

GEORGIA

INSPECTION OF DAMS

WORKSHOP/ FIELD VISITS

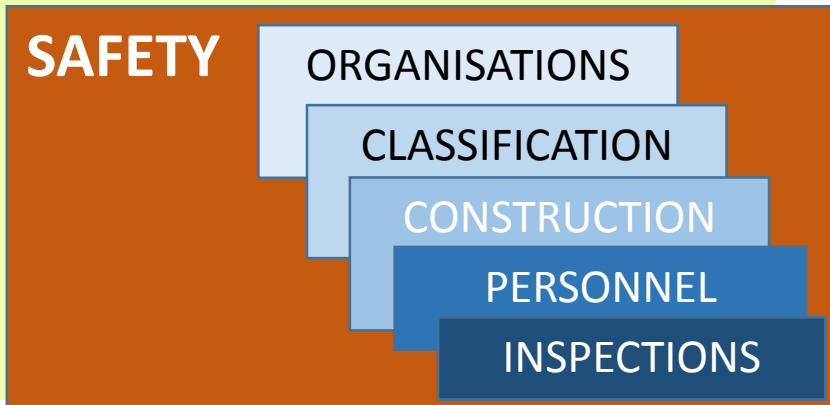
1 / Intro
Organizing
Operation

DAMS AND WATER RETAINING STRUCTURES

WRS

- **GOVERNMENT – NATION – DISTRICTS – PUBLIC/ PRIVATE**
- **ENERGY DEMAND –POPULATION-INDUSTRY**
- **ENVIRONMENTAL CONCERNS**
- **ECONOMIC CHALLENGES**
- **SOCIAL ISSUES**
- **INSTITUTIONAL SYSTEMS**
- **FINANCIAL ARRANGEMENTS**
- **TECHNICAL SOLUTIONS**
- **CONSTRUCTION & OPERATION**

A SMALL PART OF A LARGER PICTURE



Comments to PREVIOUS slide.

- THE LARGER PICTURE:
- **WRS**-- CONSISTS OF MANY IMPORTANT ELEMENTS-----
- INSPECTIONS ARE A SMALL PART OF THE WHOLE PROJECT
- BUT:
- WITHOUT INSPECTIONS STRUCTURES MAY FAIL
- PEOPLE MAY DIE
- INFRASTRUCTURE AND PROPERTY MAY BE LOST
- ENVIRONMENT DAMAGED

A SMALL, BUT IMPORTANT PART...

• SAFETY

WTR

ORGANISATION

CLASSIFICATION

CONSTRUCTION

PERSONNEL

INSPECTIONS

MITIGATION



Comments to PREVIOUS slide.

- ***WTR = WATER TECHNICAL RESPONSIBLE***
- ***SAFETY ASPECTS TOUCHES ON A NUMBER OF THEM.***
- ***THERE MUST BE AN ORGANISATION BEHIND THE PROJECT***
- ***THE ORGANISATION HAVE CONCERN OF ALL ACTIONS, AND DELEGATES RESPONSIBILITY***

SYSTEMATIC INSPECTION ACTIVITIES

WATER TECHNICAL RESPONSIBLE PERSON

WTR

Comments to PREVIOUS slide.

- *THE FUNCTION MOST IMPORTANT FOR THE PROJECT STRUCTURE IS THE WTR = WATER TECHNICAL RESPONSIBLE.*
- *WTR is a technical and APPROVED person in this function, having completed necessary training.*
- **WTR HAS THE TECHNICAL RESPONSIBILITY FOR ALL TECHNICAL MATTERS, AND ENSURES INSPECTIONS AND FOLLOW UP ACTIONS – REPAIRS AND MAINTENANCE.**
- **---AND THEREFORE ALSO SAFETY**

