ENT00334E
Submitted: March 29, 2012

APPENDIX E: POST-Q2 2010 MID-QUARTER SAMPLING DATA SHEETS

GZA GeoEnvironmental of New York
Modified Traditional Purge
Sampling Data Sheet

WELL ID: MW-44-66
SAMPLE ID: 016

CLIENT: Entergy - IPEC
SITE: Buchanan, NY
WEATHER: Sun + clouds 70's

PROJECT NO: 01.0017869.92
DATE: 6/10
SAMPLER(S): M. Britos

WATER COLUMN HEIGHT (ft)

67.00 (DTB) − 59.60 (DTW) = 7.40 (Water Column Height)

Well Diameter: _____ in

Diameter	Multipliers
1	0.041
2	0.163
4	0.653

GALLONS OF WATER PER WELL VOLUME:

Water Column Height 7.40 x 0.163 (Multiplier) = 1.20 (Well Volume) gal

1.20 x 1.5 = 1.81 gal
Designed Purge Volume

TOTAL VOLUME PURGED: 1.55 gal

WATER QUALITY: DTW = Transducer Actual Depth

Time	Volume Purged (gal)	DTW or Actual Depth	Temp (^{0}C)	Specific Conductivity (S/cm)	Dissolved Oxygen (g/l)	pH (SU)	ORP	Turbidity (NTU)	Drive/Vent Cycle (seconds)	Drive Pressure (psi)	Notes
1030	0	59.60	PUMP ON						8/8	60	
1035	0.01	60.09	18.77	0.950	7.96	7.80	35.5	—	8/8	86	
1040	0.05	60.53	18.09	1.619	5.20	7.39	38.9	26.88	8/8	86	
1045	0.10	60.92	17.83	1.594	5.72	7.35	32.2	19.67	10/6	88	
1051	0.20	61.46	17.54	1.582	5.85	7.30	32.6	17.91	↓	↓	
1059	0.40	62.20	17.28	1.579	6.14	7.30	38.1	34.21	↓	↓	
1105	0.60	63.08	17.67	1.576	6.24	7.31	43.0	56.92	14/6	88	
1115	0.90	—	17.45	1.576	6.75	7.31	47.8	52.24			
1121	1.10	—	17.31	1.576	6.61	7.31	51.2	78.96	10/9	88	
1129	1.30	—	17.76	1.580	6.18	7.31	52.7	83.32	↓	↓	
1136	1.40		17.68	1.581	6.22	7.31	53.1	94.81	↓	↓	
1137	1.55		WELL DRY. LET RECHARGE BEFORE SAMPLE								
1440			START SAMPLE COLLECTION								
1530			SAMPLE COMPLETED: 2 L IPEC								
						0.5 L IPEC					
1530			PUMP OFF								

Equipment Used	Equipment Identification #
YSI 556 MPS Reader and 5563 Sonde	5
turbidity meter	200704293

NOTES AND OBSERVATIONS:

Depth and Depth to Water (DTW) measurements are given in feet from top of casing.

Groundwater Elevation measurements are given in feet msl.

GZA GeoEnvironmental of New York
Modified Traditional Purge
Sampling Data Sheet

WELL ID: MW-44102
SAMPLE ID: 017

CLIENT: Entergy - IPEC
SITE: Buchanan, NY
WEATHER: Sun + clouds 70's

PROJECT NO: 01.0017869.92
DATE: 6/10/10
SAMPLER(S): M. BRITOS

WATER COLUMN HEIGHT (ft)

102.00 (DTB) - 68.00 (DTW) = 34.00 (Water Column Height) ft

Well Diameter: _____ in

Diameter	Multipliers
1	0.041
2	0.163
4	0.653

GALLONS OF WATER PER WELL VOLUME:

