



# Dam Safety Management in Japan

(Dam regular inspection)

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Dams in Japan are controlled under

- 1) **River law** (of National Assembly),
- 2) **MLIT ordinances** (of Minister) and
- 3) **MLIT circulars** (of Director General).

All dams must be checked by **river administrators** through

- Dam completion test (before operation),
- Dam operation report (every time) and
- **Dam regular inspection** (once 3-5 years).









# RIVER LAW

## 1) Permission

A person, who intends to build, reform or remove some facilities (including dams) within a river zone, must obtain permission of the river administrator. --- Article 26

## 2) Completion test

A person, who builds a facility permitted, must have a completion test to obtain approval by the river administrator before using it.

## 3) Maintenance

A permittee must maintain and repair the river facilities (including dams) to keep them in good functional capacity. --- Article 15-2

## 4) Preservation

A dam owner must place facilities necessary to preserve existing river functions or adopt alternative measures according to directions of the river administrator. --- Article 44



## RIVER LAW

### 5) Hydrologic monitoring

A dam owner must monitor water stage, discharge and rain fall to operate the dam in a proper manner for the river management. -

-- Article 45

### 6) Operation report

The dam owner must report the hydrological data and the dam operation to the river administrator when a flood has occurred or might occur. The dam owner must set communication equipment necessary to report data to the river administrator immediately and correctly. --- Article 46

### 7) Operation manual

A dam owner, who intends to reserve or intake water, must establish an operation manual and get approval of the river administrator. The dam owner must operate the dam in keeping with the manual. --- Article 47



## RIVER LAW

### 8) Early warning

A dam owner, who suppose considerable change of river water by the dam operation and intends to avoid its negative impact in advance, must issue early warnings to local authorities concerned and local residents in accordance with the decree. --- Article 48

### 9) Operation record

The dam owner must record operation during floods and submit it to the river administrator without delay after an order in accordance with the MLIT decree.

### 10) Dam superintendent)

A dam owner must appoint a dam superintendent, who holds an official certificate, in order to maintenance, operation and supervise the dam properly for water storage and intake. The dam owner must register the dam superintendent to the river administrator in accordance with the MLIT decree. --- Article 50



# RIVER LAW

## 11) Emergency command

When a flood disaster has occurred or might occur, the river administrator is able to command dam owners to take action to prevent or mitigate the disaster in the river basin. --- Article 52

## 12) Punishment

River administrators are able to cancel any license, and order to halt any works or restore existed river functions. --- Article 75

## 13) Inspection

The Minister for Land, Infrastructure, Transport and Tourism or river administrators are able to order report submission to a permittee, a registrant or an approved, and dispatch its officials to inspect actual conditions. --- Article 78



# MLIT ordinance for dam inspection determines (dam completion test and dam regular inspection)

## (Completion test)

Article 1. In a completion test, the river administrator must test following contents.

- 1) To verify whether the dam body has exact position, structural type and scale compliant with the permission by visual examinations.
- 2) To verify whether the dam bedrock was treated in accordance with the permission by work records, etc.
- 3) To verify whether the dam materials was selected and blended in accordance with the permission by work records, testing reports, etc.
- 4) To verify **temperature, deformation, uplift pressure, pore pressure and leakage volume of the dam body and its bedrock** by measurement reports
- 5) To verify whether the spillway has exact position, size and structure compliant with the permission by visual examinations. If invisible, it can be verified by inspection reports, work records, etc.
- 6) With regard to gates and bulbs, to verify whether the structure is made of permitted materials as well as fabricated and installed by permitted process, by inspection reports, work records, etc.
- 7) To verify **performance of the gates and the bulbs** by operation tests.
- 8) To verify **functions of equipment for observation, communication and warning** by trial runs.
- 9) To verify whether other works regarding dam construction were conducted in accordance with the permission by visual examinations or work records, etc.



