



JORNADA DE SEGURIDAD DE PRESAS DE ESTÉRILES MINEROS

# SEMBLANZA Y RECUERDO DE D. ÁNGEL GAMO TORRES

Nacimiento: 13/03/1938 en Humanes (Guadalajara)

Fallecimiento: 23/12/2020 Madrid

Edad: 82 años

Ingeniero de Caminos, Canales y Puertos (1963)

Dr. Ingeniero de Caminos, Canales y Puertos (1969)



**MEDALLA AL MÉRITO PROFESIONAL 2017**

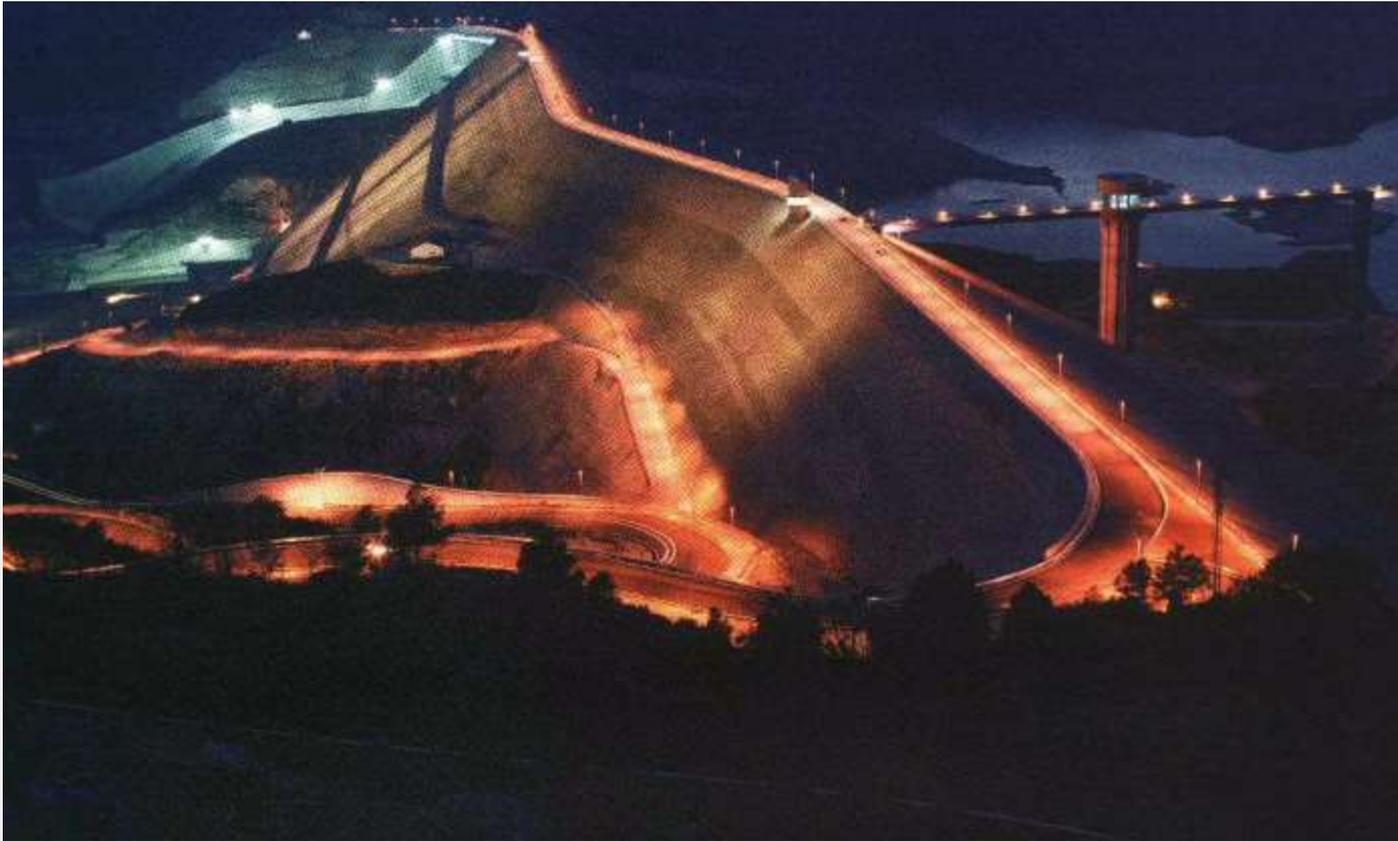
- Ángel Gamo nació en Guadalajara a finales de la década de los 30. Al finalizar sus estudios de ingeniero de Caminos, comenzó a trabajar como jefe de Obra en CINTEC.
- En 1966, entró a trabajar en INTECSA, primero como jefe de proyecto en la división de Obras Hidráulicas, después como jefe de la división de Obras Hidráulicas y, por último, como asesor adjunto al área del Agua. Durante los más de 20 años de trabajo en esta compañía.
- Desde 1988, fue consultor independiente en AHG Consultores Asociados