Water Column Height 34.00 x 0.041 (Multiplier) = 1.394 (Well Volume) gal

1.394 x 1.5 = 2.09 (Designed Purge Volume) gal

TOTAL VOLUME PURGED: 2.25 gal

WATER QUALITY: DTW = Transducer Actual Depth

Time	Volume Purged (gal)	DTW or Actual Depth	Temp (^{0}C)	Specific Conductivity (S/cm)	Dissolved Oxygen (g/l)	pH (SU)	ORP	Turbidity (NTU)	Notes
1242	0		PUMP ON						
1245	0.05	—	18.13	0.799	9.07	7.29	75.4	401.6	
1249	0.40	—	17.38	0.984	7.57	7.32	87.2	711.3	
1252	0.60	—	17.39	1.101	7.36	7.32	90.2	926.7	
1256	1.0	—	17.38	1.058	6.64	7.32	94.1	686.7	
1300	1.4	—	17.42	1.053	6.58	7.33	95.6	818.2	
1304	1.8	—	17.64	1.058	6.65	7.34	96.2	984.6	
1307	2.1	—	17.78	1.055	6.71	7.35	96.8	999.9	
1307			PUMP OFF						
1308			START SAMPLE COLLECTION						
1313			SAMPLE COMPLETED			: 2	L IPEC		
						0.5	L IPEC		
1313			PUMP OFF						

Equipment Used	Equipment Identification #
YSI 556 MPS Reader and 5563 Sonde	4
turbidity meter	200704293

NOTES AND OBSERVATIONS:

Depth and Depth to Water (DTW) measurements are given in feet from top of casing.

Groundwater Elevation measurements are given in feet msl.

WELL ID: MW 32 - 190

SAMPLE ID: 020

GZA GeoEnvironmental of New York
Waterloo Sampling Data Sheet

CLIENT: Entergy - IPEC
SITE: Buchanan, NY
WEATHER: Cloudy, showers, 70's

PROJECT NO: 01.0017869.92
DATE: 6/9/10
SAMPLER(S): M. BRITOS

SAMPLING INTERVAL (depth in ft below top of casing)

180.3 to 193.9

SAMPLING PORT

190

TOTAL VOLUME PURGED: 0.85 gal

PURGE RATE: variable (gal / min)

PURGE METHOD: Double Valve Pump

WATER QUALITY:

Time	Purged Volume (gal)	Temp (°C)	Specific Conductivity (S/cm)	Dissolved Oxygen (g/l)	pH (SU)	ORP	Turbidity (NTU)	Drive/Vent Cycle (seconds)	Drive Pressure (psi)
1050	0	PUMP	ON					8/8	49
1100	0.1	19.19	1.679	1.44	6.93	-216.7	—		
1110	0.2	19.13	1.689	1.00	6.99	-219.2	9.27		
1115	0.25	19.06	1.697	0.86	7.04	-218.5	8.93		
1120	0.30	18.99	1.702	0.74	7.05	-209.7	8.95		
1130	0.35	19.01	1.705	0.56	7.08	-188.2	8.90		
1135	0.40	19.03	1.706	0.48	7.09	-180.9	8.98		
1142	0.45	19.04	1.708	0.42	7.11	-196.6	8.91		
1150	0.50	19.01	1.708	0.32	7.13	-201.7	8.89		
1200	0.60	18.99	1.706	0.30	7.14	-199.0	8.94		
1205	0.70	18.99	1.706	0.30	7.14	-194.9	8.87	↓	↓
1206		PUMP	OFF						
1208		START	SAMPLE COLLECTION						
1243		SAMPLE	COMPLETED	: 2	L	IPEC	(Mid Quarter)		
1243		PUMP	OFF						

Equipment Used	Equipment Identification #
YSI 556 MPS Reader and 5563 Sonde	4
turbidity meter	20070429 3

NOTES AND OBSERVATIONS: Mid Quarter sample.

