THE SUMMARY OF THE DAM ACCIDENT TRAINING AT ULJUA 3.11.1999

THIS SUMMARY IS BASED ON THE TRAINING DESCRIPTION BY FIRE CHIEF OFFICER HARRI MÄKITALO

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1. Introduction

The large accident training at the dam of the Uljua artificial lake was put into practice on the third of November, 1999 at Pulkkila. The training was carried out according to the plans of the Provincial State Office of Oulu as an operation leadership and co-operation exercise. The training plan was based on the hazard risk assessment of the Uljua dam the emergency/rescue action plan in the case of a dam accident made by a rescue office. This was one of the largest co-operation trainings organised during the year 1999. Over a hundred people participated in this operation.

Regional Fire Chief Officer Harry Lehtinen and Fire Chief Officer Harri Mäkitalo took charge of the operation.

The operation was public in every way. Information was spread already in the planning phase of the training and especially the inhabitants of the area concerned were well informed. The media took an active part in the notification process. The information about the training was very pertinent.

The participants of the training were the rescue authorities of the co-operation area of Haapajärvi and Raah, the leading groups in the case of emergency in Pulkkila and Rantsila and such as the Regional Environment Centre, the Provincial State Office, the police, the Finnish Road Administration, the Defence Forces, the Coast Guard, the Convoy and the Fire Departments of Pulkkila, Rantsila, Kestilä, Pyhäntä, Kärsämäki, Ruukki, Haapavesi, Vihanti, Pyhäjärvi, Haapajärvi and Vaala.

2. The description of the Uljua dam (at Pulkkila)

The reservoir of Uljua is located in the north-east part of Pulkkila on the river Siikajoki, in the east side of the highway 4.

The purpose of the artificial lake is to regulate the flow of the river Siikajoki and its hydro power is utilised at the Uljua hydroelectric plant.

- The catchment area is 1470 km²
- The area is 28 km²
- The coast-line is 42 km long, of which the dam is 8,5 km.
- The length of the lake is 14 km
- The width is 5 km
- The lowest water level before spring flood is +71.00 and the highest level after that is +79.00.
- The storage capacity is 146 million m³
- The maximum discharge through the hydroelectric plant is 30 m³/sec
- The maximum discharge through the emergency gate is 260 m³/sec
- The dam was built in 1965 - 1971

The owner of the Uljua earth dams is the Finnish Government and the holder is the North Ostrobothnia Regional Environment Centre. The hydroelectric plant is owned by Vattenfall / Revon Sähkö Oy.

The Uljua earth dams and the hydroelectric plant are classified as P dams.

The North Ostrobothnia Regional Environment Centre acquired the hazard risk assessment for the dams in 1987 and it was updated in 1990 and 1999.
In 1991, the Rescue Office of Pulkkila made an emergency action plan for a dam accident at Uljua and the plan was updated in 1999.

3. The targets of the dam accident training at Uljua

- Testing the alarm, rescue and operative systems according to the emergency action plan.
- Testing the warning systems of the population.
- Checking and developing the hazard risk assessment of the dam.
- Training to inform various groups.
- Checking the sufficiency of the alarmed rescue organisations.
- Training of the leading staff.
- Developing the working methods of the leading staff and checking the division of labour.
- Practising the co-operation of rescue authorities during a large accident.
- Developing the co-operation of several authorities and utilising special equipment and developing the preparedness for a dam accident.

4. The training situation

There was a breach at the Tulisaari dam caused by an internal erosion. That resulted in an extreme flood at the Siikajoki water course downstream the dam. The flood caused a lot of damage to the population, property and traffic connections. There was an autumn flood and the artificial lake was at the high water (HW) level. The progress of the flood wave is described in the maps of the emergency action plan.

5. Rescuing the population of the flood area

The main damage area affected by a dam-break flood was the river Siikajoki valley and Rantsila centre about 25 km downstream the dam. There are about 1200 inhabitants and about 400 real estates of which 55 are cattle farms in this area. In the centre of Rantsila there is, among other things, the health centre ward and the old people’s home. Moreover, there are three gas stations at Rantsila, Vorna and Sipola. The highway 4 passes through the area.

In spite of rescue operations, the population of the accident area might face the risk of injury or loss of life. The accident causes a stress to health centres and first aid departments. The health centre and the old people’s home in Rantsila must be evacuated within six hours, so they will not be able to carry out first aid tasks for a long time.

6. Rescuing the animals

There are in the potential damage area over 55 cattle farms, which gather over 1000 cows. According to a veterinary surgeon, animals manage to survive in a cow-house in a half metre deep water. During a serious dam-break flood animals must be let free. If it is possible the cattle should follow a leading cow and shift aside the accident area. Temporary milking stations must be established and slaughter facilities should be prepared (police and elk-hunting gun clubs).