## ÁNGEL GAMO TORRES



- Presa de Tous
- Presa de Rules
- Presa de Itoiz
- Presa de Rialb
- Presa de La Colada
- Presa de Montearagón
- Presa de Huesna
- Presa de Los Alfilorios, etc

## PRESA DE TOUS



## PRESA DE RULES



## PRESA DE ITOIZ



## PRESA DE RIALB



## PRESA DE LA COLADA



## PRESA DE MONTE ARAGÓN



## PRESA DE HUESNA





JORNADA DE SEGURIDAD DE PRESAS DE ESTÉRILES MINEROS

# SEMBLANZA Y RECUERDO DE D. JESÚS GRANELL VICENT

Nacimiento: 31/12/1944 Madrid

Fallecimiento: 28/08/2016 Madrid

Edad: 71 años

Ingeniero de Caminos, Canales y Puertos (1969)

- JESÚS GRANELL VICENT es Ingeniero de Caminos, Canales y Puertos (Madrid, 1969) y ha dedicado su vida profesional al diseño y construcción de grandes obras de infraestructura hidráulica en España y en el norte de África.
- Completó su formación técnica en Lausana (Suiza, 1971) y en la Universidad de Berkeley (CAL, USA, 1973).
- Fue Vocal electo del Comité Nacional Español de Grandes Presas (SPANCOLD) y miembro de la Cofradía del Santo Sepulcro de Burriana (1963).
- De gran preparación técnica y sólida formación cristiana, siempre dotó a las presas de un ALMA ESTÉTICA indudable.







## JESÚS GRANELL VICENT



- Presa de Bellús
- Presa de Escalona
- Presa de La Loteta
- Presa de Puentes IV
- Presa de Los Vados
- Presa de Castrovido
- Presa de Altarejos



## PRESA DE BELLÚS



## PRESA DE ESCALONA



## PRESA DE LA LOTETA



## PRESA DE PUENTES IV



## PRESA DE LOS VADOS



## PRESA DE CASTROVIDO



## PRESA DE ALTAREJOS





JORNADA DE SEGURIDAD DE PRESAS DE ESTÉRILES MINEROS

# TAILINGS DAM SAFETY BORRADOR BOLETÍN ICOLD INDIA 2020

January 21, 2020

ICOLD

**Committee L Tailings Dams and Waste Lagoons  
Tailings Dam Safety**

PRELIMINARY DRAFT

CONFIDENTIAL

ISSUED FOR INTERNAL DISCUSSION

UNCONTROLLED DOCUMENT UNTIL PUBLISHED

- PREFACE
- 1 INTRODUCTION
- 2 TAILINGS PLANNING AND GOVERNANCE
- 3 DAM CLASSIFICATION
- 4 SITE AND TAILINGS CHARACTERIZATION
- 5 DESIGN
- 6 RISK MANAGEMENT
- 7 DAM BREACH ANALYSIS
- 8 EMERGENCY PREPAREDNESS AND RESPONSE PLANNING
- 9 CONSTRUCTION
- 10 OPERATIONS
- 11 CLOSURE



*Detected Typing errors:*

Page 28:

You say **Aznocollar** (Los Frailes), Spain (**1994**).  
You should say Aznalcóllar (Los Frailes), Spain (1998).

Explanation:

*English:*

The Aznalcóllar accident was an ecological disaster, produced by a dumping of toxic sludge in the “Doñana National and Natural Park”, in Andalusia (Spain), on April 25, 1998, caused by the failure of the Aznalcóllar Tailing Dam (also called Los Frailes), owned by the Swedish Mining company Boliden.

