



# **Country Waste Profile Report for JAPAN Reporting Year: 2007**

*For guidance on reading Country Waste Profile Reports,  
please refer to the following internet based document:*

*<http://www-newmdb.iaea.org/help/profiles9/guide.pdf>*

*For further information, please contact the Responsible Officer via e-mail:  
[NEWMDB@IAEA.org](mailto:NEWMDB@IAEA.org)*

## Waste Classification Schemes

Country: JAPAN

Reporting Year: 2007

Waste Class Matrix: **IAEA Def.**

This country does use the IAEA Scheme: No

Description: The Agency's standard matrix

Waste Class Name	Distribution %		
	LILW-SL	LILW-LL	HLW
LILW-SL	100.0	0.0	0.0
LILW-LL	0.0	100.0	0.0
HLW	0.0	0.0	100.0

Waste Class Matrix: **JP**

Description: Radioactive waste is classified into two categories, namely HLW (liquid waste generated from spent fuel reprocessing and its vitrified package) and other LLW. Reported % for LLW is only applicable to disposal packages and will be updated in a future submission. Please refer to the comment that is included for this matrix.

Waste Class Name	Distribution %		
	LILW-SL	LILW-LL	HLW
HLW	0.0	0.0	100.0
LLW	100.0	0.0	0.0

Comment **# 12115: Waste classification in Japan**

Radioactive waste other than HLW is usually called as LLW (ie. based on exclusion). Therefore, LLW includes items ranging from very low activity waste from hospitals and universities up to highly active waste such as ion exchange resins from reactor water clean up systems, irradiated reactor core components and some LLW containing transuranic nuclides (so-called TRU waste) which is to be disposed of geologically. The LLW has been sub-classified according to origin (differing radionuclide composition) and level of radioactivity in the development of waste management policy. Waste origin information is supplied according to the %distribution in Waste Data component of the NEWMDB,

## Waste Classification Schemes

Country: JAPAN

Reporting Year: 2007

**Waste Class Matrix: DISPOSAL**
**Description:**

Disposal-based classification from the Framework for Nuclear Energy Policy (October 11, 2005) decided by Japan Atomic Energy Commission (AEC). Clearance may be regarded but omitted here.

% of "Geological" class is based on future disposal package generation (HLW glass packages and some waste from reprocessing and MOX fuel fabrication those are subjected to the geological disposal). % of "Sub-surface with EBS" class (all LILW-LL) is ad-hoc and controversial.

Waste Class Name	Distribution %		
	LILW-SL	LILW-LL	HLW
Geological	0.0	78.0	22.0
Sub-surface with EBS	0.0	100.0	0.0
Near-surface with EBS	100.0	0.0	0.0
Near-surface without EBS	100.0	0.0	0.0

**Comment # 12127: Disposal-based classification**

In the Framework for Nuclear Energy Policy (October 11, 2005) decided by Japan Atomic Energy Commission (AEC), radioactive waste is grouped into two categories: a) radioactive wastes for geological disposal, and b) radioactive wastes for disposal with institutional control. Methods of disposal with institutional control include: b-1) near-surface disposal without engineered barriers, b-2) near-surface disposal with engineered barriers, and b-3) sub-surface disposal with engineered barriers.

The Framework for Nuclear Energy Policy (October 11, 2005, AEC) is available from:  
[http://aec.jst.go.jp/jicst/NC/tyoki/taikou/kettei/eng\\_ver.pdf](http://aec.jst.go.jp/jicst/NC/tyoki/taikou/kettei/eng_ver.pdf)  
 (see §2-3. Treatment and Disposal of Radioactive Waste)

**Definition of «unprocessed waste» and «processed waste»:**

This country uses the following definitions:

	as-generated waste	processed for handling	processed for storage	processed for disposal
Unprocessed means:	x	x	x	
Processed means:				x

## Groups Overview

Country: JAPAN

Reporting Year: 2007

<b>Reporting Group:</b>	<b>disposal</b>
Inventory Reporting Date:	March 2008
Waste Matrix Used:	DISPOSAL
Description:	repository

Site Name	Facility Name	Facilities Defined		
JAEA Tokai	VLLW			disposal
NUMO	HLW			disposal
Rokkasho	LLWDC-1			disposal
	LLWDC-2			disposal

<b>Reporting Group:</b>	<b>foreign</b>
Inventory Reporting Date:	March 2008
Waste Matrix Used:	JP
Description:	Sites in Other Countries (No information reported according to the NEWMDB instruction. This Reporting Group only means that some waste to be returned are stored in foreign countries.)
Comment	<p><b># 12130: Reprocessing in Overseas</b></p> <p>Utilities in Japan have concluded reprocessing contracts with British and French companies for a total of 5,600 t U of spent fuel from light water reactors and 1,500 t U of spent fuel from a gas cooled reactor.</p> <p>Uranium and Plutonium recovered from reprocessing of spent fuel are returned to each Japanese company as recycled nuclear fuel. At the same time, radioactive waste, a byproduct of reprocessing, is also returned.</p>

<b>Reporting Group:</b>	<b>JAEA</b>
Inventory Reporting Date:	March 2008
Waste Matrix Used:	JP
Description:	<p>Japan Atomic Energy Agency</p> <p>Note: Japan Atomic Energy Agency (JAEA) has newly established with the integration of Japan Atomic Energy Research Institute (JAERI) and Japan Nuclear Cycle Development Institute (JNC) as of October 1, 2005.</p> <p>Waste Data is consolidated to the "All JAEA" site.</p>

Site Name	Facility Name	Facilities Defined		
ALL JAEA	all JAEA	processing	storage	

## Groups Overview

Country: JAPAN

Reporting Year: 2007

<b>Reporting Group:</b>	<b>JNFL</b>
Inventory Reporting Date:	March 2008
Waste Matrix Used:	JP
Description:	Japan Nuclear Fuel Limited (JNFL)

Site Name	Facility Name	Facilities Defined		
Rokkasho	REP	processing	storage	
	UEP		storage	
	VWSC		storage	

<b>Reporting Group:</b>	<b>JRIA</b>
Inventory Reporting Date:	March 2008
Waste Matrix Used:	JP
Description:	Japan Radioisotope Association (JRIA)

Site Name	Facility Name	Facilities Defined		
RIWM	RWM(RI)	processing	storage	

<b>Reporting Group:</b>	<b>U Fuel Fab</b>
Inventory Reporting Date:	March 2008
Waste Matrix Used:	JP
Description:	Uranium Fuel Fabrication
	Waste Data is consolidated to the "All FFP" (all fuel fabrication plant) site.

Site Name	Facility Name	Facilities Defined		
All FFP	all FFP	processing	storage	

<b>Reporting Group:</b>	<b>Utilities</b>
Inventory Reporting Date:	March 2008
Waste Matrix Used:	JP
Description:	Commercial Nuclear Power Generation
	Waste Data is consolidated to the "All NPS" (all nuclear power station) site. Other (real) sites are for storage units information reporting.

Site Name	Facility Name	Facilities Defined		
All NPS	all NPP	processing	storage	

## Site (Structure) : JAEA Tokai

Country: JAPAN

Reporting Year: 2007

Full Name: JAEA:  
Tokai Research and Development Center

Location: Tokai Vil., Ibaraki Pref.