SYSTEMATIC INSPECTION ACTIVITIES

Inspection Plan	Operational inspections	Periodic inspection	Main inspection	Reassessment Reevaluation	Special inspection
Participants	Operators	WTR/ QP	VTA+ another equivalent VTA	Approved qualified persons VTA participates	WTR
Frequency	Every visit	1-2 times/year	< 5 years	< 15 years - or more frequent- ref. findings from Main inspections	Whenever exposed to extreme loading
Extent	Visual	All vital elements. Checklists	Struct.Condition Checklists. Classification. Instrumentation	Struct condition. Checklist control. Reconsider suitability. calculate struct. Upstream inspection	Considered in each case
Reporting	Logbook	Report damages and defects in checklist. Maintenance Plan	Report deviations Current requirements. Analyzed data	Report, with calculations, safety evaluation, analyses. Propose remedial action	Reporting of substantial damage to Authorities

Comments to PREVIOUS slide.

- SYSTEMATIC INSPECTIONS ENSURES THAT EVERYTHING IS KEPT IN ORDER, OR IDENTIFIES ACTION TO BE TAKEN
- SYSTEMATIC AND REPEATED

The ORGANISATION behind dams:

- **Owner** (Government, Industry/ Consortium, etc)

Ultimate
RESPONSIBILITY

Mandatory Site Personnel:

- Leader (Director, Manager, Chief Engineer)
- Water-Technical-Responsible, and «stand-in» WTR).
(In Norway: VTA- approved technical responsible)
- Operators (employed personnel)
- Inspectors
- Specialists
- Designers

The ORGANISATION behind dams:

- **Owner** (Government, Private Consortium, etc)

**Ultimate
RESPONSIBILITY**

- The owner is responsible to ensure that:
 - Projects are SAFE
 - projects adhere to Safety Class* requirements
 - suitable reporting routines are in place
 - qualified personnel are in place, and organized and available when required
 - That the Safety Class* is correctly defined

The ORGANISATION behind dams:

HOW DO WE ORGANIZE THIS??

WHO IS RESPONSIBLE ?

Who is qualified?

IN SOME COUNTRIES THE REQUIRED ORGANISATION OF SUCH IMPORTANT PUBLIC ISSUES IS DESCRIBED BY LAW AND REGULATIONS

THIS REFERS TO THE NORWEGIAN SYSTEM, BUT WE SHOULD ALSO DISCUSS THE GEORGIAN SYSTEM

The ORGANISATION behind dams:

- **Leader** (employed Director, Manager, Chief Engineer)
- The leader is responsible that:
 - - Internal control is performed
 - - Qualified personnel has required «Water-Technical» competence
 - - Qualified personnel is given ample time to perform their duties
 - - **Safety** demands are met, including public safety measures
 - - Physical safety measures are evaluated
 - - Reports are submitted to the Owner.

The ORGANISATION behind dams:

- **WTR** > Water-Technical-Responsible, + «stand-in»).
- In Norway: VTA- approved technical responsible
- WTR is responsible for technical issues at the site. INSPECT THE SITE. He shall:
 - - Create and continuously update internal control systems
 - - ensure that safety is monitored and reassessed
 - - **Report to Leader**, and suggest Safety measures.
 - - ensure that planning, engineering, construction and re-evaluation adhere to relevant LAW (requirements)
 - - Report abnormal situations to Leader
 - - ensure education of personnel and «stand-in WTR» for relevant sites.

The ORGANISATION behind dams:

- **Operators** perform activities on site, monitoring and entries in logbooks.
Reports to WTR -of observations of defects/damages.
- **Technically qualified and Responsible**, shall be engaged to ensure that investigations, calculations and plans are executed according to regulations
- **Qualification of Operation personnel**
OP shall have knowledge of their own project sites, their structures, functions, state of condition, floods, surveillance monitoring and emergency plans.
- **OP** shall be given specific theoretical training.

