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Release of sites or building structures - national experiences, Slovakia

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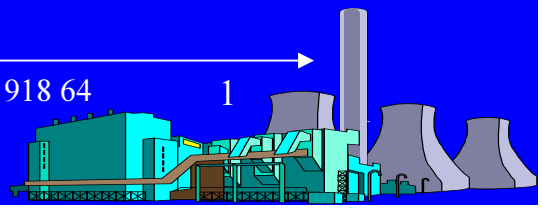


Content

- Slovakian Present day situation
- Descriprion of accidentally shut down NPP A1
- Free release at NPP A1 – experiences, amounts
- Release criteria and their optimisation
- A new concepts for building release at NPP A1
- Illustrative pictures of used measurement techniques in Slovakian decommission project

Present day situation

- NPP A1 is under decommissioning more then 11 y. – today - II. stage from 2008

  (I.stage: 1999 - 2007)

  accidentally shutdown in 1977 (melting of **2** fuel elements) – see some basic data on next slides

- NPP V1 – two units under preparation to decommissioning (2. unit shut down in 2008, 1. stage have to be strat in 2013

NPP A1 -main milestones

1972: Commissioning of NPP-A1, KS-150, HWGCR

1976: First accident during refuelling

1977: Second accident with partial core melting,

1980 - 1994: preparation of decommissioning

1999 - 2007: decommissioning - phase I

2001- 2005: IAEA TC project: SLR/4/008:

"Remotely Operated and Robotic Technologies for D&D of the A1 NPP"

Bohunice NPP complex –auxiliary buildings on left side

1. Free release licences at NPP A1

- Bulk material (concrete)
- C-steel + Stainless steel (half pipes & plates)

by 200 litre triple-HPGe detector drum monitor at central free release monitoring post of NPP A1, capacity **cca 3t / shift**

Free released amounts in tons:

year	2003 - 04	2005	2006	2007	2008	2009	2010 Sept	Sum tons
Stain steel	19	57	33	38	(from V1)	Reco nstr.	-	147
C-steel	**152**	65	68	35	48	8.2	45	421
Conc -rete	25	42	12	43	**104**	57	**95**	378

Central Free release post

Central Free release post

2. Free release licences at NPP A1

Bulk contaminated soil:

- by a sorting and free release belt monitor – capacity –cca 10 t per shift
  - 1 t during active test

- By simplified in situ and laboratory measurements, if Am << 300 bq / kg (Cs-137), only
  - 100 t of very low conatminated soil Am < 100 Bq/kg

Pilot sorting and free release facility for Contaminated Soil

The facility consist of :

- loaders with grinding shovel
- 1 pc of input bin with charging helical conveyor,
- transportable container (air condit to stabilise measrmnt),
- belt monitor with a soil feeder and electronic belt scale
- control unit with PLC and sorting flaps
- 3 pc of output conveyors and trailer containers for sorted out CS

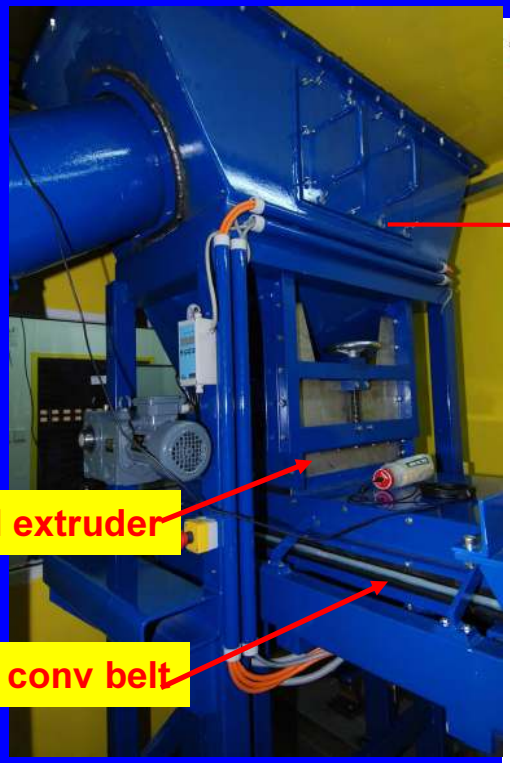
Photo of Sort Facil at contrld area, NPP A1 –

2 soil loaders for crushing, moving and loading CS

Photo of Sort Fac at controlled area of NPP A1 – CS input bin + helical conv.