Description:

Official Website:

License Holder(s): Japan Atomic Energy Agency (JAEA)

Waste management facilities that are located at this site:

## Site (Structure) : JAEA Tokai

Country: JAPAN

Reporting Year: 2007

<b>Facility:</b>	<b>VLLW</b>		
<b>Description:</b>	Waste Disposal facility (Waste burial test site in the JPDR dismantling project)		
<b>Disposal part of facility</b>	<b>VLLW</b>		
The following shows disposal status for waste classes and SRS.			
<b>Waste Class</b>	<b>Actual</b>	<b>Planned</b>	
Geological	No	No	
Sub-surface with EBS	No	No	
Near-surface with EBS	No	No	
Near-surface without EBS	Yes	No	
<b>List SRS?</b>	No		
<b>List UMMT?</b>	No		
<b>Type:</b>	trench(es)		
<b>Facility is modular?</b>	No		
<b>Capacity existing (m3):</b>	2520	<b>Capacity planned (m3):</b>	2520
<b>Depth (m):</b>	2.5 - 6.0	<b>Host medium:</b>	sedimentary (sand)
<b>Phase Name</b>	<b>Start Year</b>	<b>End Year</b>	<b>Estimate</b>
planning and/or concept assessment	1981		False
commissioning		1995	False
operation	1995	1996	False
closure	1996		False
institutional control	1997	2027	False

## Site (Data) : JAEA Tokai

Stock of waste as at March 2008

Country: JAPAN

Reporting Year: 2007

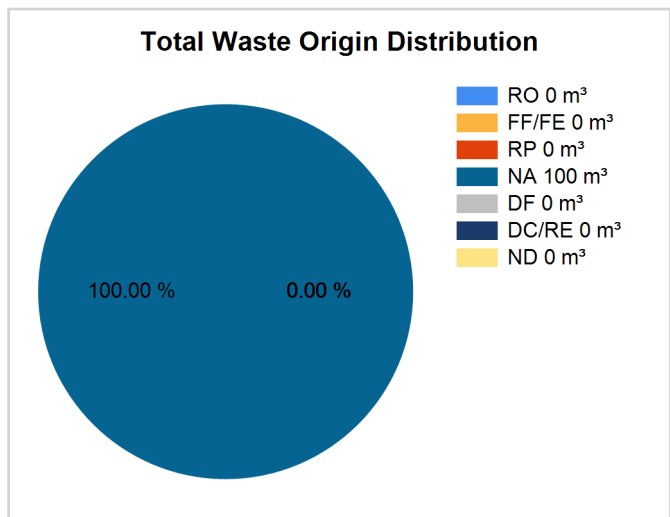
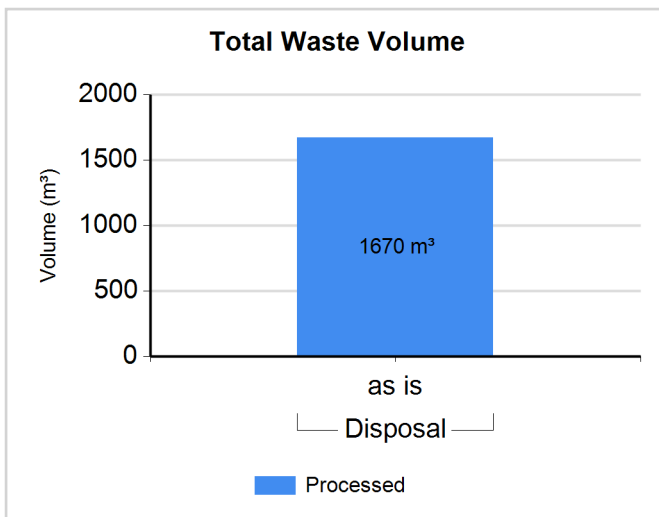
**Site Name:** JAEA TokaiFull Name: JAEA::  
Tokai Research and Development Center

Inventory Reporting Date: March 2008

Waste Matrix Used: DISPOSAL

**Waste Inventory**

Est=distribution is an estimate, Proc.=Is the waste processed (Yes/No)? RO=Reactor Operations, FF/FE=Fuel Fabrication/Fuel Enrichment, RP=Reprocessing, NA=Nuclear Applications,DF=Defence, DC/RE=Decommissioning/Remediation, ND=Not Determined



Note: where volume "as dispo" is provided, volume "as is" is used in the graph instead.

**Waste Class: Near-surface without EBS**

Waste Class Name	Location / Facility	Proc	Est.	Volume "as is" (m³)	Volume "as dispo" (m³)	RO %	FF/FE %	RP %	NA %	DF %	DC/RE %	ND %
Near-surface without EBS	Disposal	Y	N	1670.000	1670.000	0.00	0.00	0.00	100.00	0.00	0.00	0.00

Comment # 12177: Disposed Waste

Note: 1,670 ton of waste disposed (no m³ value is available).

Regard to the JPDR dismantling project, a total of 24,400 tons of waste, including 3,340 tons of radioactive waste, was produced from all dismantling activities. The extremely low level concrete waste (1,670 tons, which was 6.8% of the total waste) was disposed in a nearby surface burial location.



## Site (Structure) : NUMO

Country: JAPAN

Reporting Year: 2007

Full Name: (To Be Determined)  
a future site for the HLW repository to be developed by the Nuclear Waste Management Organization of Japan (NUMO).

Location: site not selected

Description:

Official Website:

License Holder(s): not licensed (in site selection phase for the HLW repository; NUMO is a disposal implementing entity)

Waste management facilities that are located at this site:

<b>Facility:</b>	<b>HLW</b>
<b>Description:</b>	Final Disposal Facility of Vitrified HLW (in Site Selection Phase)

## Site (Structure) : NUMO

Country: JAPAN

Reporting Year: 2007

**Disposal part of facility**                      **HLW**

The following shows disposal status for waste classes and SRS.

Waste Class	Actual	Planned
Geological	No	Yes
Sub-surface with EBS	No	No
Near-surface with EBS	No	No
Near-surface without EBS	No	No

List SRS?	No
List UMMT?	No

Type:	geological (cavern)		
Facility is modular?	Yes		
Capacity existing (m3):	0	Capacity planned (m3):	6000

Depth (m):	> 300	Host medium:	unknown (site not selected)
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Phase Name	Start Year	End Year	Estimate
site selection	2002	2027	True
construction	2025		True
operation	2035		True

## Site (Structure) : NUMO

Country: JAPAN

Reporting Year: 2007

## Comment # 12191: Capacity - planned:

The capacity of a final disposal facility is not less than 40,000 canisters.

«Program for Final Disposal of the Specified Radioactive Waste, cabinet decision, October 28, 2005» - This program shall be provided every 5 years by the Minister of METI pursuant to the article 4 of the Specified Radioactive Waste Final Disposal Act.

Capacity value in m3 unit is not available, however tentatively reported on the assumption such that a canister volume is 150L in average. (JAEA Toaki:120L, JNFL: 170L)

## Comment # 12192: Depth:

The Specified Radioactive Waste is to be disposed of at the depth specified by the Cabinet Order not less than 300 meter under the ground in geological formations.

«Article 2 of the Specified Radioactive Waste Final Disposal Act»

## Comment # 12193: Phase:

A repository site is to be selected via stepwise procedures pursuant to the Specified Radioactive Waste Final Disposal Act.

- Selection of Preliminary Investigation Areas (PIAs)
- Selection of Detailed Investigation Areas (DIAs) 2009~2013
- Selection of a repository site (2023~2027)

- Design of the repository and licensing
- Start of construction (around 2025)
- Start of operations (2033~2037)

## Site (Structure) : Rokkasho

Country: JAPAN

Reporting Year: 2007

Full Name: JNFL ::  
Low-Level Radioactive Waste Disposal Center

Location: Rokkasho Vil., Aomori Pref.

Description:

Official Website:

License Holder(s): Japan Nuclear Fuel Limited (JNFL)

Comment # 12156: LLW Disposal Center

Approved for a total capacity of 80,000 m<sup>3</sup>, the Low-Level Radioactive Waste Disposal Center has now its No.1 and No.2 disposal facility. The ultimate capacity is planned to be 600,000 m<sup>3</sup>.

Waste management facilities that are located at this site:

Facility:	LLWDC-1
Description:	Low-Level Radioactive Waste Disposal Center; No.1 Disposal facility

## Site (Structure) : Rokkasho

Country: JAPAN

Reporting Year: 2007

**Disposal part of facility**                      **LLWDC-1**

The following shows disposal status for waste classes and SRS.

