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# Emergency planning for tailing dams

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# Emergency planning for tailing dams

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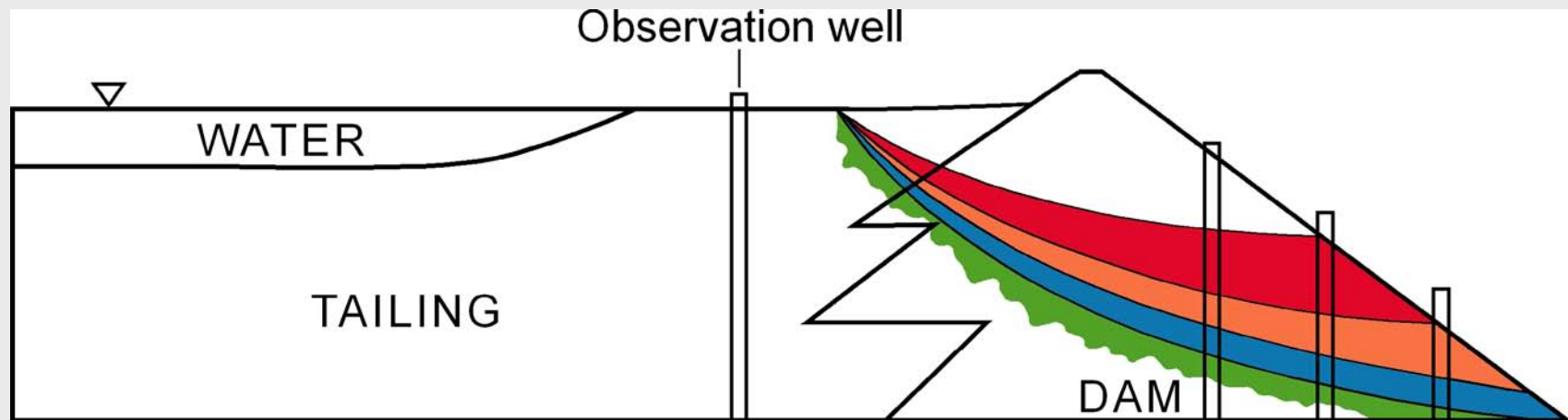
## Observation of:

- water level in the dam
- water level in decant pond
- water outflow
- weather conditions
- seismic activity
- dam movement



# Emergency planning for tailing dams

## Observation of groundwater in the dam



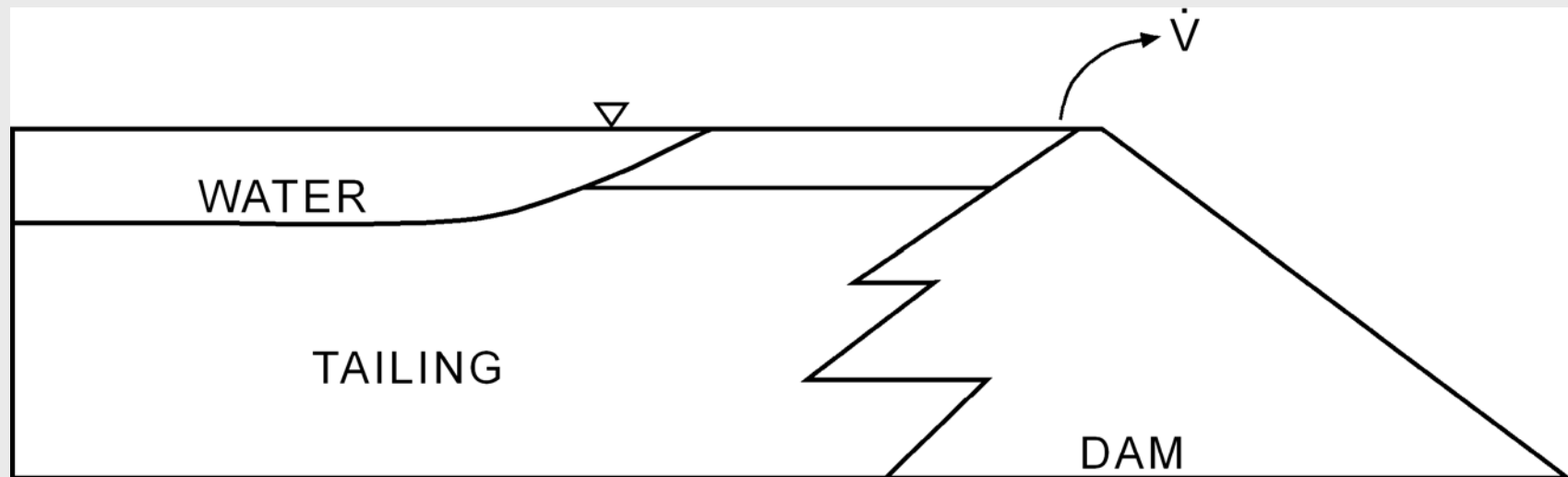
### General action plan:

