ACTINIDE MIGRATION EVALUATIONS

EROSION AND SEDIMENT MODELING

- What Cleanup Level Will Guarantee Surface Water Standards Will Always Be Met?
- Tool for Surface Soil Remediation, Site Management, And Final Land Configuration Design
- Use For Risk Evaluations

ACTINIDE MIGRATION EVALUATIONS

EROSION AND SEDIMENT MODELING

- Estimate Pu and Am Movement by Erosion and Surface Water Processes
- Estimate Surface Soil Contamination Impacts to Surface Water
- Estimate Combination of Cleanup Levels and Management Practices Protective of Surface Water
- Estimate Downstream Effects

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Conclusions

General - Results indicate that remediation alone will not guarantee That surface water standards will always be met.

- **Combination of remediation, erosion abatement, runoff controls, and sediment containment**

903 Pad Area - Long-term protection of surface water to 0.15 pCi/L Pu or Am will only be achieved at cleanup levels well below current Tier II Action Levels.

Woman and Walnut Creeks - Long-term protection to 0.15 pCi/L from low level, diffuse Pu and Am in surface soil will require a combination of erosion abatement, runoff controls, and sediment containment.

Approach

1. **Calibrate** using rainfall simulation and Site data
   - Soil, vegetation, topography, climate
   - EMSP/CSU rainfall simulations
   - Surface water monitoring
   - Peer reviewed - Dr. Leonard Lane, SW Watershed Res. Center
2. **Join** modeling results with kriged actinide distributions
   - Most complete to date
   - Over 2,000 data points for Pu and Am
3. **Estimate** sediment and actinide **transport** and surface water **concentrations** under a variety of existing and potential conditions

Conditions Modeled

100 Year Continuous Simulation

- Ft. Collins - 92 year record
- Same average precipitation as RFETS

Design Storms

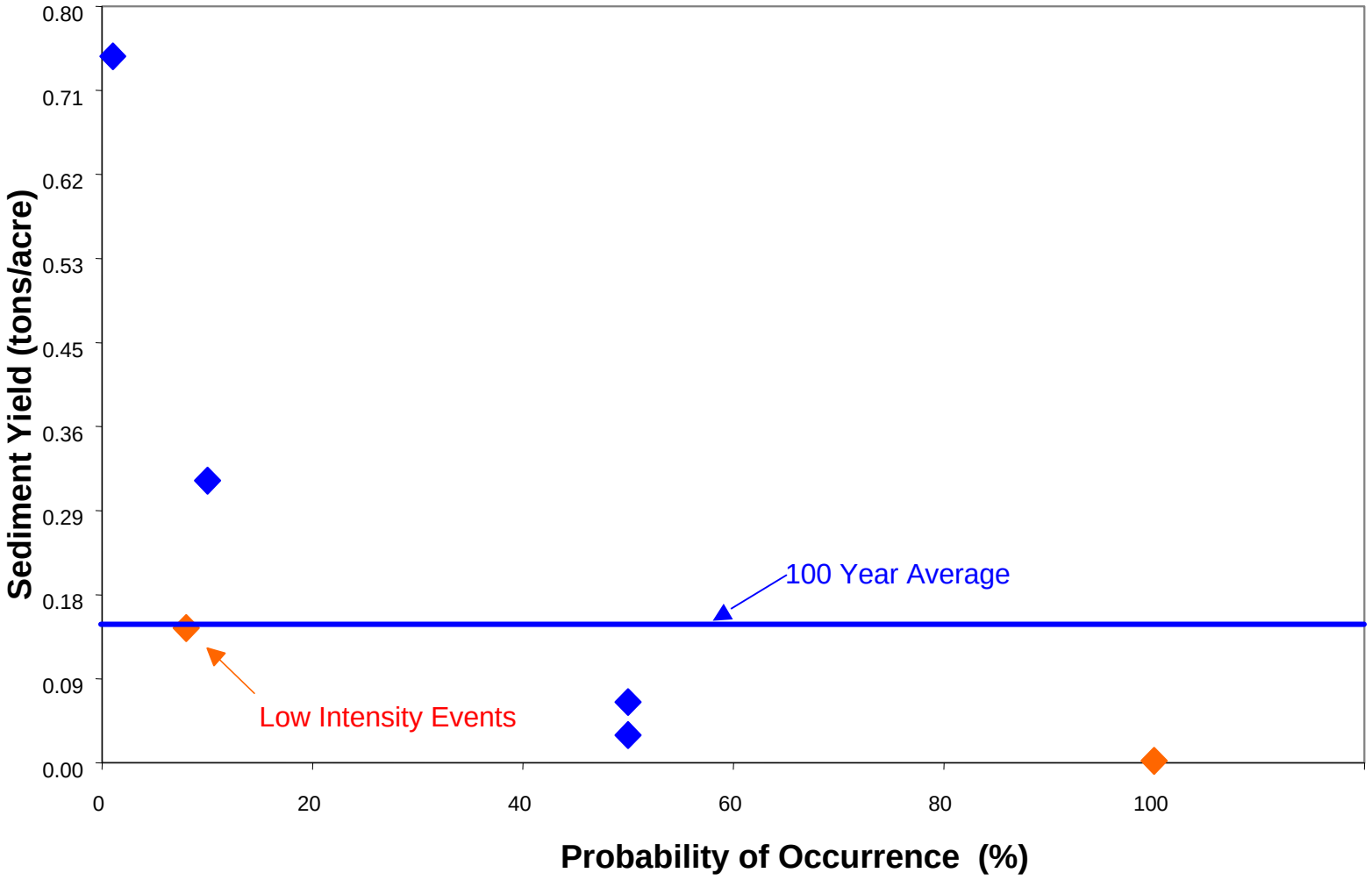
- Chosen to determine probabilities and for historical event
- 40.8 mm, 6 hour, 2 year event
- 66.3 mm, 6 hour 10 year event
- 97.1 mm, 6 hour, 100 year event
- 31.5 mm, 2 hour, 2 year event
- 35 mm, 11.5 hour event
- 74.9 mm, 11.5 hour, May 17, 1995 event

