Table 1: World uranium production by mining method [21]

|  |  |  |
| --- | --- | --- |
| Mining Methods | Value (ton) | World percentage (%) |
| In situ Leach | 29,518 | 50 |
| Underground mining and open mining | 27,328 | 46 |
| By product mining | 2,686 | 4 |

Table 2: Nuclear Fuel Material Balance (NFMB) Parameters

|  |  |
| --- | --- |
| **Uranium Ore Deposit** | **Assumed Values** |
| * Waste-to-ore ratio * Uranium ore grade | 5  0.2% weight U |
| Milling |  |
| * Losses during extraction process * Solids entrained in effluent | 4.24%  50% weight |
| Conversion |  |
| * Losses * Solid waste * Liquid waste | 0.5%  0.7 tons per ton U  6.5 m3 per ton U |
| Enrichment |  |
| * Refining product (Product assay) * Refining tails (Tails assay) * Specific electricity consumption | 3.6% weight U-235  0.3% weight U-235  50 kWh/SWU |
| Fabrication |  |
| * Loss factor * Solid waste * Liquid waste | 1%  0.5 m3 per ton U  9 m3 per ton U |
| NPP |  |
| * Burn-up * Efficiency | 42 GWd/ton U  33% |

Table 3: Material Balance for NPP

|  |  |  |
| --- | --- | --- |
|  | **Activity** | **value (Gg)** |
|  | **Mining** |  |
| Input | diesel fuel | 360 liter |
|  | fresh water | 306250 liter |
|  | explosives | 0,20 kg |
|  | rock excavated for mining+repositories | 400 ton |
| Output | raw materials | 0,903 ton |
|  | uranium mill tailings | 399,0966 |
|  | waste water | 1835 |
|  | rock excavated for mining+repositories | 13933 |
|  | chemical+aux materials | 494.3065 |

Table 4: Material Balance for NPP in Indonesia

|  |  |
| --- | --- |
| Description | Quantity |
| Reactor Type | PWR |
| Reactor Power | 500 MWe |
| Burn-Up | 42 GWd/ton U |
| Efficiency | 34,20% |
| Operating Period | 365 days |
| Electricity Production | 9720,042 GWh/days |
| Uranium Fuel Consumption | 31,98601 ton |
| Uranium Ore Consumption | 120000 ton |
| Natural Uranium Consumption U3O8 | 271,01084 ton |

Table 5: Environmental Impact based on impact category

|  |  |  |
| --- | --- | --- |
| Impact category | Reference unit | Result |
| Acidification | kg SO2 eq | 0.00351514 |
| Eutrophication | kg PO4--- eq | 0.00091637 |
| Freshwater aquatic ecotoxicity | kg 1,4-DB eq | 0.00012798 |
| Global warming (GWP100a) | kg CO2 eq | 0.36239497 |
| Human toxicity | kg 1,4-DB eq | 0.012744 |
| Marine aquatic ecotoxicity | kg 1,4-DB eq | 0.00012032 |
| Photochemical oxidation | kg C2H4 eq | 6.0374E-05 |
| Terrestrial ecotoxicity | kg 1,4-DB eq | 5.7955E-06 |

Table 6: Health Impact based on category

|  |  |  |
| --- | --- | --- |
| Impact category | Reference unit | Result |
| Asthma cases | PersonYr | 2.36E-08 |
| Cancer | PersonYr | 6.84E-12 |
| COPD severe | PersonYr | 1.84E-09 |
| Diarrhea | PersonYr | 4.93E-10 |
| Malnutrition | PersonYr | 6.23E-08 |