Waste Class	Actual	Planned
Geological	No	No
Sub-surface with EBS	No	No
Near-surface with EBS	Yes	Yes
Near-surface without EBS	No	No

List SRS?	No
List UMMT?	No

Type:	engineered near surface		
Facility is modular?	Yes		
Capacity existing (m3):	30720	Capacity planned (m3):	40000

Depth (m):	6 - 12	Host medium:	sedimentary (sand)
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Phase Name	Start Year	End Year	Estimate
planning and/or concept assessment	1982	1985	False
site selection	1984	1985	False
design	1985	1990	False
construction	1990	2027	False
commissioning	1988	1990	False
operation	1992	2027	False
closure	2027		False
institutional control	2027	2327	False

Comment                      **# 12157: Disposal Facility LLWDC-1**Capacity existing: 153,600 drums (=5,120x5x6)  
Capacity planned: 200,000 drums

## Site (Structure) : Rokkasho

Country: JAPAN

Reporting Year: 2007

<b>Facility:</b>	<b>LLWDC-2</b>
<b>Description:</b>	Low-Level Radioactive Waste Disposal Center; No.2 Disposal facility

**Disposal part of facility LLWDC-2**

The following shows disposal status for waste classes and SRS.

Waste Class	Actual	Planned
Geological	No	No
Sub-surface with EBS	No	No
Near-surface with EBS	Yes	Yes
Near-surface without EBS	No	No

List SRS?	No
List UMMT?	No

Type:	engineered near surface		
Facility is modular?	Yes		
Capacity existing (m3):	20736	Capacity planned (m3):	40000

Depth (m):	11 - 18	Host medium:	sedimentary (sand)
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Phase Name	Start Year	End Year	Estimate
planning and/or concept assessment	1992	1993	False
site selection	1984	1985	False
design	1993	1998	False
construction	1998	2030	False
commissioning	1997	1998	False
operation	2000	2030	False
closure	2030		False
institutional control	2030	2330	False

Comment # 12158: Disposal Facility LLWDC-2

Capacity existing: 103,680 drums (=12,960x2x4)

Capacity planned: 200,000 drums

## Site (Data) : Rokkasho

Stock of waste as at March 2008

Country: JAPAN

Reporting Year: 2007

**Site Name:** RokkashoFull Name: JNFL ::  
Low-Level Radioactive Waste Disposal Center

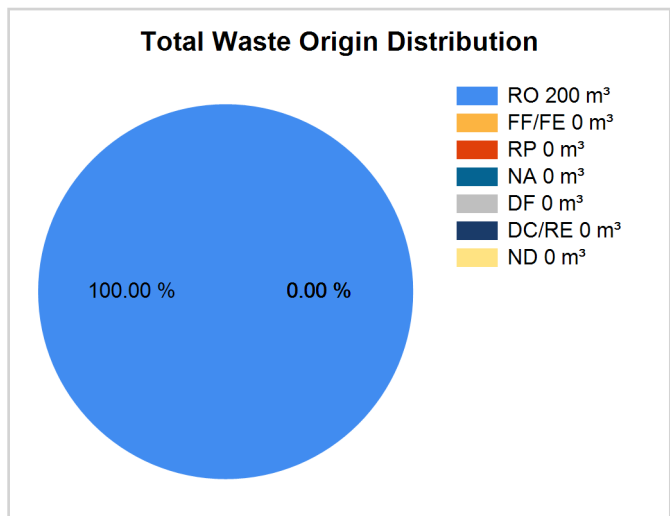
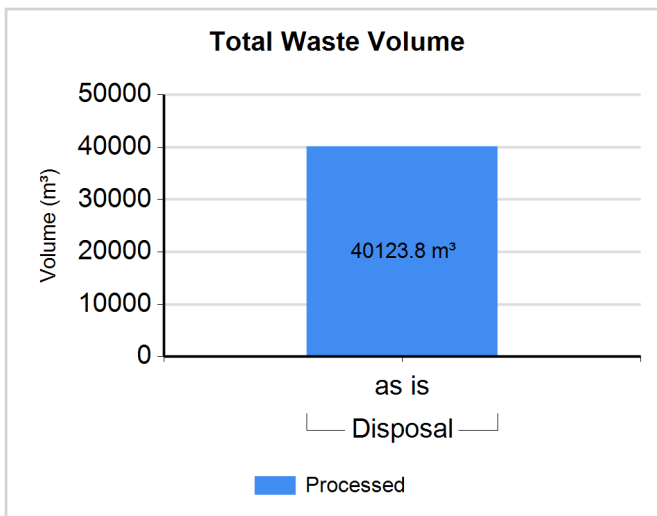
Inventory Reporting Date: March 2008

Waste Matrix Used: DISPOSAL

Comment # 12156: LLW Disposal Center

Approved for a total capacity of 80,000 m<sup>3</sup>, the Low-Level Radioactive Waste Disposal Center has now its No.1 and No.2 disposal facility. The ultimate capacity is planned to be 600,000 m<sup>3</sup>.**Waste Inventory**

Est=distribution is an estimate, Proc.=Is the waste processed (Yes/No)? RO=Reactor Operations, FF/FE=Fuel Fabrication/Fuel Enrichment, RP=Reprocessing, NA=Nuclear Applications,DF=Defence, DC/RE=Decommissioning/Remediation, ND=Not Determined



Note: where volume "as dispo" is provided, volume "as is" is used in the graph instead.

**Waste Class: Near-surface with EBS**

Waste Class Name	Location / Facility	Proc	Est.	Volume "as is" (m <sup>3</sup> )	Volume "as dispo" (m <sup>3</sup> )	RO %	FF/FE %	RP %	NA %	DF %	DC/RE %	ND %
Near-surface with EBS	Disposal / LLWDC-1	Y	N	27711.000	27711.000	100.00	0.00	0.00	0.00	0.00	0.00	0.00
Near-surface with EBS	Disposal / LLWDC-2	Y	N	12412.800	12412.800	100.00	0.00	0.00	0.00	0.00	0.00	0.00

Comment # 12178: Waste Inventory in JNFL::LLWDC

Total 200,619 drums have disposed of at March 31, 2008.

- 138,555 drums (200L equivalent) in No.1 Disposal Facility
- 62,064 drums (200L equivalent) in No.2 Disposal Facility

## Site (Structure) : ALL JAEA

Country: JAPAN

Reporting Year: 2007

Full Name: All JAEA facilities

Location:

Description:

Official Website:

License Holder(s): Japan Atomic Energy Agency (JAEA)

Waste management facilities that are located at this site:

<b>Facility:</b>	<b>all JAEA</b>					
<b>Description:</b>	all nuclear/radioactive waste management facilities of JAEA, except a disposal facility at Tokai					
<b>Storage part of facility                      all JAEA</b>						
The following shows storage status for waste classes and SRS.						
<b>Waste Class</b>	<b>Actual</b>	<b>Planned</b>				
HLW	Yes	Yes				
LLW	Yes	Yes				
<b>List SRS?</b>	No					
<b>List UMMT?</b>	No					
<b>Capacity:</b>	sufficient capacity for each licensed activities					
<b>Types of Storage Units</b>						
<b>Storage Unit Name</b>	<b>Type Name</b>	<b>Year Opened</b>	<b>Closed?</b>	<b>Full?</b>	<b>Modular?</b>	<b>Contains SRS?</b>
SWS/B	building	0	No	No	No	No
<b>Processing part of facility                      all JAEA</b>						
The following shows processing status for waste classes and SRS.						
<b>Waste Class</b>	<b>Actual</b>	<b>Planned</b>				
HLW	Yes	Yes				
LLW	Yes	Yes				
<b>Type:</b>	Treatment, Conditioning					
<b>Year opened:</b>	0					



