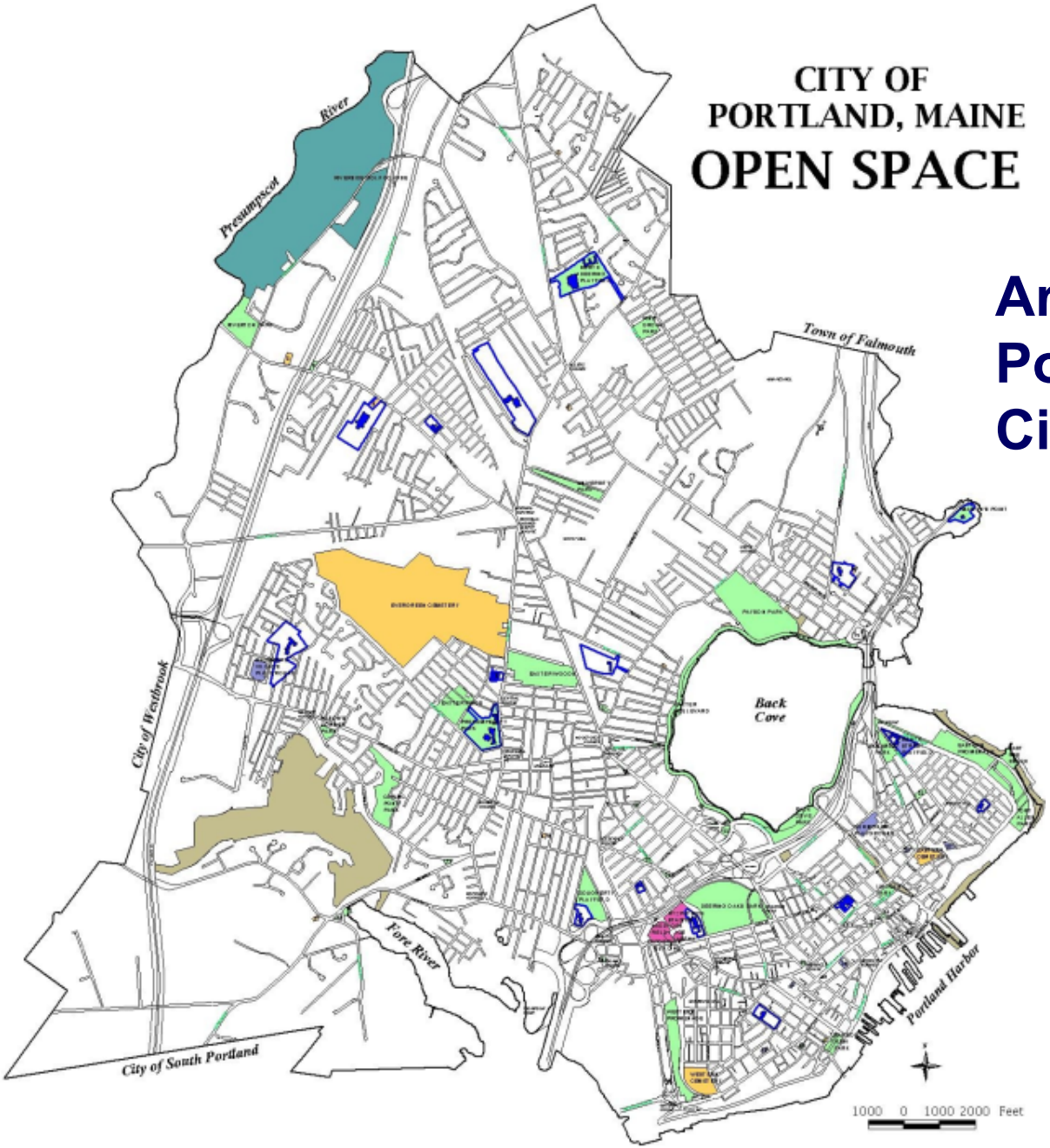
Treatment of Stormwater Runoff from Snow Melt at the Portland Snow Dump

Stormwater Management in Cold Climates
November 3-5, 2003
Portland, Maine

Presented By
Pamela Deahl
Vice-President



Area: 21.2 sq. miles
Population: 64,250
City streets: 340 miles

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Dumping Snow the old-fashioned way

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Non-Point Source Pollution

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Non-Point Source Pollution

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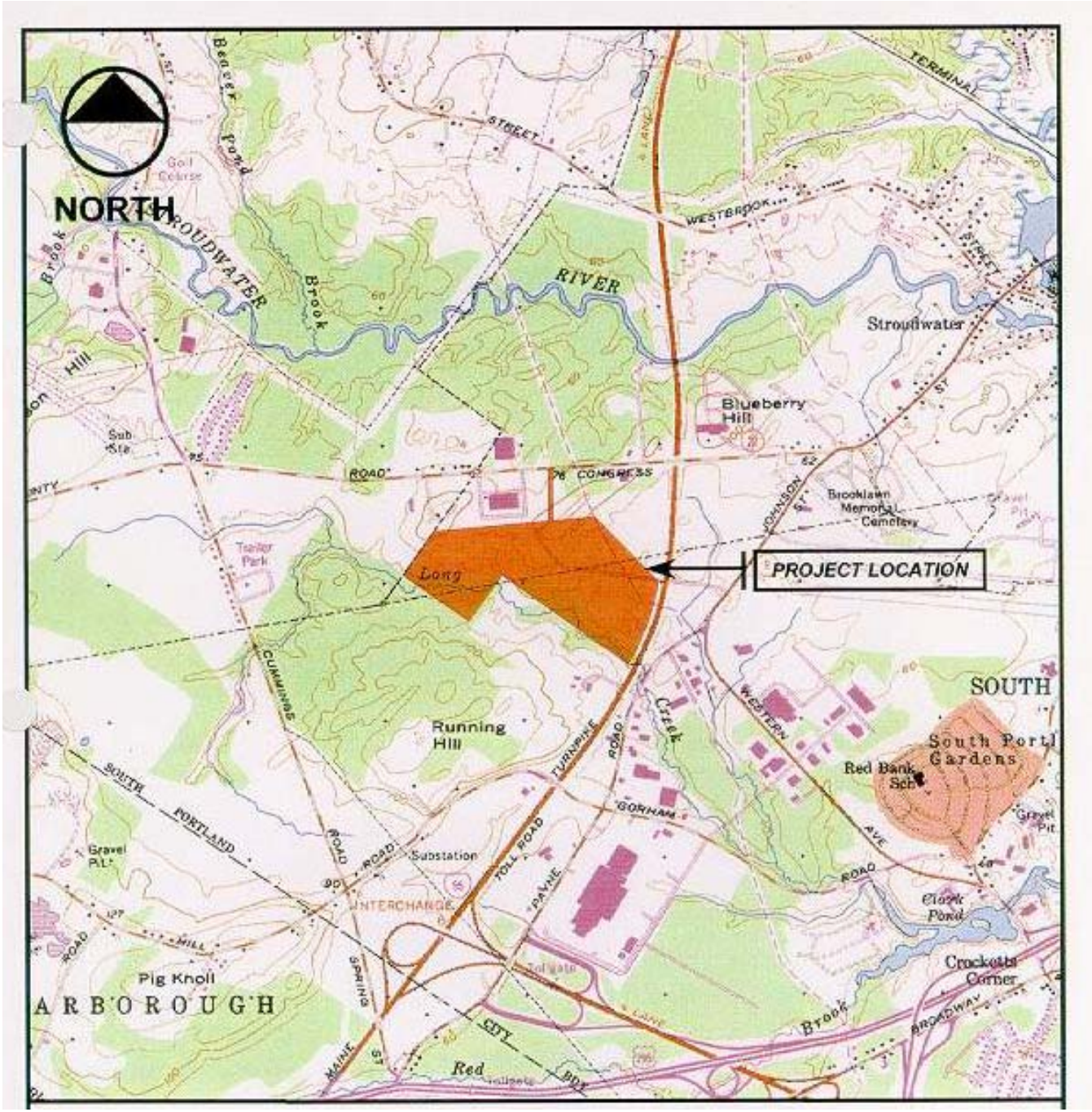

Fall 2000:

