



ALL-WEATHER
**ENVIRONMENTAL
FIELD BOOK**

Numbered Pages

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SAMPLE
Even Pages 3-137

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Common Field Data Error Codes

Error codes are used to explain common mistakes and are written above or close to the mistake.

Commonly used error codes include:

RE	Recording Error
CE	Calculation Error
TE	Transcription Error
SE	Spelling Error
CL	Changed for Clarity
DC	Original Sample Description Changed After Further Evaluation
WO	Write Over
NI	Not Initialed and Dated at Time of Entry
OB	Not Recorded at the Time of Initial Observation

Note: Error code should be circled, dated, and initialed when recorded.

Hazard Classifications

Class 1 Explosives

Class 2 Gas

Class 3 Flammable Liquid

Class 4 Flammable Solids (Potential spontaneous combustion, or emission of flammable gases when in contact with water)

Class 5 Oxidizing Substances and Organic Peroxides

Class 6 Toxic (poisonous) and infectious substances

Class 7 Radioactive material

Class 8 Corrosives

Class 9 Miscellaneous dangerous goods

Container type abbreviations (for sampling guidelines)

BR - Boston Round • ABR - Amber Boston Round • AJ - Amber Jug •
AWM - Amber Wide Mouth • Poly - Polyethylene Bottles • BOD - Bottle •
CWM - Clear Wide Mouth

Sample Collection & Analysis Guidelines for Surface Water, Effluent and Drinking Water