## Site (Data) : ALL JAEA

Stock of waste as at March 2008

Country: JAPAN

Reporting Year: 2007

**Site Name:** ALL JAEA

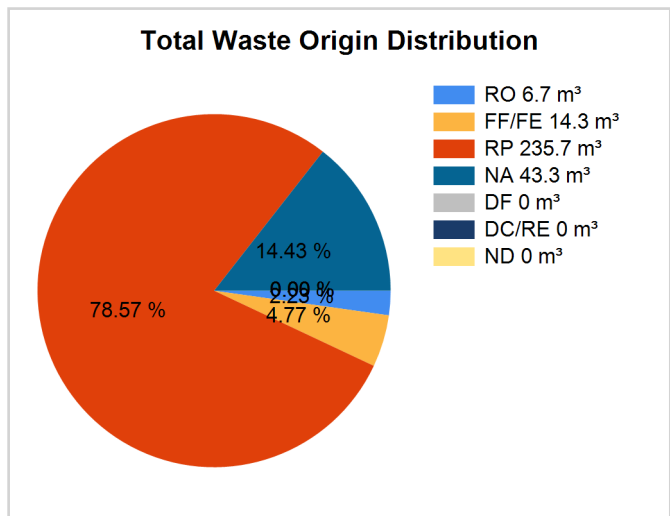
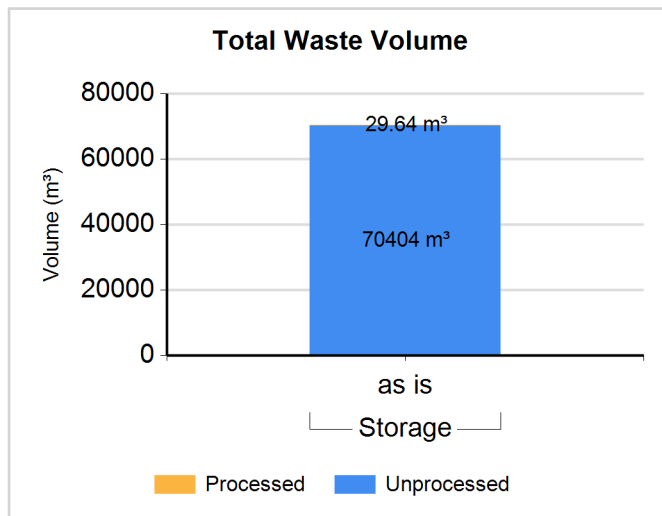
Full Name: All JAEA facilities

Inventory Reporting Date: March 2008

Waste Matrix Used: JP

**Waste Inventory**

Est=distribution is an estimate, Proc.=Is the waste processed (Yes/No)? RO=Reactor Operations, FF/FE=Fuel Fabrication/Fuel Enrichment, RP=Reprocessing, NA=Nuclear Applications,DF=Defence, DC/RE=Decommissioning/Remediation, ND=Not Determined



Note: where volume "as dispo" is provided, volume "as is" is used in the graph instead.

**Waste Class: HLW**

Waste Class Name	Location / Facility	Proc	Est.	Volume "as is" (m³)	Volume "as dispo" (m³)	RO %	FF/FE %	RP %	NA %	DF %	DC/RE %	ND %
HLW (liquid)	Storage	N	N	404.000	404.000	0.00	0.00	100.00	0.00	0.00	0.00	0.00
HLW (solid)	Storage	Y	N	29.640	29.640	0.00	0.00	100.00	0.00	0.00	0.00	0.00

Comment # 18060: HLW Inventory of JAEA

- 247 vitrified waste canister (120L) stored in the TVF.
- 404 m³ of liquid HLW is reported as unprocessed volume.

**Waste Class: LLW**

Waste Class Name	Location / Facility	Proc	Est.	Volume "as is" (m³)	Volume "as dispo" (m³)	RO %	FF/FE %	RP %	NA %	DF %	DC/RE %	ND %
LLW	Storage	N	Y	70000.000	70000.000	6.70	14.30	35.70	43.30	0.00	0.00	0.00

Comment # 18061: LLW inventory of JAEA

- Total LLW: 277,100 drums;
- RO: 23,600 drums (stored in Mutsu, Fugen, Monju sites),
  - RP: 125,000 drums (including from MOX fuel fabrication),
  - FF/FE: 50,000 drums, and
  - NA: 151,400 drums

**Processing - Treatment method(s)**

No data available.

**Site (Data) : ALL JAEA**

Stock of waste as at March 2008

Country: JAPAN

Reporting Year: 2007

**Processing - Conditioning method(s)**

**No data available.**

## Site (Structure) : Rokkasho

Country: JAPAN

Reporting Year: 2007

Full Name: Japan Nuclear Fuel Limited ::  
 - Uranium Enrichment Plant  
 (- Low-Level Radioactive Waste Disposal Center) -> see "disposal" reporting group  
 - Vitrified Waste Storage Center  
 - Reprocessing Plant

Location: Rokkasho Vil., Aomori Pref.

Description:

Official Website:

License Holder(s): Japan Nuclear Fuel Limited (JNFL)

Comment # 9749: Uranium Enrichment Plant

- 1,050 tSWU/y

Comment # 9751: Vitrified Waste Storage Center

Utilities in Japan have concluded reprocessing contracts with British and French companies for a total of 5,600 t U of spent fuel from light water reactors and 1,500 t U of spent fuel from a gas cooled reactor. In accordance with these contracts, vitrified waste canisters are returned to the utilities and are stored by JNFL.

Comment # 9752: Reprocessing Plant

- 800 tU/y (Under Construction)

The Reprocessing Plant is now under final commissioning test. The spent fuel storage building, which has 3,000 tU storage capacity with three wet-pools, have already been in service operation. Spent fuels from NPP sites have been received and stored since 2000.

Comment # 9753: MOX fuel Fabrication Plant (future facility)

(out of NEWMDB submission scope)

A license application for fuel fabrication (MOX fuel 130 tHM/y) business has submitted in 2005. The construction of the plant is scheduled to start in 2007 and completed in 2012.

Waste management facilities that are located at this site:

Facility:	REP
Description:	Reprocessing Plant; radioactive waste management (RWM) associated with Spent Fuel Reprocessing

## Site (Structure) : Rokkasho

Country: JAPAN

Reporting Year: 2007

**Storage part of facility REP**

The following shows storage status for waste classes and SRS.

Waste Class	Actual	Planned
HLW	No	Yes
LLW	Yes	Yes

List SRS?	No
List UMMT?	No

Capacity:	70,500 drums (14,100 m <sup>3</sup> ) for solid waste 850 m <sup>3</sup> for resin waste 2,000 drums (400 m <sup>3</sup> ) for hull/end pieces
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## Types of Storage Units

Storage Unit Name	Type Name	Year Opened	Closed?	Full?	Modular?	Contains SRS?
Hull/EndPs	building	2006	No	No	No	No
CB/BP	building	2006	No	No	No	No
Resin (2)	tank (stainless steel)	2006	No	No	No	No
LRW/B-1	building	1999	No	No	No	No
Resin (1)	tank (stainless steel)	1999	No	No	No	No
LRW/B-2	building	2004	No	No	No	No

**Processing part of facility REP**

The following shows processing status for waste classes and SRS.

Waste Class	Actual	Planned
HLW	No	Yes
LLW	No	Yes

Type:	Treatment, Conditioning
Year opened:	0

## Comment # 9755: Storage Units in JNFL::REP

- LRW/B-1: Low Radioactive Waste storage building-1 (for SF storage)
- Resin (1): resin waste tanks in the spent fuel receiving and storage building
- LRW/B-2: Low Radioactive Waste storage building-2 (for Reprocessing)
- Hull/EndP: storage for Hull/End Pieces
- CB/BP: storage for CB and BP
- Resin (2): resin waste tanks of reprocessing

## Site (Structure) : Rokkasho

Country: JAPAN

Reporting Year: 2007

<b>Facility:</b>	<b>UEP</b>
<b>Description:</b>	Uranium Enrichment Plant; radioactive waste management (RWM) associated with Uranium enrichment

**Storage part of facility UEP**

The following shows storage status for waste classes and SRS.

Waste Class	Actual	Planned
HLW	No	No
LLW	Yes	Yes

List SRS?	No
List UMMT?	No

Capacity:	6,700 drums (1,340 m <sup>3</sup> )
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## Types of Storage Units

Storage Unit Name	Type Name	Year Opened	Closed?	Full?	Modular?	Contains SRS?
UEW/B	building	1992	No	No	No	No
U&W S/B	building	2002	No	No	No	No

Comment **# 9748: Storage Units in JNFL::UEP**

- UEW/B: Uranium Enrichment Waste Bldg.
- U&W S/B: Uranium and Waste Storage Bldg.

## Site (Structure) : Rokkasho

Country: JAPAN

Reporting Year: 2007

<b>Facility:</b>	<b>VWSC</b>
<b>Description:</b>	Vitrified Waste Storage Center; Storage facility of Vitrified Waste returned from Overseas

**Storage part of facility**                      **VWSC**

The following shows storage status for waste classes and SRS.

