



Follow-Up Training Course (FTC) Nuclear/Radiological Emergency Preparedness (NREP)

Lesson Learned of Emergency Response for Open Source in Indonesia

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Indonesia



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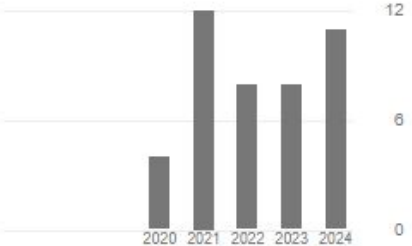
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Lesson learned



Situations Considering Remediation

- January 30-31 2020, on RDMS-MONA tool test, was detected radiation that exceed the limits in vacant site.
- Start from February 2020, BAPETEN and BATAN started coordinating to solve the problems.
- BAPETEN was declare clearance for that area on October 22 2020.



Fig 1. Location of contaminated land by Cs-137

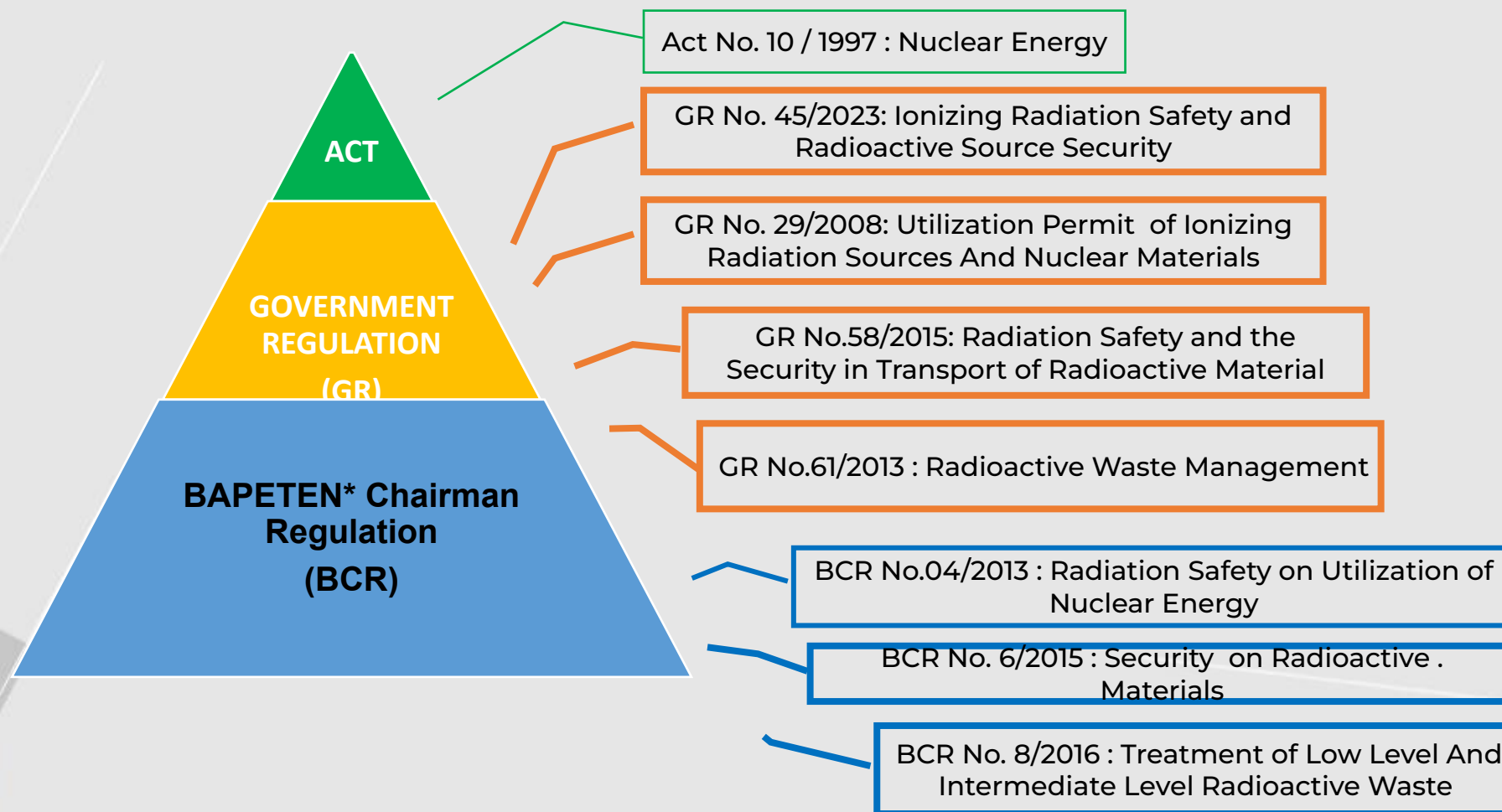
Regulatory Requirements for Safety Assessment of Remediation