The ORGANISATION behind dams:

The Owner shall ensure :

- MANAGEMENT Qualifications
 - Leader qualifications
 - WTR qualifications
 - Technical personnel qualifications
 - Contractors qualifications
 - Control personnel – qualifications

THE LEADER SHALL HAVE KNOWLEDGE OF SAFETY AT HIS SITES, RULES AND REGULATIONS, SURVEILLANCE, EMERGENCY ROUTINES, MEDIA-AND CRISIS MANAGEMENT.

The leader shall attend relevant specific theoretical training.

The ORGANISATION behind dams: **WTR qualifications**

Consequence class	Education	Practice
3 and 4	University degree. MSc civil or eqv. Within relevant fields and subjects	Min 30 moths relevant practice from safetywork at dams etc.
2	Technical college. BSc engineering or eqv. Within relevant fields and subjects	Min 30 moths relevant practice from safetywork at dams etc.
1	Technical college or high school. Bsc engineering or eqv. Within relevant fields and subjects	Min 30 moths relevant practice from safetywork at dams etc.

The ORGANISATION behind dams:

SPECIALIST PERSONNEL

Approved qualification is given for specific areas of expertise

I	Concrete/ masonry dams and foundations
II	Embankment dams and foundations
III	Release and diversion, steel structures, gates, pipes
IV	Flood hydrology
V	Hydraulics and flood dissipation design

KEY PERSONNEL ARE CATEGORIZED IN FIELDS OF EXPERTISE, AND GIVEN QUALIFICATION STATUS

The Organisation --A very **IMPORTANT PART...**

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**Without the
Organisation:**

NO PROJECT

ORGANISATION

PERSONNEL

INSPECTIONS

The **ORGANISATION** behind dams:

We have discussed the importance of

Clear organisation
responsibilities
Qualified personnel
Systematic inspections

INSPECTIOS ENSURES THAT EVERYTHING IS IN ORDER, OR IDENTIFIES ACTION TO BE TAKEN

SYSTEMATIC AND REPEATED

SYSTEMATIC INSPECTION ACTIVITIES

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The ORGANISATION behind dams:

- BREAK
- WE MOVE ON TO

WHAT ABOUT OPERATIONS?

Objectives of --The ORGANISATION behind dams:

SATISFACTORILY OPERATE THE PROJECTS SAFELY AND ECONOMICALLY

OPERATIONAL PROCEDURES;

- -Procedures for normal operation
- - Procedures for abnormal situations; Floods, Malfunction of equipment and Gates, Maintenance.
- Surveillance of operation (visual, instrumental) if any Public, Material, or Property are endangered
- Everyone involved in Operation shall be familiar with the Sites and the Operational Procedures, and know how Safety is influenced by operations.

The ORGANISATION behind dams:

Operations

- Surveillance;
- **Dams and WRS** shall be supervised in order to ensure early detection of potential safety reduction.
- **Surveillance Plans** shall be prepared for each Site.
(include internal inspections, instrumentation, measurements, permitted parameters..., etc. CCTV)
- The SP shall be included in Reassessments.
- **SP and Results** shall be documented and available upon request

The ORGANISATION BEHIND DAMS MUST HAVE ADEQUATE PLANS AND PREPAREDNESS, AS WELL AS TOOLS, VEHICLES AND EQUIPMENT -- FOR THE RESPONSIBILITY THEY ARE GIVEN

Operations The ORGANISATION behind dams:

Supervision Level	Supervision Frequency	Inspections / Supervision Extent	Performing Personnel
Periodical supervision	<p>Class 1-4: At least: < 1 /year</p>	Inspection of predefined Status. Control of reliability of data gathered in the Period	<p>Qualified Personnel WTR at least < every 2 years</p>
Main supervision	<p>Class 2-4; At least every 5 years</p> <p>Class 1; At least every 7 years</p>	<p>Scrutinize routines, Extensive inspection, Evaluate conditions and functionality, Evaluate surveillance level, and need for reassessments</p>	<p>WTR and equivalently qualified (2.nd opinion)</p>
Special supervision	<p>Class 1-4; During and after abnormal situations</p>	Investigate if the Site has endured the situation/ loading	WTR

