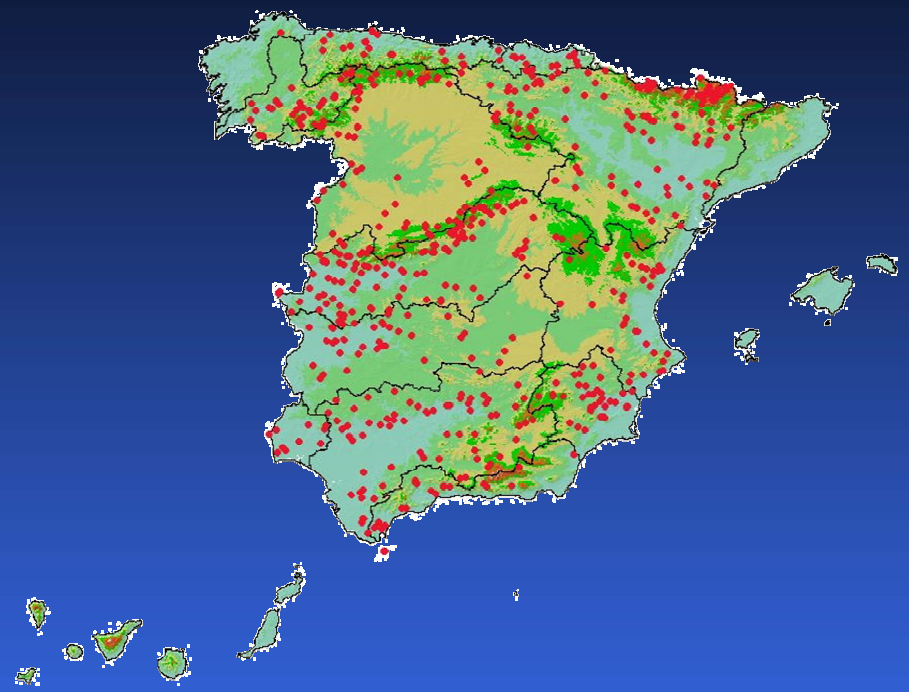
ENVIRONMENTAL DEPARTMENT OF SPAIN
Secretariat of State for Waters and Coasts
Directorate-General for Water Works and Water Quality



EMERGENCY ACTION PLANS
A SPANISH PERSPECTIVE.

January 28, 2004. San Francisco, USA

Liana Ardiles Lopez/Javier Sanchez Martinez/Jesús Yagüe Córdova

MINISTRY OF ENVIRONMENT

LEGAL FRAMEWORK.

ENVIRONMENTAL DEPARTMENT (MMA)

Secretariat of State for Waters and Coasts

- Gabinete del Secretario de Estado
- Gabinete Tecnico
- Inspeccion General de Servicios
- SUBSEC… D… MEDIO A…

Directorate-General for Water Works and Water Quality (DGOHCA)

- Subdireccion General de Planificacion Hidrologica
- Subdireccion General de Presupuestos y Contratacion
- Subdireccion General de Proyectos y Obras
- … Control de la Calidad de las Aguas

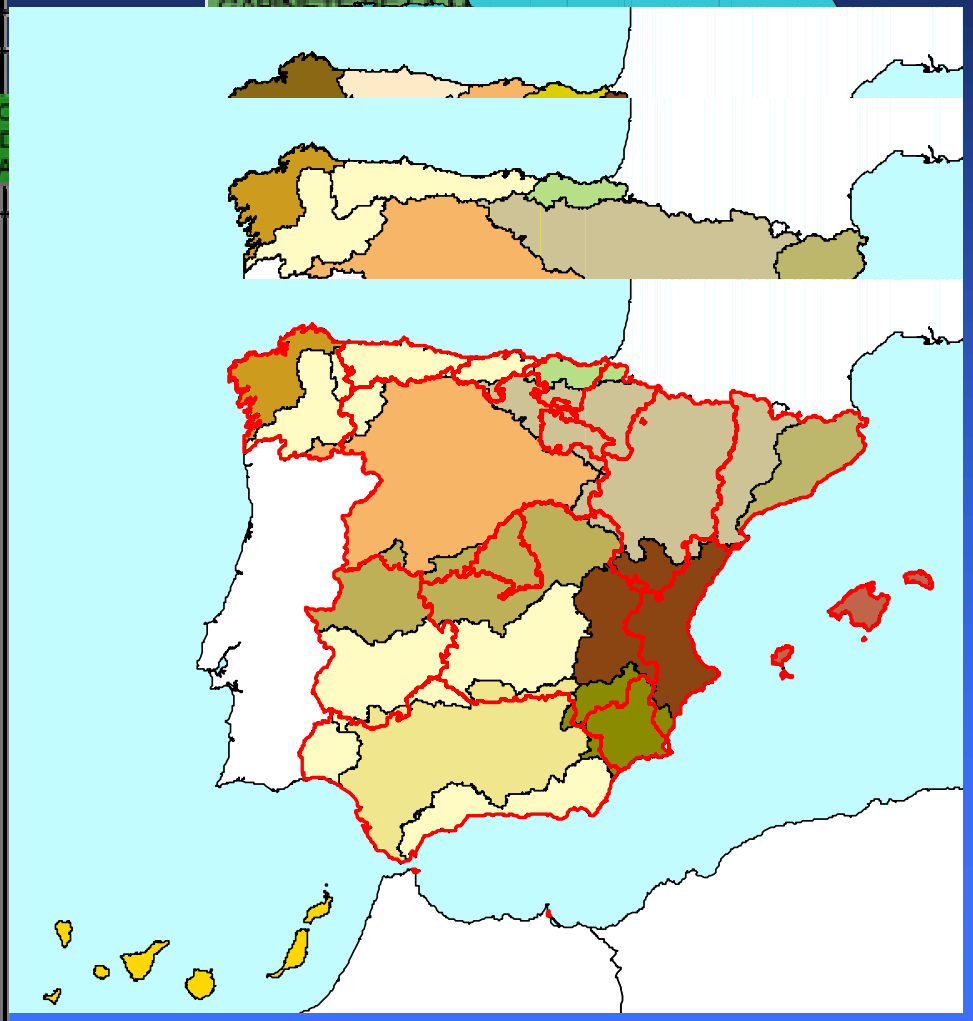
DIRECCION GENERAL DE COSTAS

- Subdireccion General de Gestion del Dominio Publico Maritimo Terrestre
- Subdireccion General de Actuaciones en la Costa