The law used as the reference for safety assessment

- Regulation about nuclear
 - Act No. 10 / 1997 : Nuclear Energy
- Regulation about environmental radiation exposure
 - BCR No. 16/2012 : Clearance Level
 - BCR No. 4/2013 : Radiation Protection and Safety

Regulatory Requirements for Safety Assessment of Remediation

- Regulatory framework for RWM in Indonesia



*BAPETEN = Nuclear Energy Regulatory Agency of Indonesia

GR 33/2007 : Ionizing Radiation Safety and Radioactive Source Security

• Article 73

- (1) BAPETEN secures radioactive sources that are unknown their owners.
- (2) BAPETEN conducts a search for information regarding the ownership of Radioactive Sources as referred to in paragraph (1).
- (3) The search for information as referred to in paragraph (2) can be carried out with other authorized agencies.

• Article 74

If from the results of the search for information as referred to in Article 73 paragraph (2) and paragraph (3), the owner of the Radioactive Source:

- a. found, then all the consequences caused by it are the responsibility of the owner; or
- b. was not found, then declared as radioactive waste by BAPETEN.

• Article 75

Radioactive waste as referred to in Article 74 letter b must be stored and managed by the National Nuclear Energy Agency (BATAN) in accordance with the requirements of Radioactive Source Security.

Case Specific Safety Assessment

- This case was occurred at vacant site near residential area.
- The radiation exposure exceeded the limits for environment.
- The unknown source was orphan source.