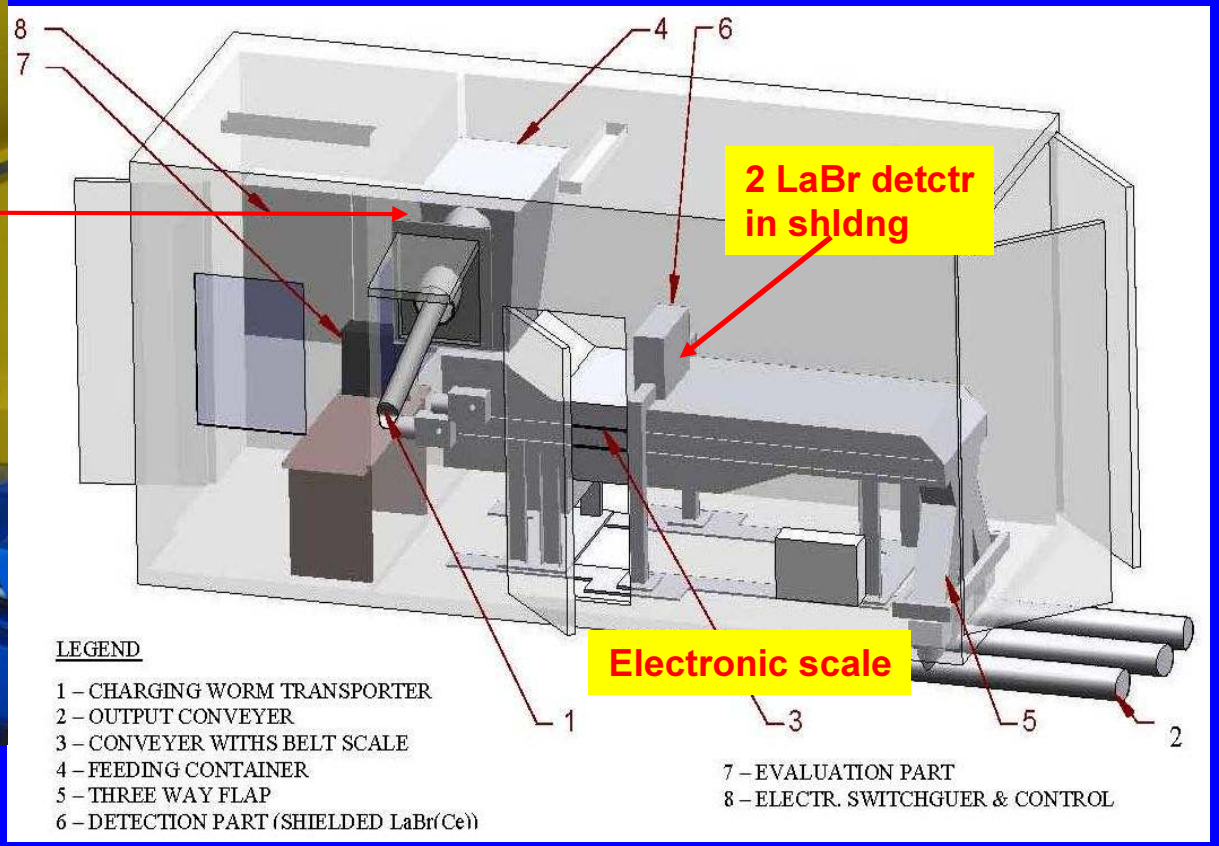
Model of the belt conveyer monitor and contaminated soil sorting system

Feeding bin



soil extruder

Covered conv belt



Free release licences under authority submition preparation

- **bulk soil and concrete**

by twin electrically cooled HPGe detectors for free release of 200 litre drums and/or 600 l containers at NPP A1

- capacity 5 t for drums and 10t for containers monitor

- **building structure walls**

1. by ISOCS collimated HPGe detector
2. by simple gross contamination meters (e.g Contamat)

ISOCS HPGe detector with Carbon window for depth distribution determination

Large area monitor 600 cm^2(suma beta A)

Contamimeter – left, and pancake probe for small area, edge,..