Water Boards (CH)

- MANCOMUNIDADES DE CANALES DEL TAIBILLA
- PARQUE DE MAQUINARIA

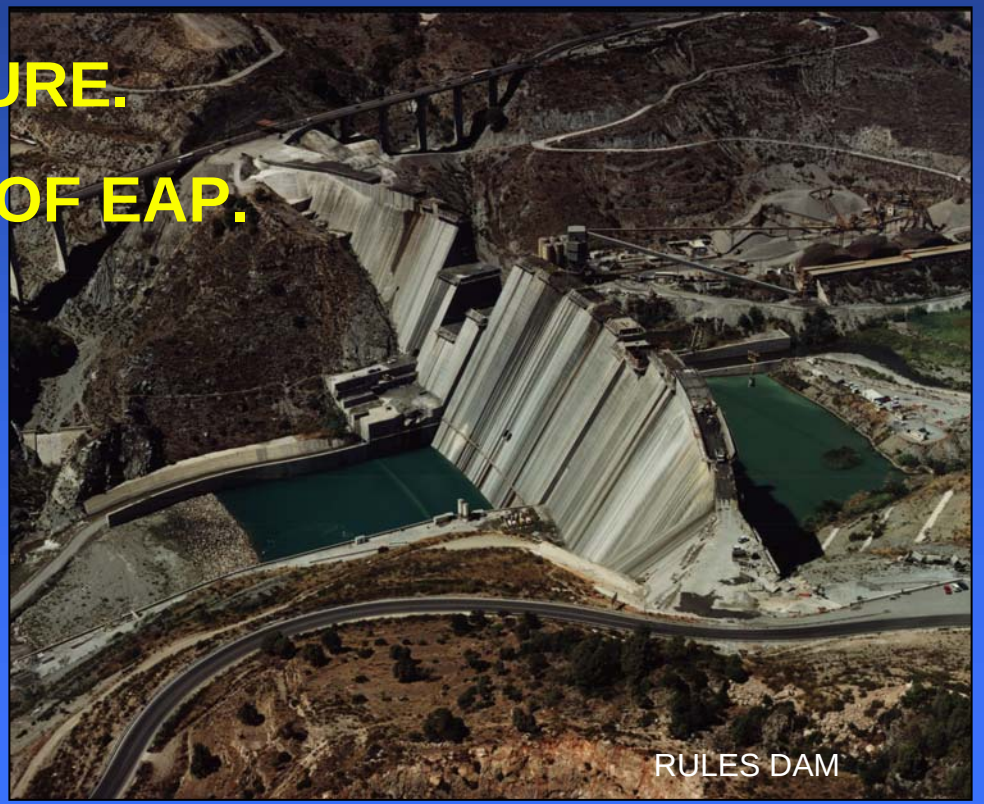
Deputy Directorate-General for the Management of the Public Water Domain **(SGGDPH)**



MINISTRY OF ENVIRONMENT

EMERGENCY ACTION PLANS (EAP)

- ✓ DAM REGULATIONS IN SPAIN.
- ✓ BASIC ELEMENTS OF AN EAP.
- ✓ APPROVAL PROCEDURE.
- ✓ TECHNICAL REVIEW OF EAP.
- ✓ IMPLEMENTATION.



RULES DAM

MINISTRY OF ENVIRONMENT

DAM REGULATIONS IN SPAIN.

- ✓ **Civil Protection Planning for Flood Hazard Directory (1995).**
  - Hazard Potential Classification : A, B, C. (High, Significant, Low).
  - Preparation and Implementation of the Emergency Action Plan (EAP).
  - Anticipated activities of Civil Protection included in the State Plan, Autonomous Region Plan and Local Plan.
  - Establishment of systems of notification of incidents and alert and alarm that allow the adoption of the appropriate measures.
- ✓ **Dams and Reservoir Safety Technical Regulations (1996).**
- ✓ **Technical Guidelines for the Classification of Dams (1996) and for the Preparation of the Emergency Action Plan (2001).**

MINISTRY OF ENVIRONMENT

GUIDELINE FOR THE CLASSIFICATION OF DAMS.

DAM CATEGORY	RISK FOR POPULATION	MATERIAL DAMAGES OR ESSENTIAL SERVICES	ENVIRONMENTAL DAMAGE
A	SERIOUS EFFECT ON TOWNS	MORE THAN 5 INHABITED DWELLINGS	VERY SERIOUS EFFECT
B	WOULD AFFECT A SMALL NUMBER DWELLINGS	BETWEEN 1 AND 5 INHABITED DWELLINGS	RIOUS EFFECT
C	INCIDENTAL LOSS OF HUMAN LIFE	NO INHABITED DWELLINGNS	

EMERGENCY ACTION PLAN (EAP) for Dams A or B.