7. Notifying of the dam accident

The decision to make the training public proved to be a good solution and prevented sensational news. The notifying of the dam accident was very pertinent and positive.
Before the happening, the notifying of the training and the explanation of its purpose was delivered to every household in the area. The same bulletin was delivered to every household in every municipality in the area as a part of a municipal bulletin.

In the beginning of the training, the rescue service information concerning the alarm signal was disseminated. The notifying was successful both before and after the training.

8. Intercommunication during the training

The intercommunication during the training was based on the ordinary rescue services intercommunication. In most cases it functioned well. The GSM was used as a supporting system, so that the operative leading group could create an overall picture of the accident.

9. Co-operation between rescue authorities

The co-operation between rescue authorities, and the warning, alarming and evacuating tasks succeeded well. Every unit had driving and action directions of its own. The action areas, e.g. the houses to be alarmed, the routs and the evacuating centre should be added to the action instructions.

10. Co-operation between other authorities

The co-operation between other authorities succeeded reasonably well. However, such co-operation should be trained, because different action patterns and alarming systems of various authorities should be compatible in an accident situation.

10.1. Using the equipment of the Frontier Guard

The Coast Guard possesses suitable boats and the staff which can be transferred by highway. The convoy possesses helicopters and a special aeroplane which can film an accident area by video. The video can be picked up from the nearest airport. The video is useful in commanding the operation.

10.2. The Police and the Finnish Road Administration

The task of the Police was to guide the traffic passing the accident area, to isolate the area, to protect the population and property and to control the evacuative traffic in co-operation with the Road Administration and the Defence Forces.

10.3. The Finnish Defence Forces

60 persons from the Finnish Defence Forces were available from Kainuu Brigade in 2-3 hours to isolate the areas and to control the traffic. The Defence Forces possesses pioneer equipment to organise the traffic connections.

10.4. The voluntary rescue services

The voluntary rescue services have about 300 persons to be available in the case of a dam accident for the first aid and searching purpose.
THE DEVELOPING OF FLOODWAVE

The dam of Tulisaari

Circumstances: Summer, the water is at the top level, spring tide
Building: no building
Inhabitants: no inhabitants
Roads and bridges: main road 4 break down H+25 minutes

H + 30 minutes

[Diagram showing the dam of Tulisaari, hydroelectric plant, damage place, main road 4, and scale]
DEVELOPING OF FLOODWAVE

The dam of Tulisaari

Circumstances: Summer, the water is at the high level, spring tide
Building: 6 buildings and 2 cattle farms
Inhabitants: about 20 people
Roads and bridges: The crossing of Jylhärinta break down (flooded) about h+40minutes

H + 1 hours

[Map showing the dam of Tulisaari, hydroelectric plant, damage place, and various locations such as dwelling house, cow-house, and summer cottage.]
THE DEVELOPING OF FLOODWAVE

The dam of Tulisaari

Circumstances: Summer, the water is at the top level, spring tide
Building: 32 buildings and 5 cattle farms
Inhabitants: about 60 people
Roads and bridges: The road and bridge of Jylhäranta are flooded

H + 2 hours

Scale

0 1 km 2 km

- Dwelling house
- Cow-house, other house
- Summer cottage
THE DEVELOPING OF FLOODWAVE

The dam of Tulisaari

Circumstances: Summer, the water is at the top level, spring tide
Building: 60 buildings and 10 cattle farms
Inhabitants: about 100 people
Roads and bridges: The road and bridge of Jylhäraanta are flooded
                           The crossing of Uljua road is flooded
                           The floodwave approach to the bridge of Matilainen
                           The flood is going up near the densely populated community of Pulkkila

H + 3 hours

![Map of the area with landmarks and floodwave development](image)

Legend:
- **Green**: Dwelling house
- **Red**: Cow-house, other house
- **Triangle**: Summer cottage

*Diagram showing locations such as Hydroelectric plant, The dam of Tulisaari, The damage place.*
The action and area map

The dam accident training of Uljua

Appendix 5

SECTOR 2
Duty-report point 2.
(Kestilä crossroads)
Driving time:
Kestilä 28 min
Pyhäjärvi 48 min
Vaalā 57 min
Haapajärvi 58 min

SECTOR 4
Duty-report point 4.
(Matilainen crossroads)
Driving time:
Haapavesi 40 min
Vihanti 60 min

SECTOR 3
Duty-report point 3.
(Sipola crossroads)
Driving time:
Rantsila 23 min
Ruukki 38 min

SECTOR 1
Duty-report point 1.
(Jylhänranta crossroads)
Driving time:
Pulkila 16 min
Kärämäki 30 min
Pyhäntä 33 min
Haapavesi 35 min
SEPE 35 min

Meeting place
Vorna perhekoti
Evacuation centre
Pulkila high-school
Breach location of the Tulisaari dam
Evacuation route
Arrival route of rescue units
Limits of responsibility area

Selite:
Evacuation route
Arrival route of rescue units
Limits of responsibility area