# MLIT ordinance for dam inspection determines (dam completion test and dam regular inspection)

## (Regular inspection)

Article 4. The river administrator must order its officials to inspect maintenance and operation of existing dams more than every three years, or more than every five years for less-harmful dams on the river because of its small scale, etc.

2 the inspection should be conducted according to Clause 4), 7) and 8) of Article 1 and following clauses:

- 1) To verify **sand deposition and water stage rising in the reservoir** by survey/observation reports
- 2) To verify **ground collapses and landslides around the reservoir** by visual examinations.
- 3) To verify **other aspects of dam maintenance** by visual examinations or operation records.



# MLIT circular for dam regular inspection (dam risk level, check points and inspection sheets)

## 1. Outline of inspection

Dam inspection is implemented through the following 3 viewpoints:

- I Management organization and activity
- II Document compilation and archive
- III Conditions of facilities and equipment

An inspector must record each inspection result on the checklist and wrap up a final judgment on the inspection sheet.

The inspector must conduct monitoring record verification, on-site visual examination, document confirmation, interview with operators, etc.

Taking the viewpoint I, II and III into consideration, the inspector must determine a total evaluation of the dam from Risk level A, B or C.

**A: Fatal defectives** for the dam or the river which require immediate recovery  
(with evaluation “a” for an inspection subject)

**B: Same defectives but manageable** as a whole

**C: No problem** in whole



# MLIT circular for dam regular inspection (dam risk level, check points and inspection sheets)

## 1.1 Key point and method

The dam owner fills “general information” and “subjects to be inspected” on the inspection sheet and “pre-declaration” on the check list to submit them to the inspector in advance. Inspection contents and methods are shown as below:

### (1) Management organization and activity

The dam owner describes “management organization and activity” on the inspection sheet.

### (2) Document compilation and archive

The dam owner explains existence of basic management document and its archive conditions.

### (3) Conditions of facilities and equipment

The dam owner collects up monitoring data of the dam body, the bedrock, the spillway, reservoir, outlets facilities, etc., and describe points of concern on the inspection sheets in advance.

The inspector makes a judgment of the facilities and equipment with the next criteria.

- a: Definite defects to be recovered immediately.
- b: Potential defects to be monitored carefully.
- c: No problem



# (1) Management organization and activity

Component		Key point	Method	
Organiza tion	Superintendent	Appointment and status of the superintendent (residential? full-time?)	Inspection sheet	
	Staff members	Staff assignment in emergency (each job category)	Inspection sheet	
	Cooperative agencies	Communication channels and its fluidity	Channel chart and communication record	
Activity	Operation	Flood	Proper operation according to a manual, especially in prior outlet	Operation record
		Daily/ drought	Proper operation according to water-use rules	Operation record
	Maintenance	Inspection	Proper daily/extra works according to a maintenance manual	Inspection report
		Repair	Immediate and proper repair works	Repair record
	Observation	Observation	Necessary items with required accuracy and frequency	Observation data
	Monitoring	Monitoring	Necessary items with required accuracy and frequency	Monitoring data



## (2) Document compilation and archive

Component		Key point	Method
Basic document		Dam operation manual, water-use rule, etc.	Check list
Document archive	Operation system	Organization chart, communication chart, etc.	Check list
	Mandatory report	Archive of reports required	Check list
	Maintenance record	Archive of reports	Check list
	Data collection	Archive of data	Check list
	Documents for operation	Preparedness of an outlet control curve, etc.	Check list
Before operation	Survey/design	Archive of reports	Check list
	Construction	Archive of construction records	Check list
	Initial impoundment	Monitoring/analysis report in the initial impoundment	Check list

