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QDS TECHNICAL WHITE PAPER

REACTOR CAVITY DECONTAMINATION

2025 U.S. Nuclear Power Plant Case Studies

Product used
Quick Decon Solutions (QDS™)

In collaboration with:
Master Lee Decon Services &
RT Technologies, Inc.

Document Type
Technical White Paper

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This technical white paper presents scientifically supported case studies evaluating reactor cavity decontamination methodologies applied at U.S. nuclear power plants. Results are based on field data, controlled procedures, and post-application assessments conducted in accordance with industry standards and ALARA principles.

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Quick Decon Solution (QDS)
Executive Summary
2025 US NPP Reactor Cavity Decon Case Studies

Date: January 6, 2026

Executive Summary

This executive summary synthesizes three (3) reactor cavity decontamination case studies carried out at US nuclear power plants in 2025. All smearable contamination values were normalized to dpm/100 cm². Where pre/post smears were recorded as mrRad/hr per 100 cm², values were converted using the empirical factor 1 mRad/hr ≈ 22,000 dpm/100 cm². Across the portfolio, average removable contamination decreased by ~82% to ~99.9%, with the largest reductions observed at sites with the highest initial contamination.

• NPP Result #1 (BWR) : 3,632,200 → 127,850 dpm/100 cm² (−96.48%; 28.41× lower).

– Location performance vs pre baseline mean: Floor ~214,200 (−94.11%); Wall ~41,500 (−98.86%).

• NPP Result #2 (PWR): 19,060,000 → 27,400 dpm/100 cm² (−99.86%; 696× lower).

– Floor: 36,399,999.8 → 44,000 (−99.88%); Wall: 1,150,000 → 12,333 (−98.93%).

• NPP Result #3 (PWR): 988,800 → 173,500 dpm/100 cm² (−82.45%; 5.70× lower).

Methods

Smear survey values were parsed from site Cavity Decon Surveys PDFs and QDS survey tables. Where needed, mrRad/hr smears were converted to dpm/100 cm² using 1 mRad/hr ≈ 22,000 dpm/100 cm² (empirical plant-practices factor). We computed mean, median, min, max for pre and post sets, absolute and percent reductions, and pre/post ratios. Location-level reductions were calculated where location tags existed in both pre and post datasets.

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Case Studies (Three (3) 2025 Nuclear Plant Outage data sets were analyzed for this report)

2025 US NPP QDS Cavity Decon Result #1 (BWR)

Pre smears: 10 | Post smears: 20

Pre mean/median: 3,632,200 / 2,893,000 dpm/100 cm²

Post mean/median: 127,850 / 80,000 dpm/100 cm²

Reduction: 3,504,350 dpm/100 cm² (−96.48%; 28.41× lower)

2025 US NPP QDS Cavity Decon Result #2 (PWR)

Pre smears: 10 | Post smears: 10

Pre mean/median: 19,060,000 / 7,000,000 dpm/100 cm²

Post mean/median: 27,400 / 15,000 dpm/100 cm²

Reduction: 19,032,600 dpm/100 cm² (−99.86%; 695.62× lower)

2025 US NPP QDS Cavity Decon Result #3 (PWR)

Pre smears: 25 | Post smears: 20

Pre mean/median: 988,800 / 230,000 dpm/100 cm²

Post mean/median: 173,500 / 210,000 dpm/100 cm²

Reduction: 815,300 dpm/100 cm² (−82.45%; 5.70× lower)

Summary Tables

Case Study	Pre Mean (dpm/100 cm²)	Post Mean (dpm/100 cm²)	Reduction (%)	Ratio (Pre/Post)	Count (Pre/Post)
2025 US NPP QDS Cavity Decon Result #1	3,632,200	127,850	96.48%	28.41×	10 / 20
2025 US NPP QDS Cavity	19,060,000	27,400	99.86%	695.62×	10 / 10

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Decon Result #2					
2025 US NPP QDS Cavity Decon Result #3	988,800	173,500	82.45%	5.70×	25 / 20

Location-Level Averages (selected):

Case Study / Location	Pre Avg (dpm/100 cm²)	Post Avg (dpm/100 cm²)	Reduction (%)
Result #1 — Floor	3,632,200	214,200	94.10%
Result #1 — Wall	3,632,200	41,500	98.86%
Result #2 — Floor	36,400,000	44,000	99.88%
Result #2 — Wall	1,150,000	12,333	98.93%