<u>Parameters</u>	<u>Analysis Volume</u>	<u>EPA Method #</u>	<u>Con-tainer</u>	<u>Preservative</u>	<u>Holding Times</u>
Acidity	100 ml	305	Poly	Cool @ 4°C	14 days
Alkalinity	100 ml	310	Poly	Cool @ 4°C	14 days
Ammonia	400 ml	350	Poly	pH<2 H ₂ SO ₄ , 4°C	28 days
Asbestos (Drinking Water)	2 l	600/4-83-043	ABR	4°C	48 hours
Biochemical Oxygen Demand	1 l	405.1	Poly	Cool @ 4°C	48 hours
Bromide	100 ml	320.1	Poly	none required	28 days
Chemical Oxygen Demand	50 ml	410	Poly	pH<2 H ₂ SO ₄ , 4°C	28 days
Chloride	50 ml	300.0, 325	Poly	none required	28 days
Chlorine total residual	200 ml	330	Poly	none required	Analyze ASAP
Color	50 ml	110	Poly	Cool @ 4°C	48 hours
Cyanide total & amenable	500 ml	335.2, 335.1	Poly	(2) pH>12 NaOH & 6 gm Asbc. Acid 4°C	14 days
Fluoride	300 ml	300.0, 340	Poly	none required	28 days
Hardness	100 ml	130	Poly	pH<2 HNO ₃ /Cool 4°C	6 months
Hydrogen Ion (pH)	25 ml	150	Poly	none required	Analyze ASAP
Kjeldahl & Organic Nitrogen	500 ml	351	Poly	pH<2 H ₂ SO ₄ , 4°C	28 days
Chromium VI	200 ml	218.4, 218.5	Poly	Cool @ 4°C	24 hours
Mercury	100 ml	245	Poly	pH<2 HNO ₃	28 days
Metals (except Hg • Crui)	200 ml	200 series/200.7	Poly	pH<2 HNO ₃	6 months
Nitrate	100 ml	300.0, 352.1	Poly	Cool @ 4°C	48 hours
Nitrate-Nitrite	100 ml	300.0, 353	Poly	Cool @ 4°C	28 days
Nitrite	50 ml	300.0, 354.1	Poly	Cool @ 4°C	48 hours
Oil & Grease	1 l	413	ABR	pH<2 H ₂ SO ₄ /HCl, 4°C	28 days
Organic Carbon (TOC)	25 ml	415	Poly	pH<2 HCl/H ₂ SO ₄ , 4°C Dark	28 days
Oxygen, dissolved (probe)	300 ml	360.1	BOD Btl.	none required	Analyze ASAP
Oxygen, dissolved (winkler)	300 ml	360.2	BOD Btl.	(3) fix on site/dark	8 hours
Petrol. Hydrocarbons (TRPH)	1 l	418.1	ABR	pH<2 HCl, 4°C	Analyze ASAP
Phenolics	500 ml	420	ABR	pH<2 H ₂ SO ₄ , 4°C	28 days
Phosphorus Hydrolyzable	50 ml	365	Poly	pH<2 H ₂ SO ₄ , 4°C	28 days
Phosphorus, Orthophosphate	50 ml	300.0, 365	Poly	filter immed. 4°C	48 hours
Phosphorus, total	50 ml	365	Poly	pH<2 H ₂ SO ₄ , 4°C	28 days
Phosphorus, total dissolved	50 ml	365	Poly	Filter, pH<2 H ₂ SO ₄ , 4°C	24 hours
Residue, total	100 ml	160.3	Poly	Cool @ 4°C	7 days
Residue, filterable (TDS)	100 ml	160.1	Poly	Cool @ 4°C	7 days
Residue, non-filterable (TSS)	100 ml	160.2	Poly	Cool @ 4°C	7 days
Residue, settleable	1 l	160.5	ABR	Cool @ 4°C	48 hours
Residue, volatile	100 ml	160.4	Poly	Cool @ 4°C	7 days
Silica	50 ml	370.1, 200.7	Poly	Cool @ 4°C	28 days
Specific Conductance	100 ml	120.1	Poly	Cool @ 4°C	28 days
Sulfate	100 ml	300.0, 375	Poly	Cool @ 4°C	28 days
Sulfide	500 ml	376	Poly	pH>9 NaOH, ZnOAc, 4°C	7 days
Sulfite	50 ml	377.1	Poly	none required	Analyze ASAP
Surfactants (MBAS)	250 ml	425.1	Poly	Cool @ 4°C	48 hours
Temperature	1 l	170.1	Poly	none required	Analyze ASAP
Turbidity	100 ml	180.1	Poly	Cool @ 4°C	48 hours
Purgeable Halocarbons	5 ml	601, 624	GV	(1) .025% Na ₂ S ₂ O ₃ , 4°C	14 days
Purgeable aromatic Hyd. carb.	5 ml	602, 604	GV	(1) pH<2 HCl, .025% Na ₂ S ₂ O ₃ , 4°C	14 days
Acrolein & Acrylonitrile	5 ml	603, 1624	GV	(1) pH 4-5, .025% Na ₂ S ₂ O ₃ , 4°C	14 days
Phenols	1 l	604, 625	ABR	(1) .008% Na ₂ S ₂ O ₃ , 4°C	7 days
Benzidines	1 l	605, 625	ABR	(1) .008% Na ₂ S ₂ O ₃ , 4°C pH=4, Dark	7 days
Phthalate Esters	1 l	606, 625	ABR	Cool @ 4°C	7 days
Nitrosamines	1 l	607, 625	ABR	(1) .008% Na ₂ S ₂ O ₃ , 4°C Dark pH 7-10	7 days
PCB's	1 l	608, 625	ABR	.008% Na ₂ S ₂ O ₃ , Cool 4°C	7 days
Pesticides, Chlorinated	1 l	608, 625	ABR	(1) pH 5-9, Cool 4°C, Na ₂ S ₂ O ₃	7 days
Nitroaromatics & Isophorone	1 l	609, 625	ABR	Cool @ 4°C	7 days

<u>Parameters</u>	<u>Volume</u>	<u>EPA Method Water/Wastewater</u>	<u>Con-tainer</u>	<u>Preservative</u>	<u>Holding Times</u>
Polynuclear Aromatic Hydrocarbon	1l	610, 625	ABR	(1) .008% Na ₂ S ₂ O ₃ , 4°C Dark	7 days
Haloethers	1l	611, 625	ABR	(1) .008% Na ₂ S ₂ O ₃ , 4°C	7 days
Chlorinated Hydrocarbons	1l	612, 625	ABR	.008% Na ₂ S ₂ O ₃ , Cool 4°C	7 days
Chlorinated Herbicides	1l	6640B(SM 19th Ed.)	ABR	(1) Cool 4°C, .008% Na ₂ S ₂ O ₃	7 days
Dioxins & Furans	1l	613, 1613	ABR	(1) .008% Na ₂ S ₂ O ₃ , 4°C	7 days
Coliform, Fecal & Total	100 ml	9221, 9222-SM 19th	Poly	(1) .008% Na ₂ S ₂ O ₃ , 4°C	6 hours
Fecal Streptococci	100 ml	9230 (SM 19th Ed.)	Poly	(1) .008% Na ₂ S ₂ O ₃ , 4°C	6 hours
Volatile Organics	5 ml	624, 1624	GV	0.025% Na ₂ S ₂ O ₃ , pH HCl Cool @ 4°C	14 days
Semi-Volatile Organics	1l	625, 1625	ABR	(1) Cool 4°C, .008% Na ₂ S ₂ O ₃	7 days