Design storms from RFETS Drainage and Flood Control Master Plan

SUMMARY OF WEPP-ESTIMATED 100-YEAR AVERAGE EROSION RATES

WATERSHED	SEDIMENT YIEILD	SEDIMENT YIELD	RUNOFF COEFFICIENT	CONTRIBUTION FROM ROADS/DISTURBED AREAS
	(T/Ha)	(T/A)	(Unitless)	(%)
WALNUT CREEK	0.324	0.144	0.035	33%
WOMAN CREEK	0.221	0.1	0.043	75% (19% GRAZED)
SID	0.324	0.144	0.035	33%

Estimated Sediment Yield for the SID for Six Design Storms



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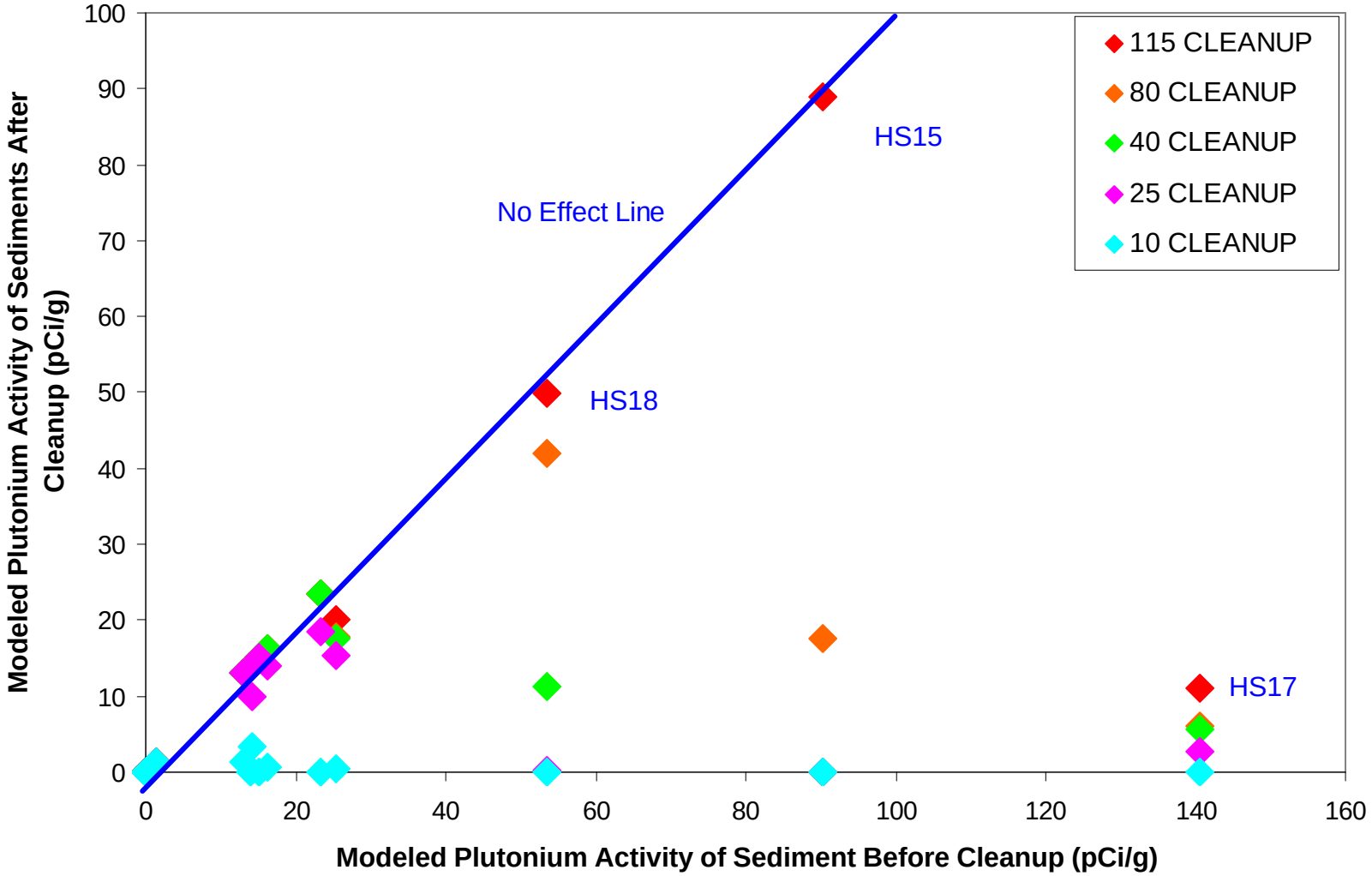
Erosion Maps