- green – no action
- blue – daily control
- orange – hourly control / stop of production
- red – stop of production / counter measure



# Emergency planning for tailing dams

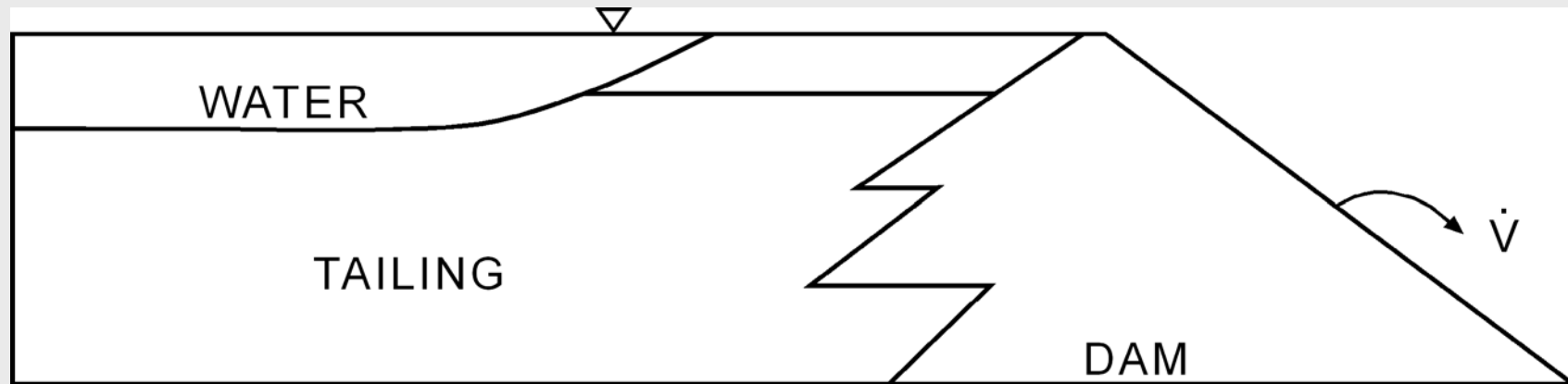
## Lowering of the water level in the decant pond



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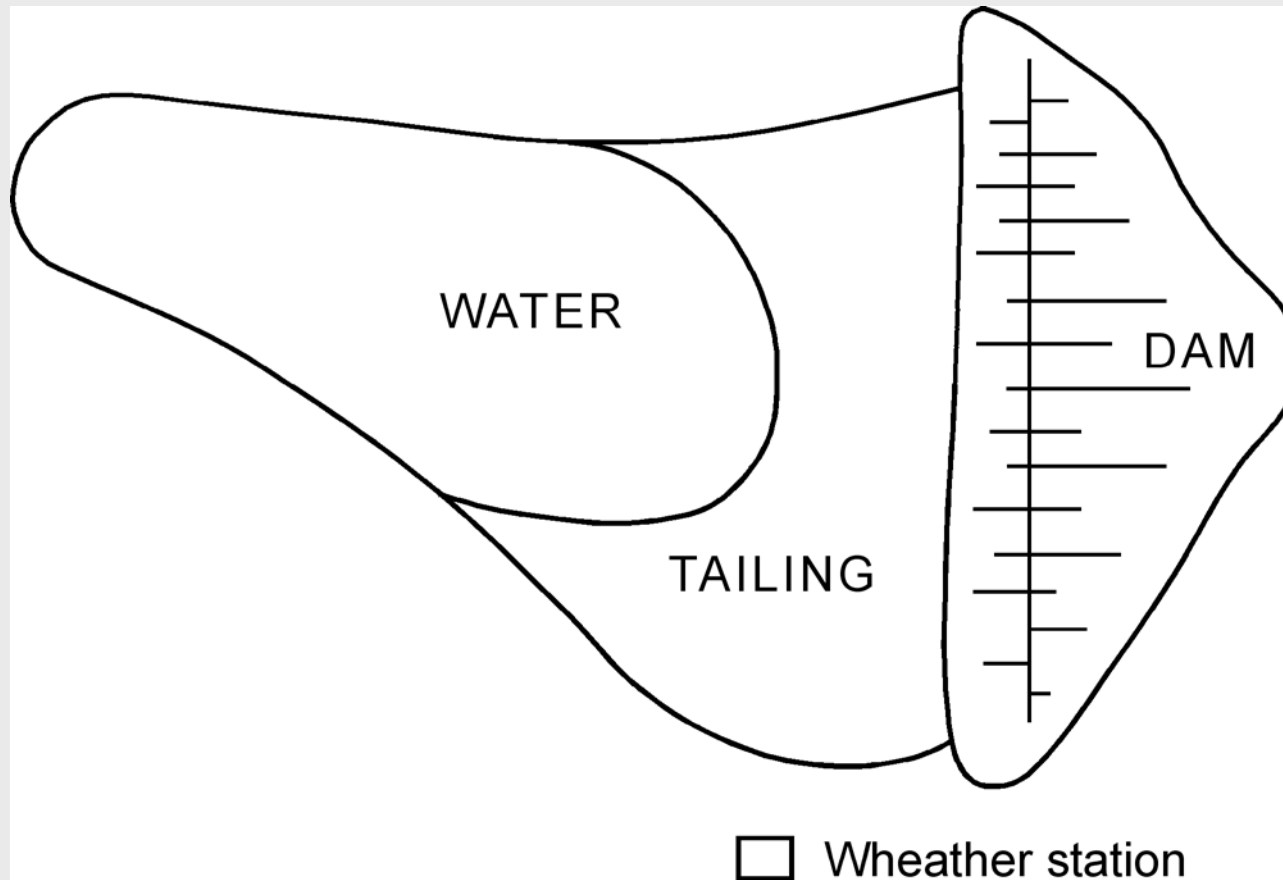