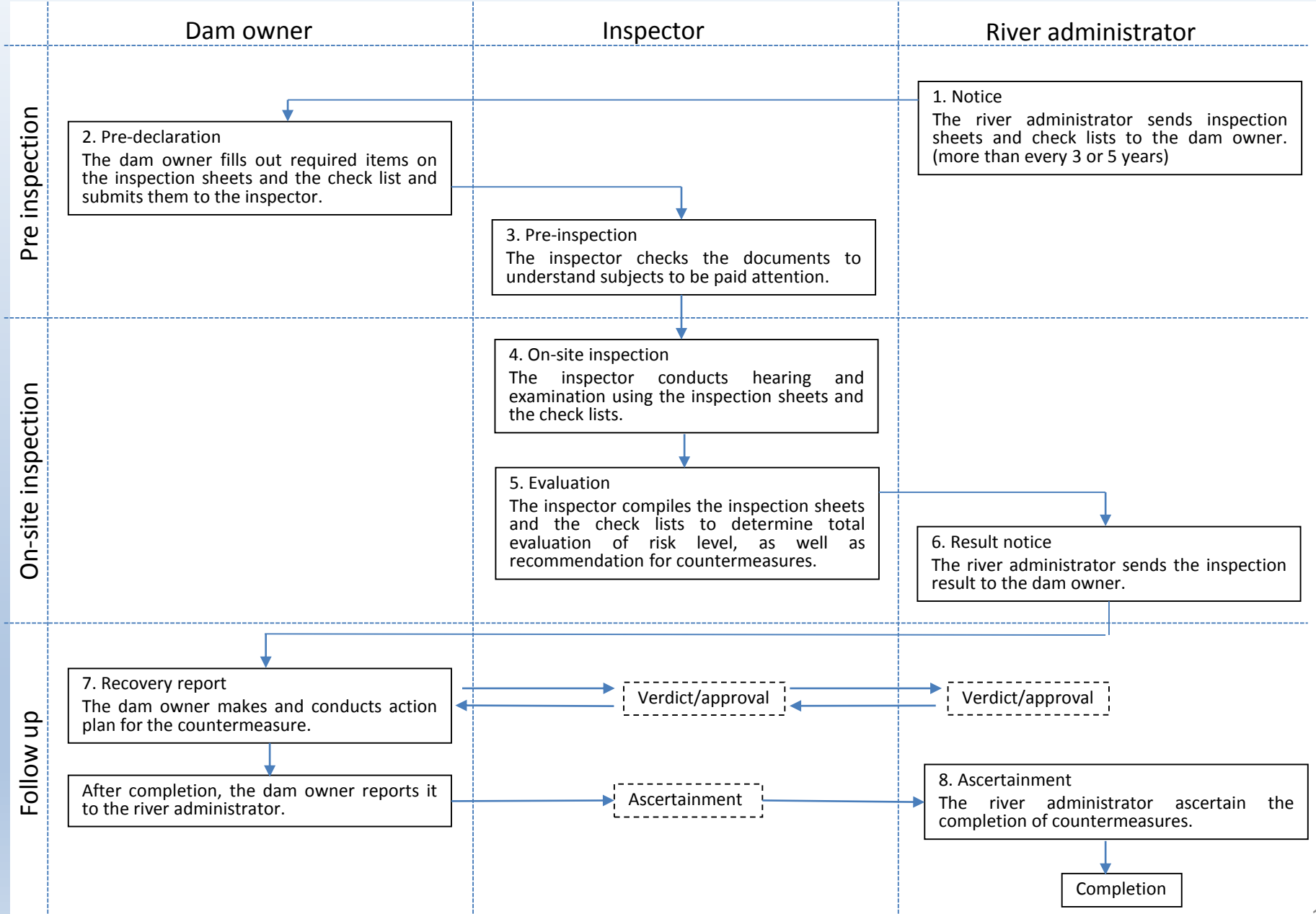


### (3) Conditions of facilities and equipment

Component		Key point	Method
Concrete dam	Leakage/seepage	Indication of unexpected situation	Data analysis and visual examination
	Displacement/deformation	Indication of unexpected situation	Data analysis and visual examination
	Uplift pressure	Indication of unexpected situation	Data analysis
Fill dam	Leakage/seepage	Indication of unexpected situation	Data analysis and visual examination
	Displacement/deformation	Indication of unexpected situation	Data analysis and visual examination
	Pore pressure	Indication of unexpected situation	Data analysis
	Saturated line	Indication of unexpected situation	Data analysis
Outlet	Gate operation	Performance and damage	Maintenance report and visual examination
	Gate control	Correctness and facility's conditions	Maintenance report and visual examination
	Backup power supply	Sufficiency of preset power value	Maintenance report and visual examination
Reservoir and surroundings	Reservoir and surroundings	Land slide, collapse, over deposition, etc.	Site survey, report check and hearing
Monitoring equipment	Monitoring equipment	Proper monitoring and lifetime of buried equipment	Maintenance report and visual examination
Observation equipment	Observation equipment	Proper observation	Maintenance report and visual examination
Communication equipment	Communication equipment	Reliability of communication	Maintenance report and visual examination
Alert equipment	Alert equipment	Reliability of performance	Maintenance report and visual examination
Other equipment	Other equipment	Management office, patrol car, etc.	Maintenance report and hearing



# < Inspection flow >





# < Dam inspection sheet 1-1 >

## (1) General information (filled by the owner)

Date			Inspector		
Purpose	Owner's name		Completion date		
Dam name					
Purpose	Owner's name		Completion date		
Structural type	Dam height		Crest length		
Design flood discharge	m <sup>3</sup> /s	Maximum outlet capacity	m <sup>3</sup> /s	Previous largest discharge	m <sup>3</sup> /s

## (2) Subjects to be inspected (by the dam owner)

### a) Management organization and activities

Subject	Necessity
Management organization	O / X
Management activities	O / X
Others	O / X

### b) Document compilation and archive

Subject	Necessity