Kriged Distributions

Actinide Mobility Map

South Interceptor Ditch - Relationship of Modeled Plutonium Activity of Sediment Leaving Hillslopes to Cleanup Level



DRAFT SUBJECT TO REVISION

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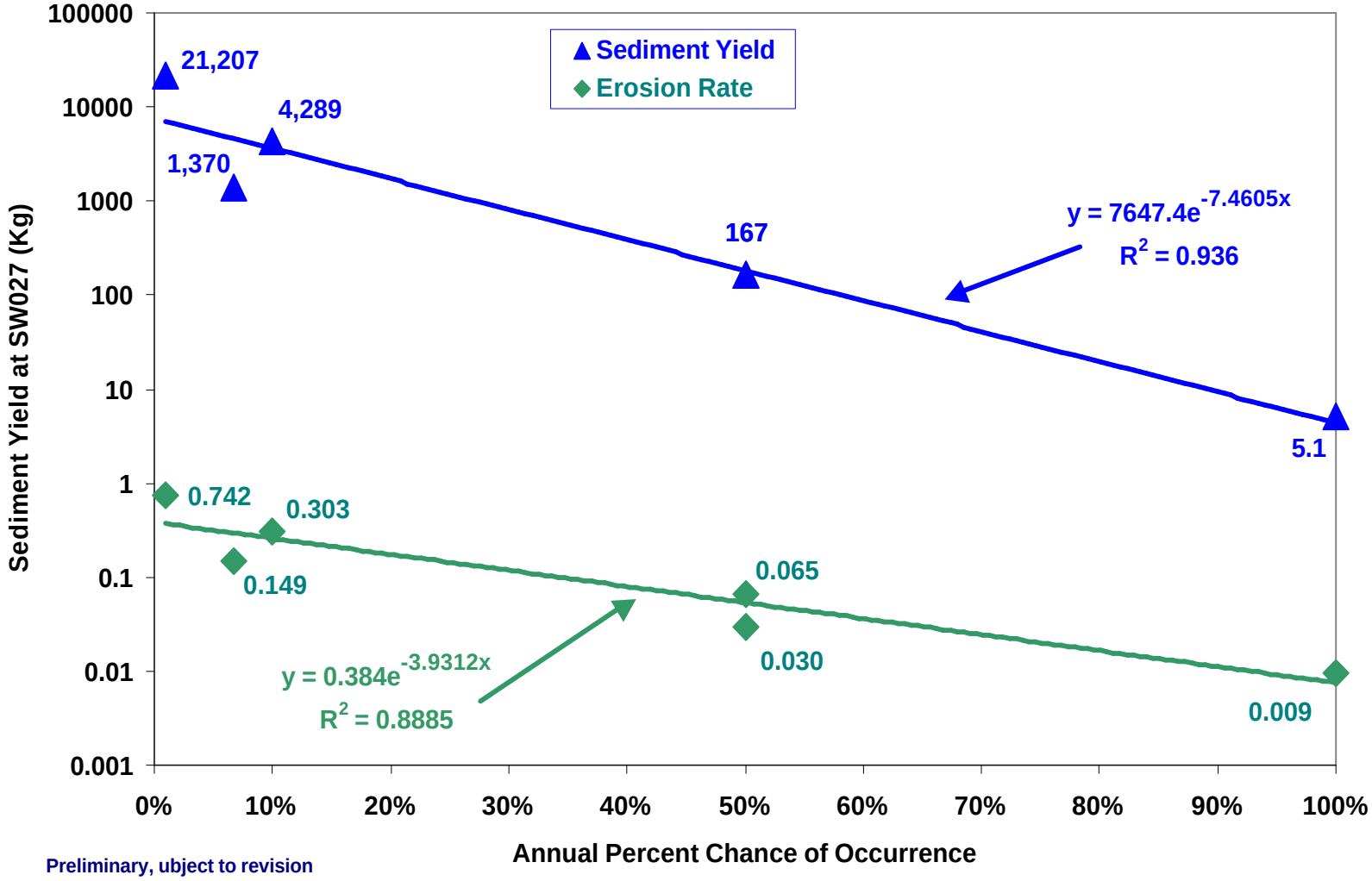
Summary of Erosion and Sediment Transport Modeling Results
South Interceptor Ditch



