



Reactions on Lessons Learned from Fukushima in Switzerland

Consequences in Switzerland after Fukushima Event

destruction and loss of trust by the majority of public and government

- in nuclear energy as a save technique
- in IAEA as an organisation to ensure nuclear safety world wide
- in Swiss Federal Nuclear Safety Inspectorate (ENSI),
because of missing independence from NPP and
loopholds in the former authority surveillance getting visible after Fukushima

exchange of opinion leaders and experts

- from experienced operators and scientists as well as regulatory body members
- to media scene, NGO and politicians

ending up in a sharp bend in future energy strategy in Switzerland

- cancellation of the three licensing processes for new NPP (applied 2009)
- prohibition for new installations of NPP (for the next decade)
excluding research in nuclear energy and safety



Reaction of ENSI on Fukushima

gathering information about

- course
- causes (direct and root)
- consequences of the event
- lessons learned

from Japanese and other websites (big thank to GRS)

spending information to the public and government

strengthening the ENSI communication pathways to the public
(new website, twitter, facebook, ..)

giving advice to Swiss people, companies and embassy in Japan
about basics on radiation, health risk, the principles of RP
by delegating a radiation protection technician to Tokio



Reaction of ENSI on Fukushima

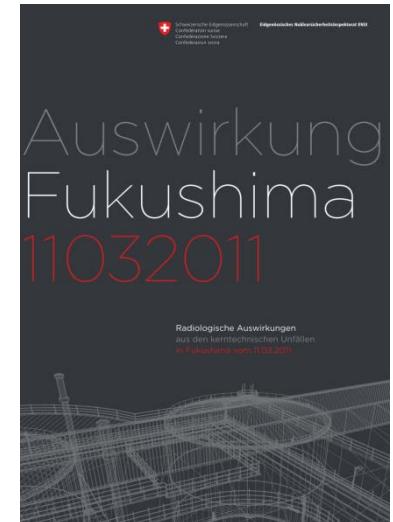
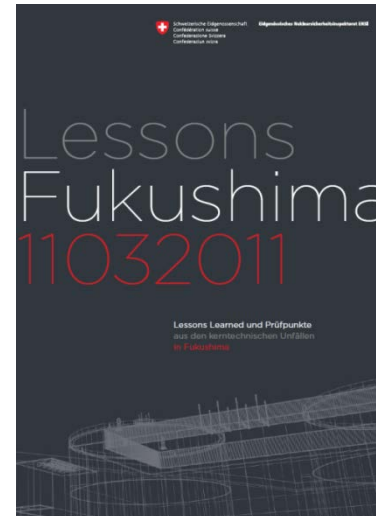
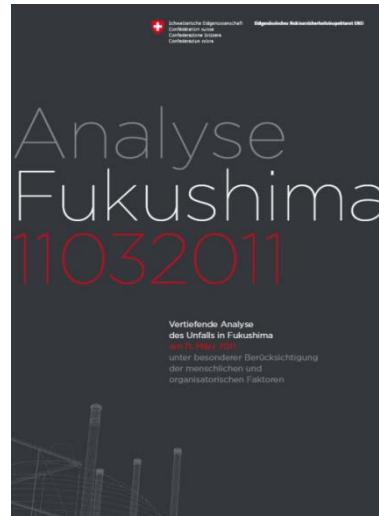
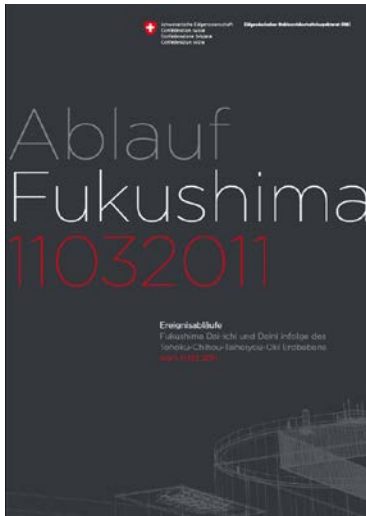
preparing reports about

course

causes

lessons learned

radiological
consequence



you will find them in www.ensi.ch – Dossiers

still only in german language

translations in english and french will be published this year



Further Sources for Information used to prepare these 4 reports

- METI (Ministry of Economy, Trade & Industry)
- NISA (Nuclear and Industrial Safety Agency)
- TEPCO (Tokyo Electric Power Company)
- JAIF (Japan Atomic Industrial Forum)
- JMA (Japan Meteorological Agency)
- IAEA (International Atomic Energy Agency)



Reaction of ENSI on Fukushima

giving several instructions to all NPP licensees

(18. March 2011, 1. April 2011, 5. May 2011)

giving the order to licensees to participate in “EU-Stresstest”

