. Fukushima Daiichi Nuclear Power Station started to utilize the measure from August 1995.

* In total 13 fire engines are lent for spraying water to the spent fuel pools and water injection to the nuclear reactors by various regional fire departments* as well as Tokyo Fire Department. Also, instruction regarding the setting and operation of large scale decontamination system was provided.

* On March 21st, 23rd to 28th, we detected technetium, cobalt, iodine, cesium, tellurium, barium, lanthanum and molybdenum from the seawater around discharge canal of Unit 1, 2, 3 and 4.

* On March 20th, 21st, 23rd to 28th, we detected iodine, cesium, tellurium and ruthenium in the air collected at the site of Fukushima Daiichi

Nuclear Power Station.

* Plutonium has detected from the sample of soil at the site of Fukushima Daiichi Nuclear Power Station collected on 21st and 22nd of March, Concentration level of Plutonium detected was same as that of under usual environment and it is thought not to be harmful to human health. We will strengthen environmental monitoring of power station and surrounding environment.

* On March 28th, we detected radioactive materials contained in the puddles found in the turbine building of Unit 1 to 4.

* At approximately 3:30 pm, March 27th, we found water pooling in the vertical shaft of the trench outside of the turbine buildings for Units 1 to 3. The radiation dose at the surface of the water amounted 0.4 mSv/h in Unit 1 and over 1,000 mSv/h in Unit 2. We could not confirm the amount of the radiation dose in Unit 3. We will keep observing the condition of the water in the vertical shaft.

* At 12:03 pm, March 29th, when taking off the flange of the pipe to remove the residual heat in the seawater system, 3 workers from other companies received water in the pipe. Mopping up water, we confirmed no radioactive material had adhered to their bodies.

*We will continuously endeavor to securing safety, and monitoring of the surrounding environment.

Fukushima Daini Nuclear Power Station:
Units 1 to 4: shutdown due to the earthquake
* The national government has instructed evacuation for those local residents within 10km radius of the periphery.

* In order to achieve cold shutdown, reactor cooling function was restored and cooling of reactors was conducted. As a result, all reactors achieved cold shutdown: Unit 1 at 5:00 pm, March 14th, Unit 2 at 6:00 pm, March 14th, Unit 3 at 0:15 pm, March 12th, Unit 4 at 7:15 am, March 16th.

*Since March 12th, we had been preparing measures for reducing the pressure of reactor containment vessels (partial discharge of air containing radioactive materials to outside), but on March 17th, we stopped such preparation in all Units.

* (Unit 1)
As it is confirmed that the temperature of the Emergency Equipment Cooling Water System *1 has increased, at 3:20 pm, March 15th, we stopped the Residual Heat Removal System (B) for the inspection. Subsequently, failure was detected in the power supply facility associated with the pumps of the Emergency Equipment Cooling Water System. At 4:25 pm, March 15th, after replacing the power facility, the pumps and the Residual Heat Removal System (B) have been reactivated.

* (Unit 4)
As it is confirmed that the pressure at the outlet of the pumps of the Emergency Equipment Cooling Water System*1 has been decreased, at 8:05 pm, March 15th, we stopped the Residual Heat Removal System (B) for the inspection. Subsequently, failure was detected in the power supply facility associated with the pumps of the Emergency Equipment Cooling Water System. At 9:25 pm, March 15th, after replacing the relevant facility, the pumps and the Residual Heat Removal System (B) have been reactivated.

*1:emergency water system in which cooling water (pure water) circulates which exchanged the heat with sea water in order to cool down bearing pumps and/or heat exchangers etc.

Kashiwazaki Kariwa Nuclear Power Station:
Units 1, 5, 6, 7: normal operation
(Units 2 to 4: outage due to regular inspection)

[Thermal Power Station]
-Hirono Thermal Power Station Units 2 and 4: shutdown due to the earthquake
-Hitachinaka Thermal Power Station Unit 1: shutdown due to the earthquake
-Kashima Thermal Power Station Units 2, 3, 5, 6: shutdown due to the earthquake

[Hydro Power Station]
-All the stations have been restored.
(Facilities damaged by the earthquake are now being repaired in a timely manner.)