WELL ID: MW 32 - 173

SAMPLE ID: 016

GZA GeoEnvironmental of New York
Waterloo Sampling Data Sheet

CLIENT: Entergy - IPEC
SITE: Buchanan, NY
WEATHER: Cloudy, showers, 70's

PROJECT NO: 01.0017869.92
DATE: 6/9/10
SAMPLER(S): M. BRITOS

SAMPLING INTERVAL (depth in ft below top of casing)

165.8 to 174.3

SAMPLING PORT

173 2

TOTAL VOLUME PURGED: 0.70 gal

PURGE RATE: variable (gal / min)

PURGE METHOD: Double Valve Pump

WATER QUALITY:

Time	Purged Volume (gal)	Temp (°C)	Specific Conductivity (S/cm)	Dissolved Oxygen (g/l)	pH (SU)	ORP	Turbidity (NTU)	Drive/Vent Cycle (seconds)	Drive Pressure (psi)
1050	0	PUMP	ON					8/8	49
1100	0.1	19.27	1.978	1.55	7.40	-121.6	—	↓	↓
1110	0.2	19.25	1.939	0.76	7.25	-124.7			
1115	0.25	19.16	1.937	0.62	7.21	-125.3	8.87		
1120	0.30	19.18	1.932	0.50	7.16	-128.6	8.93		
1130	0.35	19.20	1.941	0.36	7.15	-130.9	8.88		
1135	0.40	19.22	1.946	0.32	7.14	-132.0	8.97		
1142	0.45	19.19	1.963	0.30	7.13	-132.2	8.99		
1150	0.55	19.15	1.976	0.28	7.12	-130.9	8.94	↓	↓
1152		PUMP	OFF						
1155		START SAMPLE COLLECTION							
1223		SAMPLE COMPLETED : 2 L IPEC (Mid Quarter)							
1223		PUMP	OFF						

Equipment Used	Equipment Identification #
YSI 556 MPS Reader and 5563 Sonde	5
turbidity meter	20070429 3

NOTES AND OBSERVATIONS: Mid Quarter Sample.

WELL ID: MW 32-149

SAMPLE ID: 018

GZA GeoEnvironmental of New York
Waterloo Sampling Data Sheet

CLIENT: Entergy - IPEC
SITE: Buchanan, NY
WEATHER: Cloudy, showers, 70's

PROJECT NO: 01.0017869.92
DATE: 6/9/10
SAMPLER(S): M. BRITOS

SAMPLING INTERVAL (depth in ft below top of casing)

147.3 to 156.8

SAMPLING PORT

149 3

TOTAL VOLUME PURGED: 0.75 gal

PURGE RATE: variable (gal / min)

PURGE METHOD: Double Valve Pump

WATER QUALITY:

Time	Purged Volume (gal)	Temp (°C)	Specific Conductivity (S/cm)	Dissolved Oxygen (g/l)	pH (SU)	ORP	Turbidity (NTU)	Drive/Vent Cycle (seconds)	Drive Pressure (psi)
1050	0	PUMP ON						8/8	49
1100	0.01	19.18	1.514	2.02	6.68	-85.6	—		
1110	0.05	19.13	1.503	1.02	6.76	-146.7			
1115	0.1	19.01	1.510	0.99	6.79	-155.4	9.46		
1120	0.15	19.06	1.518	0.89	6.89	-156.7	9.20		
1130	0.20	19.11	1.552	0.85	6.93	-157.2	9.01		
1135	0.25	19.12	1.560	0.67	6.97	-158.4	8.83		
1142	0.30	19.13	1.570	0.50	7.01	-154.6	8.76		
1150	0.35	19.08	1.583	0.41	7.05	-145.5	8.60		
1200	0.40	19.07	1.590	0.39	7.07	-148.9	8.51		
1205	0.50	19.08	1.593	0.33	7.08	-150.4	8.45		
1210	0.55	19.11	1.596	0.32	7.09	-151.9	8.47		
1215	0.60	19.12	1.596	0.31	7.09	-152.7	8.43		
1216		PUMP	OFF						
1217		START	SAMPLE COLLECTION						
1252		SAMPLE	COMPLETED	: 2	L	IPEC	(Mid Quarter)		
1252		PUMP	OFF						

Equipment Used	Equipment Identification #
YSI 556 MPS Reader and 5563 Sonde	2
turbidity meter	20070429 3

NOTES AND OBSERVATIONS: Mid Quarter Sample.