Waste Class	Actual	Planned
HLW	Yes	Yes
LLW	Yes	Yes

List SRS?	No
List UMMT?	No

<b>Capacity:</b>	1,440 dry storage pits for Vitrified HLW packages 1,200 drums (240 m <sup>3</sup> )
------------------	--

## Types of Storage Units

Storage Unit Name	Type Name	Year Opened	Closed?	Full?	Modular?	Contains SRS?
SWS	building	1995	No	No	No	No
VHLW S/B	pit	1995	No	No	No	No

Comment                      **# 9754: Storage Units in JNFL::VWSC**

Currently, the center has a storage capacity of 1,440 canisters of Vitrified HLW. The additional vitrified HLW storage building, which will have same capacity of 1,440 canisters, is under construction since June 2004 and will be completed in 2009. This means that total storage capacity will be increased to 2,880 canisters.

- SWS: solid waste storage room, located in Vitrified Waste Receiving Building
- VHLW S/B: Vitrified Waste Storage Building

## Site (Data) : Rokkasho

Stock of waste as at March 2008

Country: JAPAN

Reporting Year: 2007

**Site Name:** Rokkasho

**Full Name:** Japan Nuclear Fuel Limited ::  
 - Uranium Enrichment Plant  
 (- Low-Level Radioactive Waste Disposal Center) -> see "disposal"  
 reporting group  
 - Vitrified Waste Storage Center  
 - Reprocessing Plant

**Inventory Reporting Date:** March 2008**Waste Matrix Used:** JP**Comment # 9749: Uranium Enrichment Plant**

• 1,050 tSWU/y

**Comment # 9751: Vitrified Waste Storage Center**

Utilities in Japan have concluded reprocessing contracts with British and French companies for a total of 5,600 t U of spent fuel from light water reactors and 1,500 t U of spent fuel from a gas cooled reactor. In accordance with these contracts, vitrified waste canisters are returned to the utilities and are stored by JNFL.

**Comment # 9752: Reprocessing Plant**

• 800 tU/y (Under Construction)

The Reprocessing Plant is now under final commissioning test. The spent fuel storage building, which has 3,000 tU storage capacity with three wet-pools, have already been in service operation. Spent fuels from NPP sites have been received and stored since 2000.

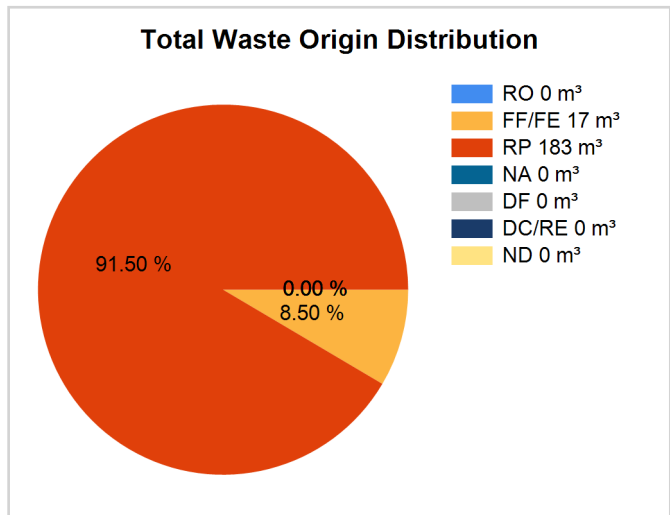
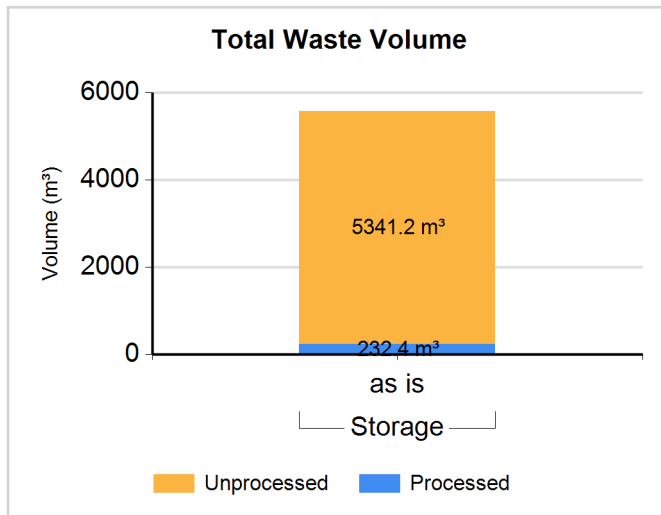
**Comment # 9753: MOX fuel Fabrication Plant (future facility)**

(out of NEWMDB submission scope)

A license application for fuel fabrication (MOX fuel 130 tHM/y) business has submitted in 2005. The construction of the plant is scheduled to start in 2007 and completed in 2012.

**Waste Inventory**

Est=distribution is an estimate, Proc.=Is the waste processed (Yes/No)? RO=Reactor Operations, FF/FE=Fuel Fabrication/Fuel Enrichment, RP=Reprocessing, NA=Nuclear Applications,DF=Defence, DC/RE=Decommissioning/Remediation, ND=Not Determined



Note: where volume "as dispo" is provided, volume "as is" is used in the graph instead.

## Site (Data) : Rokkasho

Stock of waste as at March 2008

Country: JAPAN

Reporting Year: 2007

**Waste Class: HLW**

Waste Class Name	Location / Facility	Proc	Est.	Volume "as is" (m <sup>3</sup> )	Volume "as dispo" (m <sup>3</sup> )	RO %	FF/FE %	RP %	NA %	DF %	DC/RE %	ND %
HLW (solid)	Storage / VWSC	Y	N	232.400	232.400	0.00	0.00	100.00	0.00	0.00	0.00	0.00

Comment **# 9876: HLW inventory in JNFL::Rokkasho**

1,310 vitrified waste canisters (170L) have stored in the storage pits of VWSC.  
57 vitrified waste has produced in the reprocessing plant.

**Waste Class: LLW**

Waste Class Name	Location / Facility	Proc	Est.	Volume "as is" (m <sup>3</sup> )	Volume "as dispo" (m <sup>3</sup> )	RO %	FF/FE %	RP %	NA %	DF %	DC/RE %	ND %
LLW	Storage	N	N	5341.200	5341.200	0.00	17.00	83.00	0.00	0.00	0.00	0.00

Comment **# 9877: LLW inventory in JNFL::Rokkasho**

Total LLW: 25,921 drums (200L) + 157 drums (1,000L)  
•RP: 21,388 drums (200L) + 157 drums (1,000L). (sum of reprocessing plant and VWSC)  
•FF/FE: 4,533 drums in uranium enrichment plant.

**Processing - Treatment method(s)**

Method	Status			
	Planned	R&D program	Current practice method use over the last 5 years	Past Practice
Chemical Precipitation	N	N	Same	N
Compaction	Y	N		N
Evaporation	Y	N		N
Filtration	N	N	Same	N
Incineration	Y	N		N
Shredding	Y	N		N

**Processing - Conditioning method(s)**

Method	Status			
	Planned	R&D program	Current practice method use over the last 5 years	Past Practice
Cementation	Y	N		N
Vitrification	Y	N		N



## Site (Structure) : RIWM

Country: JAPAN

Reporting Year: 2007

Full Name: JRJA's radioisotope waste management sites

Location: Takizawa Vil., Iwate Pref. / others

Description:

Official Website:

License Holder(s): Japan Radioisotope Association (JRIA)

Comment # 6940: Activities of JRIA

The Japan Radioisotope Association is engaged in activities concerning stable supply of various kinds of radioisotopes for research, industrial and medical uses, and collection and treatment of radioisotope wastes. The waste collection system consists of some separate sites, however, all sites of JRIA are abstracted to one site for the convenience of the NEWMDB reporting.

Comment # 9890: Waste Management in JRIA::RIWM

Among various radioisotope waste, "medical RI waste" is treated and stored in the Takizawa Laboratory. Another "research RI waste" is stored in other associated sites such as relay stations constituting country-wide waste collection system of JRIA.