Handy Inspector 1k (left) and Inspector 2k (right) for programmable spectrometry measurement (LaBr, NaI, HPGe) of walls, soils

Release criteria according to SR Gov. Regulative No 345/2006,

- IED < 10 μSv/y + KED < 1 manSv (optimis if KED >)
- Am < tabulated releas levels for RNs in APP.8:
  - e.g 300 Bq/kg or 0.3 Bq/cm2 for Cs-137 (I. class), for higher classes RL >10 times - (considered optimised)
  - Way of measurements are also defined in this Regulative:
    - Average value < RL in 1000 kg if homogeneous,
    - Avreage value < 3*RL in 300 kg if inhomog. material
  - Similar for surfaces (10000 and 1000 cm2)

Release criteria –cont.

- The tabulated values of RL are suitable for small amounts of material to be released, only, as the measurements are extremly costly
- Quick direct survey at this levels is almost impossible - it also implies stay of heavy techniques (excavators, lifting platform, scaffolding) for waiting for monitoring results
- For large amounts of materials or surfaces - no experineces, yet
- optimisation of RL is necessary to reduce the mentioned high costs

Release criteria –cont. 2

- At NPP A1 there are large amounts of contaminated soils, as well, due to acidents, and following flooding – RL for them need complex optimisation that is at the very beginning,

- In exceptional case like this (accident) NV345/2006 allows higher IED < 50 μSv/y + demonstration of optimisation

- The management of Cont. Soil is not solved, yet.

Release criteria –cont. 3

- For building structures the aproach in EC directive RP-113 means optimisation of monitoring and release cost (most of buildings at NPP A1 are in some extent contaminated)

  – An auxiliary building free release is planned in 2012-13

Release criteria –cont 2

A new concept for building release according to RP-113 was developed within the A1 decomm project and agreed with the Slovak Public health authority (regulatory body):

- Based on total surface activity measurements on erected building after deconatmination,
- RL e.g for Cs-137 10 Bq/cm2 are easy measurable,
- Summ rule for all significant RNs is applied,
- Confidence building and good comunication to authority and public is necessary
- After releasing demolishing as non nuclear builg

A new concepts for building release at NPP A1

- A central contaminated building surface database will be used for release management and communication with the authority,
- All physical and radiological measurement data will be centralised in CBS DB with needed output sheets,
- CBS DB will be fed by pre-, post-, charact and release measurement data
- The rules in NV 345/2006 for measurements of surface contamination will be respected (1000 / 10000 cm2),
- Graded approach to monitoring density according to the MARSIM methodology will be applied,
- The main criteria for clasification will be the contamination potential and depth of contamination (preliminary and final)

A new concepts for building release at NPP A1

- RN vectors will be used according to sampling and RCh analis (mian HDRNs: Sr-90, transuranium),
- Measuremnet techniques are under selction, but they will be based on combination of gross beta, scintilation and semiconductor detectors application

Site release

- No real experience exist in Slovakia,
- Only selective free release of bulk materils and steel (pipes, plates) from A1 and V1 site was realised in limited extent.
- Final status criteria for release of site is not clarified, yet (for NPP A1 problems with underground structures),

Questions and expectations

- To learn the German experiences in this field,
  - RL and measurement conditions,
  - Optimisation for large amounts of materila and soil
  - Approach to mnitoring of potentially contaminated underground structures,
  - Selection of apropriate measurement techniques,
  - Graded approach to monitoring of building surfaces
  - Assistant techniques for monitoring in height -platfrms
  - Use of statistics at data evalutaion

- To identify experiances from other countries

Examples of used techniques in Slovakian decommisioning free release projects

Key technical characteristics and parameters of pilot soil sorting facility

- input bin, helical input conv,
- feeder bin + soil extruder, it forms soil on monitor belt to an adjustable rectangle shape – thickness 3- 15 cm,
- Belt conveyer monitor, 60 cm belt width, 2x shd. LaBr
- 3 belt conveyers and 3 trailer containers with dust rise protection

- MDA, Cs-137, 1.5x1.5“ LaBr: 140 Bq/kg for 30 kg sorting batch and 50 Bq/kg for 300 kg weight lot of released soil (at 500 Bq/kg of K-40 and background DR 0.15 μGy/h)

- Automatic sorting into 3 adjustable categs, Throughput: 1 t/h at belt speed 1 cm/s (free release mode), 2 t/h at sorting mode (A>300 Bq/kg),
- Automatic gammaspec. and sorting cycles by Canberra SW + PLC automat, so no need for specially qualified operator