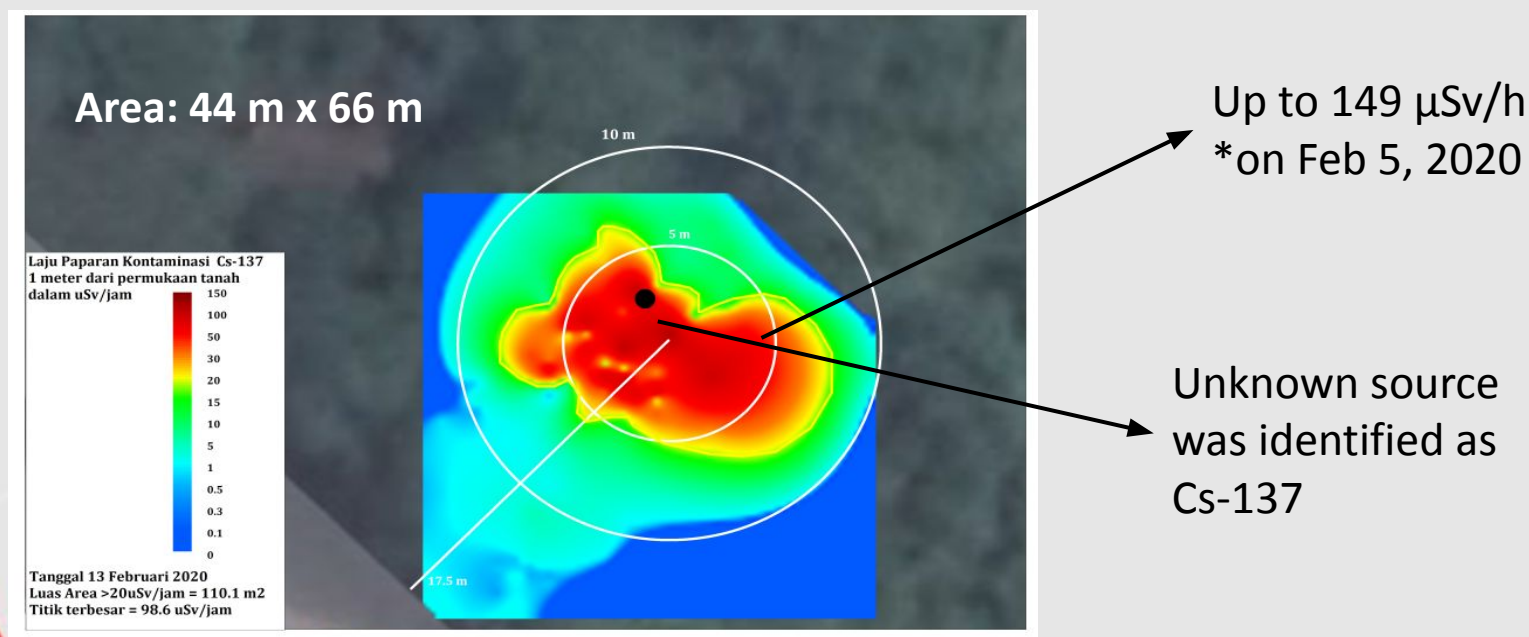
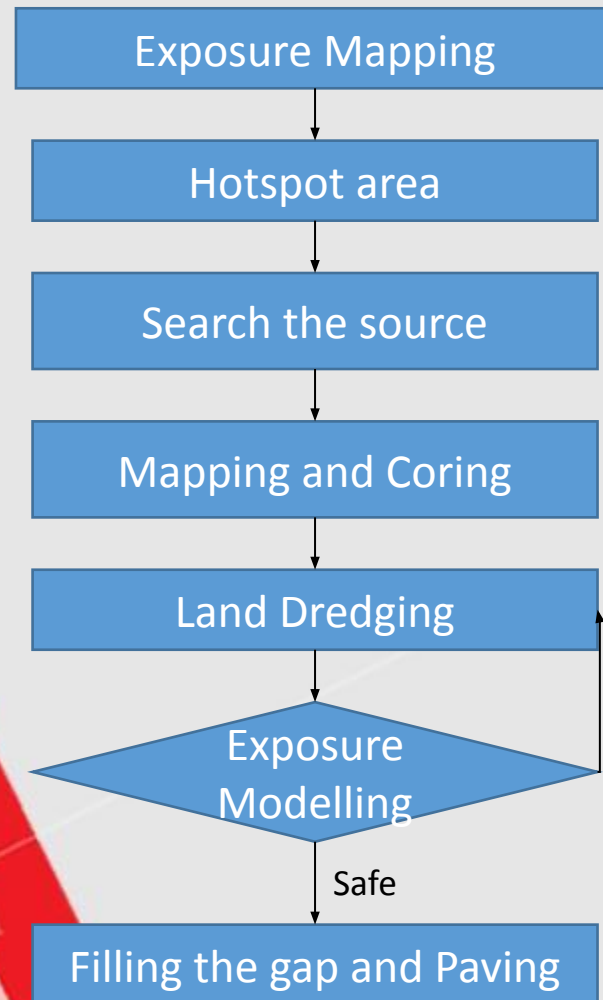


Fig 2. Radiation exposure mapping on site

Methodology, Tools and Software



- Mapping used radiation meter integrated with GPS.
- Survey meter and Gamma spectrometer was used for determined the sources.
- Exposure was modelled by using Micro shield 7.0 software.
- Excavator and truck was used for dredging and transport.