[Transmission System, etc.]
-All substation failed due to the earthquake have been restored.
(Facilities damaged by the earthquake are now being repaired in a timely manner.)

[Power Supply to TEPCO's Service Areas]
-Except in case of planned rolling blackouts, we can supply electricity to

our all service areas.

[Supply and Demand Status within TEPCO's Service Area to Secure Stable Power Supply]
-Considering the critical balance of our power supply capacity and expected power demand forward, in order to avoid unexpected blackout, TEPCO has been implementing rolling blackout (planned blackout alternates from one area to another) since Mar 14th. We will make our utmost to secure the stable power supply as early as possible. For customers who will be subject to rolling blackout, please be prepared for the announced blackout periods. Also for customers who are not subject to blackouts, TEPCO appreciates your continuous cooperation in reducing electricity usage by avoiding using unnecessary lighting and electrical equipment.

[Others]
-Please do NOT touch cut-off electric wires.
-In order to prevent fire, please make sure to switch off the electric appliances such as hair driers when you leave your house.
-For the customer who has in-house power generation, please secure fuel for generator.

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Press Releases

Press Release (Mar 29,2011)
Plant Status of Fukushima Daini Nuclear Power Station (as of 9:00 pm March 29th)

[No update from the last release issued at 3:00 pm, March 29th]

Unit	Status
1	· Reactor cold shutdown, stable water level, offsite power is available. · No reactor coolant is leaked to the reactor containment vessel. · Maintain average water temperature below 100°C in the Pressure Suppression Chamber.
2	· Reactor cold shutdown, stable water level, offsite power is available. · No reactor coolant is leaked to the reactor containment vessel. · Maintain average water temperature below 100°C in the Pressure Suppression Chamber.
3	· Reactor cold shutdown, stable water level, offsite power is available. · No reactor coolant is leaked to the reactor containment vessel. · Maintain average water temperature below 100°C in the Pressure Suppression Chamber.
4	· Reactor cold shutdown, stable water level, offsite power is available. · No reactor coolant is leaked to the reactor containment vessel. · Maintain average water temperature below 100°C in the Pressure Suppression Chamber.
Other	N.A.

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Press Releases

Press Release (Mar 29,2011)
Plant Status of Fukushima Daiichi Nuclear Power Station (as of 8:00 PM Mar 29th)

*Updates are underlined

All 6 units of Fukushima Daiichi Nuclear Power Station have been shut down.

Unit 1(Shut down)
-Explosive sound and white smoke were confirmed after the big quake occurred at 3:36 pm Mar 12th. It was assumed to be hydrogen explosion.
-At approximately 2:30 am on March 23rd, seawater injection to the nuclear reactor through the feed water system was initiated.
-At approximately 10:50 am on March 24th, white fog-like steam arising from the roof part of the reactor building was observed.
-At approximately 11:30 am on March 24th, lights in the main control room was restored.
-We had been injecting seawater into the reactor, but from 3:37 pm on March 25th, we started injecting freshwater.
-At 8:20 am on March 29th, we switched injection of fresh water from using fire engine to temporary electrical pump.

Unit 2(Shut down)
-At approximately 6:00 am on March 15th, an abnormal noise began emanating from nearby Pressure Suppression Chamber and the pressure within the chamber decreased.
-At 6:20 pm on March 21st, white smoke was confirmed arising from the top of the reactor building. As of 7:11 am on March 22nd, smoke decreased to the level to nearly non-existent.
-We have been injecting seawater into the reactor, but from 10:10 am on March 26th, we started injecting fresh water (with boric acid).
-At approximately 4:46 pm on March 26th, the light in the main control room was restored.
-We had been injecting fresh water in to the reactor utilizing fire pump, however, we switched over to utilizing temporary electrical pump from 6:31 pm on March 27th.