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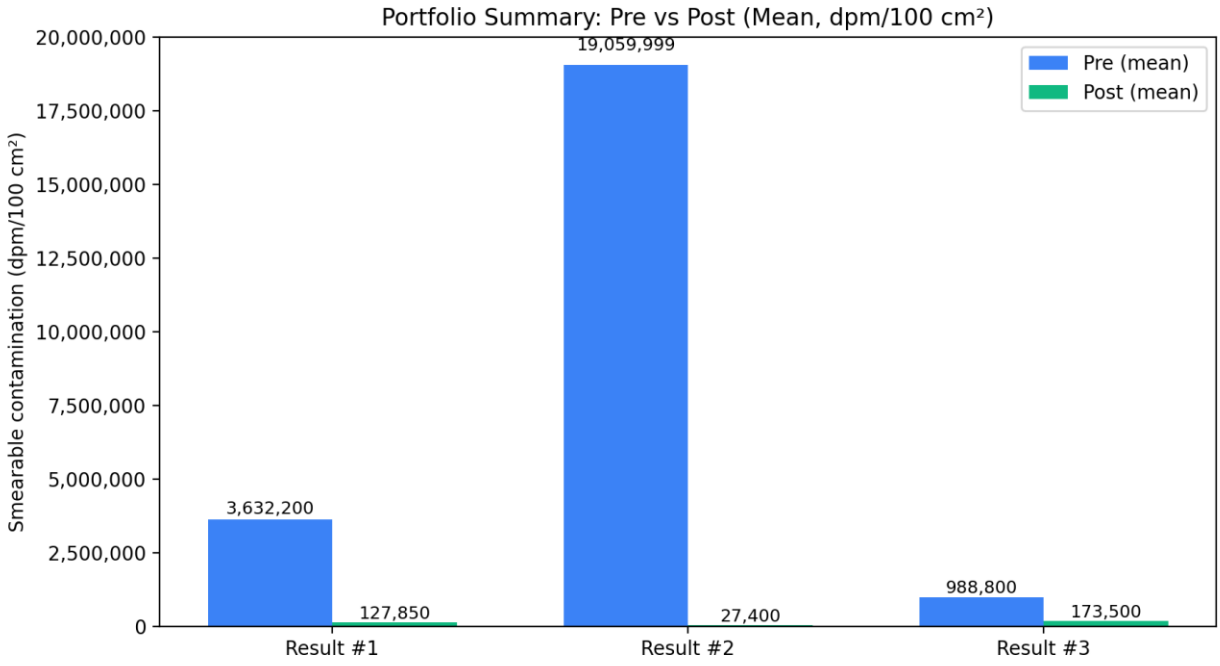
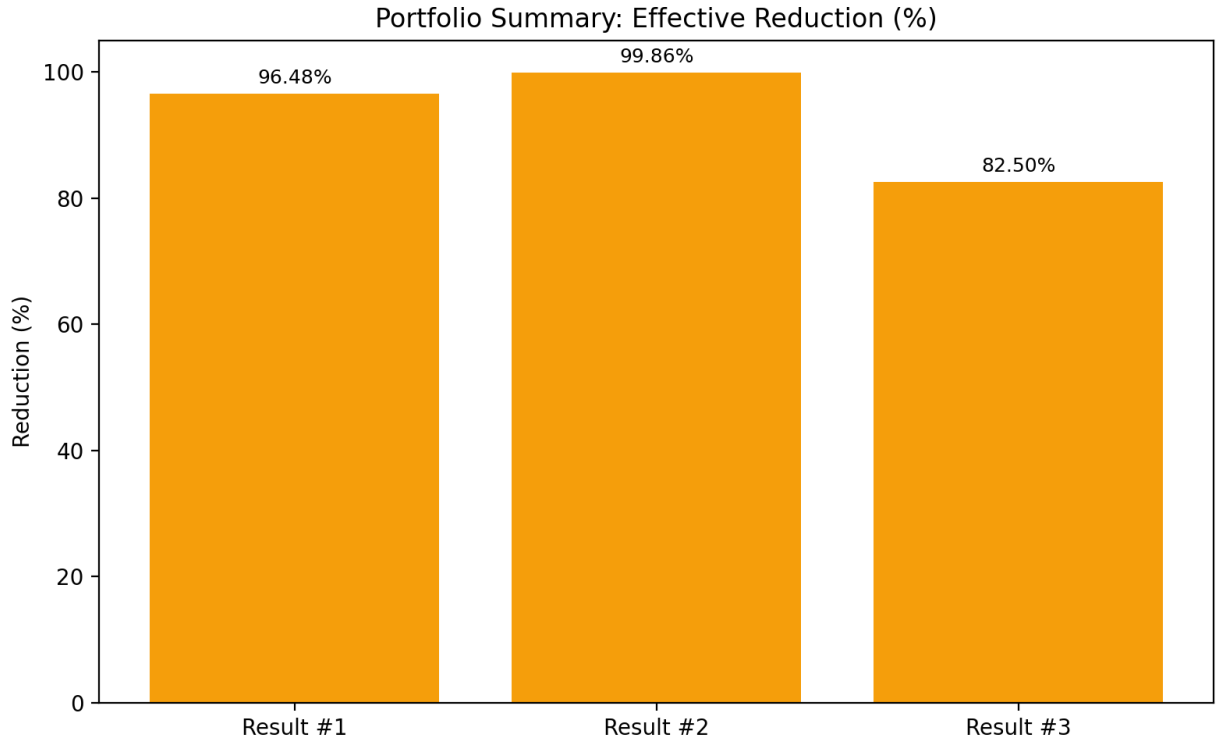
Portfolio Summary Charts