City changes Snow Dumping Practices, Establishing Snow Dump Site

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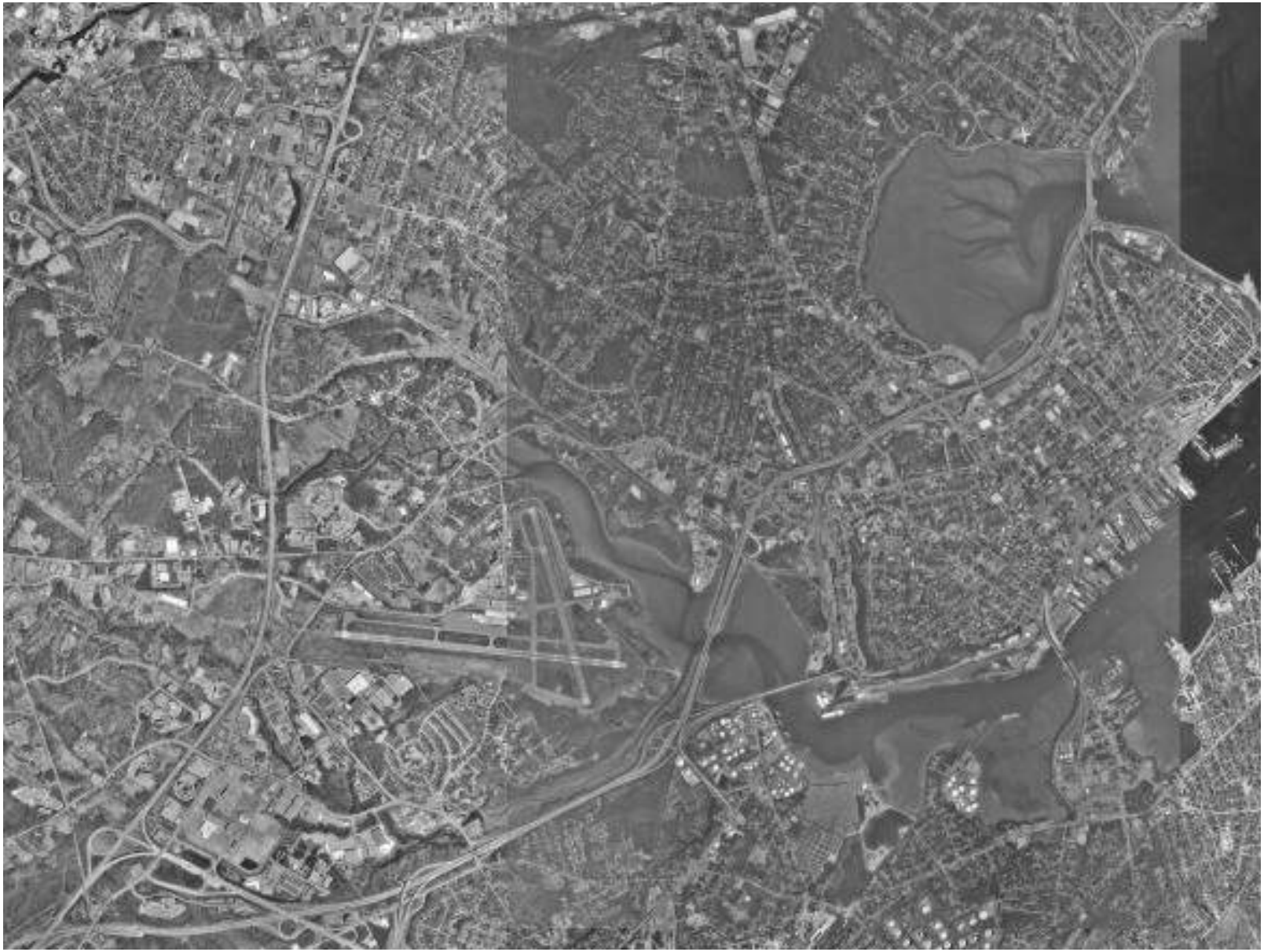

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Design Considerations

- 88.26-acre site.
- 6.05 acres of impervious surface (6.85%).
- 40% TSS removal required.
- 2-year pre-development = 12.98 cfs.
- 2-year post-development = 19.83cfs.
- 25-year pre-development = 45.77 cfs.
- 25-year post-development = 57.7 cfs.

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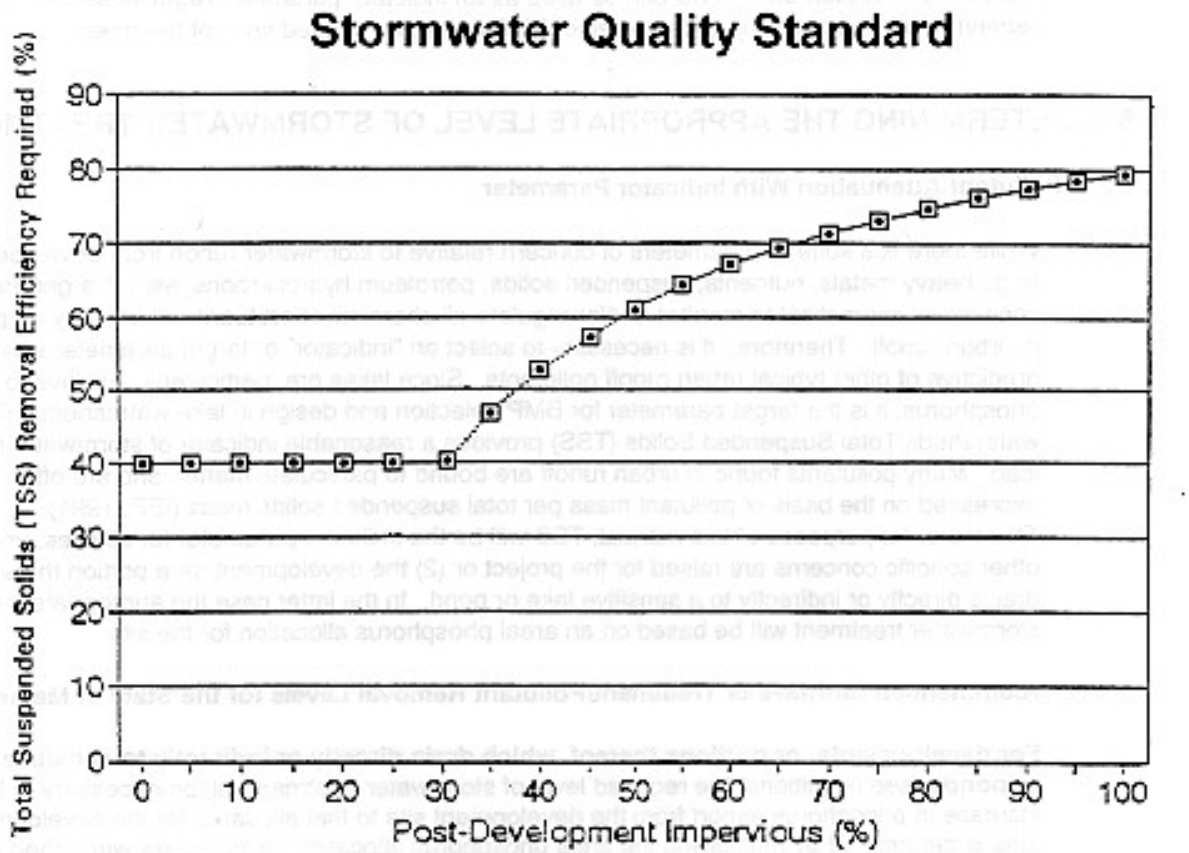
MEDEP TSS Removal Requirement