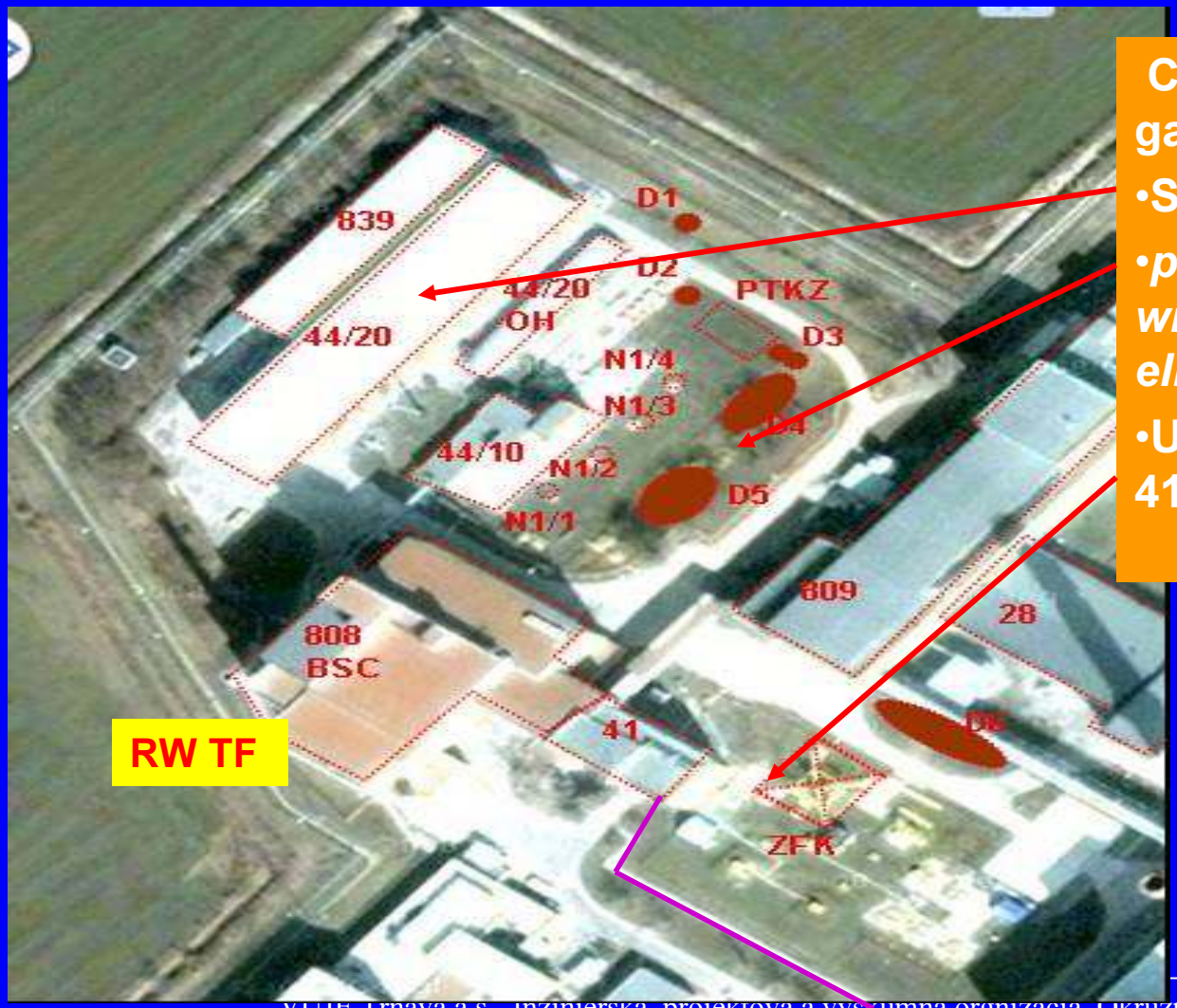
Hand held surface contamination monitoring equipments

Sampling of concrete by Core drill and sample preparation (diamond circular saw) for lab depth distribution determination

END of presentation

- Thanks for your attention
- Last picture are illustrative, only

Garden of WWPS in NPP A1 site areal- foto



Controlled area in garden of WWPS with:

- **Solid RW shafts 44/20**
- ***piles of excavated soil with A<100 Bq/kg - ellipses***
- **Underground LRW tanks 41, 44/10**