

Application of VRdose® at Leningrad NPP



Fig.1 View of VRdose® main window



Fig.2 3D-view of the room with measurements data

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Fig.3 3D-view of the room with measurements data



Fig.4 Distribution of gamma radiation field within the room

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Fig.5 Distribution of gamma radiation field within working area





Fig.6 Distribution of gamma radiation field within working area prior to installation of a shielding IFE



Fig.7 Distribution of gamma radiation field within working area after a shielding installation



Fig.8 Distribution of gamma radiation field within working area prior to shielding installation - Point visualization

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Fig.9 Distribution of gamma radiation field within working area after a shielding installation – Point visualization



Fig.11 Radiological parameters after shielding installation



Fig.12 Changing of exposure rate prior to shielding installation



Fig. 13 Changing of exposure rate after shielding installation

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Fig. 14 Comparison of radiological parameters in various scenarios

Application of VRdose® at Leningrad NPP CASE 2 – the rooms with emergency core cooling system piping K LNPP VRdose Planner Pro: /Default Project/413 52 FULL

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Fig.15 View of VRdose® main window

Application of VRdose® at Leningrad NPP CASE 2 – the rooms with emergency core cooling system piping



Fig. 16 3D-view of the room with measurements data

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Fig. 17 Distribution of gamma radiation field within working area prior to shielding installation

Fig. 18 Distribution of gamma radiation field within working area after 4 cm thick shielding installation

Fig. 19 Distribution of gamma radiation field within working area after 1 cm thick shielding installation Application of VRdose® at Leningrad NPP CASE 2 – The Rooms With Emergency Core Cooling System



Fig. 17 Distribution of gamma radiation field within working area prior to shielding installation

Fig. 18 Distribution of gamma radiation field within working area after 4 cm thick shielding installation

Fig.19 Distribution of gamma radiation field within working area after 1 cm thick shielding installation

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Fig.19 Distribution of radiation field within working area after 1 cm thick shielding installation



Fig.18 Distribution of gamma radiation field within working area after 4 cm thick shielding installation

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Fig. 20 Positioning of workers during the installation of lead shield; 4 cm thick

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Fig.21 Collective dose diagrams; no shielding installed

Fig.22 Collective dose diagrams; 1cm lead shielding installed

Fig.23 Collective dose diagrams; 4cm lead shielding installed

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Fig. 24 Personal dose diagrams; no shielding installed

Fig.25 Personal dose diagrams; 1cm lead shielding installed

Fig.26 Personal dose diagrams; 4cm lead shielding installed

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Fig. 27 Exposure rate diagrams; no shielding installed

Fig. 28 Exposure rate diagrams; 1cm lead shield installed

Fig.29 Exposure rate diagrams; 4cm lead shield installed

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Fig. 30 Comparison of radiological parameters in various scenarios

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Fig.31 View of the map with sources and measurements data



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Источники			Измерения			
1мя	Активность (ГБк):		Имя	Мощность Дозы	Предполагаемый	Отклонение
очечный Источник 1		0	(0.0, 1.1, 7.5)	0,001	0,001	5% увеличить
очечный Источник 10		0	(0.0, 1.1, 6.5)	0,001	0,001	6% увеличить
очечный Источник 11		0	(0.0, 1.1, 5.5)	0,001	0,002	66% увеличить
очечный Источник 12		0,093	(0.0, 1.1, 4.5)	0,002	0,002	9% увеличить
очечный Источник 2		0	(0.0, 1.1, 3.5)	0,002	0,003	17% увеличить
очечный Источник 3		0	(0.0, 1.1, 2.5)	0,004	0,004	1% уменьшить
очечный Источник 4		0,039	(0.0, 1.1, 1.5)	0,007	0,005	19% уменьшить
очечный Источник 5		0,138	(0.0, 1.1, 0.5)	0,009	0,006	24% уменьшить
очечный Источник 6		0,152	(0.0, 1.1, -0.5)	0,011	0,007	34% уменьшить
очечный Источник 7		0	(0.0, 1.1, -1.5)	0,012	0,008	33% уменьшить
чечный Источник 8		0,055	(0.0, 1.1, -2.5)	0,012	0,009	24% уменьшить
чечный Источник 9		0	(0.0, 1.1, -3.5)	0,015	0,01	35% уменьшить
			(0.0, 1.1, -4.5)	0,016	0,009	41% уменьшить
			(0.0, 1.1, -5.5)	0,017	0,008	54% уменьшить
			(0.0, 1.1, -6.5)	0,014	0,006	58% уменьшить
			(0.0, 1.1, -7.5)	0,008	0,004	47% уменьшить
			(0.0, 1.1, -8.5)	0,005	0	100% уменьшить
			(2.7, 1.1, -8.5)	0,005	0	99% уменьшить
			(2.7, 1.1, -7.5)	0,006	0,007	20% увеличить
			(2.7, 1.1, -6.5)	0,008	0,015	89% увеличить
			(2.7, 1.1, -5.5)	0,038	0,037	4% уменьшить
			(2.7, 1.1, -4.5)	0,066	0,068	3% увеличить
			(2.7, 1.1, -3.5)	0,077	0,073	5% уменьшить
			(2.7, 1.1, -2.5)	0,028	0,037	33% увеличить
			(2.7, 1.1, -1.5)	0,018	0,023	28% увеличить
			(2.7, 1.1, -0.5)	0,037	0,035	6% уменьшить
			(2.7, 1.1, 0.5)	0,034	0,038	13% увеличить
			(2.7, 1.1, 1.5)	0,026	0,02	22% уменьшить
			(2.7, 1.1, 2.5)	0,01	0,008	18% уменьшить
			(2.7, 1.1, 3.5)	0,004	0,004	19% увеличить
			(2.7, 1.1, 4.5)	0,003	0,003	6% уменьшить
			(2.7, 1.1, 5.5)	0,002	0,002	30% увеличить
			(2.7, 1.1, 6.5)	0,001	0,001	48% увеличить
			(2.7, 1.1, 7.5)	0,001	0,001	16% увеличить
			(2.7, 1.1, 8.5)	0,001	0,001	15% уменьшить

Fig.33 Activity calculations for various sources



Fig.34 The surface visualization of exposure rates from gamma field

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Fig.35 2D visualization of exposure rates from gamma field

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Fig. 36 Analyzer of exposure doses

Application of VRdose® at Leningrad NPP SUMMARY

LNPP Planner helps us to make:

- A forecast of accumulated doses (personal and collective)
- Visualization of exposure from gamma fields in 2D and 3D
- To make calculations of radioactive sources
- To make calculations of shielding
- To make comparison between different scenarios
- To make modeling of future works

AND WE ARE HAPPY TO ANSWER YOUR QUESTIONS!

Pavel Vinnikov Shift supervisor