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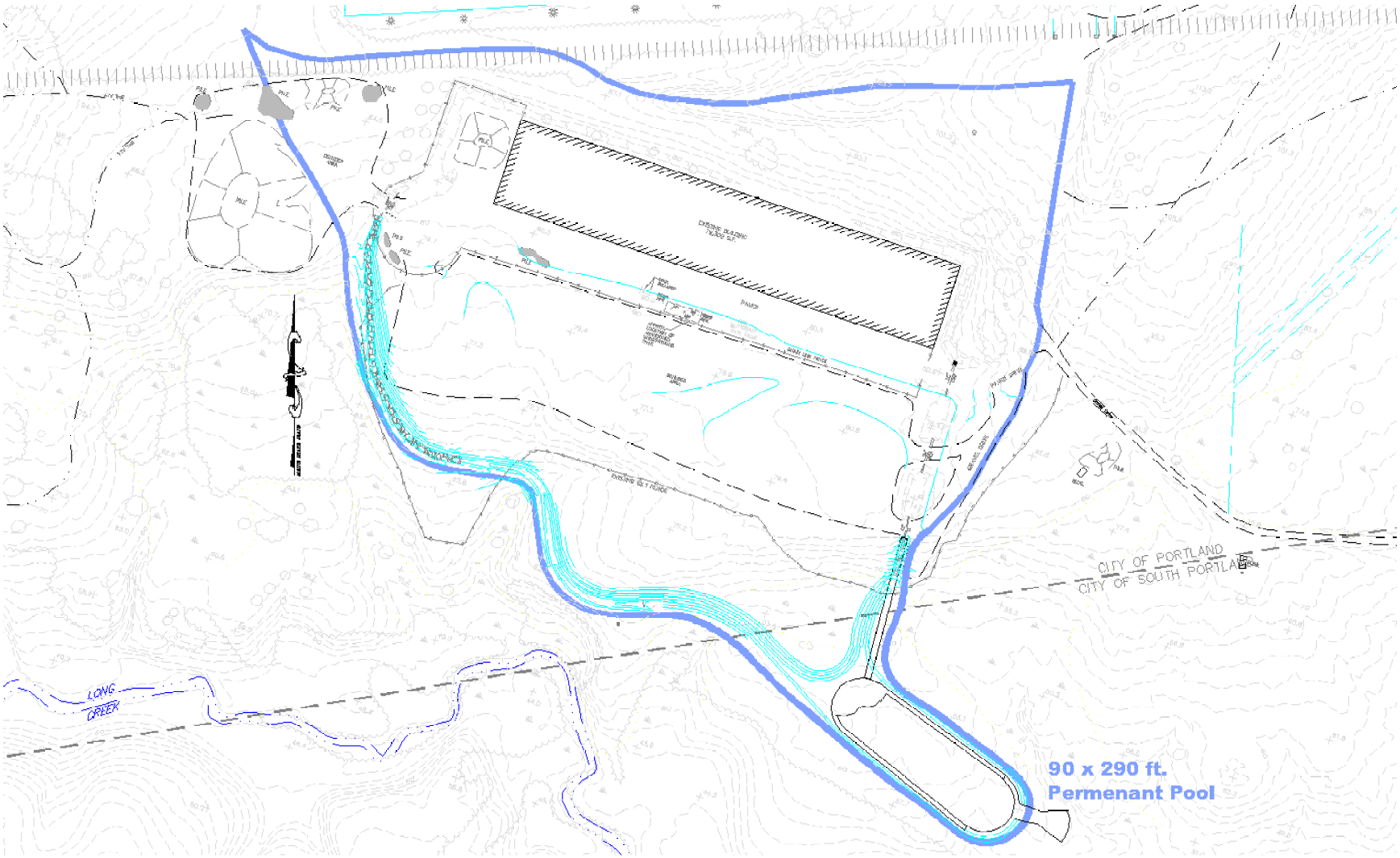
Water Quality with Retention Facility



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34 Species of Waterfowl in Maine

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Airplane taking off from PWM

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Airplane landing at PWM

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FAA's "Hazardous Wildlife Attractants Near Airports"

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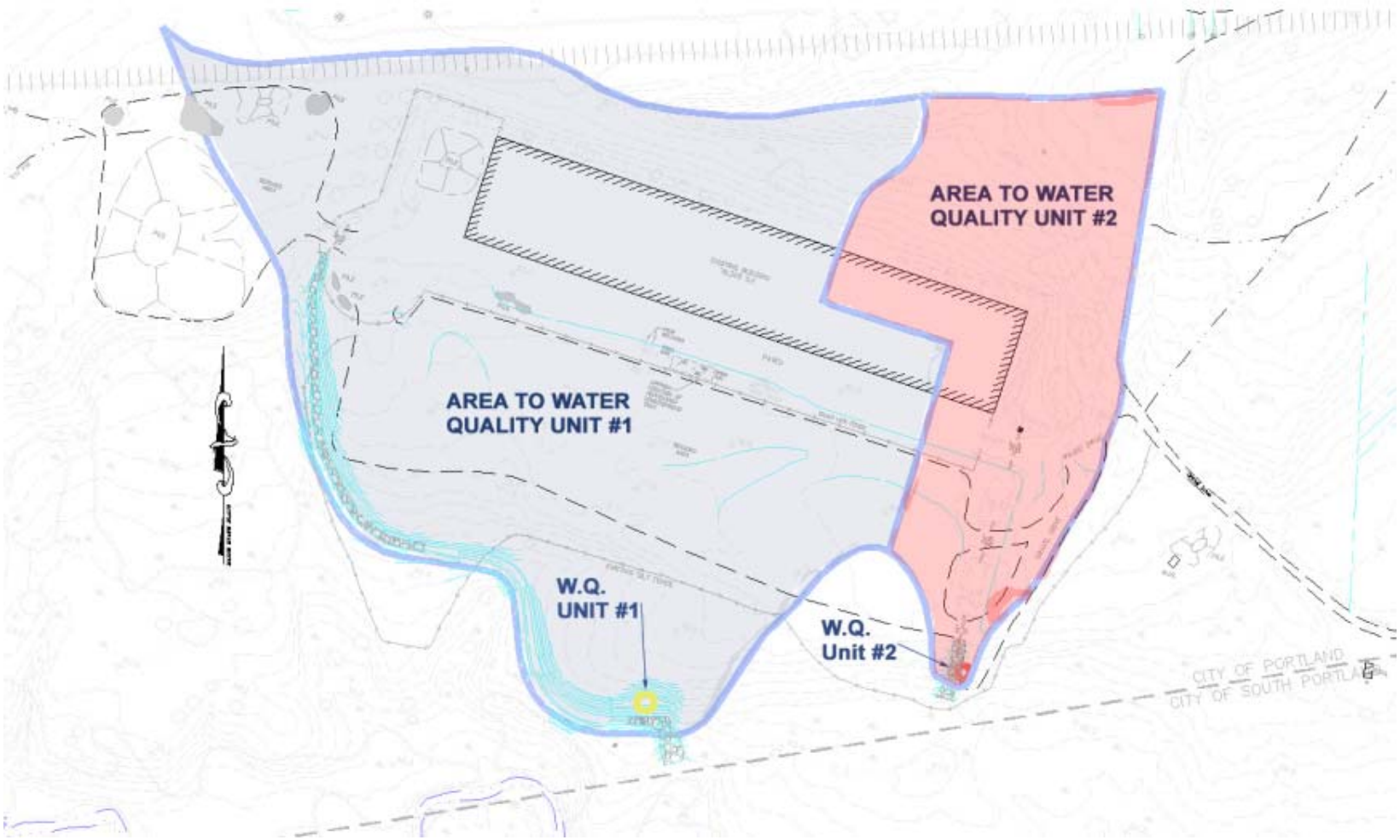
Water Quality with Hydrodynamic Vortex Separation



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Maine DEP's Requirements for Manufactured systems
October 1, 2000

- Calculate required *treatment flow rate* as: peak runoff from a one year 24-hour storm

