Current status of nuclear facilities in Ukraine

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Institute for Safety Problems of Nuclear Power Plants
The current frontline in Ukraine
Nuclear facilities in Ukraine

SE ChNPP
Decommissioned and deoccupied (March 31)

SUNPP
3 units working under missile attacks

ZNPP
Units 1-4, 5 in cold shut-down, Unit 5 – hot state
Orphan sources

According to the national registry of sources (2020): 25248 RS, in particular –

• 8728 sealed isotopic sources and
• 16520 generators
• 4531 users of RS (74%- medical use)
• 549 use sealed RS
State Enterprise „Chornobyl NPP“
State Enterprise „Chornobyl NPP“

- 1300 tons fuel-containing masses (FCM)
- 43,000 m³ of high-level waste (HLW)
- 2000 tons of combustible materials
- 630,000 m³ of radioactive waste (RAW)
- 200 tons of nuclear fuel (by uranium)
- 4 tons of radioactive dust
- 1500 R/h dose rate in the under-reactor space (Premise 305/2)

chnpp.gov.ua
Chornobyl exclusion zone

Overall area 2,600 km²

10-km zone contains:
- Power Generating Units №1, №2, and №3 of the Chornobyl NPP – permanent shutdown
- The Shelter and the New Safe Confinement (NSC Arch)
- Industrial complex for solid radioactive waste management
- Wet spent fuel storage facility (ISF-1)
- Dry spent fuel storage facility (ISF-2)
- Radioactive waste disposal points (RWDP Buryakivka, RWDP Pidlisnyi, ChNPP Stage III RWDP)
- Radioactive waste interim confinement sites (RICS ChREBR – protected area with unique flora and fauna)
Chornobyl. Fortifications in the Red Forest

<table>
<thead>
<tr>
<th>NUCLIDE</th>
<th>SPECIFIC ACTIVITY (Bq/g)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cs-137</td>
<td>5.90E+00</td>
</tr>
<tr>
<td>Eu-154</td>
<td>1.43E-02</td>
</tr>
<tr>
<td>Am-241</td>
<td>2.45E-01</td>
</tr>
<tr>
<td>Pb-210</td>
<td>3.20E-02</td>
</tr>
<tr>
<td>U-238</td>
<td>4.97E-03</td>
</tr>
<tr>
<td>U-233</td>
<td>1.02E-06</td>
</tr>
<tr>
<td>U-234</td>
<td>5.31E-03</td>
</tr>
<tr>
<td>U-235</td>
<td>2.35E-04</td>
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<tr>
<td>U-236</td>
<td>3.20E-05</td>
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<tr>
<td>Pu-239</td>
<td>3.58E-02</td>
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<td>Pu-240</td>
<td>5.14E-02</td>
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<tr>
<td>Pu-241</td>
<td>1.14E+00</td>
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</tbody>
</table>
Chornobyl. Fortifications in the Red Forest

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Estimated total effective dose [mSv]</th>
<th>Dominant pathways</th>
<th>Radionuclides</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scenario A (35 days)</td>
<td>0.6</td>
<td>External (97%)</td>
<td>Cs-137</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Inhalation (3%)</td>
<td>Am-241</td>
</tr>
<tr>
<td>Scenario B (14 days)</td>
<td>0.3</td>
<td>External (88%)</td>
<td>Cs-137</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Inhalation (12%)</td>
<td>Am-241</td>
</tr>
</tbody>
</table>
Somewhere in Chornobyl forests

Gentlemen, anything arriving to the EZ – stays in the EZ. Just radiation safety measures.

Can we just follow the Russian warship?...
Zaporizhzhia NPP

<table>
<thead>
<tr>
<th>Name</th>
<th>Type</th>
<th>Status</th>
<th>Location</th>
<th>Reference Unit Power [MW]</th>
<th>Gross Electrical Capacity [MW]</th>
<th>First Grid Connection</th>
</tr>
</thead>
<tbody>
<tr>
<td>ZAPOROZHIE-1</td>
<td>PWR</td>
<td>Operational</td>
<td>ENERGODAR</td>
<td>950</td>
<td>1000</td>
<td>1984-12-10</td>
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<tr>
<td>ZAPOROZHIE-2</td>
<td>PWR</td>
<td>Operational</td>
<td>ENERGODAR</td>
<td>950</td>
<td>1000</td>
<td>1985-07-22</td>
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<tr>
<td>ZAPOROZHIE-3</td>
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<td>ENERGODAR</td>
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<td>1000</td>
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<td>ZAPOROZHIE-4</td>
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<td>ZAPOROZHIE-5</td>
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<td>ENERGODAR</td>
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<td>1000</td>
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<tr>
<td>ZAPOROZHIE-6</td>
<td>PWR</td>
<td>Operational</td>
<td>ENERGODAR</td>
<td>950</td>
<td>1000</td>
<td>1995-10-19</td>
</tr>
</tbody>
</table>
Zaporizhzhia NPP
Zaporizhzhia NPP.
Possible contamination map, if the reactors are hot

© Ukrainian Hydrometeorological Institute
Kakhovka dam
Kakhovka dam

[Map of Kakhovka dam and surrounding areas with annotations in Ukrainian and English.

Map details:
- Нікополь
- Каховське водосховище
- Підвідний канал Запорізької ТЕС
- Запорізька АЕС
- Запорізька ТЕС
- Станов-охолоджувач
- Станом на 10:00 14 червня 2023 року

Links:
https://www.thetimes.co.uk/]

Annual
Zaporizhzhia NPP – possibly, the Kyshtym (1975) case
Zaporizhzhia NPP: IAEA mission, today

IAEA SUPPORT AND ASSISTANCE MISSION TO ZAPORIZHZHYA (ISAMZ)

7 INDISPENSABLE PILLARS
for ensuring nuclear safety and security in Ukraine

1. Physical integrity of the facilities
2. Safety and security systems fully functional
3. Operating conditions for staff
4. Off-site power supply
5. Logistical chains
6. Radiation monitoring and emergency response
7. Reliable communications with the regulator

as of 1 September 2022

Annual Meeting 2023, Porto
Thank you!

Questions?