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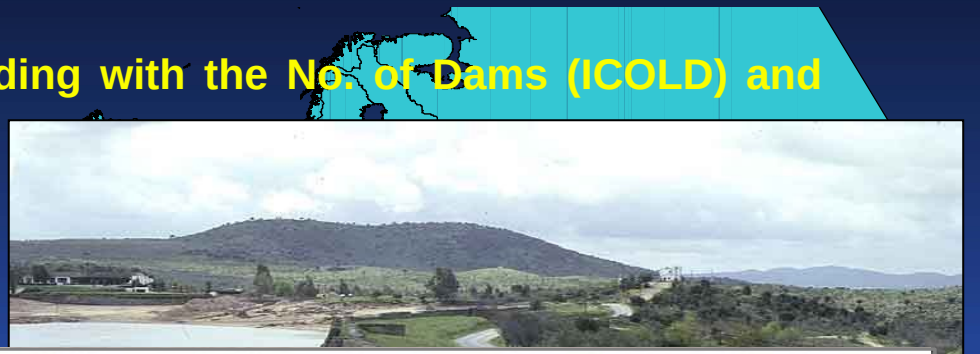
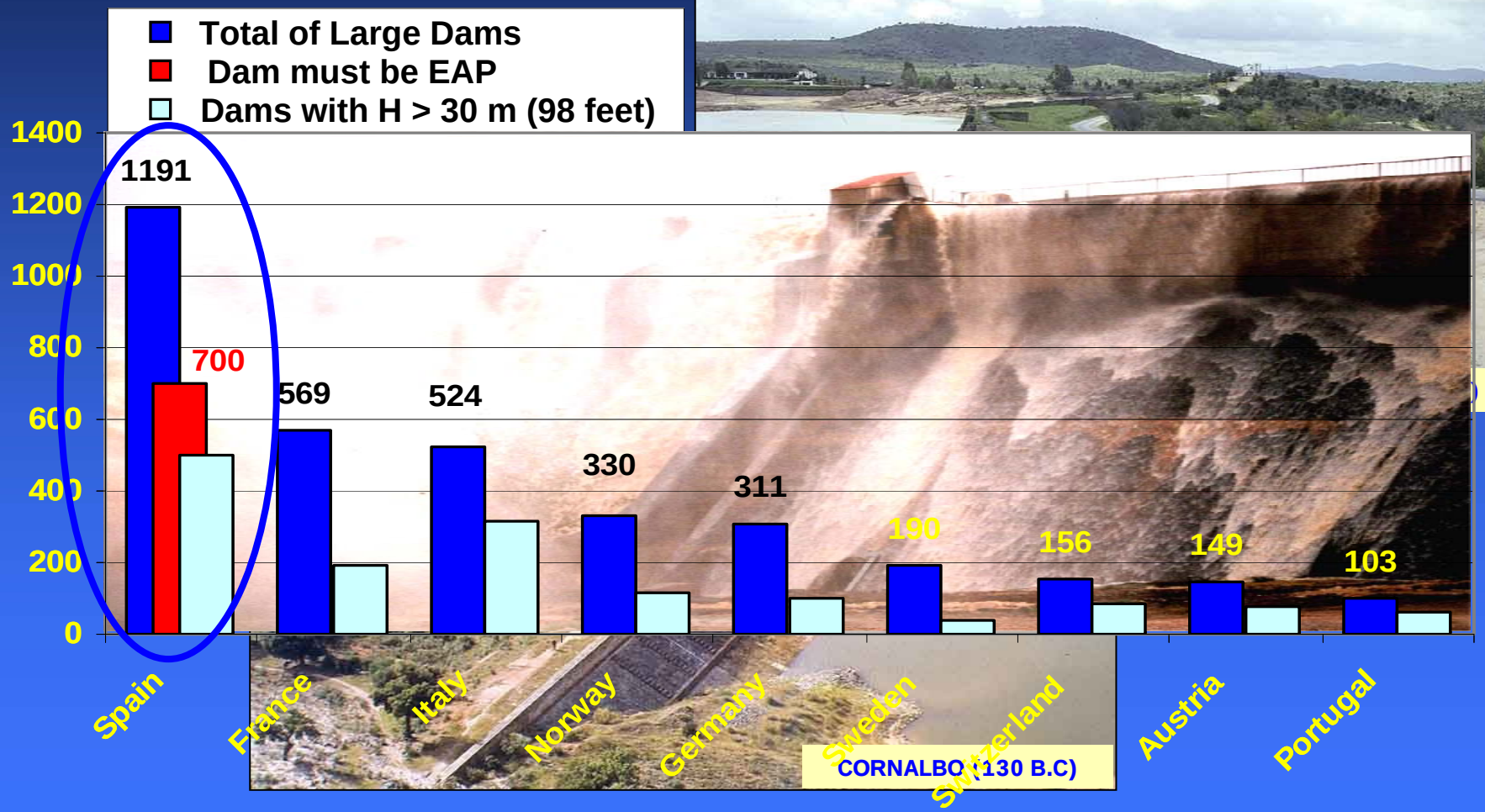
IMPLEMENTATION DAM SAFETY LEGISLATION.

✓ **Fifth in the world ranking according with the No. of Dams (ICOLD) and first in Europe.**





MINISTRY OF ENVIRONMENT

BASIC ELEMENTS OF AN EAP.

DAM SAFETY ANALYSIS

- Situations and phenomena to be consider.
- Indicators.
- Thresholds for safety scenarios.

REGIONAL ZONIFICATION

- Define the Inundation Maps and identify the potential damages.

OPERATIONAL PROCEDURES

- Increase the surveillance and control over the dam.
- Application of corrective measures to reduce the risk.
- Notification Flowcharts.

ORGANIZATION

- Define the team to carry out the operational procedures.

RESOURCES

- Emergency Operation Center and Direct warning System.

MINISTRY OF ENVIRONMENT

FORMAL STRUCTURE OF AN EAP.

1. Dam Safety analysis
2. Regional Zonification
3. Operation regulations
4. Organization
5. Resources

Entire development of each section

Appendices

Operative Elements.

Operational Procedures

"Operative Document"