Waste management facilities that are located at this site:

<b>Facility:</b>	<b>RWM(RI)</b>
<b>Description:</b>	JRIA's radioisotope waste management facilities throughout Japan

**Storage part of facility RWM(RI)**

The following shows storage status for waste classes and SRS.

Waste Class	Actual	Planned
HLW	No	No
LLW	Yes	Yes

List SRS?	No
List UMMT?	No

Capacity:	Total 181,100 drums (36,220 m <sup>3</sup> )
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## Types of Storage Units

Storage Unit Name	Type Name	Year Opened	Closed?	Full?	Modular?	Contains SRS?
Kanto S/F	building	1966	No	No	No	No
Kanto WRS	building	1979	No	No	No	No
Kanto WRS2	building	1983	No	No	No	No
Ichihara	building	2000	No	No	No	No
Kansai WRS	building	2002	No	No	No	No
Takizawa	building	1987	No	No	No	No

## Site (Structure) : RIWM

Country: JAPAN

Reporting Year: 2007

**Processing part of facility RWM(RI)**

The following shows processing status for waste classes and SRS.

Waste Class	Actual	Planned
HLW	No	No
LLW	Yes	Yes

Type:	Treatment
Year opened:	0

Comment **# 7103: JRIA radioisotope waste storage facilities**

facilities and licenced year (fiscal)

- Kanto S/F (Kanto Storage Facility): Tokai Vil., Ibaraki Pref.(1966)
- Kanto WRS (Kanto Waste Relay Station): Kashiwa City, Chiba Pref.(1979)
- Kanto WRS2 (Kanto Waste Relay Station II): Kashiwa City, Chiba Pref.(1983)
- Takizawa (Kaya memorial Takizawa laboratory): Takizawa Vil., Iwate Pref.(1985)
- Ichihara Office: Ichihara City, Chiba Pref. (2000)
- Kansai WRS (Kansai Waste Relay Station): Daito City, Osaka Pref.(2002)

Comment **# 12154: Storage Capacity**

Takizawa: 22,400 drums (4,480 m<sup>3</sup>), Kanto S/F: 5,900 drums (1,180 m<sup>3</sup>), Kanto WRS: 45,600drums (9,120m<sup>3</sup>), Kanto WRS2: 22,000drums (4,400m<sup>3</sup>), Ichihara: 83,600drums (16,720 m<sup>3</sup>), Kansai WRS: 1,600 drums (320 m<sup>3</sup>)

# Site (Data) : RIWM

Stock of waste as at March 2008

Country: JAPAN

Reporting Year: 2007

**Site Name:** RIWM

**Full Name:** JRIA's radioisotope waste management sites

**Inventory Reporting Date:** March 2008 **Waste Matrix Used:** JP

**Comment # 6940: Activities of JRIA**

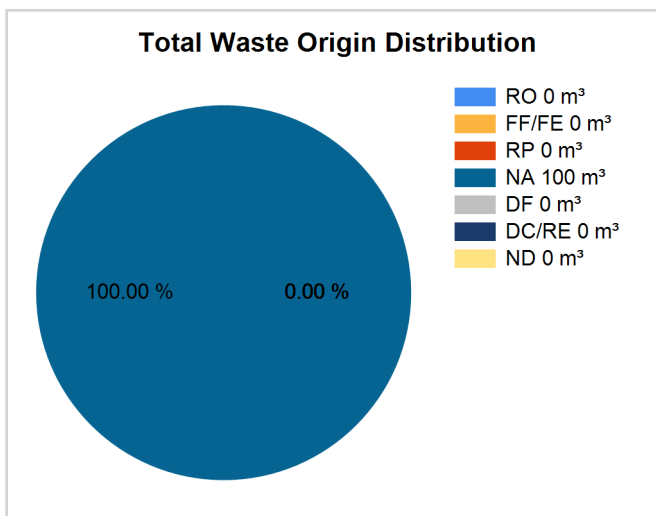
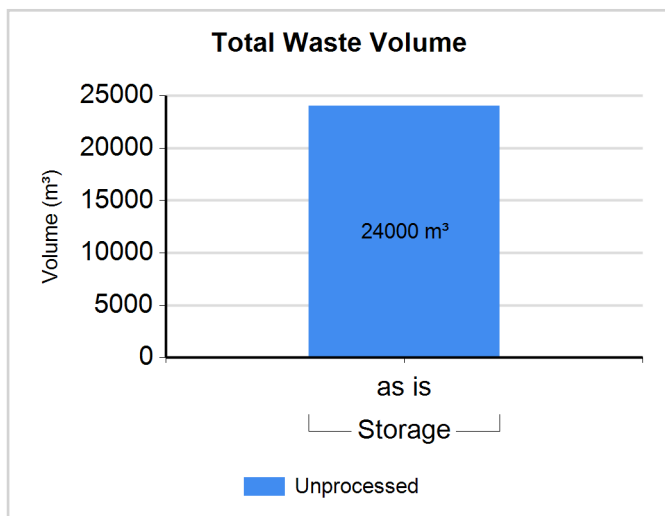
The Japan Radioisotope Association is engaged in activities concerning stable supply of various kinds of radioisotopes for research, industrial and medical uses, and collection and treatment of radioisotope wastes. The waste collection system consists of some separate sites, however, all sites of JRIA are abstracted to one site for the convenience of the NEWMDB reporting.

**Comment # 9890: Waste Management in JRIA::RIWM**

Among various radioisotope waste, "medical RI waste" is treated and stored in the Takizawa Laboratory. Another "research RI waste" is stored in other associated sites such as relay stations constituting country-wide waste collection system of JRIA.

## Waste Inventory

Est=distribution is an estimate, Proc.=Is the waste processed (Yes/No)? RO=Reactor Operations, FF/FE=Fuel Fabrication/Fuel Enrichment, RP=Reprocessing, NA=Nuclear Applications,DF=Defence, DC/RE=Decommissioning/Remediation, ND=Not Determined



Note: where volume "as dispo" is provided, volume "as is" is used in the graph instead.

**Waste Class:** LLW

Waste Class Name	Location / Facility	Proc	Est.	Volume "as is" (m³)	Volume "as dispo" (m³)	RO %	FF/FE %	RP %	NA %	DF %	DC/RE %	ND %
LLW	Storage	N	N	24000.000	24000.000	0.00	0.00	0.00	100.00	0.00	0.00	0.00

**Comment # 12179: Waste Inventory in JRIA::RIWM**

- 120,000 drums (200L equivalent)

A part of radioisotope (RI) waste collected by JRIA, which were processed and stored in JAEA's Tokai site, are excluded from the waste volume.

## Site (Data) : RIWM

Stock of waste as at March 2008

Country: JAPAN

Reporting Year: 2007

**Processing - Treatment method(s)**

Method	Status			
	Planned	R&D program	Current practice method use over the last 5 years	Past Practice
Compaction	N	N	Same	N
Incineration	N	N	Same	N
Segregation/Sorting	N	N	Same	N

Comment **# 9858: Waste Processing in JRIA::RIWM**

Among various radioisotope waste, "medical RI waste" is treated and stored in the Takizawa Laboratory. Another "research RI waste" is stored in other associated sites such as relay stations constituting country-wide waste collection system of JRIA.

## Site (Structure) : All FFP

Country: JAPAN

Reporting Year: 2007

Full Name: All nuclear (uranium) fuel fabrication facilities

Location: 5 sites

Description:

Official Website:

License Holder(s):

- Global Nuclear Fuel - Japan Co., Ltd.
- Mitsubishi Nuclear Fuel Co., Ltd.
- Nuclear Fuel Industries, Ltd. (2 licences for fabrication in 2 sites)
- JCO Co., Ltd. (license of fabrication cancelled on March 2000)

Waste management facilities that are located at this site:

## Site (Structure) : All FFP

Country: JAPAN

Reporting Year: 2007

<b>Facility:</b>	<b>all FFP</b>
<b>Description:</b>	all nuclear fuel fabrication facilities (5 sites)

**Storage part of facility                      all FFP**

The following shows storage status for waste classes and SRS.