*Spanish:*

El desastre de Aznalcóllar fue un desastre ecológico, producido por un vertido de lodos tóxicos en el “Parque Nacional y Natural de Doñana”, en Andalucía (España), el 25 de abril de 1998, causado por la rotura de la Balsa Minera de Aznalcóllar (también denominada Los Frailes), propiedad de la empresa sueca Boliden.

Our Spanish Technical Committee considers that the two most important singularities of Tailings dams are:

- a) that they do not store water but materials that, in most cases, cannot be considered harmless and this has a very important environmental implication.
- b) that it is not easy to distinguish (in many occasions) the phases of construction and operation, because these dams have a quite dynamic heightening and this has an extraordinary importance in the control of this infrastructure safety.

## ENVIRONMENTAL ASPECTS (DRAFT )

In general, throughout the Bulletin, the importance of environmental aspects during the design, construction and operation phases of Tailings Dams is stated at several points:

- On page 8-9, when you are describing the classification of Tailings Dams, you talk about environmental aspects, as well as in Table 3-1, you also refer to their classification based on damage environmental.
- In section 4.3.3, it refers to the social and environmental aspects to be taken into account in the design and operation phase. It does not detail great things, but neither does it with seismic or other aspects.

## ENVIRONMENTAL ASPECTS (DRAFT )

- In addition, throughout the text, it refers to the importance of environmental issues, for example, on page 25, in the general scheme, it incorporates environmental issues as a decision factor throughout the process and in the different phases.
- On page 30, you briefly talk about the environmental impacts caused by the different failure modes.
- Page 48 (full point 5.13) is dedicated to the importance of environmental aspects and the necessary monitoring and controls to be carried out in surface and groundwater, as well as atmospheric controls.
- And similarly in the following pages.



## ENVIRONMENTAL ASPECTS (DRAFT )

- However, despite being the environmental aspects one of the key aspects when classifying a Tailing dam based on its risk, the issue is not treated with sufficient depth, just briefly enumerating the consequences in case of failure.
- In addition, the aspects derived from the responsibility of the operators of this type of Tailings dams regarding environmental risks have not been collected (that is, to the potential effects on water, wild species and habitats, on the riverbank of the sea and soil contamination), according to the definitions and postulates of the different international laws on environmental responsibility.

## ENVIRONMENTAL ASPECTS (DRAFT )

- It is not about generating a Guide for the Environmental Risk Assessment, but at least writing a specific chapter or point on the aspects related to the analysis of environmental risk as an integral part of the required safety reports.

## OPERATIONS (DRAFT )

- In page 65 (10. Operations; 10.1 Overview) you say: *The Owner should ensure that the tailings dam is operated by an appropriately experienced team. For EXTREME, VERY HIGH and HIGH Consequence Category dams, the team should include a professionally qualified civil or geotechnical engineer. Operators should be appropriately trained for their roles with regular refresher training.*
- The Spanish Technical Committee is of the opinion that, throughout the whole life of the TSF, the following should be implemented:

## OPERATIONS (DRAFT )

- In ALL CASES Consequence Category dams the team should include a professionally qualified civil / geotechnical engineer.
- For HIGH Consequence Category dams this professional must belong to an independent engineering company (approved by the competent Public Administration). The objective is to review the information provided by the monitoring devices and perform quarterly visual inspections (at least).
- For VERY HIGH Consequence Category dams a team consisting of several professionals will be required. Specifically, the following ones:

## OPERATIONS (DRAFT )

- Qualified civil engineer
- Qualified geotechnical engineer
- Qualified geologist
- Qualified environmental specialist

These team must belong to an independent engineering company (approved by the competent Public Administration). The objective is to review the information provided by the monitoring devices and perform monthly visual inspections (at least).

## OPERATIONS (DRAFT )

- For EXTREME Consequence Category dams a team consisting of several professionals will be required:
  - Qualified civil engineer
  - Qualified geotechnical engineer
  - Qualified geologist
  - Qualified environmental specialist
  - Other support staff and auxiliary staff

These team must belong to an independent engineering company (approved by Public Administration). The objective is to review the information provided by the monitoring devices and perform visual inspections, in the TSF facilities, permanently.