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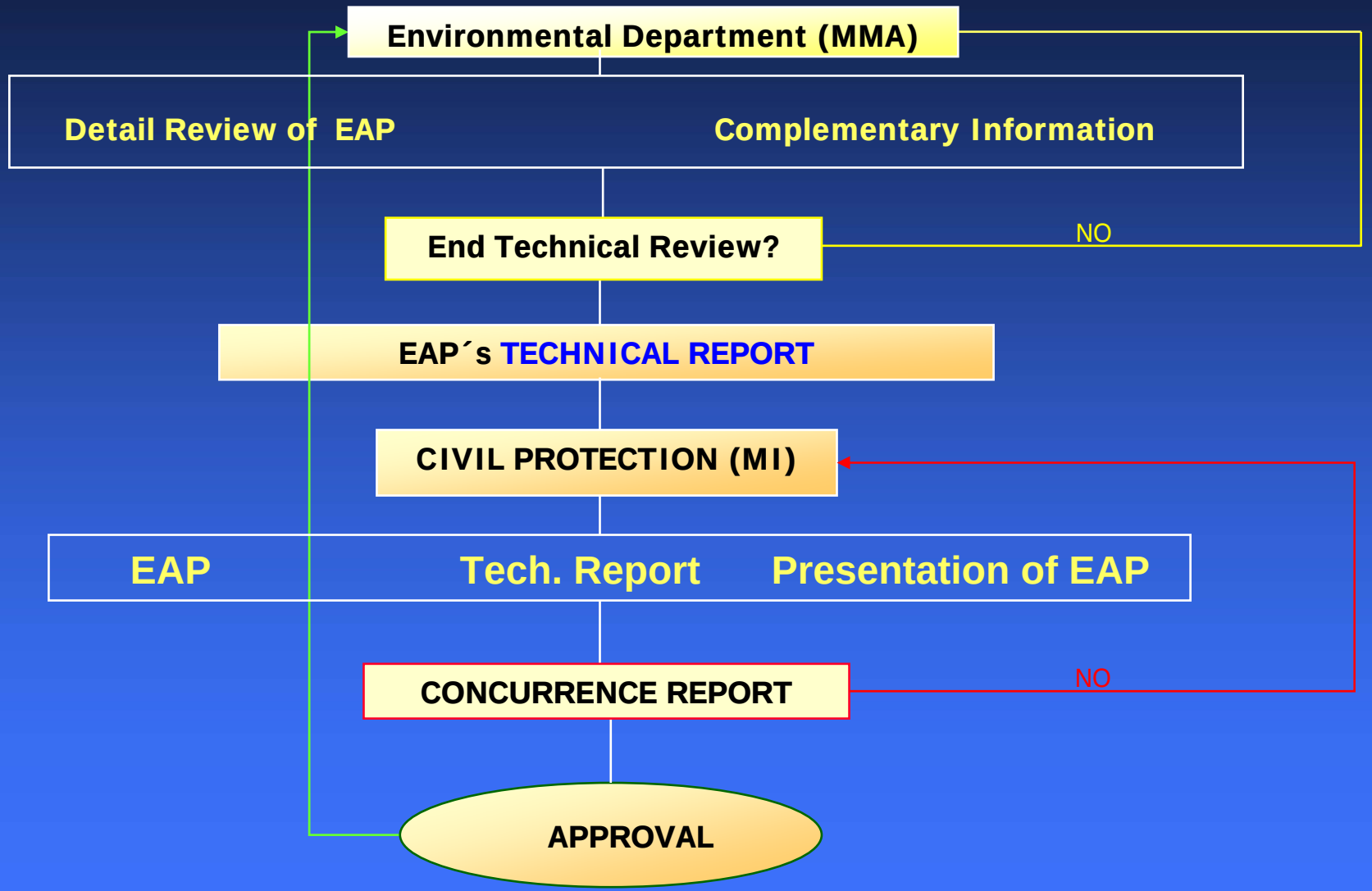
APPROVAL PROCEDURE.



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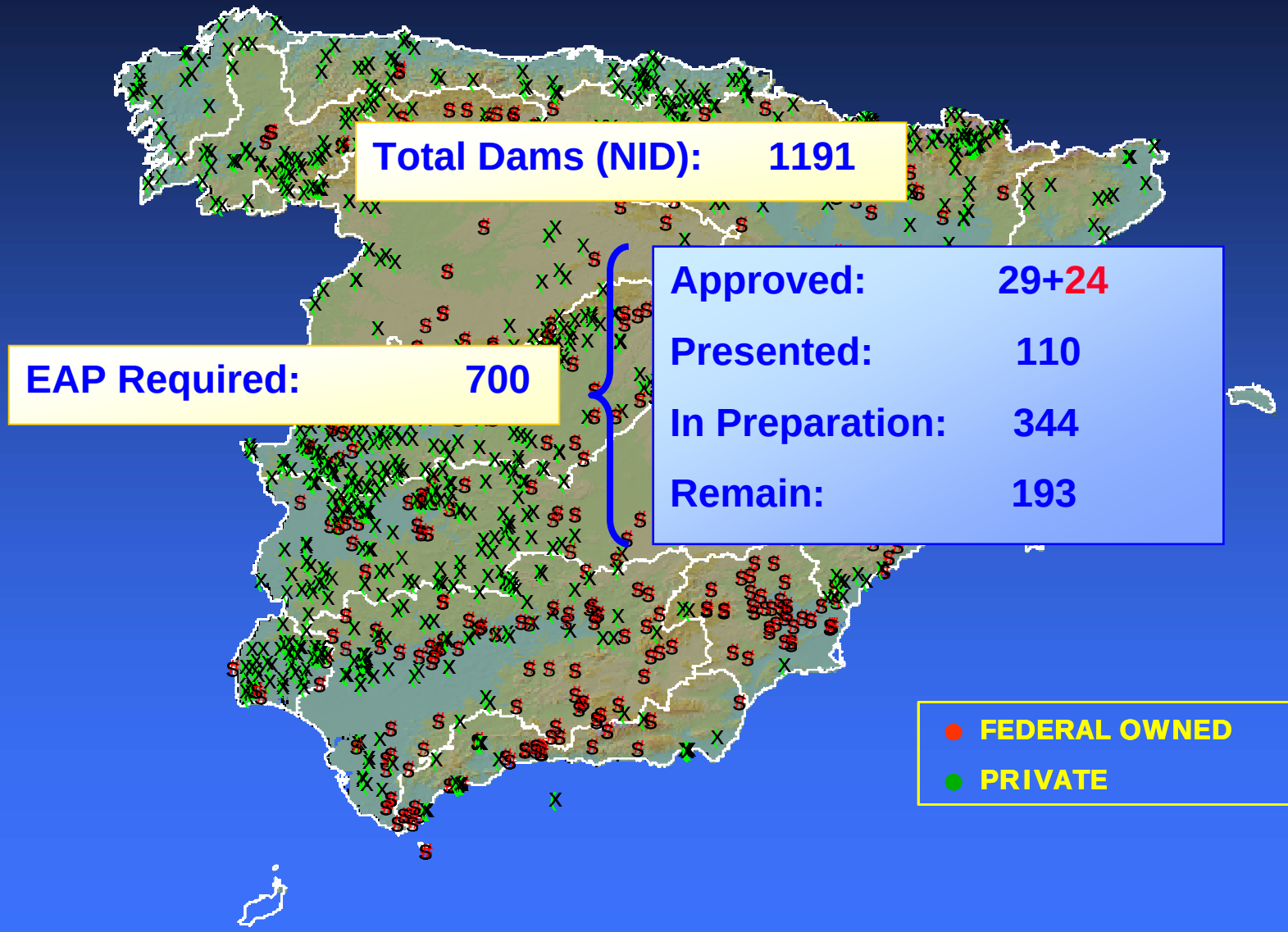
EAP CURRENT SITUATION.



MINISTRY OF ENVIRONMENT

TECHNICAL REVIEW OF EAP's.