Waste Class	Actual	Planned
HLW	No	No
LLW	Yes	Yes

<b>List SRS?</b>	No
<b>List UMMT?</b>	No

<b>Capacity:</b>	Total 58,160 drums (Solid Waste Storage Buildings in 5 fuel fabrication facilities)
------------------	---

## Types of Storage Units

Storage Unit Name	Type Name	Year Opened	Closed?	Full?	Modular?	Contains SRS?
SWS/B	building	0	No	No	No	No

**Processing part of facility                      all FFP**

The following shows processing status for waste classes and SRS.

Waste Class	Actual	Planned
HLW	No	No
LLW	Yes	Yes

<b>Type:</b>	Treatment
<b>Year opened:</b>	0

## Site (Data) : All FFP

Stock of waste as at March 2008

Country: JAPAN

Reporting Year: 2007

**Site Name:** All FFP

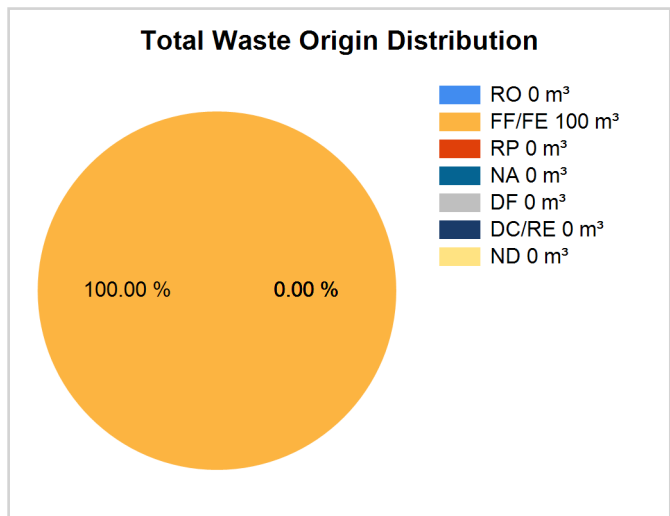
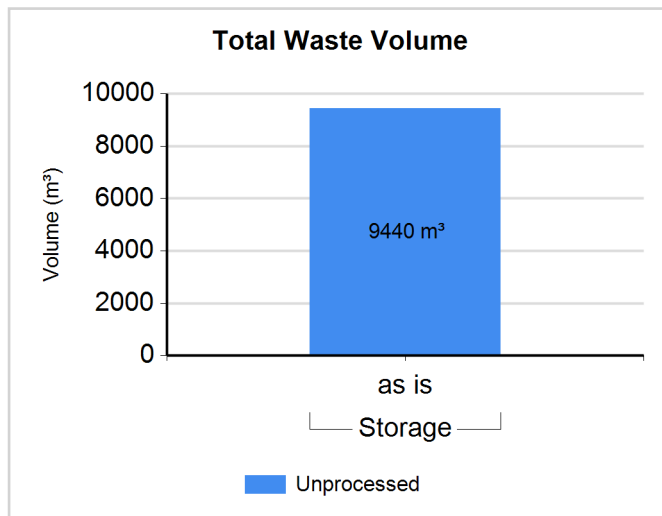
Full Name: All nuclear (uranium) fuel fabrication facilities

Inventory Reporting Date: March 2008

Waste Matrix Used: JP

**Waste Inventory**

Est=distribution is an estimate, Proc.=Is the waste processed (Yes/No)? RO=Reactor Operations, FF/FE=Fuel Fabrication/Fuel Enrichment, RP=Reprocessing, NA=Nuclear Applications,DF=Defence, DC/RE=Decommissioning/Remediation, ND=Not Determined



Note: where volume "as dispo" is provided, volume "as is" is used in the graph instead.

**Waste Class:** LLW

Waste Class Name	Location / Facility	Proc	Est.	Volume "as is" (m³)	Volume "as dispo" (m³)	RO %	FF/FE %	RP %	NA %	DF %	DC/RE %	ND %
LLW	Storage	N	N	9440.000	9440.000	0.00	100.00	0.00	0.00	0.00	0.00	0.00

Comment # 12155: Waste Inventory in All FFPs

- 47,200 drums (200L equivalent)

**Processing - Treatment method(s)**

Method	Status			
	Planned	R&D program	Current practice method use over the last 5 years	Past Practice
Compaction	N	N	Same	N
Decontamination	N	N	Same	N
Incineration	N	N	Same	N
Segregation/Sorting	N	N	Intermittent	N
Shredding	N	N	Same	N

## Site (Structure) : All NPS

Country: JAPAN

Reporting Year: 2007

Full Name: All Nuclear Power Stations

Location: 18 sites

Description:

Official Website:

License Holder(s): 9 EPC + JAPC

Waste management facilities that are located at this site:

<b>Facility:</b>	<b>all NPP</b>					
<b>Description:</b>	all nuclear power reactor facilities					
<b>Storage part of facility</b>	<b>all NPP</b>					
The following shows storage status for waste classes and SRS.						
<b>Waste Class</b>	<b>Actual</b>	<b>Planned</b>				
HLW	No	No				
LLW	Yes	Yes				
<b>List SRS?</b>	No					
<b>List UMMT?</b>	No					
<b>Capacity:</b>	Total 879,600 drums (Solid Waste Storage Buildings in 18 nuclear power stations)					
Types of Storage Units						
<b>Storage Unit Name</b>	<b>Type Name</b>	<b>Year Opened</b>	<b>Closed?</b>	<b>Full?</b>	<b>Modular?</b>	<b>Contains SRS?</b>
SWS/B	building	0	No	No	No	No
<b>Processing part of facility</b>	<b>all NPP</b>					
The following shows processing status for waste classes and SRS.						
<b>Waste Class</b>	<b>Actual</b>	<b>Planned</b>				
HLW	No	No				
LLW	Yes	Yes				
<b>Type:</b>	Treatment, Conditioning					
<b>Year opened:</b>	0					



## Site (Data) : All NPS

Stock of waste as at March 2008

Country: JAPAN

Reporting Year: 2007

**Site Name:** All NPS

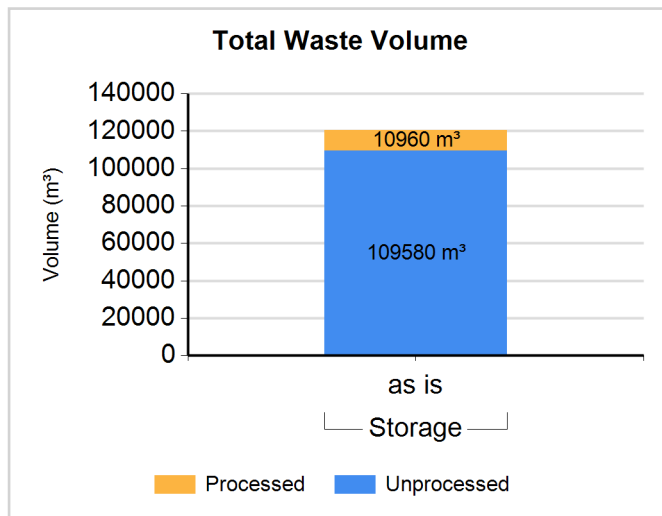
Full Name: All Nuclear Power Stations

Inventory Reporting Date: March 2008

Waste Matrix Used: JP

**Waste Inventory**

Est=distribution is an estimate, Proc.=Is the waste processed (Yes/No)? RO=Reactor Operations, FF/FE=Fuel Fabrication/Fuel Enrichment, RP=Reprocessing, NA=Nuclear Applications,DF=Defence, DC/RE=Decommissioning/Remediation, ND=Not Determined



Note: where volume "as dispo" is provided, volume "as is" is used in the graph instead.

**Waste Class:** LLW

Waste Class Name	Location / Facility	Proc	Est.	Volume "as is" (m³)	Volume "as dispo" (m³)	RO %	FF/FE %	RP %	NA %	DF %	DC/RE %	ND %
LLW	Storage	N	N	109580.000	109580.000	100.00	0.00	0.00	0.00	0.00	0.00	0.00
LLW	Storage	Y	N	10960.000	10960.000	100.00	0.00	0.00	0.00	0.00	0.00	0.00

Comment # 12134: Waste Inventory of ALL NPPs

Total 602,651 drums (in 200L equivalent) in SWS/B, of which 54,797 are disposal packages (reported as processed).  
(reported volume in m³) = (number of drums rounded to nearest 100) x 0.2

Waste volume does not include replaced control rods and channel boxes, etc. (kept as generated or shredded), spent ion exchange resins that are reserved in tanks, replaced steam generators, and other waste items of a large-volume.