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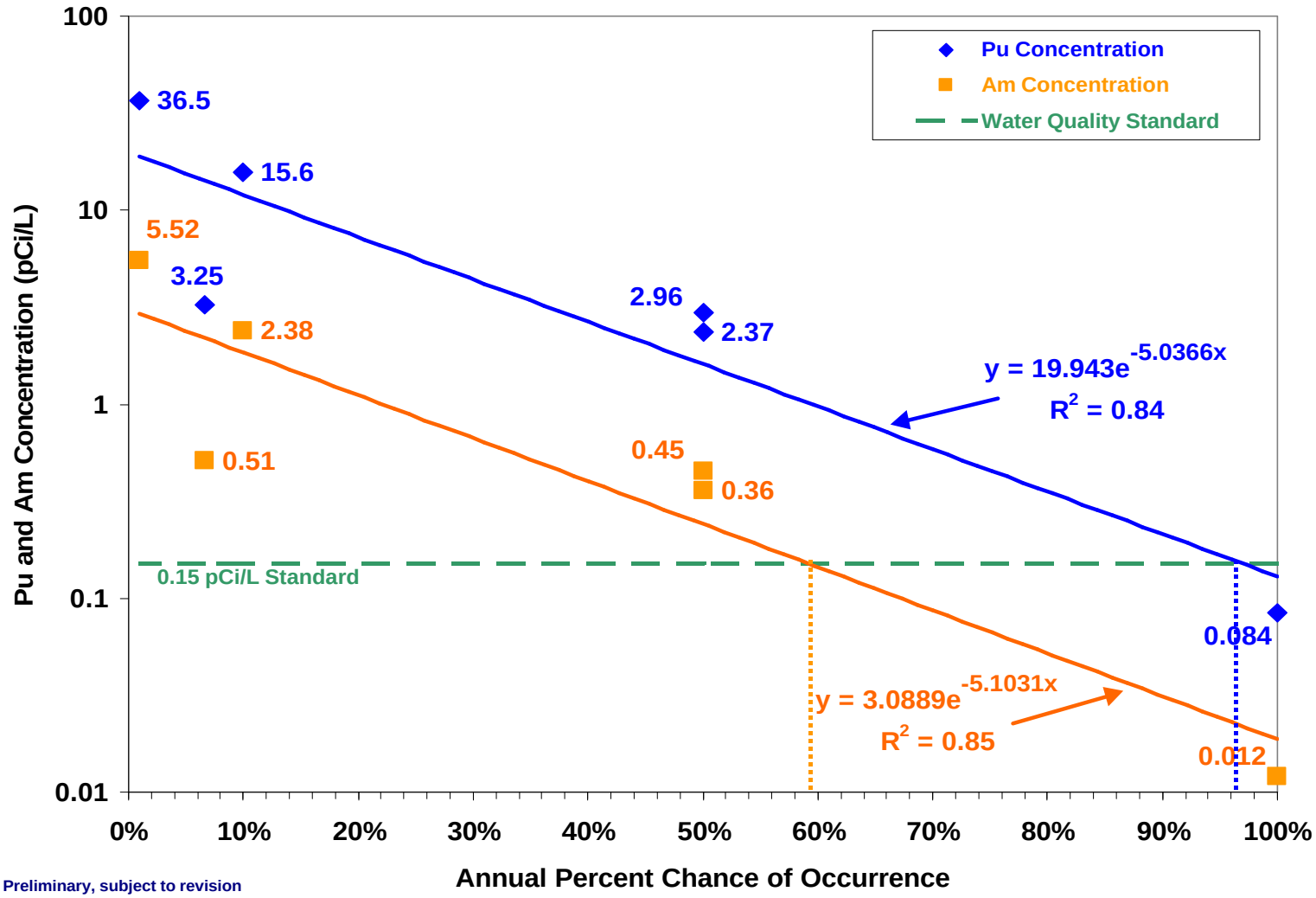
Summary of Surface Water Actinide Concentration Modeling Results
South Interceptor Ditch