ITOIZ DAM

IRABIA DAM

1. Dam Safety Analysis
2. Regional Zonification
3. Operational Procedures
4. Organization
5. Resources

MINISTRY OF ENVIRONMENT

1. DAM SAFETY ANALYSIS.

✓ **OBJECTIVE:**

Study of the situations that might have a negative effect upon the safety conditions.

✓ **ASPECTS TO CONSIDER:**

MINISTRY OF ENVIRONMENT

DAM SAFETY ANALYSIS.

Phenomena

Flood	Earthquakes	Inspection	Monitoring

Indicator

Reservoir Level	Detection	Periodic Inspection	Measures out of the normal range

Thresholds for different scenarios

SAFETY CONTROL SITUATION. — E 0

range

APPLICATION OF CORRECTIVE MEASURES. — E 1

EXCEPCIONAL SITUATION. — E 2

evolution

EXTREME SITUATION. — E 3

MINISTRY OF ENVIRONMENT

2. ZONIFICATION AND POTENTIAL DAMAGES.

1. Dam Safety Analysis
2. Regional Zonification
3. Operational Procedures
4. Organization
5. Resources

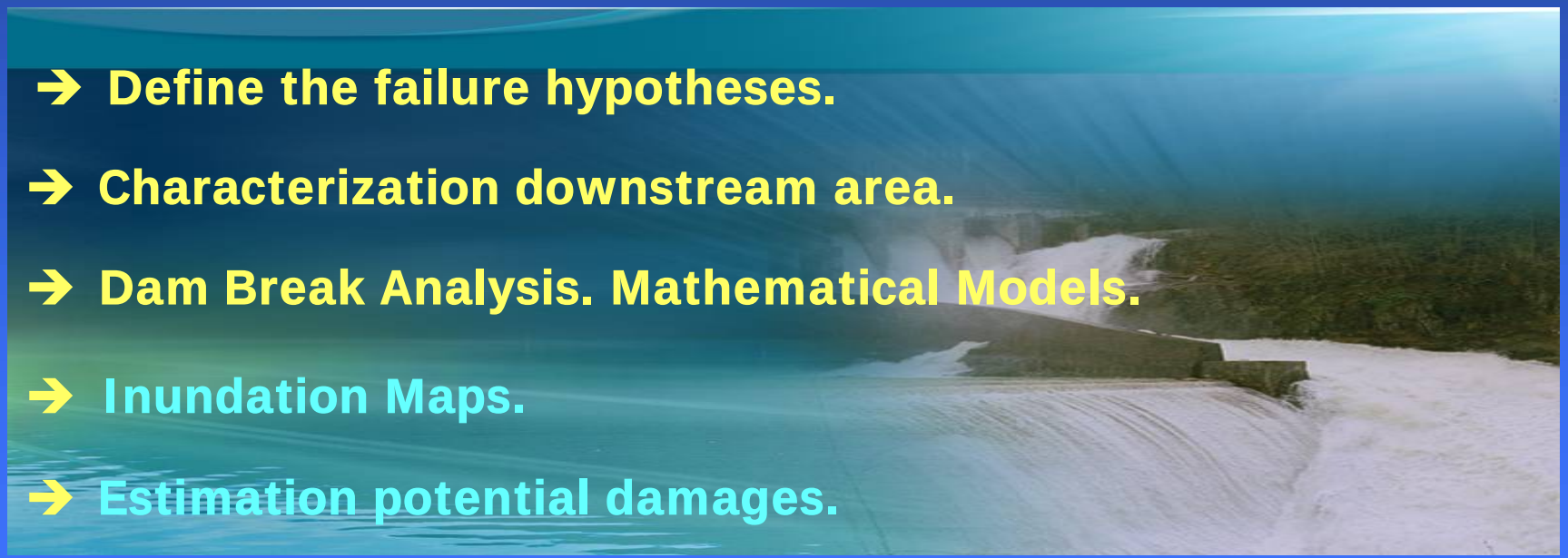
MINISTRY OF ENVIRONMENT

2. ZONIFICATION AND POTENTIAL DAMAGES.

✓ **OBJETIVE:**

Define the flood areas as a result of a dam failure and the potential damages.

✓ **ASPECT TO CONSIDER:**



- ➔ **Define the failure hypotheses.**
- ➔ **Characterization downstream area.**
- ➔ **Dam Break Analysis. Mathematical Models.**
- ➔ **Inundation Maps.**
- ➔ **Estimation potential damages.**

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INUNDATION MAPS.

THESE IMAGES ARE OWNED BY EHN (IRABIA DAM)