(1. June 2011)

verifying and valuating the safety status of Swiss NPP

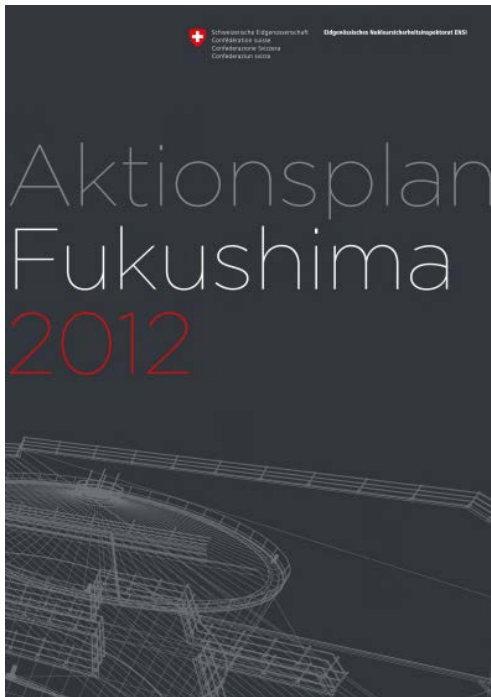
- examining licensees analysis reports
- carrying out **inspections** of several emergency systems
- supplementation of Lessons Learned in the IRRS visit of ENSI (Integrated Regulatory Review Service) taking place 21. Nov. until 2. Dec. 2011
- creating a **list of actions** (plan of action) to be taken by NPP and ENSI

if necessary ordering and approving technical improvements on the NPP



ENSI-List on Actions after Fukushima

ENSI – Main Points 2012-2014

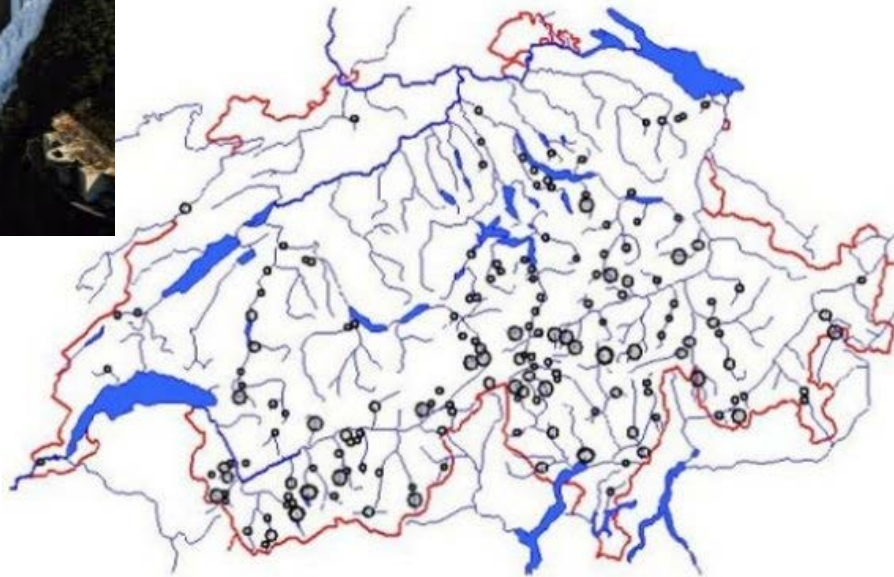


1. Earthquake
2. Flooding
3. Extreme Weather Conditions
4. Loss of Electrical Power
5. Loss of Ultimate Heat Sink
6. Containment Venting and Isolation
7. Hydrogen Control
8. National Emergency Preparedness
9. Safety Culture
10. Feedback procedures on Lessons Learned
11. International Regulatory and Cooperations
12. External Storage



Example of Instructions given to Licensee

- to **investigate the consequences** of **earthquake damage** in NPP (internal leakages, fire, station black out, ...) including **bursting of water dams** along the rivers above NPP carrying along stones, wood and other material



around 400 water dams exist in Switzerland
producing about 60% of Swiss electricity consumption