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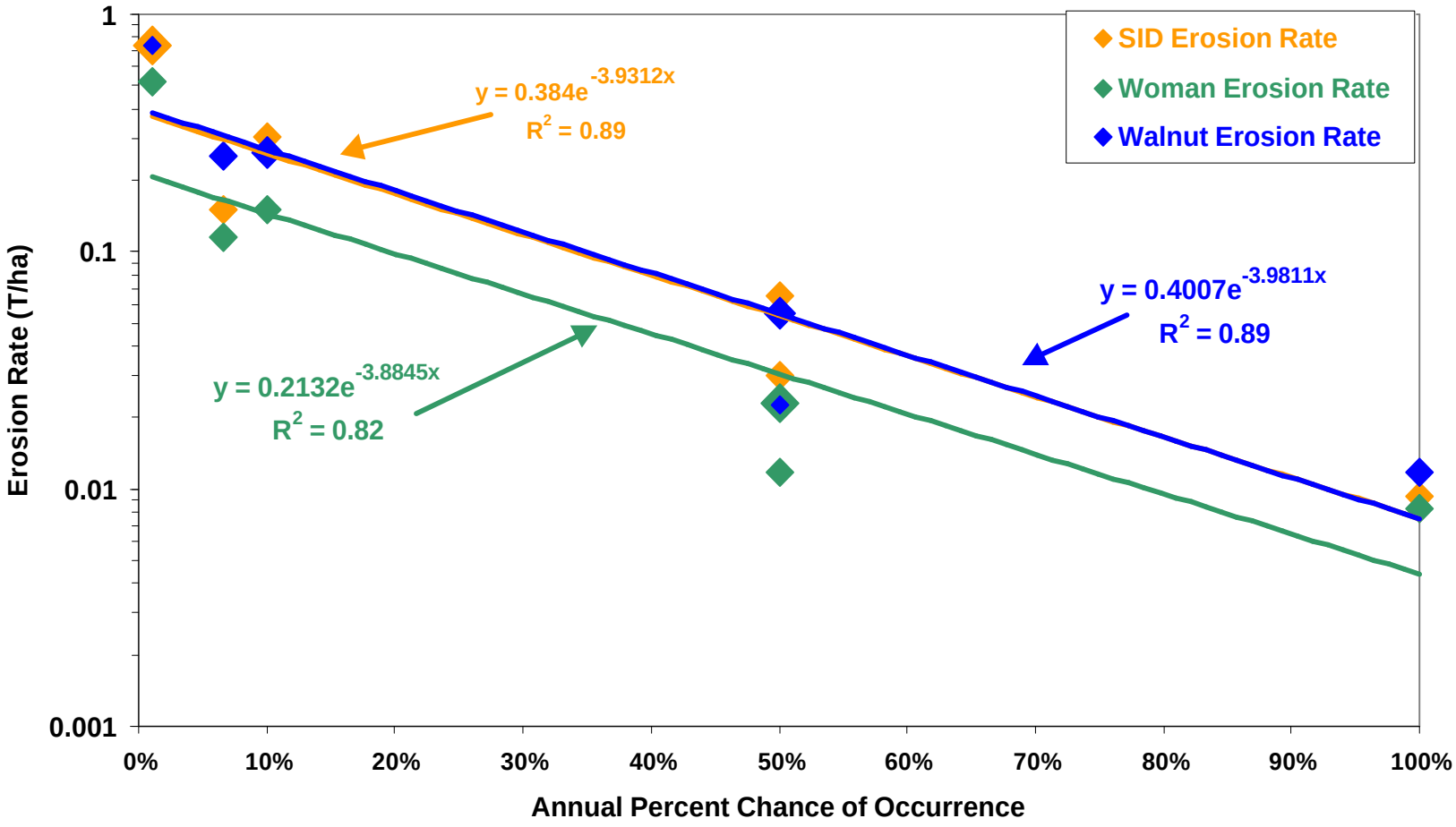
Modeled Erosion Rate for RFETS Drainages