- Size water quality units to provide

  - 80% U.S. Silica F-95 foundry sand for 50% TSS rating
  - 80% U.S. Silica OK-110 sand for 60% TSS rating

  at the *treatment flow rate*

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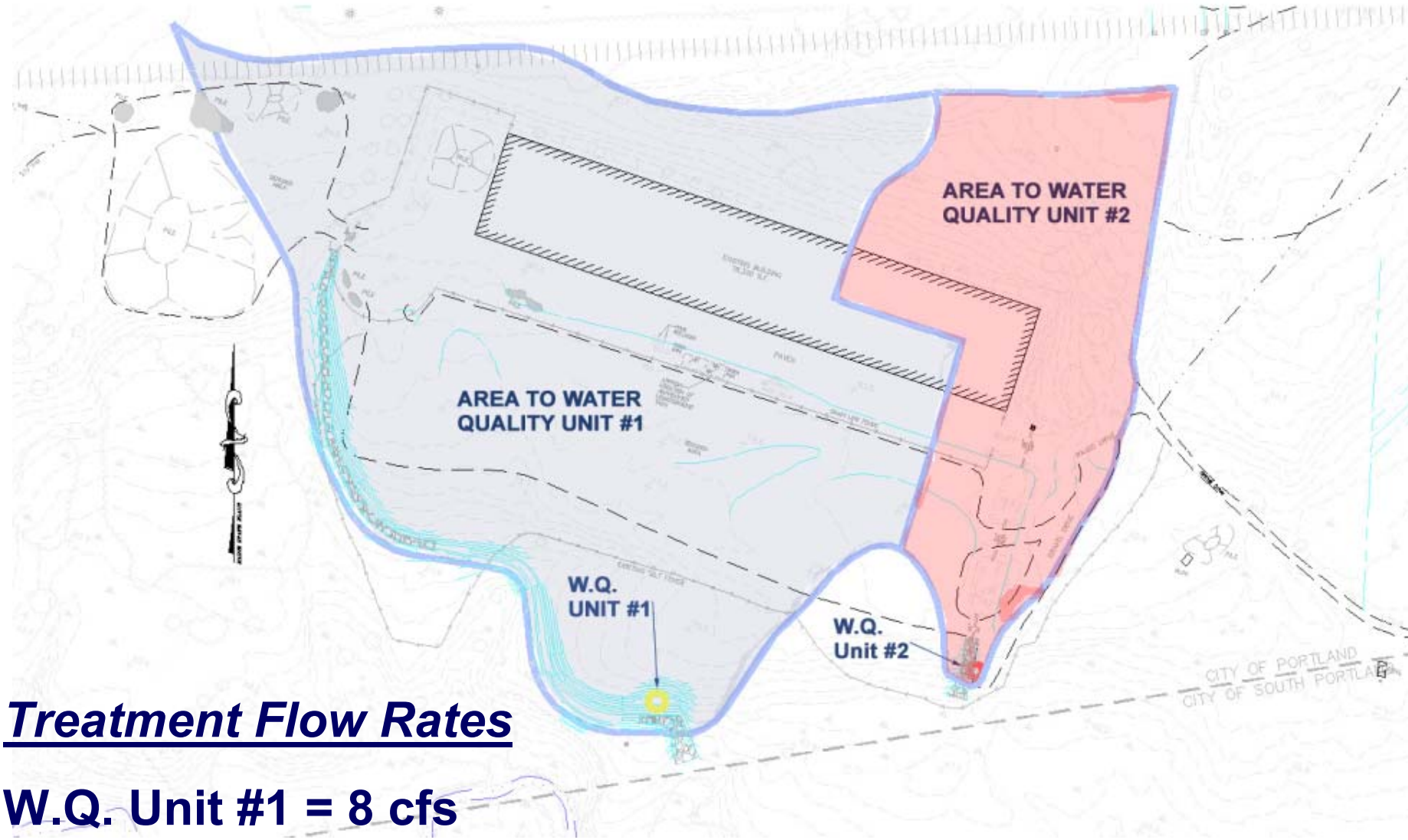

Treatment Flow Rates

W.Q. Unit #1 = 8 cfs

W.Q. Unit #2 = 4 cfs

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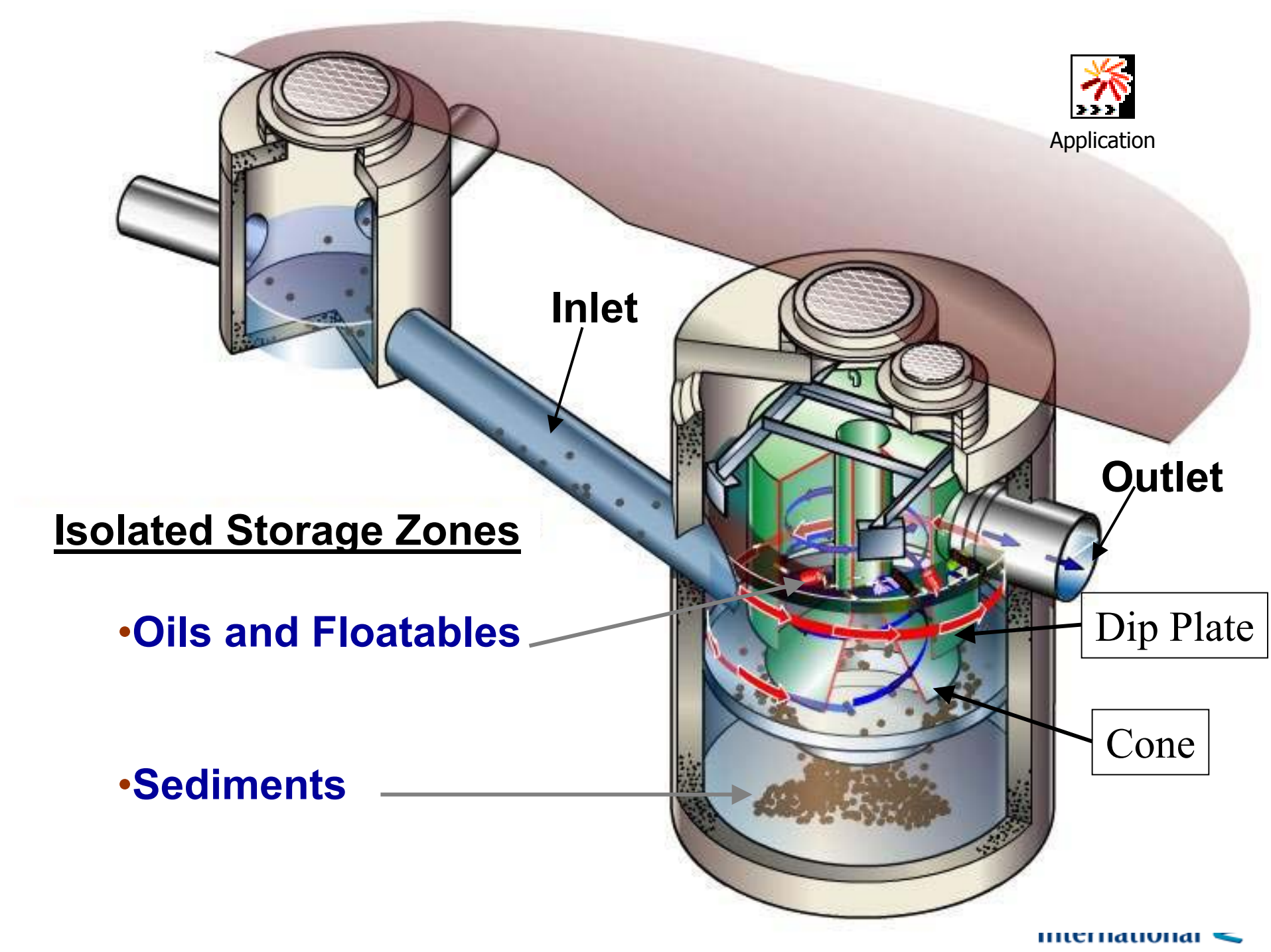
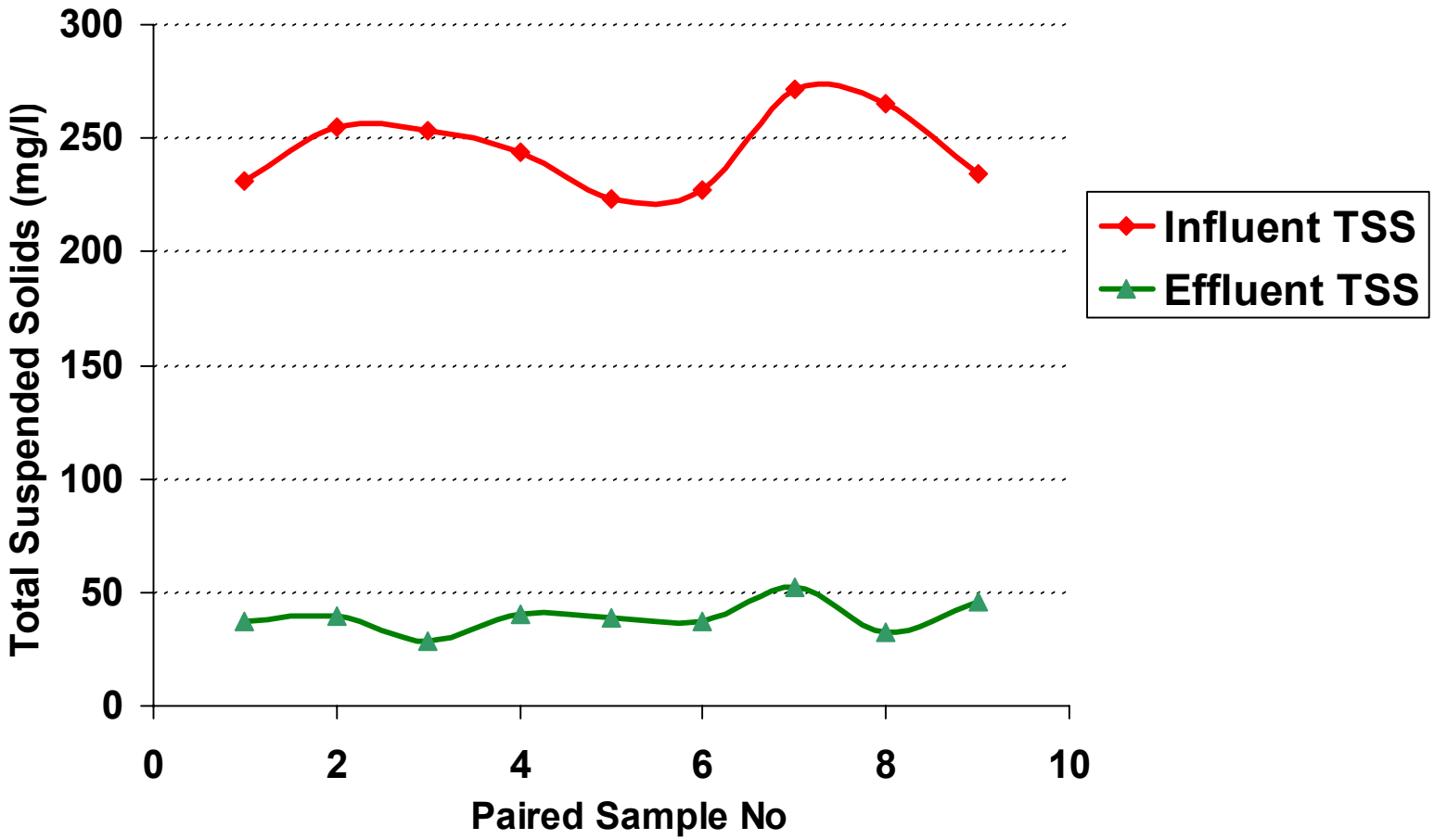

