

APPENDIX E
Monitoring and Testing Techniques and
Instrumentation

Exploratory Study of Basement Moisture During Operation of ASD
Radon Control Systems

Contractor Report to EPA

December 6, 2007

Parameter	Location		Estimated Range of Values	Instrument Technology
Temp. & water vapor content	Outdoor Air	T	-30 – 35°C (-22 – 95°F)	Thermistor
		RH	10 – 100%	Thin film capacitance
	Basement Air	T	10 – 30°C (50 -- 86°F)	Thermistor
		RH	10 – 90%	Thin film capacitance
	Microclimate Air	T	10 – 30°C (50 -- 86°F)	Thermistor
		RH	10-100%	Thin film capacitance
	Upstairs Air	T	10 – 35°C (50 – 95°F)	Thermistor
		RH	10 – 90%	Thin film capacitance
	Soil Air	T	5 – 28°C (41 – 82°F)	Thermistor
		RH	30 – 100%	Thin film capacitance
	ASD Air	T	10 – 20°C (50 -- 68°F)	Thermistor
		RH	20 – 90%	Thin film capacitance
Moisture storage	Walls		0.1 to 6% MC	Wood sensor / heated RH
	Floor		0.1 to 6%MC	Wood sensor / heated RH
	Soil		0.1 to 10%MC	Gypsum block
	Finishes		5 to 25% MC wood	Moisture pin
	Furnishings		5 to 25% MC wood	Moisture pin
Diffusion	Walls		10-90%/5 to 25C	RH/T – ΔP_v only
	Floor		10-90%/5 to 25 C	RH/T – ΔP_v only
Radon	Basement air		0.5 - 2000 pCi/L 18 - 74000 Bq/m ³	Pulse ion chamber
	1st & 2nd floor air		"	Pulse ion chamber
	ASD exhaust		10 – 100,000 pCi/L 370 – 3,700,000 Bq/m ³	Scintillation cell, PMT
	Sub-slab		"	Scintillation cell, PMT
	Outside wall		"	Scintillation cell, PMT
Wind speed	Outside house 1		0 - 50 m/s	Anemometer-AC generator
Wind direction	Outside house 1		0 - 360 degrees	Vane-potentiometer
Precipitation	Outside house 1		0 - 3"/hr	Tipping bucket rain gage
ΔP , continuous	Various (see meas. descriptions, above)		From +/- 0.1"WC to 5"WC (25 - 1250 Pa)	Variable capacitance transducer
ΔP , periodic	Pressure field mapping; multiple locations		+/- 1"WC (250 Pa)	Variable capacitance transducer (hand-held digital micromanometer)
House air leakage			0.1 – 15 ACH50	Blower door
Soil gas entry potential (flow & pressure)	Various; (see meas. descriptions, above)	Flow	0 - 1500 f/m (0 - 7 m/s)	Hot wire anemometer
		Pressure	0 - 1"WC (0 - 250 Pa)	Digital micromanometer (above)
ASD system diagnostics & design: ΔP and P_v	Slab, wall (TBD on-site)	Flow	0 – 200 cfm	Pitot tube/digital micro-manometer Hot wire anemometer
		Pressure	0 – 3"WC	Digital micromanometer