## Observation of the water outflow



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## Observation weather conditions



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Rain rate:

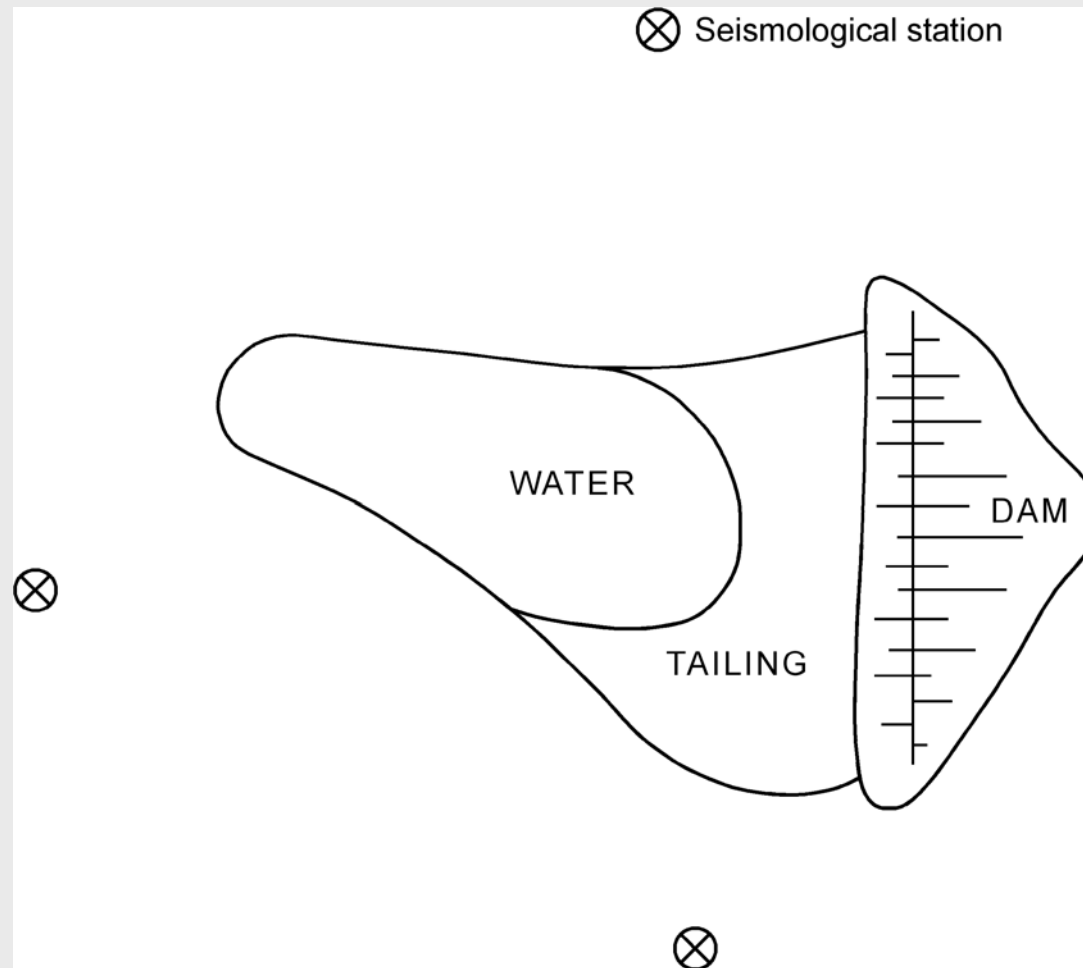
- $45 \text{ l} / \text{m}^2 * \text{d} = \text{green (no actions)}$
- $45 - 60 \text{ l} / \text{m}^2 * \text{d} = \text{blue (field control)}$
- $60 - 80 \text{ l} / \text{m}^2 * \text{d} = \text{orange (safety actions)}$
- $80 - 125 \text{ l} / \text{m}^2 * \text{d} = \text{red (emergency actions)}$
- $125 \text{ l} / \text{m}^2 * \text{d} = \text{emergency actions}$