Application
Inlet
Outlet
Isolated Storage Zones
•Oils and Floatables
•Sediments
Dip Plate
Cone

Maine DEP Testing

.. 4 ft Downstream Defender Unit ..



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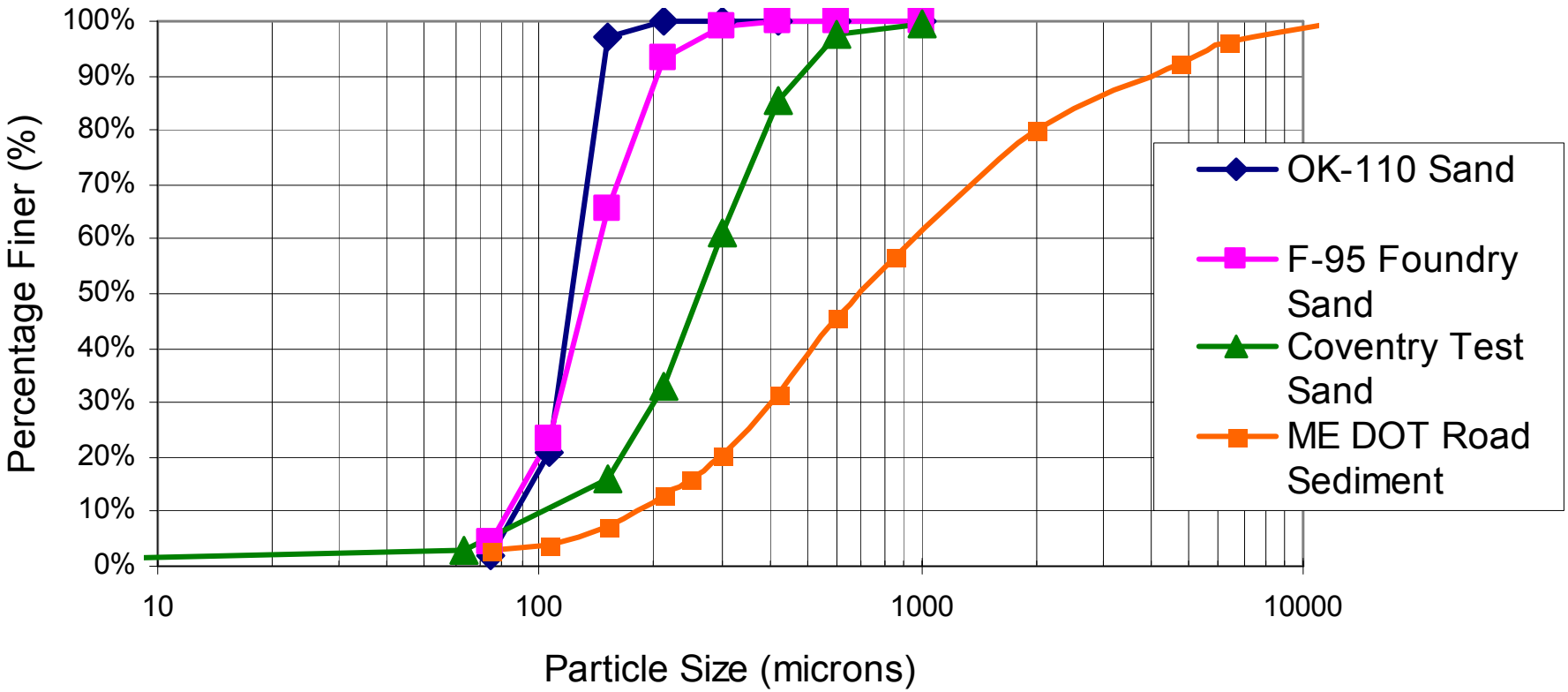
Particle Size Distributions

..Sediment Samples..



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Maine DEP Approved Flows

$Q_{1ypf} = 628\ (D/4)^{2.5}$ → **50% rating**

Where:

Q_{1ypf} = the projected one year peak flow from the device's drainage area and
D = the diameter in feet of the device's treatment chamber

Chamber Diameter (ft)	Max 1 yr Peak Flow (cfs)
2	0.7
4	1.4
6	4.0
8	8.0
10	14
12	15