Unit 3(Shut down)
-Explosive sound and white smoke were confirmed at 11:01am March 4th. It was assumed to be hydrogen explosion.
-At 8:30am on March 16th, fog like steam was confirmed arising from the reactor building.
-At approximately 6:15 am on March 17th the pressure of the Suppression Chamber has temporarily increased. We were preparing to implement measures to reduce the pressure of the reactor containment vessel (partial discharge of air containing radioactive material to outside) in order to fully secure safety. However, at present, it is not a situation to immediately implement measures and discharge air containing radioactive material to outside. We will continue to monitor the status of the pressure of the reactor containment vessel.
-At approximately 4:00 pm, March 21st, light gray smoke was confirmed arising from the floor roof of the Unit 3 building. On March 22nd, the color of smoke changed to somewhat white and it is slowly dissipating.
-At approximately 10:45 pm on March 22nd, the light in the main control room was turned on.
-At around 4:20 pm on March 23rd, our staff confirmed light black smoke belching from the Unit 3 building. At approximately 11:30 pm on March 23rd and 4:50 am on March 24th, our employee found no signs of smoke.
-We had been injecting sea water into the reactor pressure vessel, but from 6:02 pm on March 25th, we started injecting freshwater.
-We had been injecting fresh water in to the reactor utilizing fire pump, however, we switched over to utilizing temporary electrical pump from 8:30 pm on March 28th.

Unit 4 (outage due to regular inspection)
-At approximately 6 am on March 15th, we confirmed the explosive sound and the sustained damage around the 5th floor rooftop area of the Nuclear

Reactor Building.
-On March 15th and 16th, we respectively confirmed the outbreak of fire at the 4th floor of the northwestern part of the Nuclear Reactor Building. We immediately reported this matter to the fire department and the related authorities. TEPCO employees confirmed that each fire had already died down by itself.
-At this moment, we do not consider any reactor coolant leakage inside the reactor happened.

Unit 5 (outage due to regular inspection)
-Sufficient level of reactor coolant to ensure safety is maintained.
-At 5 am, March 19th, we started the Residual Heat Removal System Pump (C) in order to cool the spent fuel pool.
-At 2:30 pm, March 20th, the reactor achieved reactor cold shutdown. At around 5:24 pm on March 23rd, when we switched the temporary Residual Heat Removal System Seawater Pump, it has stopped automatically. At around 4:14 pm, March 24th we replaced the pump, and restarted cooling of reactor at around 4:35 pm.
-At this moment, we do not consider any reactor coolant leakage inside the reactor happened.

Unit 6 (outage due to regular inspection)
-Sufficient level of reactor coolant to ensure safety is maintained.
-We completed the repair work on the emergency diesel generator (A).
-At 10:14 pm, March 19th, we started the Residual Heat Removal System Pump (B) of Unit 6 in order to cool the spent fuel pool.
-At 7:27 pm, March 20th, the reactor achieved reactor cold shutdown.
-In relation to the two seawater side pumps of the Residual Heat Removal System, we switched the power source from temporary to permanent at 3:38 PM and 3:42PM, Mar 25 respectively.
-At this moment, we do not consider any reactor coolant leakage inside the reactor happened.

Today's work for cooling the spent fuel pools
-From 2:17pm to 6:18pm, March 29th, water was injected into Unit 3 from a concrete pumping vehicle. Until March 28th, we had been injecting sea water, however, from March 29th, we started injecting fresh water.
-At Unit 2, seawater had been injected from the fire fighting pump, but at 4:30pm, March 29th, we started injecting fresh water from a temporary motor driven pump instead. The water was injected until 6:25pm, March 29th.
-We are considering further spraying subject to the conditions of spent fuel pools.

Casualty
-Presence of 2 TEPCO employees at the site is not confirmed on March 11th.
-On March 24th, it was confirmed that 3 workers from cooperative companies who were in charge of cable laying work in the 1st floor and the underground floor of turbine building were exposed to the radiation dose of more than 170 mSv. 2 of them were confirmed that their skins on legs were contaminated. After they were decontaminated, since there was a possibility of beta ray burn injury, they were transferred to Fukushima Medical University Hospital. The third worker was also transferred to Fukushima Medical University Hospital on March 25th. Later, the 3 workers were transferred to National Institute of Radiological Sciences in Chiba Prefecture. They all left the hospital on March 28th.
Regarding this event, TEPCO has reported to the related government ministries and agencies on measures to be taken to assure appropriate radiation dose control and radiation exposure related operations.
We will inform the related parties of countermeasures and continue to take all possible measures to future management.