Methodology, Tools and Software



Fig 3. Documentation of decontamination process of contaminated land by Cs-137



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Methodology, Tools and Software

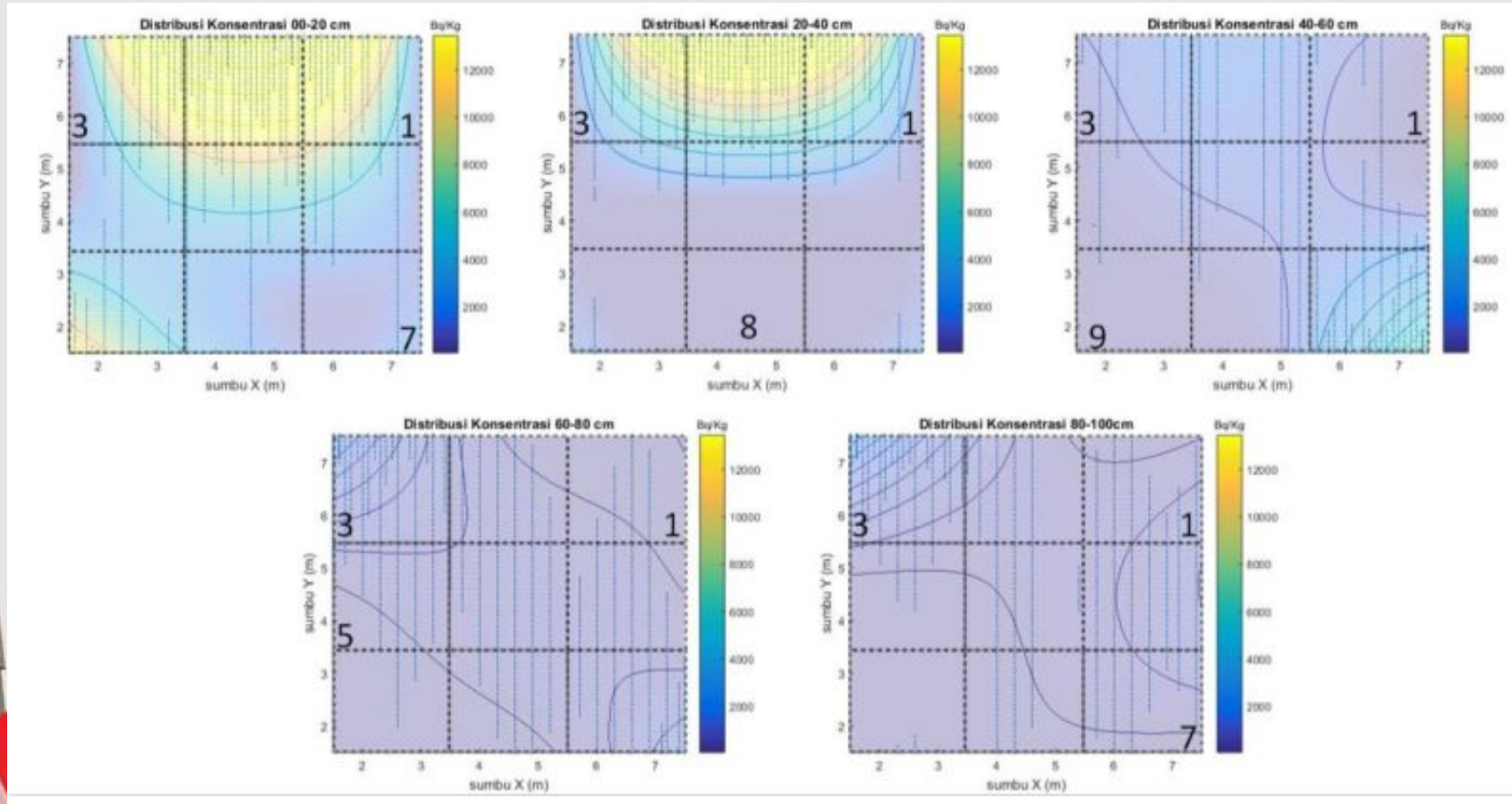


Fig 4. The distribution of activity concentrations of coring soil samples showed decreased activity concentration with increasing depth