Preliminary, subject to revision

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Key Points

General

- Final remedy will depend on water quality standard and determination of acceptable probability of higher concentrations occurring.

903 Pad/SID

- Surface soil remediation of Pu & Am to Tier II Action Level will have little effect on surface water quality.
- Surface soil remediation of all areas above 10 pCi/g will not ensure that the Site will meet current surface water standards.
- A combination of remediation, erosion and runoff controls, and sediment containment will be necessary.

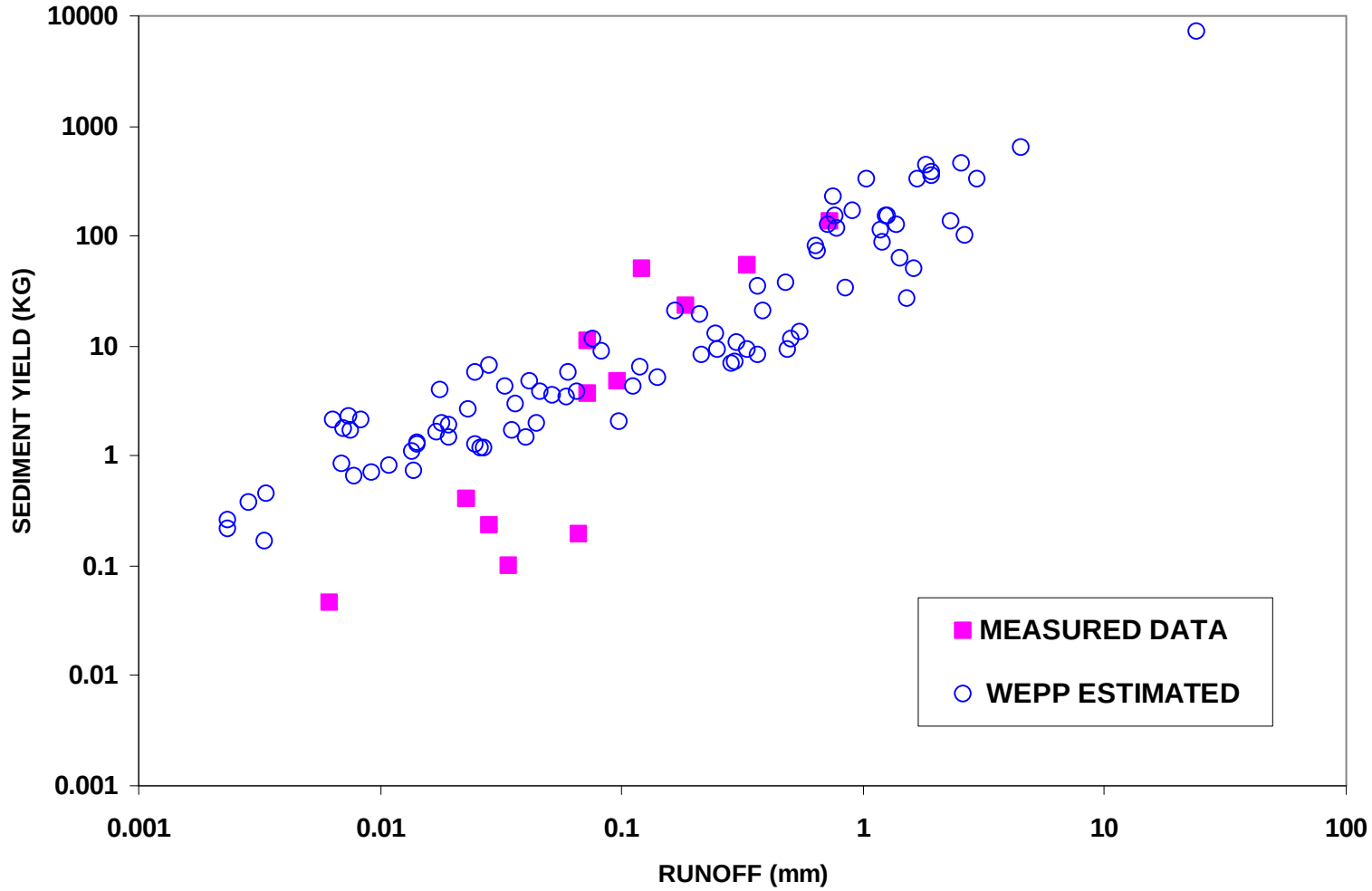
Woman and Walnut Creeks

- Meet current water quality standard through combination of erosion and runoff controls, and sediment containment.