**Processing - Treatment method(s)**

Method	Status			
	Planned	R&D program	Current practice method use over the last 5 years	Past Practice
Compaction	N	N	Same	N
Evaporation	N	N	Same	N
Incineration	N	N	Same	N
Metal Melting	N	N	Same	N

## Site (Data) : All NPS

Stock of waste as at March 2008

Country: JAPAN

Reporting Year: 2007

**Processing - Conditioning method(s)**

Method	Status			
	Planned	R&D program	Current practice method use over the last 5 years	Past Practice
Bituminization	N	N	Same	N
Cementation	N	N	Same	N
Grouting	N	N	Same	N

## Regulators

Country: JAPAN

Reporting Year: 2007

<b>Name:</b>	<b>NISA/METI</b>
<b>Full Name:</b>	Nuclear and Industrial Safety Agency Ministry of Economy, Trade and Industry
<b>Divison:</b>	
<b>City or Town:</b>	Tokyo
<b>Main Website:</b>	

Comment **# 6967: Regulatory Functions**

The Minister of METI, as the competent minister stipulated in the Reactor Regulation Law and the Electric Utilities Industry Law, governs the safety regulation over all activities on the utilization of nuclear energy including nuclear power generation, and NISA was established as a special organization of METI to administer the safety regulation.

NISA, under the Minister of METI, has the authority to issue a license for the establishment of a nuclear facility, after conducting safety examination that the siting, structure and equipment has no hindrance to the prevention of disasters. It also has the authority to cancel the license under certain circumstances such as violation of applicable laws and regulations by the license holder.

<b>Name:</b>	<b>STPB/MEXT</b>
<b>Full Name:</b>	Ministry of Education, Culture, Sports, Science and Technology
<b>Divison:</b>	Science and Technology Policy Bureau
<b>City or Town:</b>	Tokyo
<b>Main Website:</b>	

Comment **# 6968: Regulatory Functions**

The safety regulation concerning the activities around the nuclear utilization from a scientific and technological aspect and the utilization of radioisotopes (excluding medicines, etc.) is governed by the Minister of MEXT as the competent minister, and is administered by the Science and Technology Policy Bureau (STPB).

With regard to the licensing of a new business under the Reactor Regulation Law and the radioisotope waste management business under the Radiation Hazards Prevention Law, the Minister of MEXT has the authority to issue the respective licenses, after conducting an examination of the site, structure and equipment from the standpoint of disaster prevention. He or she also has the authority to revoke the licenses under certain circumstances, such as the violation of applicable laws and regulations by the license holder.

<b>Name:</b>	<b>MHLW</b>
<b>Full Name:</b>	Ministry of Health, Labour and Welfare
<b>Divison:</b>	- Pharmaceutical and Food Safety Bureau - Health Policy Bureau
<b>City or Town:</b>	Tokyo
<b>Main Website:</b>	

Comment **# 6969: Regulatory Functions**

The Ministry of Health, Labour and Welfare (MHLW) administers the safety regulations for radioactive medicines and the regulations for the protection against clinical radiation.

## Regulators

Country: JAPAN

Reporting Year: 2007

<b>Name:</b>	<b>NSC</b>
<b>Full Name:</b>	Nuclear Safety Commission Cabinet Office
<b>Divison:</b>	
<b>City or Town:</b>	Tokyo
<b>Main Website:</b>	

Comment **# 6970: Regulatory Functions**

The Nuclear Safety Commission (NSC), which was established within the Cabinet Office under the Atomic Energy Basic Law, consists of five members who are appointed by the Prime Minister with the consent of the Diet. The chairperson is elected by the committee from among its members.

The NSC has duties of planning, deliberation and decisions on matters that are related to ensuring safety of the utilization of nuclear energy, and establishes guidelines to be used at the safety examination.

<b>Name:</b>	<b>JNES</b>
<b>Full Name:</b>	Japan Nuclear Energy Safety Organization (independent administrative institutions)
<b>Divison:</b>	
<b>City or Town:</b>	Tokyo
<b>Main Website:</b>	

Comment **# 6972: Regulatory Functions**

A law for the establishment of an incorporated administrative agency, "Japan Nuclear Energy Safety Organization" as a technical support organization of NISA was approved in December 2002 by the Diet. The objectives of this organization, which is scheduled to be established in October 2003, is to provide a foundation for the nuclear safety preservation with regard to utilization of nuclear energy.

<b>Name:</b>	<b>NUSTEC</b>
<b>Full Name:</b>	Nuclear Safety Technology Center (non-governmental, delegated agency)
<b>Divison:</b>	
<b>City or Town:</b>	Tokyo
<b>Main Website:</b>	

Comment **# 6971: Regulatory Functions**

As to the activities of the STPB related to the safety regulation for the nuclear facility, Nuclear Safety Technology Center (NUSTEC) is designated as an organization for welding inspections of the nuclear facility under the Reactor Regulation Law, periodic inspections of the facilities for radioisotope waste management business under the Radiation Hazards Prevention Law, etc.

## Regulations / Laws

Country: JAPAN

Reporting Year: 2007

<b>Name:</b>	<b>Act186/S30</b>	
Title or Name:	Atomic Energy Basic Act	
Reference Number:	Act No.186 /S30(1955)	
Date Promulgated or Proclaimed:	12/19/1955	Law

<b>Name:</b>	<b>Act179/H14</b>	
Title or Name:	Act on Japan Nuclear Energy Safety Organization	
Reference Number:	Act No.179 /H14(2002)	
Date Promulgated or Proclaimed:	12/18/2002	Law

<b>Name:</b>	<b>Act166/S32</b>	
Title or Name:	Act on the Regulations of Nuclear Source Material, Nuclear Fuel Material and Reactors	
Reference Number:	Act No.166 /S30(1957)	
Date Promulgated or Proclaimed:	6/10/1957	Law

<b>Name:</b>	<b>Act167/S32</b>	
Title or Name:	Act on Prevention from Radiation Hazards due to Radioisotopes, etc.	
Reference Number:	Act No.167 /S32(1957)	
Date Promulgated or Proclaimed:	6/10/1957	Law

<b>Name:</b>	<b>Act117/H12</b>	
Title or Name:	Specified Radioactive Waste Final Disposal Act	
Reference Number:	Act No.117 /H12(2000)	
Date Promulgated or Proclaimed:	6/7/2000	Law

Comment # 12190: Act117/H12

The term "Specified Radioactive Waste" as used in this Act (shall) means a vitrified substance remaining after the reprocessing of spent fuel.

«Article 2 of the Specified Radioactive Waste Final Disposal Act»

## Regulations / Laws

Country: JAPAN

Reporting Year: 2007

<b>Name:</b>	<b>Act048/H17</b>		
Title or Name:	Act on Deposit and Management of the Reserve Fund for Spent Fuel Reprocessing and so forth in the Nuclear Power Generation		
Reference Number:	Act No.48 /H17(2005)		
Date Promulgated or Proclaimed:	5/20/2005		Law

## Future Outlook

Country: JAPAN

Reporting Year: 2007

**Data not available.**

## Future Outlook

Country: JAPAN

Reporting Year: 2007

**Data not available.**



## Future Outlook

Country: JAPAN

Reporting Year: 2007

**Data not available.**

## Future Outlook

Country: JAPAN

Reporting Year: 2007

**Data not available.**

## Future Outlook

Country: JAPAN

Reporting Year: 2007

**Data not available.**

## Future Outlook

Country: JAPAN

Reporting Year: 2007

**Data not available.**

## Future Outlook

Country: JAPAN

Reporting Year: 2007

**Data not available.**

## Future Outlook

Country: JAPAN

Reporting Year: 2007

**Data not available.**

## Future Outlook

Country: JAPAN

Reporting Year: 2007

**Data not available.**