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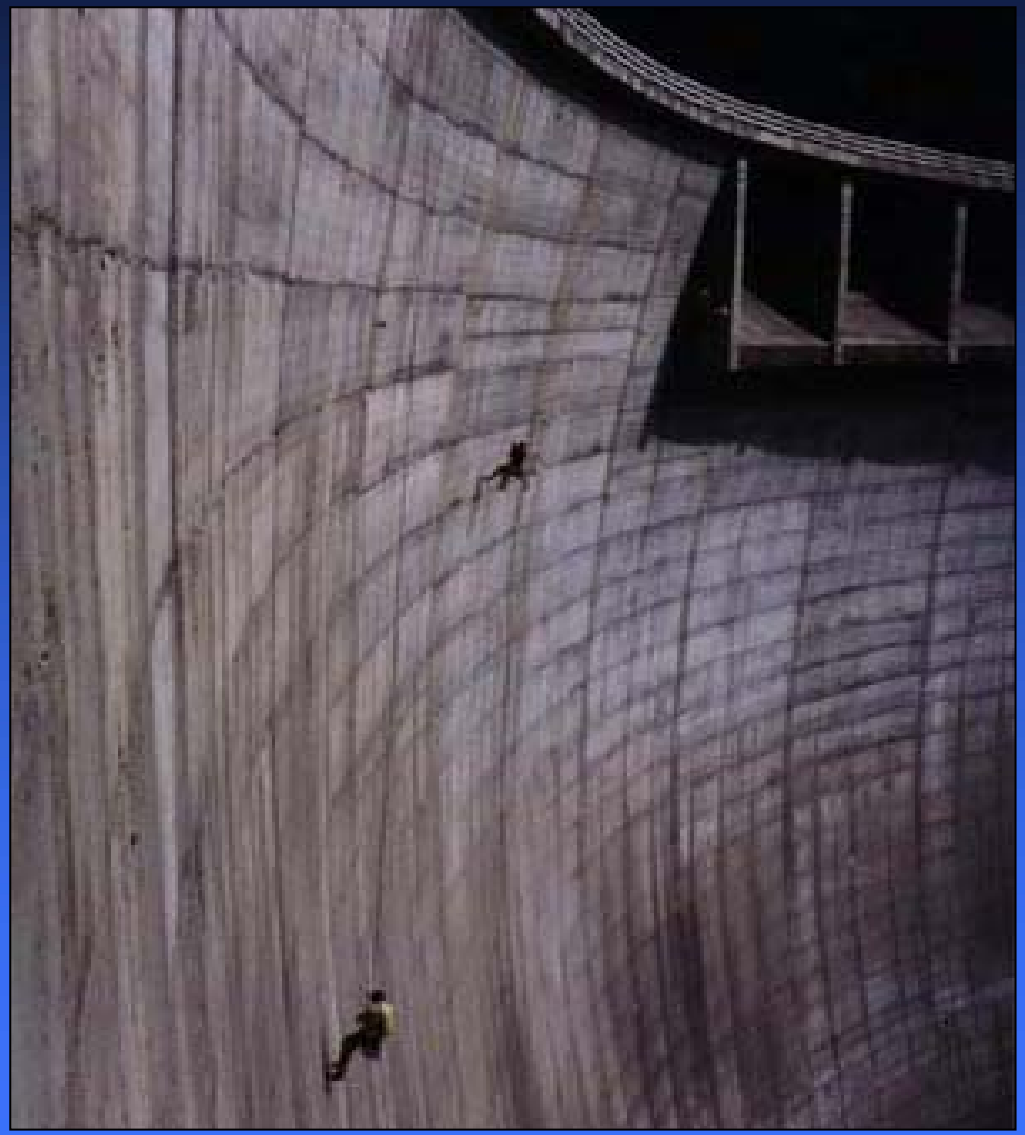
3. OPERATIONAL PROCEDURES.



1. Dam Safety Analysis
2. Regional Zonification
3. Operational Procedures
4. Organization
5. Resources

MINISTRY OF ENVIRONMENT

ACTIVITIES FLOWCHART.

SAFETY SCENARIOS

0

- Specific inspection activities.
- Check the emergency Communication Networks and alarms.
- Notify to Federal Administration (MMA).

1

- Specific inspection activities and corrective measures.
- Notify the Territorial Office of the Autonomous Region (CCAA).
- Notify the downstream dam.
- Activities Scenario 0.

2

- Specific inspection activities and corrective measures.
- Notify the Autonomous Region Coordination Center (CECOPI).
- Check the Direct warning System.
- Activities Scenario 1.

3

- Specific inspection activities and corrective measures.
- Activate the Direct warning System.
- Activities Scenario 2.

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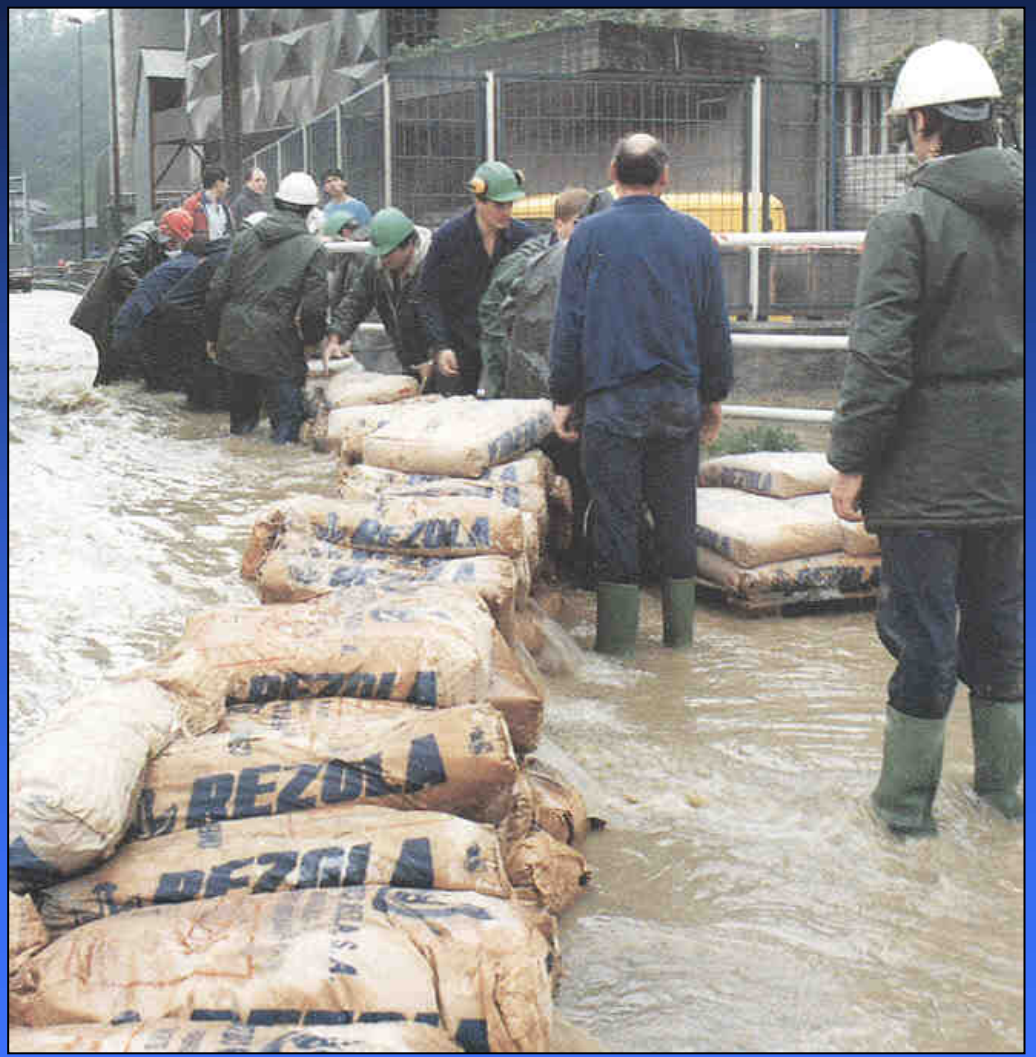
4. ORGANIZATION AND RESOURCES.