Sampling Guidelines For Solids

<u>Parameters</u>	<u>Sample Weight</u>	<u>EPA Method #</u>	<u>Con-tainer</u>	<u>Holding Times</u>
Hydrogen Ion (pH)	20 g	9045	CWM	Analyze ASAP
Chromium VI	2 g	7196, 7199	CWM	24 Hours
Mercury	2 g	7471	CWM	28 days
Metals (except Chromium VI&HG)	2 g	7000 Series, 6010, 6020	CWM	6 months
Nitrate	70-1000	9210	CWM	Analyze ASAP
Oil & Grease	20 g	9071	CWM	Analyze ASAP
Organic Carbon (TOC)	10 g	9060	CWM	Analyze ASAP
Sulfide		9030, 9031, 9034	CWM	7 days
Purgeable Halocarbons	5 g	8021, 8260	CWM	14 days
Purgeable Aromatic Hydrocarbons	5 g	8021, 8260	CWM	14 days
Acrolein & Acrylonitrile	5 g	8060	CWM	14 days
Phenols	30 g	8041,8278	CWM	7 days(40 days AE)
Benzidines	30 g	8325	CWM	7 days(40 days AE)
Phthalate Esters	30 g	8061,8270	CWM	7 days(40 days AE)
Nitrosamines	30 g	8070, 8270	AWM	7 days(40 days AE)
PCB's	30 g	8082, 8275	CWM	7 days(40 days AE)
Pesticides, Chlorinated	30 g	8081	CWM	7 days(40 days AE)
Nitroaromatics & Isophorone	30 g	8091, 8270	AWM	7 days(40 days AE)
Polynuclear Aromatic Hydrocarbon	30 g	8100, 8270, 8310, 8275	AWM	7 days(40 days AE)
Haloethers	30 g	8111, 8270	CWM	7 days(40 days AE)
Chlorinated Hydrocarbons	30 g	8121, 8270	CWM	7 days(40 days AE)
Chlorinated Herbicides	50 g	8151, 8321	CWM	7 days(40 days AE)
Dioxins & Furans	10 g	8280, 8290	AWM	7 days(40 days AE)
Pesticides, Organophosphorus	50 g	8141, 8321	CWM	7 days(40 days AE)
Nonhalogenated Hydrocarbons	5 g	8015, 8260	CWM	14 days
Volatile Organics	5 g	8260	CWM	14 days
Semi-Volatile Organics	30 g	8270, 8410	CWM	7 days(40 days AE)
TCLP Extraction (Hazardous Waste Tox.)	300 g	1311	CWM	14 days TCLP Ext.
Hazardous Waste Ignitability	varies	1030	CWM	Analyze ASAP
Hazardous Waste Reactivity-Cyn./Sulf.	10 g	7.3.3.2, 7.3.4.2	AWM	Analyze ASAP