Basic documents	O / X
Documents of management	O / X
Documents before operation	O / X

### c) Conditions of facilities and equipment

Subject	Necessity
Concrete dam and bedrock	O / X
Fill dam and bedrock	O / X
Spillway of fill dam	O / X
Continuous outlet	O / X
Emergency outlet	O / X
Water-use outlet	O / X
Backup power supply	O / X
Observation equipment	O / X
Monitoring equipment	O / X
Communication equipment	O / X
Alert equipment	O / X
Reservoir and surroundings	O / X
Others	O / X



< Dam inspection sheet 1-2 >

**(3) Remarks and recommendations**

I Management organization and activity

II Document compilation and archive

III Conditions of facilities and equipment

Total evaluation (Risk level)

( A, B, C )

The inspector should summarize the results of 3 categories and judge the dam's risk level form A, B or C.

- A: Fatal defects for the dam or the river. Subjects with "a" evaluation should be recovered immediately
- B: Same detectives but manageable as a whole
- C: No problem in whole



### < Dam inspection sheet 1-3 >

#### (4) Technical certificate

Date	Inspector		Dam owner	Inspector
	Risk level "a"	Reasons	Countermeasures	Ascertainment
	Subject: Component: Check point:			Date
	Subject: Component: Check point:			Date
	Subject: Component: Check point:			Date
	Subject: Component: Check point:			Date
	Subject: Component: Check point:			
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	Subject: Component: Check point:			
	Subject: Component: Check point:			
	Subject: Component: Check point:			

The inspector must describe all defects of facilities which evaluated as risk level "a", and necessary comments on equipment which doesn't need to be evaluated. After receiving the report format, the inspector fill the certification with the date.



## < Dam inspection sheet 1-4 >

### (5) Recovery report

	Evaluation "a"	Response
<1>	Date: Subject: Component: Check point:	
<2>	Countermeasures to be conducted	
<3>	Countermeasures completed  <a details report and photos should be attached>	

After copying the inspector's comments on the box <1>, the dam owner must fill the box <2> and submit it to the inspector after the inspection or in a few days. When the countermeasures are completed, the dam owner should report it in the box <3> and resubmit the format as soon as possible.