1. Dam Safety Analysis
2. Regional Zonification
3. Operational Procedures
4. Organization
5. Resources

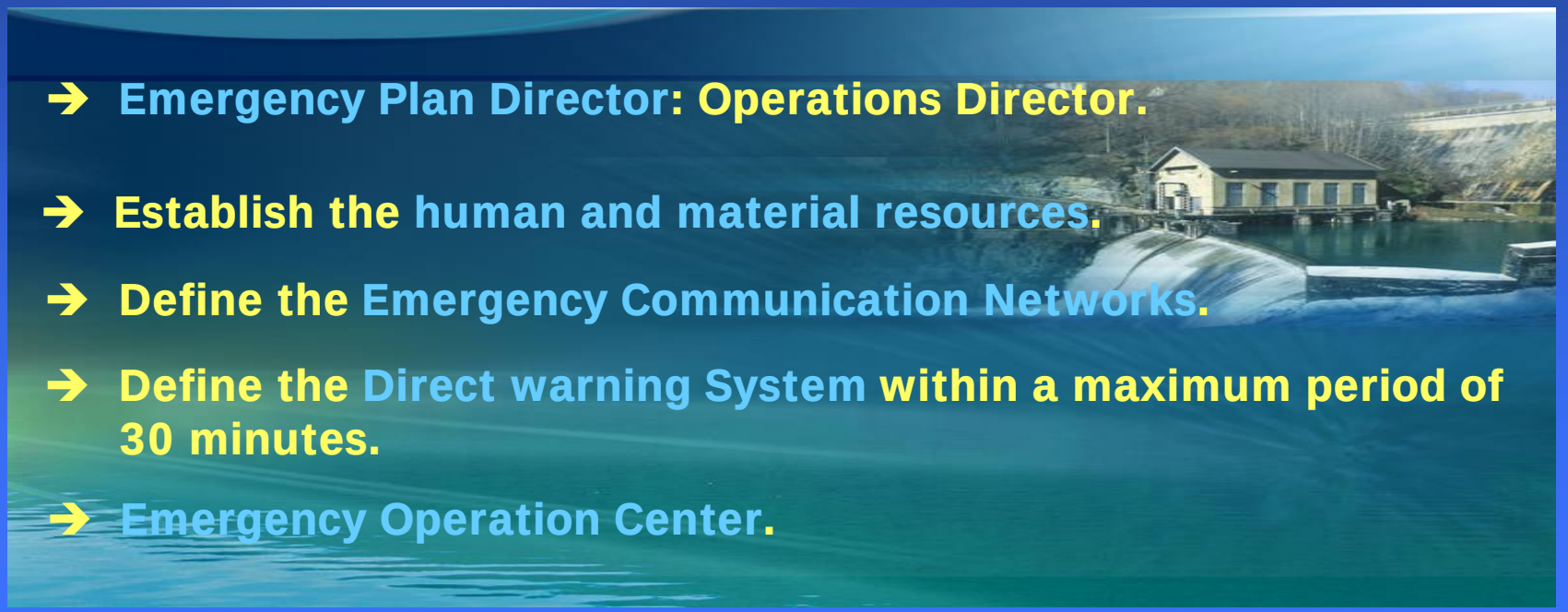
MINISTRY OF ENVIRONMENT

4. ORGANIZATION AND RESOURCES.

✓ **OBJETIVE:**

Define the operational procedures in emergency situations.

✓ **ASPECT TO CONSIDER :**



- ➔ **Emergency Plan Director: Operations Director.**
- ➔ **Establish the human and material resources.**
- ➔ **Define the Emergency Communication Networks.**
- ➔ **Define the Direct warning System within a maximum period of 30 minutes.**
- ➔ **Emergency Operation Center.**

MINISTRY OF ENVIRONMENT

IMPLEMENTATION CRITERIA OF EAP's.

✓ **GENERAL CRITERIA:**

➔ **Maximum period: 2 years.**

➔ **The owner will be coordinate the implementation with the MMA and the Autonomous Region responsible.**

➔ **The Implementation Project will included all of aspects related to the Emergency Operation Center, Emergency Communication Networks and Direct warning System in the first 30 minutes flood.**

➔ **Public Information Campaign: Owner in collaboration with local authorities (Civil Protection).**

MINISTRY OF ENVIRONMENT

IMPLEMENTATION OF EAP.

1. Emergency Communication Network
2. Emergency Operation Center
3. Direct Warning System
4. Public Information

MINISTRY OF ENVIRONMENT

IMPLEMENTATION OF EAP.

- Emergency Communication Networks: MMA (Water Board), Autonomous Region, Civil Protection, population in the first 30 minutes. Resources: Telephone, Radio, System for alarms, Cellular, etc..
- Emergency Operation Center: located in the dam.
- Direct Warning System: Sirens located in the 30 minutes area, if there is a risk to the population.