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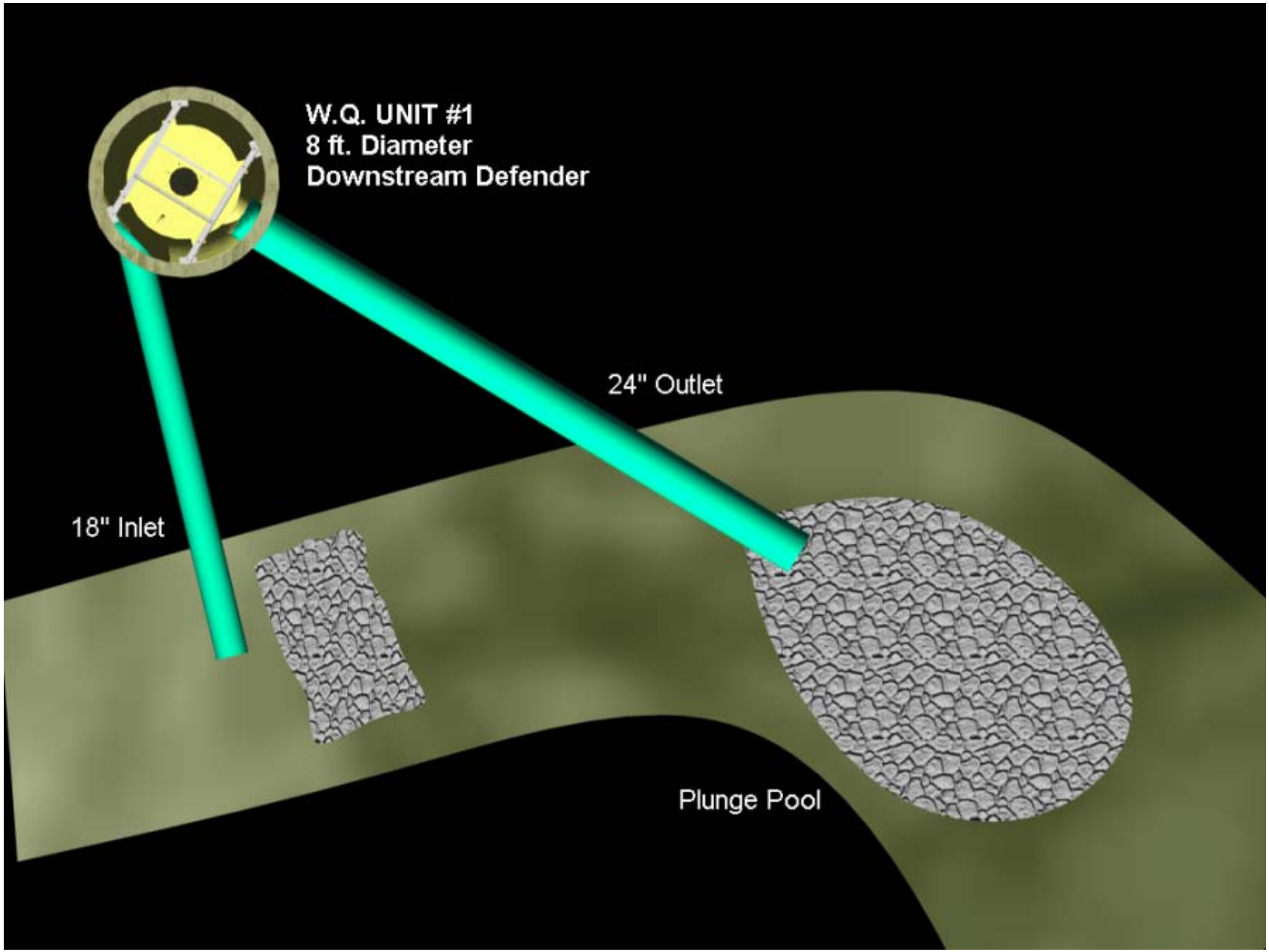

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8-ft diameter Downstream Defender

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18-inch Inlet to 8-ft Downstream Defender

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24-inch Outlet Pipe from 8-ft Downstream Defender

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Looking upstream from 8-ft diameter Downstream Defender

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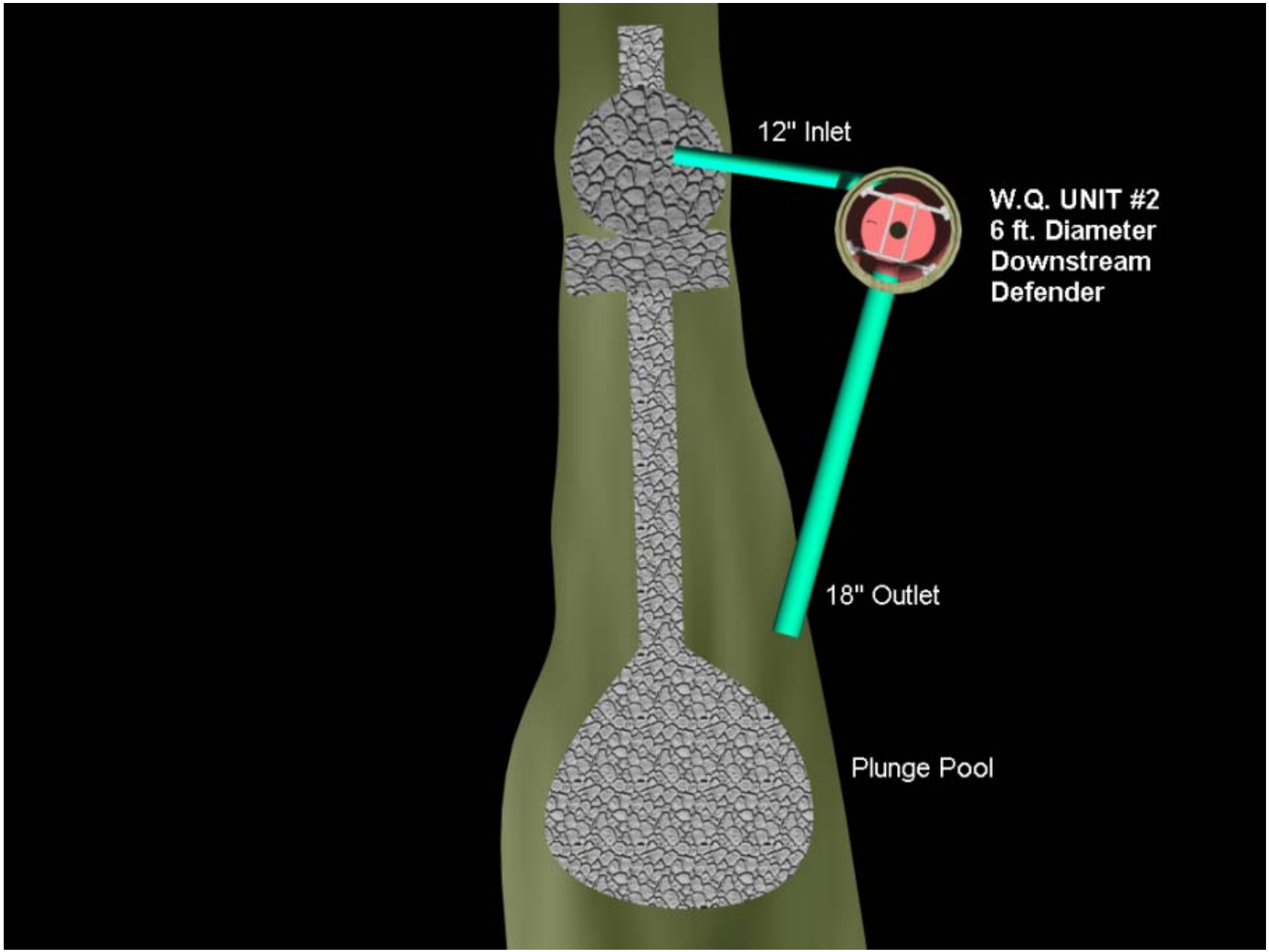