Text ref to frame above and below

- ***SYSTEMATIC TIME SCHEDULES AND TASKS. AND PERSONNEL TO DO IT***
- *Instruments and equipment shall be reliable, exact and easy to read off, and placed to give correct values. Transfer systems of data shall be failsafe, and all checked regularly. Data and time references in standardized reference systems.*

Operations- Required instrumentation /parameters

Dam type	Class	Water Level	Leak age	Deforma-tions	Pore Pressure
Embankment dam founded on good rock	2, 3, 4	x	x	x	
Embankment dam founded on loose material or weak & fissured rock and fault zones	2, 3, 4	x	x	x	x
Concrete and Masonry dams founded on good rock	3, 4	x	x	x	
Concrete and Masonry dams founded on good rock	2	x	x		
Concrete and Masonry dams founded on soil or rock with significant weak zones	3, 4	x	x	x	x
Concrete and Masonry dams founded on soil or rock with significant weak zones	2	x	x		x

Class 1 - Dams; shall have a device / scale for Water Level monitoring

Operations - The ORGANISATION behind dams

PREPAREDNESS PLANS (contingency plans)

- Preparedness Plans (Emergency Plans) for Dams that can cause significant dangers for people, environment and property. (Class 2, 3, 4)
- The Plan shall define case situations of what to with increasing dangers beyond normal operation; that requires preparedness, notifications, evacuation plans, personnel and Resources (eg. vehicles).

EXERCISES

- every 3 years to train personnel and test emergency plans (EP)
- EP - Coordination between different sites /in same area
- Authorities responsible for evacuation to be notified of EP and routines. Dam owners shall invite authorities to excercises.

Operations - The ORGANISATION behind dams

SAFETY MEASURES

- shall ensure safe public traffic on and around sites. **Analyze situation at least every 5 years**, wrt. use and public traffic. Expose potential dangers.

ACCESS LIMITATIONS

- Class 2-4 sites should be protected against wrongdoing/sabotage, by limiting public access to the Site and operational systems.

INFORMATION DISCRETION (safety requirements) (secrecy)

- Class 2-4 sites; Information to be security/safety evaluated. Certain information may be treated as Classified.

Operations - The ORGANISATION behind dams

Dam Break Warning

- Class 2, 3 and 4 dams may be required to establish direct warning to influenced personnel. Warning to be suited to dam type, extent of surveillance and distance from dam to evacuation area. Functionality of warning systems.
- Other Special Precautions?

Notification of accidents

- or unplanned events. (almost accidents)

Authorities should be notified of such «happenings» in order to improve safety knowledge and awareness.

Operations - The ORGANISATION behind dams

Law: «Dam Safety Act» - or similar. Enforcing

A DAM SAFETY ACT IS THE BACKBONE OF THE AUTHORITIES CONTROL WITH THE SAFETY OF DAMS AND WATER RETAINING STRUCTURES.

- Requirements;
- Documentation of all relevant material
- Dispensations if safety is ensured, or stronger measures if required, limited to the relevant law/ Act.
- Financing of fees by owner for Authorities costs. (Fees depends on Class/ Dam Break consequences, dam height and volume. Small dams may demand minimum fees.
- Authorities may enforce improvements within limited time period. Penalties.

Text ref frameabove

- THE OWNER IS RESPONSIBLE TO INFORM AUTHORITIES OF EVERY ASPECT CONCERNING THE PROJECT. ACC. TO LAW.
- DOCUMENTATION MAY INCLUDE VALID ATTESTATION/ EXAM CERTIFICATES FOR PERSONNEL, OR REPORTS FROM INSPECTIONS.
- SENSITIVE INFORMATION TO AUTHORITIES ASSUMED GIVEN TO SECURITY CLEARED PERSONS.