Approximate Volume of Water in Casing or Hole

Diameter of Casing or Hole (In.)	Gallons Per Foot of Depth	Cubic Feet Per Foot of Depth	Liters Per Meter of Depth	Cubic Meters Per Meter of Depth
1	0.041	0.0055	0.509	0.509×10^{-3}
1 ½	0.092	0.0123	1.142	1.142×10^{-3}
2	0.163	0.0218	2.024	2.024×10^{-3}
2 ½	0.255	0.0341	3.167	3.167×10^{-3}
3	0.367	0.0491	4.558	4.558×10^{-3}
3 ½	0.500	0.0668	6.209	6.209×10^{-3}
4	0.653	0.0873	8.110	8.110×10^{-3}
4 ½	0.826	0.1104	10.26	10.26×10^{-3}
5	1.020	0.1364	12.67	12.67×10^{-3}
5 ½	1.234	0.1650	15.33	15.33×10^{-3}
6	1.469	0.1963	18.24	18.24×10^{-3}
7	2.000	0.2673	24.84	24.84×10^{-3}
8	2.611	0.3491	32.43	32.43×10^{-3}
9	3.305	0.4418	41.04	41.04×10^{-3}
10	4.080	0.5454	50.67	50.67×10^{-3}
11	4.937	0.6600	61.31	61.31×10^{-3}
12	5.875	0.7854	72.96	72.96×10^{-3}
14	8.000	1.069	99.35	99.35×10^{-3}
16	10.44	1.396	129.65	129.65×10^{-3}
18	13.22	1.767	164.18	164.18×10^{-3}
20	16.32	2.182	202.68	202.68×10^{-3}
22	19.75	2.640	245.28	245.28×10^{-3}
24	23.50	3.142	291.85	291.85×10^{-3}
26	27.58	3.687	342.52	342.52×10^{-3}
28	32.00	4.276	397.41	397.41×10^{-3}
30	36.72	4.909	456.02	456.02×10^{-3}
32	41.78	5.585	518.87	518.87×10^{-3}
34	47.16	6.305	585.68	585.68×10^{-3}
36	52.88	7.069	656.72	656.72×10^{-3}

Permanent Monitoring Well

1 Gallon water weighs 8.33 lbs. = 3.785 Kg

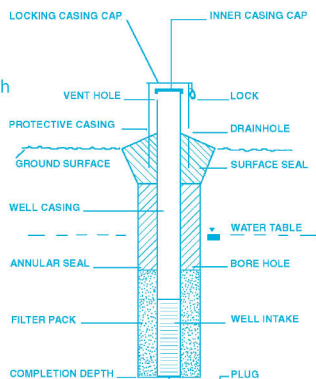
1 Liter water weighs 1 Kg = 2.205 lbs

1 Gallon per foot of depth = 12.419 liters per meter of depth

$$V = \pi r^2 h \text{ (Volume of a Cylinder)}$$

height of water column = (well depth) - (depth to water)

water column vol (Gal) = (height of water column)
x (volume/foot value of a well diameter)



Schedule 40 PVC Pipe

Nominal size	Max PSI at 74° F	OD	ID	Nominal wall	Nominal Weight per 100
½"	600	0.840"		0.109"	16.2 Lbs
¾"	480	1.050"	0.824"	0.113"	21.5 Lbs
1"	450	1.315"	1.049"	0.133"	32.0 Lbs
1¼"	370	1.660"	1.380"	0.140"	43.4 Lbs
1½"	330	1.900"	1.610"	0.145"	51.9 Lbs
2"	280	2.375"	2.067"	0.154"	69.8 Lbs
2½"	300	2.875"	2.469"	0.203"	111.0 Lbs
3"	260	3.500"	3.068"	0.216"	145.0 Lbs
4"	220	4.500"	4.026"	0.237"	206.0 Lbs
5"	n/a	5.563"	5.047"	0.258"	277.0 Lbs
6"	180	6.625"	6.065"	0.280"	363.0 Lbs
8"	160	8.625"	7.961"	0.332"	563.0 Lbs
10"	140	10.750"	10.020"	0.365"	775.0 Lbs
12"	130	12.750"	11.938"	0.406"	1030.0 Lbs

Schedule 80 PVC Pipe

Nominal size	Max PSI at 74° F	OD	ID	Nominal wall	Nominal Weight per 100
½"	850	0.840"	0.546"	0.147"	20.6 Lbs
¾"	690	1.050"	0.742"	0.154"	28.0 Lbs
1"	630	1.315"	0.957"	0.179"	41.3 Lbs
1¼"	520	1.660"	1.278"	0.191"	57.1 Lbs
1½"	470	1.900"	1.500"	0.200"	69.2 Lbs
2"	400	2.375"	1.939"	0.218"	95.8 Lbs
2½"	420	2.875"	2.323"	0.276"	146.0 Lbs
3"	370	3.500"	2.900"	0.300"	196.0 Lbs
4"	320	4.500"	3.826"	0.337"	286.0 Lbs
5"	n/a	5.563"	4.768"	0.375"	392.0 Lbs
6"	280	6.625"	5.761"	0.432"	546.0 Lbs
8"	245	8.625"	7.625"	0.500"	830.0 Lbs
10"	230	10.750"	9.564"	0.593"	1230.0 Lbs
12"	230	12.750"	11.376"	0.687"	1690.0 Lbs