Methodology, Tools and Software

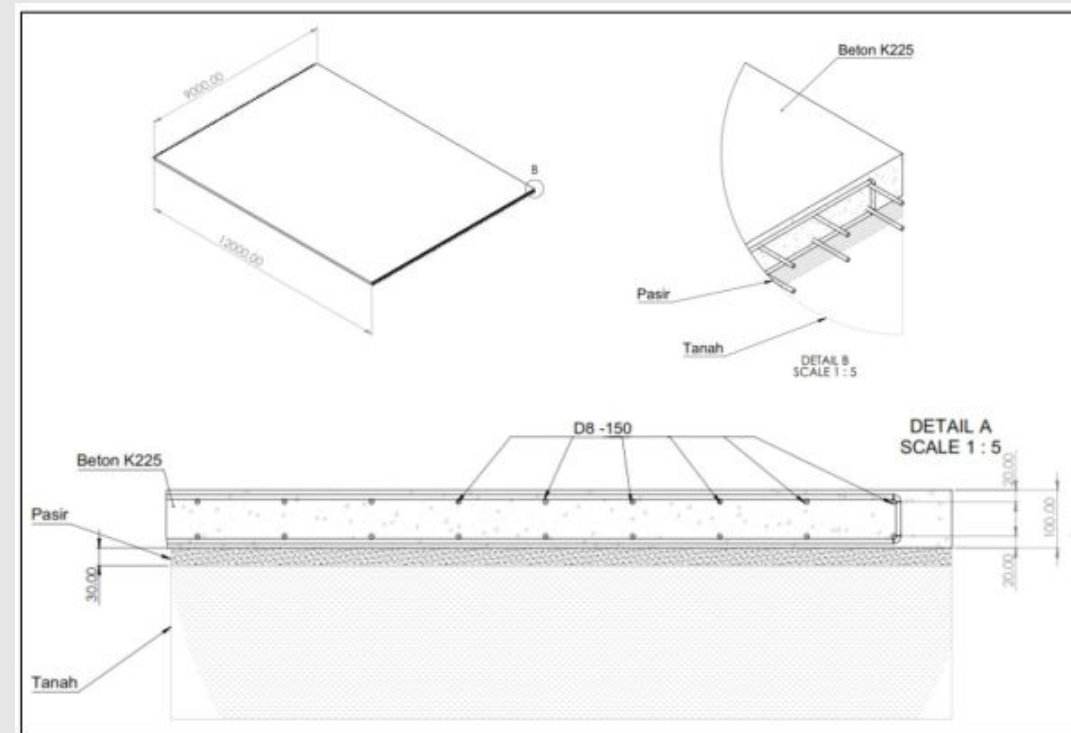


Fig 5. The Specifications for filling and casting contaminated land



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Fig 6. Coring and extracting the soil

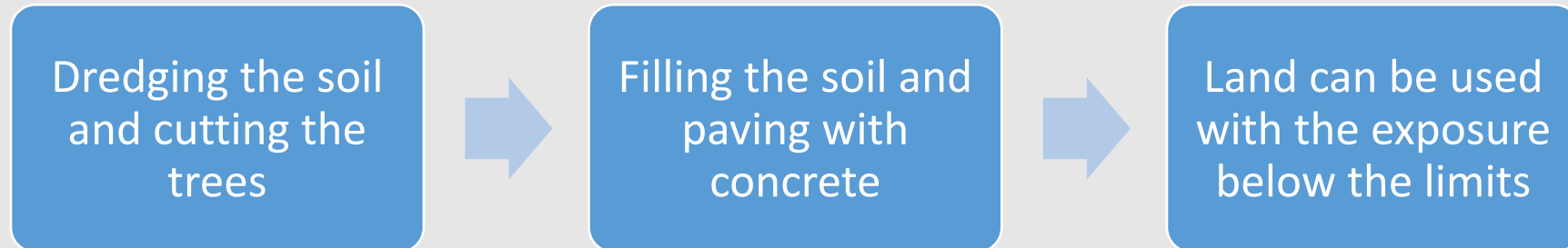


Fig 7. Cutting of contaminated trees

- Soil samples were extracted from 3 different points and analyzed by using gamma spectrometry. The source was Cs-137 (Activity Concentration: $9.36E4$ - $5.24E5$ Bq/kg. (BAPETEN Regulation No. 16/2012 Clearance Level for Cs-137: 100 Bq/kg)
- Plants in the location area (fruit, leaves, mango, turmeric, chili, etc) : Activity concentrations above the limit (500 Bq/kg)
- Drinking water sources (well water) is safe for consumption (no radioactive contamination detected).