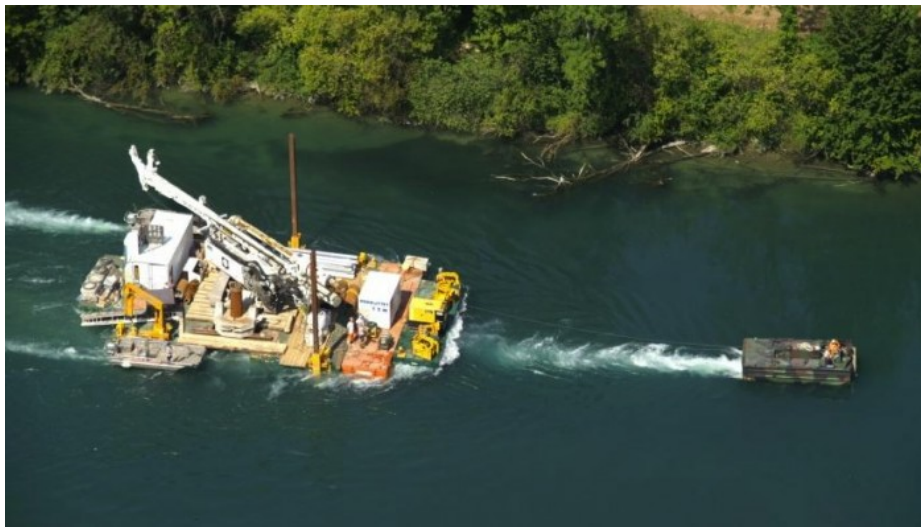
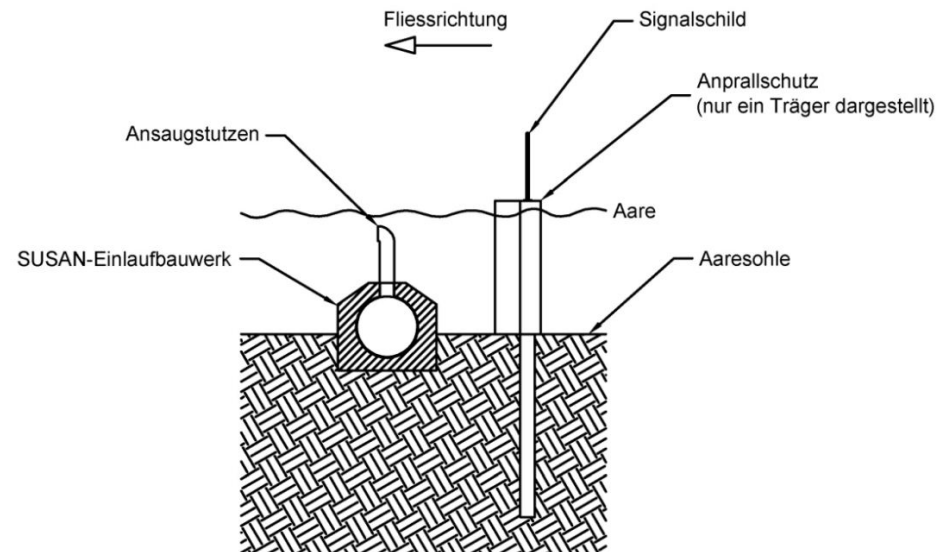




Example of Technical Improvement on NPP approved by ENSI

to strengthen the **emergency heat sink** at NPP Mühleberg
a new special emergency intake structure
sheltered against flooding and floating debris
was constructed during outage 2011
inside the river Aare

Schematische Darstellung:
Ausschnitt SUSAN-Einlaufbauwerk
und Ansaugstutzen mit Anprallschutz





Example of Instructions given to Licensee



- to **set up an external storage** (for all Swiss NPP)
- safe against earthquake, flooding and other extraordinary events
 - containing equipment for emergency aid as auxiliary pumps, generators, motors, fuel, water hosepipes ... (supporting cooling),
 - containing boron acid (supporting safety on criticality)
 - **containing radiation protection equipment as personal protection suits, dosimeters, monitors, batteries, decontamination solvents, ...**
 - which may be transported by helicopter
 - equipment should be on site and prepared to be used within 8 h (still in discussion)

Example of actions taken by ENSI

priority inspection program on containment venting and percolation

focusing on

- the condition of equipment and filter chemicals
- the SAMG procedures concerning pressure release from primary containment
- the human factor engineering (ergonomics) including **radiation protection** concerning actions to prepare the venting system for operation
 - some need manual preparation of the chemicals,
 - some need manual opening of valves

Not yet done:

- Investigation on the behavior of containment venting concerning hydrogen deflagration
- Verification of resistance to earthquake damage





Example of actions under the way by ENSI

investigating safety culture inside the regulatory body
by a self-assessment (moderated by external experts)
starting with an anonymous interviewing of colleagues

do we have weak points in

- ▶ basic documentation for safety evaluation
- ▶ the ENSI organisational structure (distribution of competence)
- ▶ qualification of ENSI experts and inspectors
- ▶ the teamwork between all members of ENSI staff
- ▶ our procedures on assessing, examining, inspection, monitoring, ...
- ▶ the enforcement of requirements
- ▶ the outcome on the safety culture of the licensee
- ???



Example of actions under the way by ENSI

to investigate the taken precautions regarding occupational **RP** during the **necessary actions in emergency situations (but not only)**

- ▶ analysing all procedures,
 - which are prepared in case of deviations
 - from normal operation or
 - from planned outage actionsor
 - which are prescribed in the Severe Accident Management Guideline

- ▶ participation in ISOE EG SAM (at least 1 NPP, 1 ENSI) to learn from others and exchange our experience



Conclusion:

**Safety is not a Status
it is a Process**

let us working on