Soil Classification

	Millimeters	Inches	Sieve Sizes
Boulders	>300	>11.8	-
Cobbles	75 - 300	2.9 - 11.8	-
Coarse Gravel	75 - 19	2.9 - .75	-
Fine Gravel	19 - 4.8	.75 - .19	3/4" - No. 4
Coarse Sand	4.8 - 2.0	.19 - .08	No. 4 - No. 10
Medium Sand	2.0 - .43	.08 - .02	No. 10 - No. 40
Fine Sand	.43 - .08	.02 - .003	No. 40 - No. 200
Fine Silt & Clay	<.08	<.003	>No. 200

Clay

Clay Consistency	Thumb Penetration	SPT, N Blows/Ft.	Undrained shear strength c_u (PSF) Torvane	Unconfined Compressive Strength q_u Pocket Penetrometer
Very Soft	Penetrated several inches by thumb. Escapes between thumb and fingers when squeezed in hand.	<2	250	500
Soft	Penetrated one inch by thumb. Molded by light finger pressure.	2 - 4	250 - 500	500 - 1000
Medium Soft	Penetrated over 1/4" by thumb with moderate effort. Molded by strong finger pressure.	4 - 8	500 - 1000	1000 - 2000
Stiff	Indented 1/4" with thumb, but only penetrated with great effort.	8 - 15	1000 - 2000	2000 - 4000
Very Stiff	Readily indented by thumbnail.	15 - 30	2000 - 4000	4000 - 8000
Hard	Indented only with difficulty, by thumbnail.	>30	>4000	>8000

Sand

Soil Type	SPT N Blows/Ft.	Relative Density %	Field Test
Very Loose Sand	4	0 - 15	Easily Penetrated with 1/2" rod pushed by hand.
Loose Sand	4 - 10	15 - 35	Easily Penetrated with 1/2" rod pushed by hand.
Med. Dense Sand	10 - 30	35 - 65	Penetrated a foot with 1/2" rod driven with a 5 lb hammer.
Dense Sand	30 - 50	65 - 85	Penetrated a foot with 1/2" rod driven with a 5 lb hammer.
Very Dense Sand	50	85 - 100	Penetrated inches with 1/2" rod driven with a 5 lb hammer.

Coarse-grained Soils More than half of material is larger than No. 200 sieve	Gravel More than half of coarse fraction is larger than No. 4 sieve size	Clean gravels (Little or no fines)	GW	Well-graded gravels, gravel sand mixtures, little or no fines.
			GP	Poorly-graded gravels, gravel sand mixtures, little or no fines.
		Gravels with fines (Appreciable amount of fines)	GM	Silty gravels, gravel-sand-silt mixtures.
			GC	Clayey gravels, gravel-sand-clay mixtures.
	Sands More than half of coarse fraction is smaller than No. 4 sieve size	Clean sands (Little or no fines)	SW	Well-graded sands, gravelly sands, little or no fines.
			SP	Poorly- graded sands, gravelly sands, little or no fines.
Sands with fines (Appreciable amount of fines)		SM	Silty sands, sand-silt mixtures.	
		SC	Clayey sands, sand-clay mixtures.	
Fine-grained Soils More than half of material is smaller than No. 200 sieve	Silts and Clays Liquid limit less than 50	ML	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands, or clayey silts with slight plasticity.	
		CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays.	
		OL	Organic silts and organic silty clays of low plasticity.	
	Silts and Clays Liquid limit greater than 50	MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts.	
		CH	Inorganic clays of high plasticity, fat clays.	
		OH	Organic clays of medium to high plasticity, organic silts.	
	Highly Organic	Pt	Peat and other highly organic soils.	