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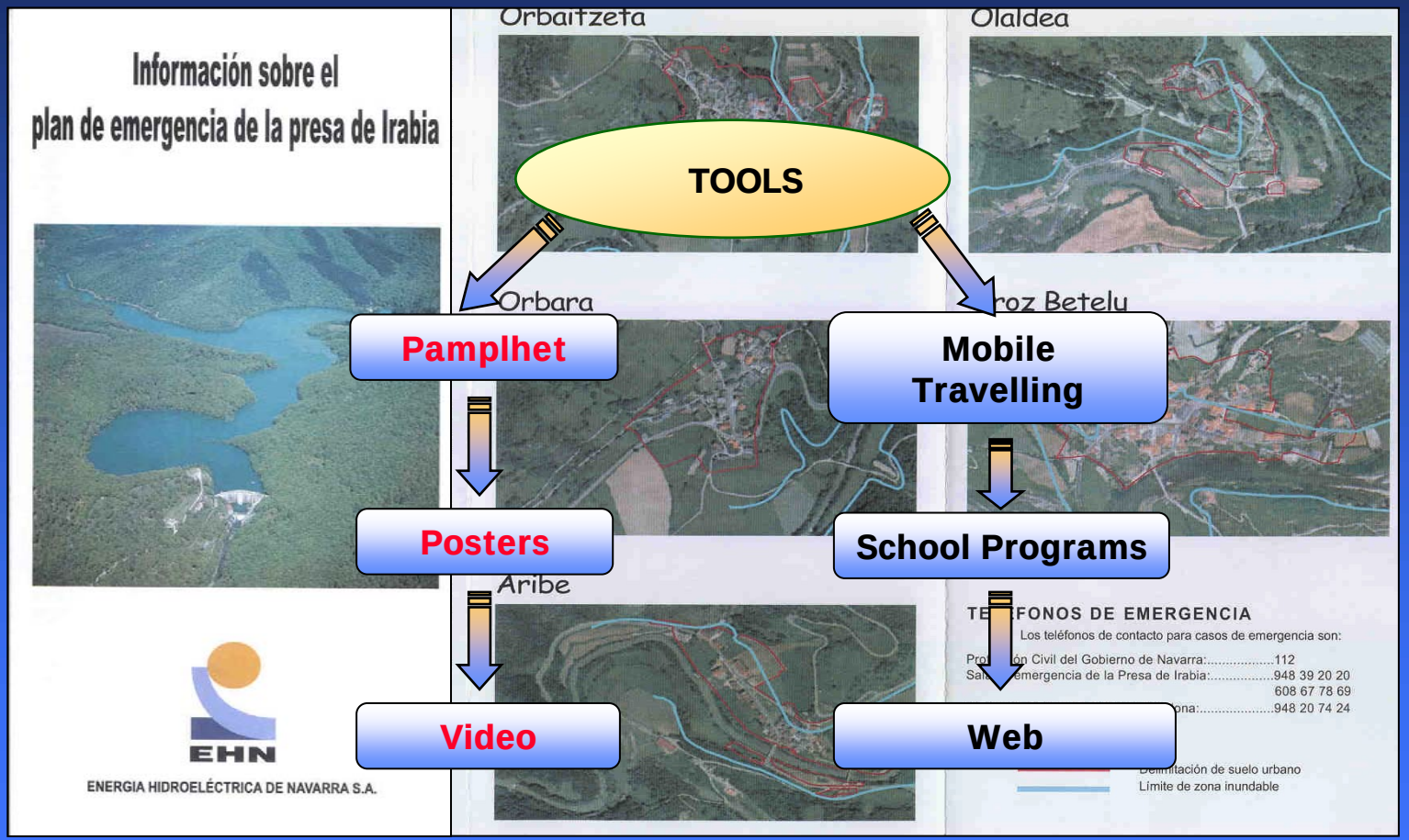
IMPLEMENTATION OF EAP.

✓ Public Information.



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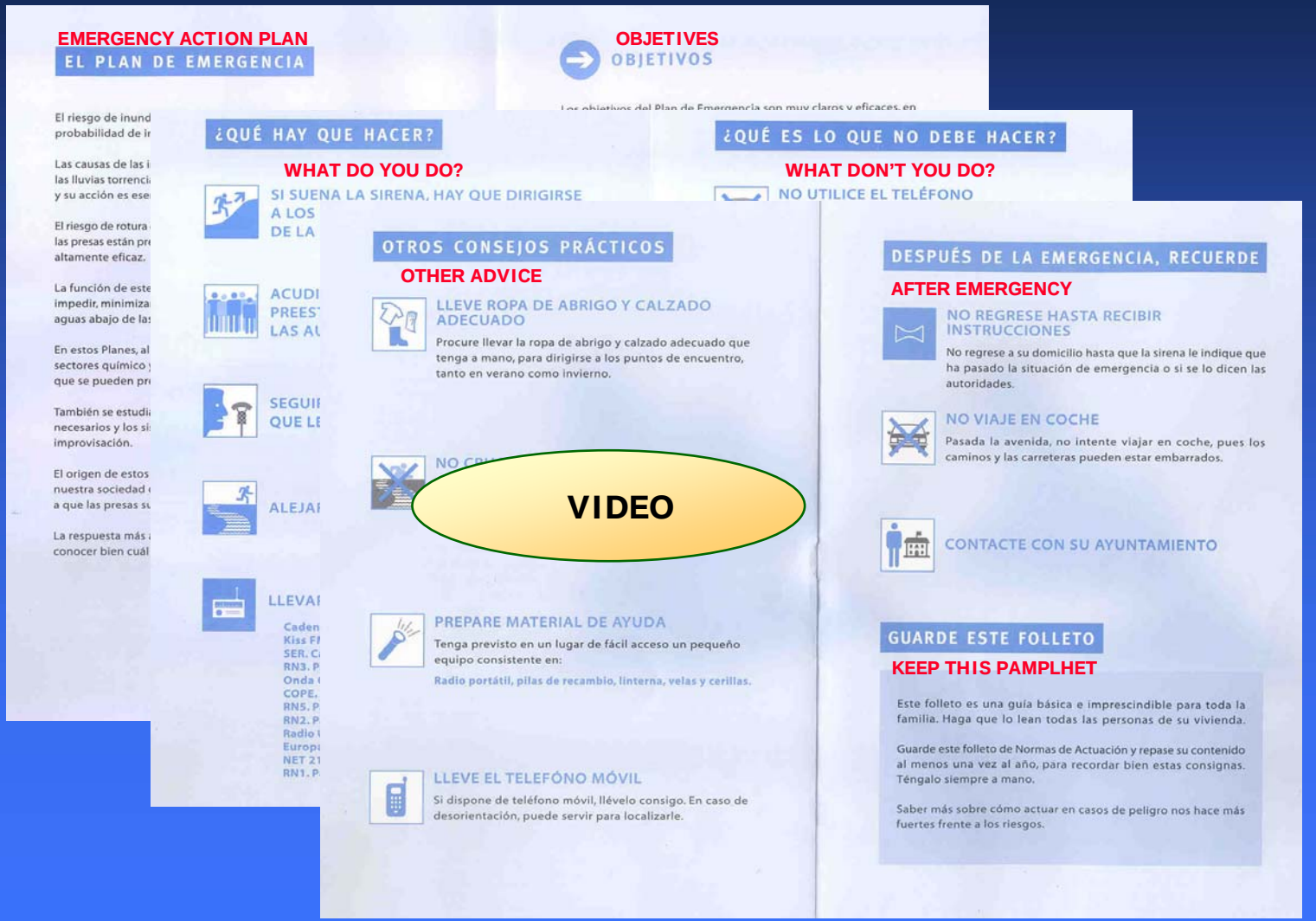
IMPLEMENTATION OF EAP.

✓ Public Information. Another Example.



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