Others
-We measured radioactive materials (iodine etc.) inside of the nuclear power station area (outdoor) by monitoring car and confirmed that radioactive materials level is getting higher than ordinary level. As listed below, we have determined that specific incidents stipulated in article 15, clause 1 of Act on Special Measures Concerning Nuclear Emergency Preparedness (Abnormal increase in radiation dose measured at site boundary) have occurred.
·Determined at 4:17 pm Mar 12th (Around Monitoring Post 4)
·Determined at 8:56 am Mar 13th (Around Monitoring Post 4)
·Determined at 2:15 pm Mar 13th (Around Monitoring Post 4)
·Determined at 3:50 am Mar 14th (Around Monitoring Post 6)
·Determined at 4:15 am Mar 14th (Around Monitoring Post 2)
·Determined at 9:27 am Mar 14th (Around Monitoring Post 3)
·Determined at 9:37 pm Mar 14th (Around main entrance)
·Determined at 6:51 am Mar 15th (Around main entrance)
·Determined at 8:11 am Mar 15th (Around main entrance)
·Determined at 4:17 pm Mar 15th (Around main entrance)
·Determined at 11:05 pm Mar 15th (Around main entrance)
·Determined at 8:58 am Mar 19th (Around MP5)
From now on, if the measured figure fluctuates and goes above and below 500 micro Sv/h, we deem that as the continuous same event and will not regard that as a new specific incidents stipulated in article 15, clause 1 of the Act on Special Measures Concerning Nuclear Emergency Preparedness (Abnormal increase in radiation dose measured at site

boundary) has occurred. In the interim, if we measure a manifestly abnormal figure and it is evident that the event is not the continuous same event, we will determine and notify.

-The national government has instructed evacuation for those local residents within 20km radius of the periphery and evacuation to inside for those residents from 20km to 30km radius of the periphery, because it is possible that radioactive materials are discharged.
-At around 10:37 am March 21st, water spraying to common spent fuel pool and finished at 3:30 pm (conducted by TEPCO).
-At around 3:37 pm, March 24th, electricity supply to common spent fuel pool has started from external power source. At around 6:05 pm, fuel pool cooling pump was started to cool the pool.
-We found no signs of abnormal situation for the casks by visual observation during the patrol activity. A detailed inspection is under preparation.
-At Units 5 and 6, in order to prevent hydrogen gas from accumulating within the buildings, we have made three holes on the roof of the reactor building for each unit.
-In total 12 fire engines are lent for the water spraying to the spent fuel pools and water injection to the nuclear reactors by various regional fire departments* as well as Tokyo Fire Department. Also, instruction regarding the setting and operation of large scale decontamination system was provided by Niigata City Fire Headquarter and Hamamatsu City Fire Headquarter.
*: Koriyama Fire Department, Iwaki Fire Brigade Headquarters, Fire Headquarters of Sukagawa District Wide Area Fire-fighting Association, Yonezawa City Fire Headquarters, Utsunomiya City Fire Headquarters, Fire Headquarters of Aizu-Wakamatsu wide area municipal association, Saitama City Fire Bureau, and Niigata City Fire Bureau.
-By March 22nd, Units 1 through 6 were started to be energized from the external power source.
-At 3:30PM, March 27th, we found that there was water in the trenches of Units 1 to 3. The radioactive emission at the surface of the water was 0.4mSv/h for Unit 1 and over 1,000mSv/h for Unit 2. As for Unit 3, we couldn't have access to the surface because of debris. We will continue to monitor water in the trenches.
-We will continue to take all measures to ensure the safety and to continue monitoring the surrounding environment around the Power Station.

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