Maximum Concentration of Contaminants for the Toxicity Characteristic

EPA HW NUMBER*		REGULATORY LEVEL (mg/L)	ANALYTE CATEGORY
D004	Arsenic	5.0	Metal
D005	Barium	100.0	Metal
D018	Benzene	0.5	Volatile
D006	Cadmium	1.0	Metal
D019	Carbon tetrachloride	0.5	Volatile
D020	Chlordane	0.03	Pesticide
D021	Chlorobenzene	100.0	Volatile
D022	Chloroform	6.0	Volatile
D007	Chromium	5.0	Metal
D023	o-Cresol	200.0	Acid Extractable
D024	m-Cresol	200.0	Acid Extractable
D025	p-Cresol	200.0	Acid Extractable
D026	Cresol	200.0	Acid Extractable
D016	2,4-D	10.0	Herbicide
D027	1,4-Dichlorobenzene	7.5	Base Neutral
D028	1,2-Dichloroethane	0.5	Volatile
D029	1,1-Dichloroethylene	0.7	Volatile
D030	2,4-Dinitrotoluene	0.13	Base Neutral
D012	Endrin	0.02	Pesticide
D031	Heptachlor (and its epoxide)	0.008	Pesticide
D032	Hexachlorobenzene	0.13	Base Neutral
D033	Hexachlorobutadiene	0.5	Base Neutral
D034	Hexachloroethane	3.0	Base Neutral
D008	Lead	5.0	Metal
D013	Lidane	0.4	Pesticide
D009	Mercury	0.2	Metal
D014	Methoxychlor	10.0	Pesticide
D035	Methyl ethyl ketone	200.0	Volatile
D036	Nitrobenzene	2.0	Base Neutral
D037	Pentachlorophenol	100.0	Acid Extractable
D038	Pyridine	5.0	Base Neutral
D010	Selenium	1.0	Metal
D011	Silver	5.0	Metal
D039	Tetrachloroethylene	0.7	Volatile
D015	Toxaphene	0.5	Pesticide
D040	Trichloroethylene	0.5	Volatile
D041	2,4,5-Trichlorophenol	400.0	Acid Extractable
D042	2,4,6-Trichlorophenol	2.0	Acid Extractable
D017	2,4,5-TP (Silvex)	1.0	Herbicide
D043	Vinyl chloride	0.2	Volatile

*Hazardous Waste Number

Concentrations

mg/L = 1000.30 ppb
mg/L = 1.00030 ppm
ppb = 0.00100 mg/L
ppm = .99970 mg/L
mg/L = (0.00245 x cu.ft./sec.) tonnes/day
mg/L = (0.0000864 x L/sec.) tonnes/day
mg/L = (0.00270 x cu.ft./sec.) tons/day

tons/day = (370.79782 ÷ cu.ft./sec.) mg/L
tonnes/day = (408.73452 ÷ cu.ft./sec.) mg/L
tonnes/day = (11574.07407 ÷ L/sec.) mg/L

Volume/ Flow or Time

Cubic ft./sec. = 1.98347 Acre ft./day
Cubic ft./sec. = 0.64632 Million gallons/day
Cubic ft./sec. = 448,83117 Gallons/min.
Cubic ft./sec. = 0.02832 Cubic meters/sec.
Cubic ft./sec. = 28.31685 Liters/sec.
Cubic ft./sec. = 373.73 Imperial gallons/min.

Gallons/min. = 0.00223 Cubic ft./sec.
Gallons/min. = 6.309×10^{-5} Cubic meters/sec.
Gallons/min. = 0.06309 Liters/sec.

Cubic meters/sec. = 1000.00012 Liters/sec.
Cubic meters/sec. = 35.31467 Cubic ft./sec.

Liters/sec. = 0.001 Cubic meters/sec.
Liters/sec. = 0.03531 Cubic ft./sec.
Liters/sec. = 15.85032 Gallons/min.