Applications

- Remediation/Management Focus Action Areas
- Remedial Alternatives
- Final Site Configuration Design
- Watershed Management and Design
- Cleanup to Protect Surface Water
- Catastrophic Events
- Human and Ecological Risk

SEDIMENT YIELD AS A FUNCTION OF RUNOFF FOR ANTELOPE SPRINGS GULCH
1995-1998 WEPP SIMULATION



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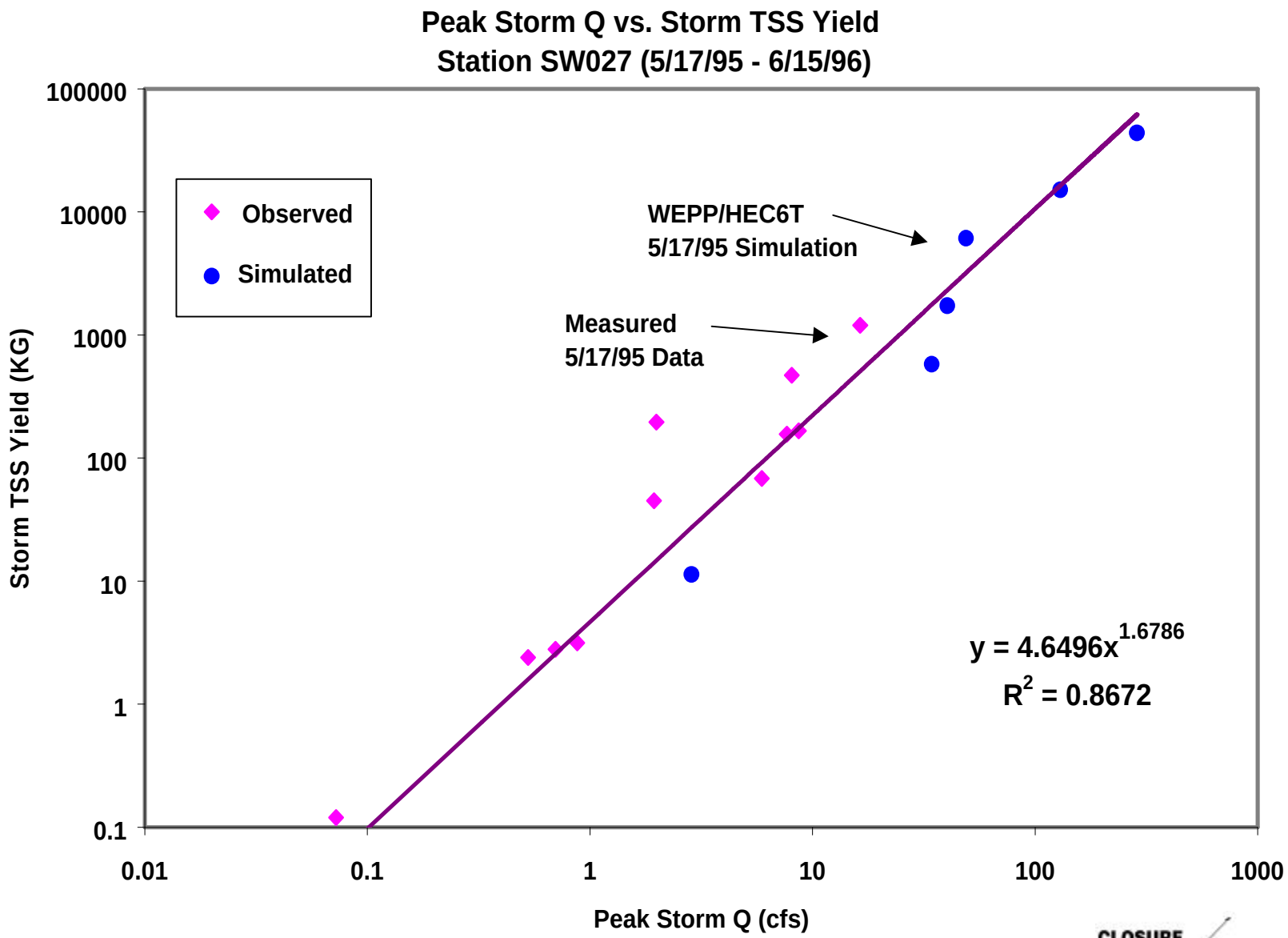