# Emergency planning for tailing dams



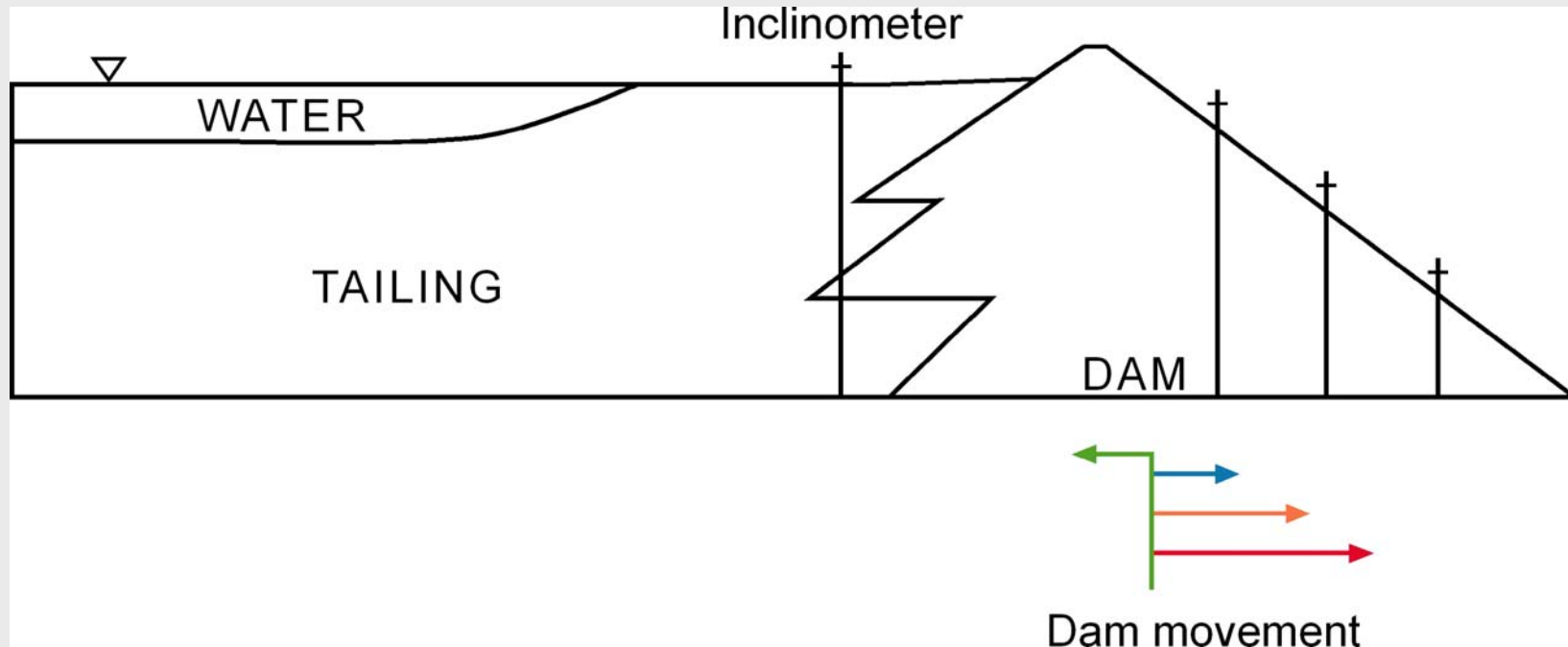
## Observation of the seismic activity





# Emergency planning for tailing dams

## Observation of the dam movement



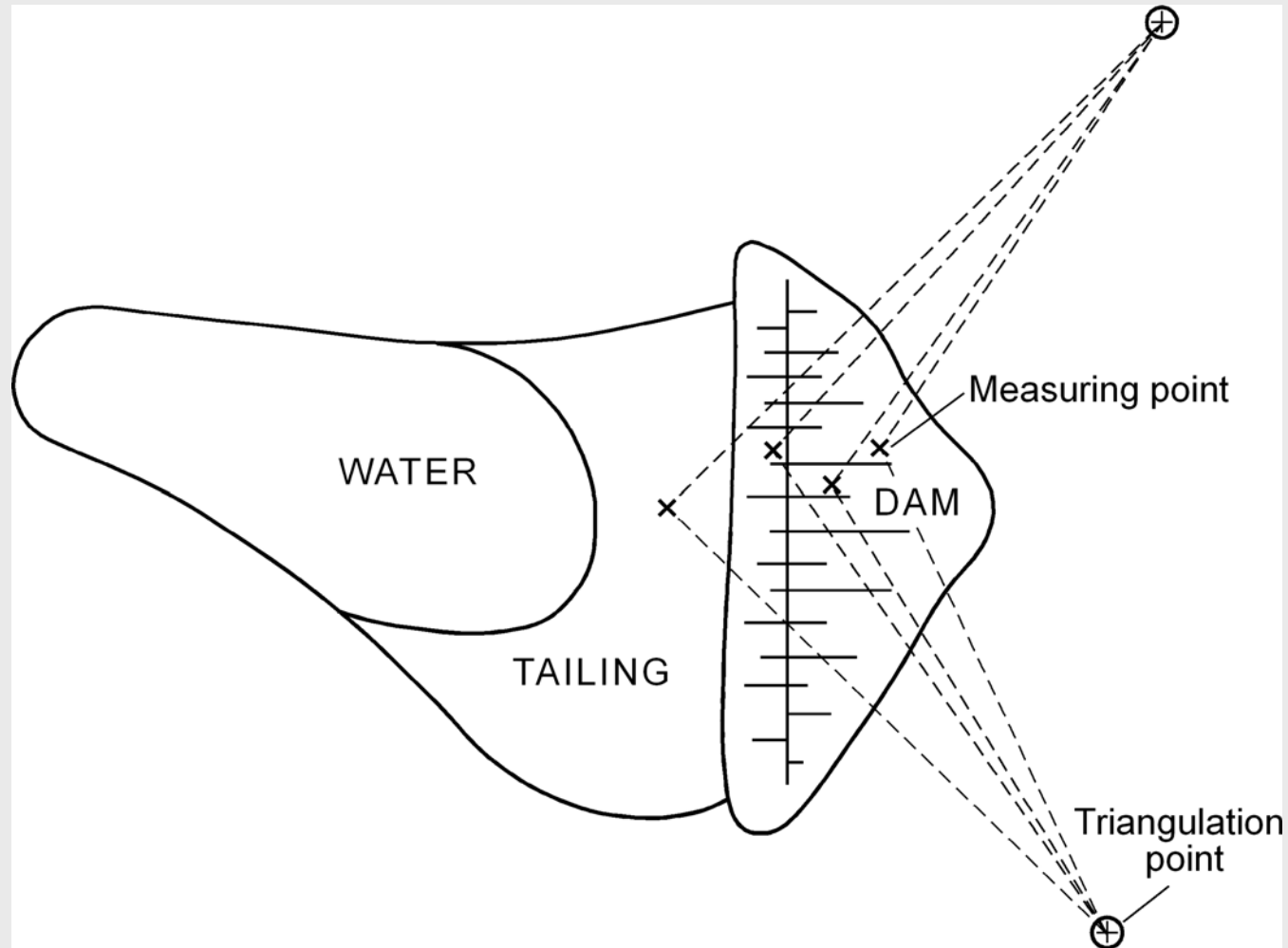
Movement of the dam:

- linear movement
- acceleration of the movement
  - 1mm per quarter of a year (blue)
  - 5mm per quarter of a year (orange)
  - 1cm per quarter of a year (red)



# Emergency planning for tailing dams

## Observation of the dam movement



# Conclusion

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- Different parameters concerning safety must be measured
- These parameters must be adapted to the local situation as:
  - Type of dam
  - Tailing material
  - Meteorology
  - Seismology