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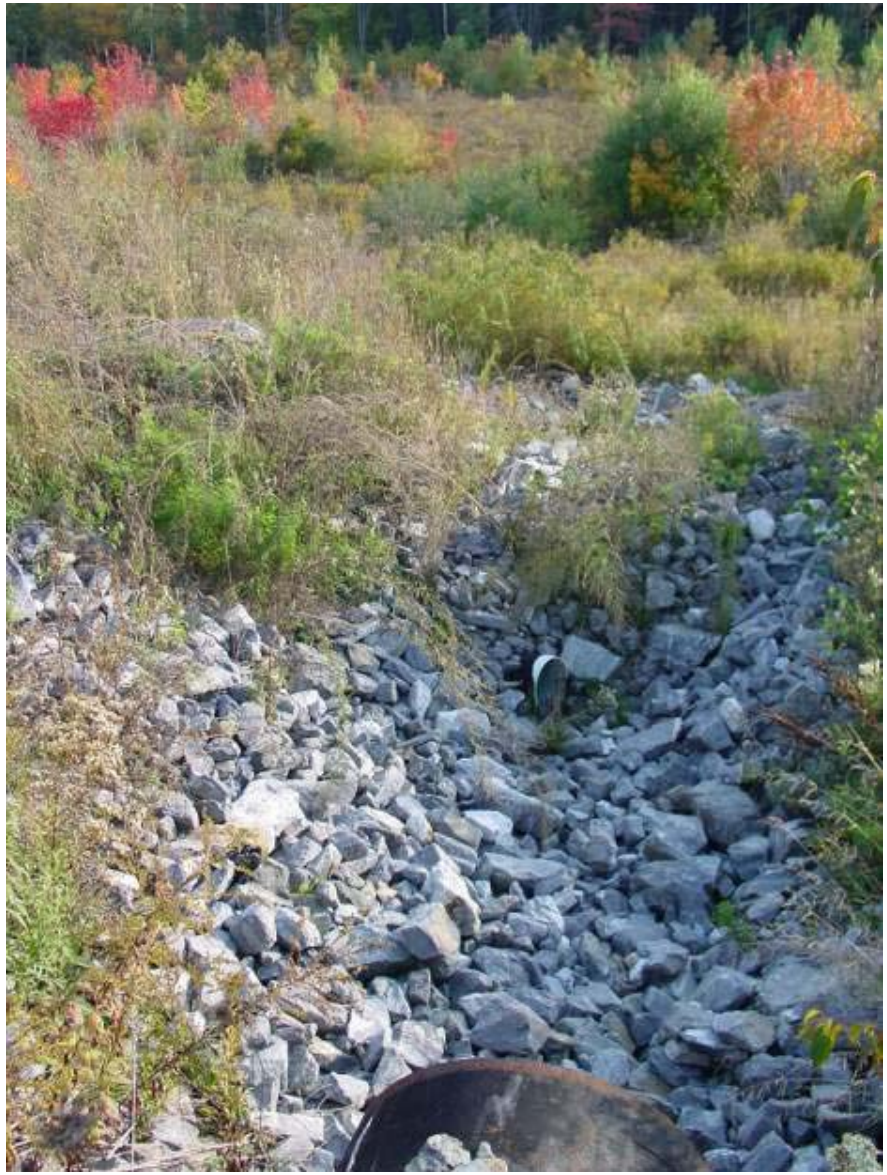

12-inch Inlet to 6-ft Downstream Defender

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18-inch Outlet Pipe from 6-ft Downstream Defender

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Looking upstream from 6-ft diameter Downstream Defender

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Trash and oil captured in 8-ft Downstream Defender

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Sediment captured in 8-ft Downstream Defender

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Oil and sediment captured in 6-ft Downstream Defender

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Sediment Sampling

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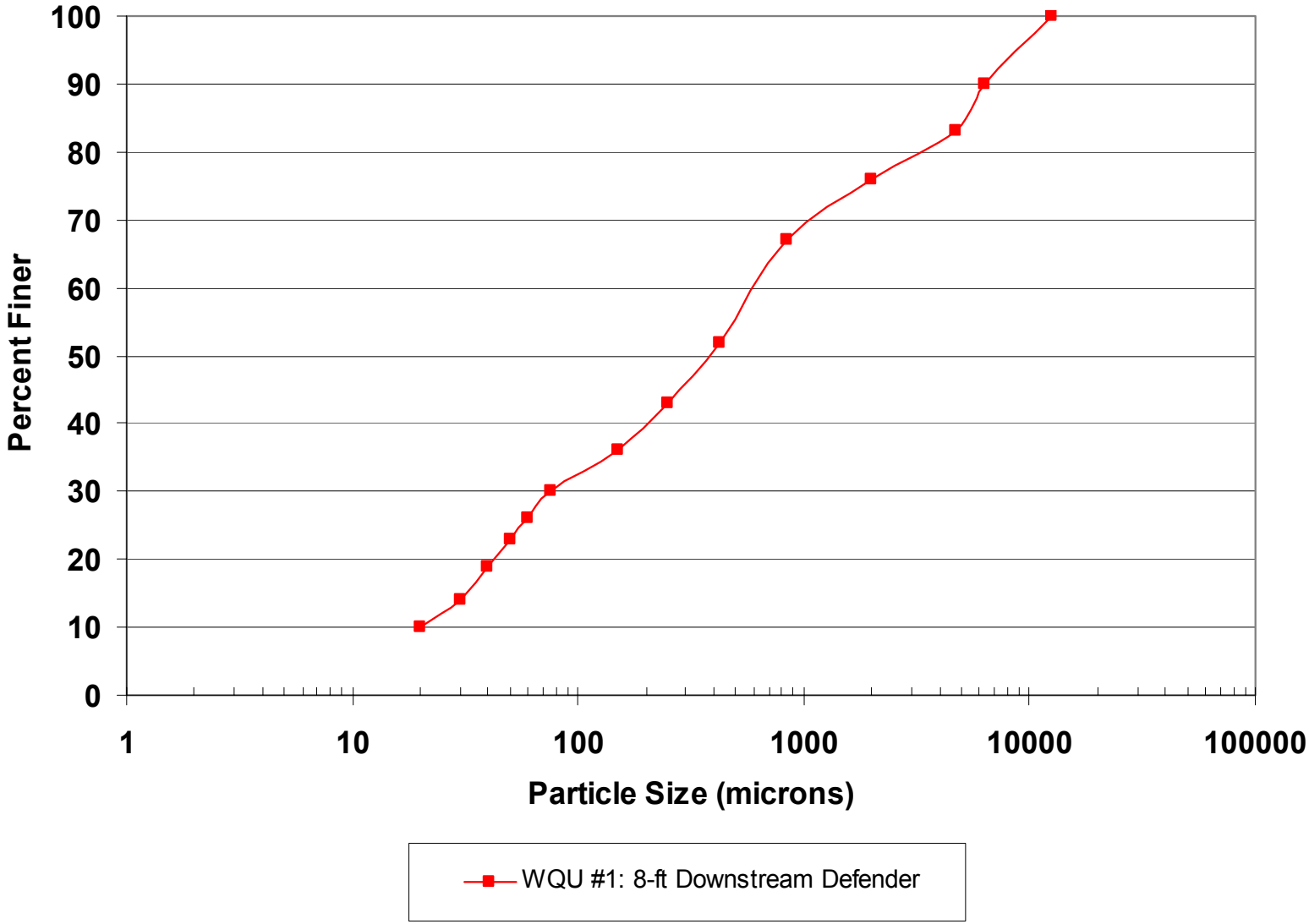
Snow Dump Particle Size Distribution



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Sediment Analysis
WQU #1: 8-ft Downstream Defender

Katahdin ANALYTICAL SERVICES

nelac Cert No E87604

Report of Analytical Results

Client: Mark Johnston
Hydro International
94 Hutchins Drive
Portland,ME 04102

Lab Sample ID: WT2577-2
Report Date: 24-OCT-03
Client PO: 2032
Project: SNOW DUMP
SDG: WT2577

Sample Description	Matrix	Date Sampled	Date Received
SD#8	SL	17-OCT-03	21-OCT-03

Parameter	Result	Adj PQL	Anal. Method	QC.Batch	Anal. Date	By	Prep. Method	Prep. Date	By	Footnotes
Phosphorus, Total As P	620 mg/Kg	37	EPA 365.4	WG3961	22-OCT-03	PAG	EPA 365.4	21-OCT-03	PAG	
Total Solids	61 %	.1	CLP SOW 788	WG3999	23-OCT-03	PAG	CLP SOW 788	22-OCT-03	PAG	

Parameter	Result	Units	Adjusted PQL	Dilution Factor	PQL	Analytical Method	Analysis Date	By	Prep Method	Prepped Date	By	QC	Notes
ARSENIC	7.0	mg/Kg	0.8	1	0.8	SW846 6010	10/21/03	MJF	SW846 3050	10/21/03	JWM	TJ21ICS0	
BARIUM	44.3	mg/Kg	0.49	1	0.5	SW846 6010	10/21/03	MJF	SW846 3050	10/21/03	JWM	TJ21ICS0	
CADMIUM	U 1.00	mg/Kg	0.976	1	1	SW846 6010	10/21/03	MJF	SW846 3050	10/21/03	JWM	TJ21ICS0	
CHROMIUM	24.6	mg/Kg	1.46	1	1.5	SW846 6010	10/21/03	MJF	SW846 3050	10/21/03	JWM	TJ21ICS0	
COPPER	15.3	mg/Kg	2.4	1	2.5	SW846 6010	10/21/03	MJF	SW846 3050	10/21/03	JWM	TJ21ICS0	
LEAD	20.7	mg/Kg	0.5	1	0.5	SW846 6010	10/21/03	MJF	SW846 3050	10/21/03	JWM	TJ21ICS0	
MERCURY	0.072	ug/g	0.060	1	0.04	SW846 7471	10/23/03	MJF	7471	10/22/03	MJF	TJ22HGS0	
NICKEL	22.9	mg/Kg	3.90	1	4	SW846 6010	10/21/03	MJF	SW846 3050	10/21/03	JWM	TJ21ICS0	
SELENIUM	U 1.0	mg/Kg	0.98	1	1	SW846 6010	10/21/03	MJF	SW846 3050	10/21/03	JWM	TJ21ICS0	
SILVER	U 1.5	mg/Kg	1.5	1	1.5	SW846 6010	10/21/03	MJF	SW846 3050	10/21/03	JWM	TJ21ICS0	
ZINC	56.2	mg/Kg	2.44	1	2.5	SW846 6010	10/21/03	MJF	SW846 3050	10/21/03	JWM	TJ21ICS0	