Million gallons/day = 1.54723 Cubic ft./sec.
Million gallons/day = 3.06888 Acre ft./day

Acre ft./day = 0.504167 Cubic ft./sec.
Acre ft./day = 0.325851 Million gallons/day

Velocity

ft./sec. = 0.304800 m/s
ft./sec. = 0.681818 mph
km/hr. = 0.277778 m/s
km/hr. = 0.621371 mph

Acceleration

ft./s/s = 0.304600 m/s/s
m/s/s = 3.280640 ft./s/s

MEASUREMENT CONVERSIONS**U.S. to METRIC**

inches x 2.54 = centimeters

feet x 0.3048 = meters

yards x 0.914 = meters

miles x 1.609 = kilometers

quarts x 0.946 = liters

gallons x 3.785 = liters

ounces x 28.349 = grams

lbs x 0.454 = kilograms

mpg x 0.425 = km/ltr

mph x 1.609 = km/hr

°F to °C (F - 32) x .555

METRIC to U.S.

centimeters x 0.394 = inches

meters x 3.28 = feet

meters x 1.094 = yards

kilometers x 0.621 = miles

liters x 1.057 = quarts

liters x 0.264 = gallons

grams x 0.035 = ounces

kg x 2.205 = lbs

km/ltr x 2.352 = mpg

km/hr x 0.621 = mph

°C to °F (C x 1.8) + 32

ENGLISH LINEAR MEASUREMENTS

12 inches = 1 foot

36 inches = 1 yard

3 feet = 1 yard

1,760 yards = 1 mile statute

2,025.37 yards = 1 mile nautical

5,280 feet = 1 mile statute

6,076.12 feet = 1 mile nautical

63,360 inches = 1 mile statute

72,913.4 inches = 1 mile nautical

MAP SCALES—ENGLISH & METRIC

SCALE	1 INCH =	1 CENTIMETER =
1:10,000	833.33 feet 254 meters	328.1 feet 100 meters
1:25,000	2,083.3 feet 635 meters	820.2 feet 250 meters
1:50,000	4,166.7 feet 1,270 meters	1,640.4 feet 500 meters
1:63,360	5,280 feet 1,609.3 meters	2,078 feet 633.6 meters
1:100,000	8,333.3 feet 2,540 meters	3,280.8 feet 1,000 meters
1:250,000	20,833 feet 6,350 meters	8,202 feet 2,500 meters
1:500,000	41,667 feet 12,700 meters	16,404 feet 5,000 meters

MADE IN TACOMA

— SINCE 1916 —

Rite in the Rain®

— DEFYING MOTHER NATURE —

**USE WET OR DRY***most pens stop writing when wet*

- ALL PENCILS
- RITE IN THE RAIN PENS
- WAX MARKERS
- CRAYONS
- OIL PASTELS / PAINT

**WHEN DRY ONLY***what you write won't wash off*

- PERMANENT MARKERS
- STANDARD BALLPOINTS

**WON'T WORK***water-based inks bead off sheet*

- GEL PENS
- MOST HIGHLIGHTERS
- FOUNTAIN PENS
- WATER COLORS
- ACRYLIC PAINT

Yes, Rite in the Rain is a wood-based & recyclable paper, but unlike plain paper... **it won't turn to mush when exposed to:**



rain storms



heavy sweat



oil & grease



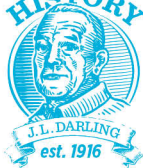
mud & grime



laundry mishap

— ALL-WEATHER TOUGH!™ —

BRAND HISTORY

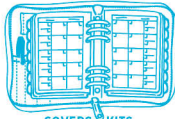


The Rite in the Rain story began a century ago in the forests of the Great Pacific Northwest. Entrepreneur Jerry Darling recognized the logging industry's need for a durable material that could be written on and survive in poor weather conditions. Jerry developed a special coating that created a unique moisture shield on the hand-dipped sheets of paper that he and his wife, Mary, processed at their home.

From these humble beginnings our first all-weather paper was born. Over the many years we've perfected and patented our environmentally responsible coating process. Still located in Tacoma, our continued mission is to provide innovative products for professionals and enthusiasts who brave the outdoors.

EQUIPPING MULTIPLE INDUSTRIES WORLD-WIDE*products available*

BOUND BOOKS



COVERS, KITS & PLANNERS



LOOSE LEAF & BINDERS



WRITING INSTRUMENTS



PRINTER / COPIER BLANK SHEETS

**RiteintheRain.com**

©JL DARLING LLC
2614 PACIFIC HWY EAST,
TACOMA, WA 98424 USA



CM

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SAMPLE