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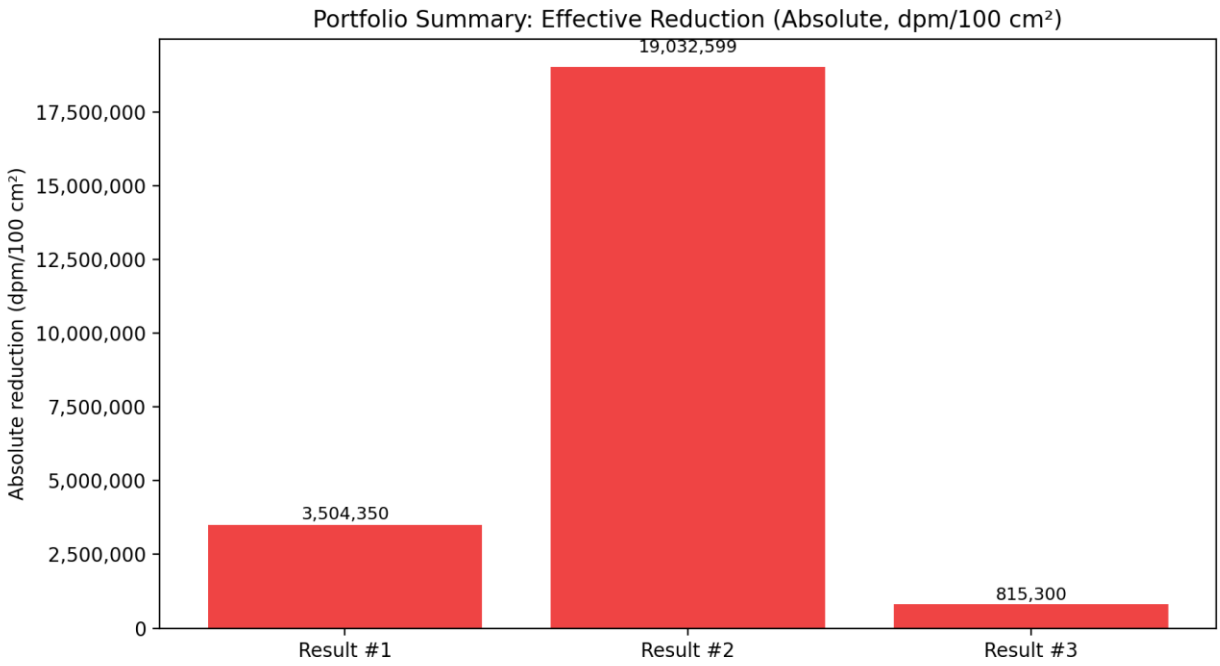

Methods

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Results (Compact)

Result #1

Pre mean: 3,632,200 dpm/100 cm²; Post mean: 127,850 dpm/100 cm²; **Reduction: −96.48%.**

Result #2

Pre mean: 19,060,000 dpm/100 cm²; Post mean: 27,400 dpm/100 cm²; **Reduction: −99.86%.**

Result #3

Pre mean: 988,800 dpm/100 cm²; Post mean: 173,500 dpm/100 cm²; **Reduction: −82.50%.**

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References

Health Physics Society archive discussion (1998): empirical conversion 1 mRad/hr ≈ 22,000 dpm/100 cm² (Browns Ferry context). URL: http://health.phys.iit.edu/extended_archive/9809/msg00499.html

Source survey PDFs and QDS brochure tables provided by client (2025).

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Packet for 1Gallon of QDS