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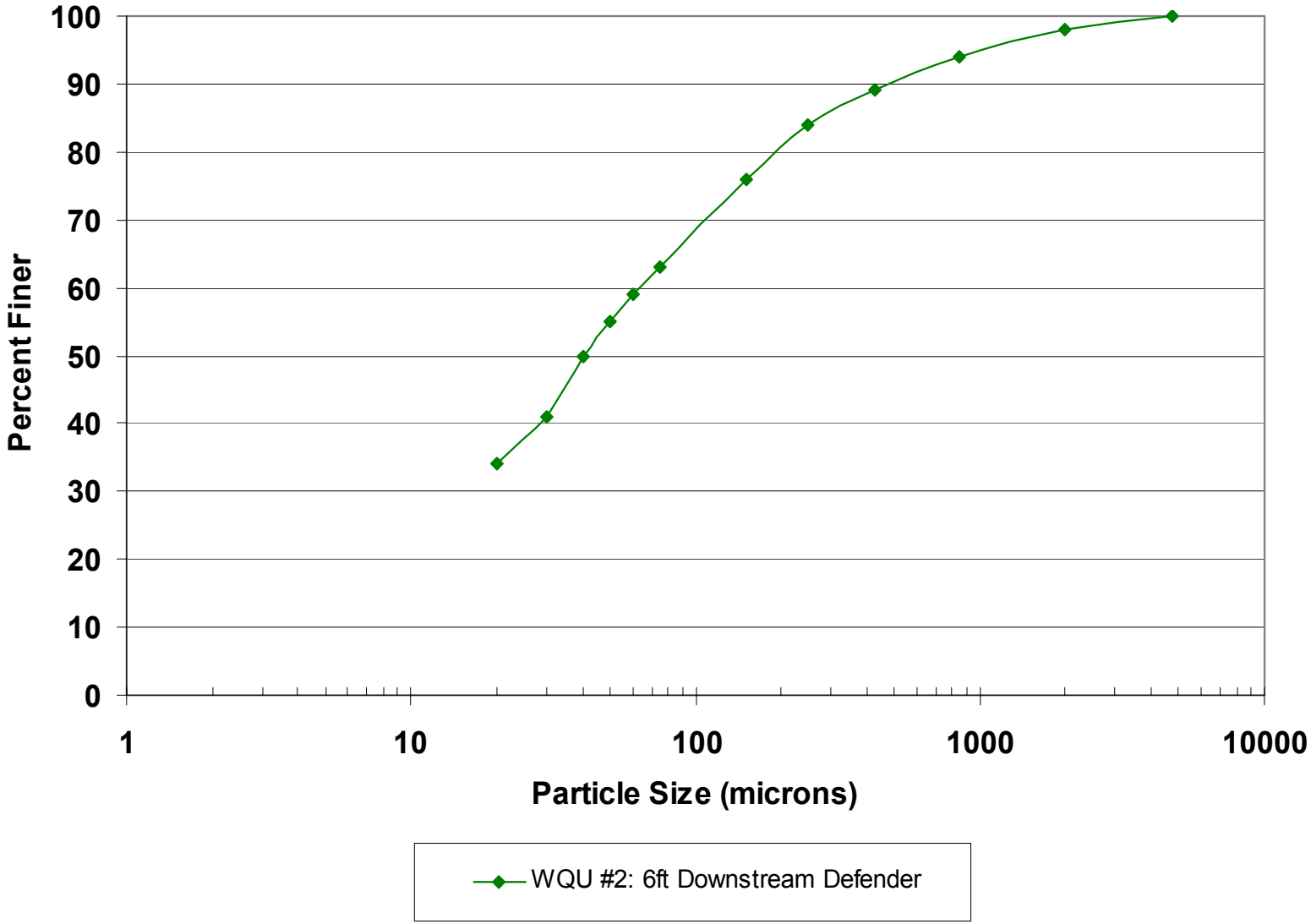
Snow Dump Particle Size Distribution



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Sediment Analysis
WQU #2: 6-ft Downstream Defender

Katahdin
ANALYTICAL SERVICES

nelac
Cert No E87604

Report of Analytical Results

Client: Mark Johnston
Hydro International
94 Hutchins Drive
Portland,ME 04102

Lab Sample ID: WT2577-1
Report Date: 24-OCT-03
Client PO: 2032
Project: SNOW DUMP
SDG: WT2577

Sample Description	Matrix	Date Sampled	Date Received
SD#6	SL	17-OCT-03	21-OCT-03

Parameter	Result	Adj PQL	Anal. Method	QC.Batch	Anal. Date	By	Prep. Method	Prep. Date	By	Footnotes
Phosphorus, Total As P	650 mg/Kg	44	EPA 365.4	WG3961	22-OCT-03	PAG	EPA 365.4	21-OCT-03	PAG	
Total Solids	56 %	.1	CLP SOW 788	WG3999	23-OCT-03	PAG	CLP SOW 788	22-OCT-03	PAG	

Parameter	Result	Units	Adjusted PQL	Dilution Factor	PQL	Analytical Method	Analysis Date	By	Prep Method	Prepped Date	By	QC	Notes
ARSENIC	12.	mg/Kg	1.	1	0.8	SW846 6010	10/21/03	MJF	SW846 3050	10/21/03	JWM	TJ21ICS0	
BARIUM	162.	mg/Kg	0.64	1	0.5	SW846 6010	10/21/03	MJF	SW846 3050	10/21/03	JWM	TJ21ICS0	
CADMIUM	U 1.28	mg/Kg	1.28	1	1	SW846 6010	10/21/03	MJF	SW846 3050	10/21/03	JWM	TJ21ICS0	1
CHROMIUM	53.4	mg/Kg	1.93	1	1.5	SW846 6010	10/21/03	MJF	SW846 3050	10/21/03	JWM	TJ21ICS0	
COPPER	26.4	mg/Kg	3.2	1	2.5	SW846 6010	10/21/03	MJF	SW846 3050	10/21/03	JWM	TJ21ICS0	
LEAD	22.2	mg/Kg	0.6	1	0.5	SW846 6010	10/21/03	MJF	SW846 3050	10/21/03	JWM	TJ21ICS0	
MERCURY	U 0.057	ug/g	0.057	1	0.04	SW846 7471	10/23/03	MJF	7471	10/22/03	MJF	TJ22HGS0	1
NICKEL	42.5	mg/Kg	5.14	1	4	SW846 6010	10/21/03	MJF	SW846 3050	10/21/03	JWM	TJ21ICS0	
SELENIUM	U 1.3	mg/Kg	1.3	1	1	SW846 6010	10/21/03	MJF	SW846 3050	10/21/03	JWM	TJ21ICS0	1
SILVER	U 1.9	mg/Kg	1.9	1	1.5	SW846 6010	10/21/03	MJF	SW846 3050	10/21/03	JWM	TJ21ICS0	1
ZINC	102.	mg/Kg	3.21	1	2.5	SW846 6010	10/21/03	MJF	SW846 3050	10/21/03	JWM	TJ21ICS0	

1 The laboratory's Practical Quantitation Level could not be achieved for this parameter due to sample composition, matrix effects,sample volume, or quantity used for analysis.

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Portland, ME Snow Dump Benefits

- Avoidance of large retention pond
  - eliminated FAA safety hazard
  - no unsightly trash and debris
- Protection of Clark Pond and Fore River
- Elimination of pollutants into Back Bay

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Thank You!

Dump trucks drop off snow at the Portland Snow Dump

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