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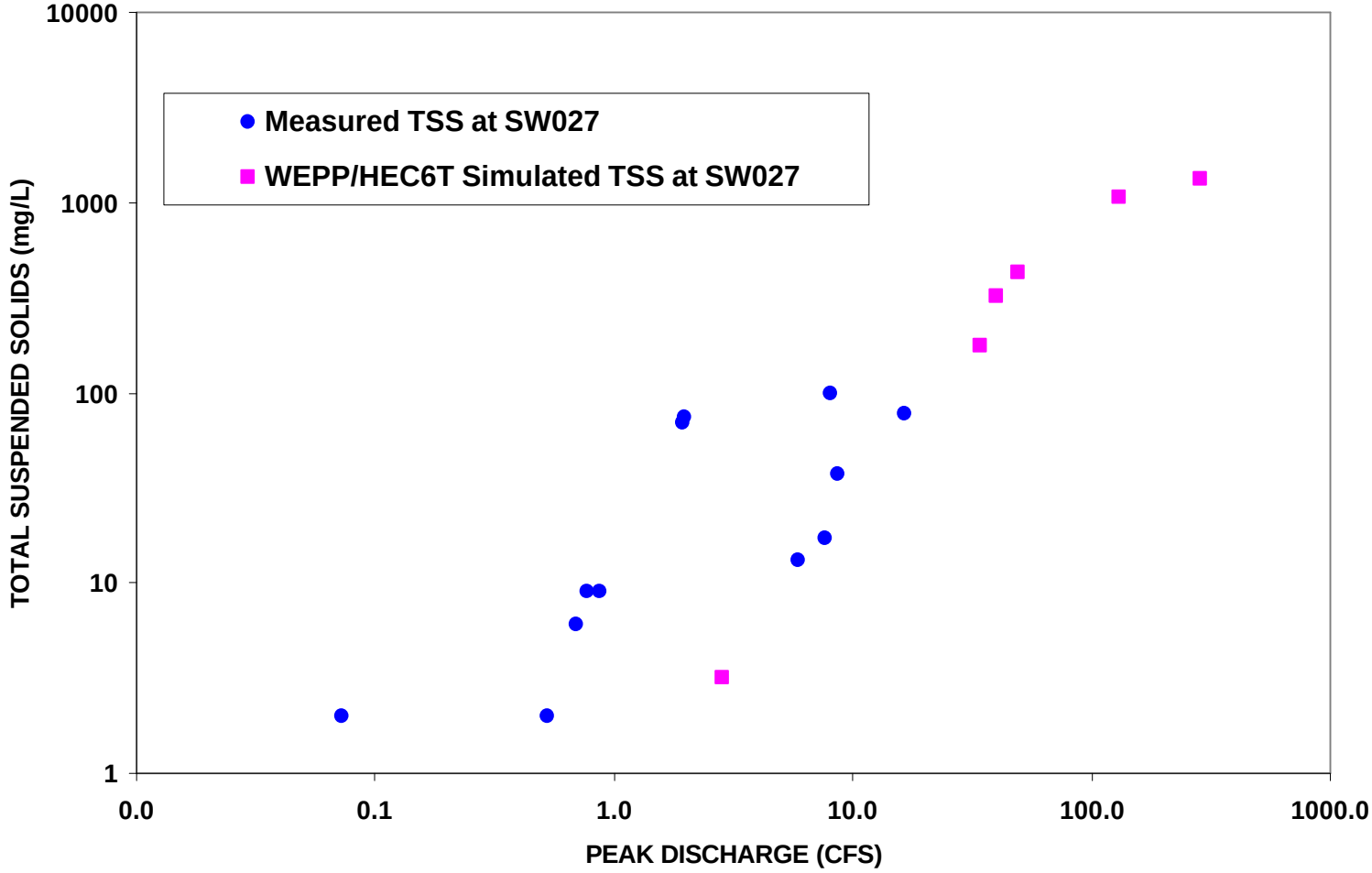
Comparison of Measured and Simulated Total Suspended Solids Concentrations at SW027



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