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- Remediation Process



- Radioactive Waste Management

- 906 drums contained radioactive waste.
- Contaminated soil was processed.
- Contaminated trees and fruits was processed.

- Handling of contaminated people

- Residents was checked by WBC.
- Until press release of BAPETEN, Cs-137 radiation was detected on **4 people**.

Challenging Issues In Remediation And Safety Assessment



- Provide understanding to the general public that this case can be handled safely.



- Manage contaminated soil and waste in bigger volume.

Expected Outputs In Terms Of Safety Assessment For Remediation

- Press release BAPETEN on October 20 2020 (No. 11/PR/HM 02/BHKK/X/2020)



Press Release BAPETEN

20 Oktober 2020

No: 11/PR/HM 02/BHKK/X/2020

Pernyataan Status Clearance atas Lahan dengan Paparan Tinggi Di Perumahan Batan Indah – Tangerang Selatan

Ditemukannya zat radioaktif oleh Badan Pengawas Tenaga Nuklir (BAPETEN) di lahan kosong perumahan Batan Indah, Kecamatan Setu, Tangerang Selatan, mengakibatkan adanya kontaminasi pada tanah dan vegetasi di lahan tersebut. Untuk itu, tim gabungan BATAN-BAPETEN berupaya melakukan dekontaminasi melalui proses *clean-up* berupa pengerukan tanah yang terkontaminasi. Di samping upaya *clean-up*, Tim juga melakukan pengambilan sample vegetasi, air tanah, maupun pemeriksaan *Whole Body Counting* (WBC) terhadap beberapa warga di sekitar lokasi.

Expected Outputs In Terms Of Safety Assessment For Remediation



Fig 9. Contaminated area after remediation become Tennis court for the residents

Lesson Learned

- Strengthening supervision carried out by BAPETEN through regulation, licensing and inspection.
- Strengthening radioactive waste management technology
- Strengthening radioactive waste management infrastructure
- Certainty of financing for similar cases.
- Strengthening coordination with relevant stakeholders
- Strengthening information and communication systems
- Guarantee of public safety and health against radiation exposure
- Strengthening the enforcement of nuclear energy laws

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THANK YOU

TERIMA KASIH



Peraturan Pemerintah yang membahas kedaruratan radiasi adalah Peraturan Pemerintah Nomor 45 Tahun 2023 tentang Keselamatan Radiasi Pengion dan Keamanan Zat Radioaktif. Peraturan ini mencakup berbagai aspek keselamatan dan keamanan terkait zat radioaktif dan radiasi pengion, termasuk penanggulangan keadaan darurat. 

Peraturan Pemerintah ini mengatur berbagai hal terkait:

Keselamatan Radiasi Pengion:

Meliputi aspek proteksi radiasi, pembatasan dosis, dan tindakan pencegahan terhadap paparan radiasi yang tidak diinginkan. 

Keamanan Zat Radioaktif:

Meliputi aspek pencegahan pencurian, pengalihan, dan penggunaan zat radioaktif yang tidak sah. 

Keadaan Darurat Radiasi:

PP ini juga mengatur tindakan yang harus dilakukan dalam situasi darurat radiasi, termasuk evakuasi, penanganan korban, dan koordinasi antar instansi. 

Beberapa poin penting yang diatur dalam PP ini adalah:

Tanggung jawab pemegang izin:

Pemegang izin fasilitas radiasi bertanggung jawab atas keselamatan dan keamanan radiasi di fasilitas mereka, termasuk penanggulangan keadaan darurat. 

Peran Penyelenggara Proteksi dan Keselamatan Radiasi:

PP ini mengatur susunan dan tugas Penyelenggara Proteksi dan Keselamatan Radiasi, yang bertanggung jawab membantu pemegang izin dalam menjalankan tugas-tugas terkait keselamatan radiasi. 

Pedoman Rencana Penanggulangan Keadaan Darurat:

PP ini menjadi dasar untuk penyusunan pedoman rencana penanggulangan keadaan darurat oleh BAPETEN. 