WELL ID: MW 32 - 85

SAMPLE ID: 021

GZA GeoEnvironmental of New York
Waterloo Sampling Data Sheet

CLIENT: Entergy - IPEC
SITE: Buchanan, NY
WEATHER: Cloudy, showers 70's

PROJECT NO: 01.0017869.92
DATE: 6/9/10
SAMPLER(S): M. Britos

SAMPLING INTERVAL (depth in ft below top of casing)

79.3 to 92.8

SAMPLING PORT

85

5

TOTAL VOLUME PURGED: 1.35 gal

PURGE RATE: variable (gal / min)

PURGE METHOD: Double Valve Pump

WATER QUALITY:

Time	Purged Volume (gal)	Temp (°C)	Specific Conductivity (S/cm)	Dissolved Oxygen (g/l)	pH (SU)	ORP	Turbidity (NTU)	Drive/Vent Cycle (seconds)	Drive Pressure (psi)
1050	0	PUMP ON						8/8	49
1100	0.25	19.07	1.647	4.13	7.17	-24.4	—		
1110	0.45	18.94	1.644	3.14	7.19	-35.6			
1115	0.55	18.98	1.641	2.50	7.21	-44.5	7.94		
1120	0.70	19.00	1.644	2.26	7.21	-45.1	7.91		
1130	0.95	19.00	1.647	1.98	7.21	-45.8	7.89		
1135	1.05	18.98	1.648	1.97	7.22	-45.7	7.87		
1142	1.20	18.97	1.651	1.95	7.22	-45.0	7.84	↓	↓
1144		PUMP	OFF						
1145		START	SAMPLE COLLECTION						
1203		SAMPLE	COMPLETED	: 2	L IPEC	(MID	QUARTER)		
1203		PUMP	OFF						

Equipment Used	Equipment Identification #
YSI 556 MPS Reader and 5563 Sonde	3
turbidity meter	Q00704293

NOTES AND OBSERVATIONS: Mid Quarter Sample.

WELL ID: MW 32 - 59

SAMPLE ID: 018

GZA GeoEnvironmental of New York
Waterloo Sampling Data Sheet

CLIENT: Entergy - IPEC
SITE: Buchanan, NY
WEATHER: Cloudy, showers, 70's

PROJECT NO: 01.0017869.92
DATE: 6/9/10
SAMPLER(S): M. BRITOS

SAMPLING INTERVAL (depth in ft below top of casing)

28.3 to 61.3

SAMPLING PORT

59 6

TOTAL VOLUME PURGED: 1.0 gal

PURGE RATE: variable (gal / min)

PURGE METHOD: Double Valve Pump

WATER QUALITY:

Time	Purged Volume (gal)	Temp (°C)	Specific Conductivity (S/cm)	Dissolved Oxygen (g/l)	pH (SU)	ORP	Turbidity (NTU)	Drive/Vent Cycle (seconds)	Drive Pressure (psi)
1353	0	PUMP	ON					8/7	25
1359	0.01	19.01	1.098	6.60	7.26	94.6	—	8/8	26
1405	0.1	19.06	0.960	5.82	7.29	73.5	2.17		
1413	0.3	19.12	0.874	6.47	7.30	65.3	1.76		
1423	0.5	19.18	0.831	6.61	7.33	65.3	1.68		
1428	0.65	19.21	0.826	6.60	7.34	65.6	1.74		
1433	0.80	19.20	0.822	6.59	7.35	66.5	1.67		
1435		PUMP	OFF						
1437		START SAMPLE COLLECTION							
1453		SAMPLE COMPLETED :				2 L IPEC (Mid Quarter)			
1453		PUMP	OFF						

Equipment Used	Equipment Identification #
YSI 556 MPS Reader and 5563 Sonde	5
turbidity meter	200704293

NOTES AND OBSERVATIONS:

WELL ID: MW 30 - 84

SAMPLE ID: 023

GZA GeoEnvironmental of New York
Waterloo Sampling Data Sheet

CLIENT: Entergy - IPEC
SITE: Buchanan, NY
WEATHER: Sunny 70's

PROJECT NO: 01.0017869.92
DATE: 06/08/10
SAMPLER(S): M. BRITOS

SAMPLING INTERVAL (depth in ft below top of casing)

77.3 to 85.4

SAMPLING PORT

84

TOTAL VOLUME PURGED: 1.0 gal

PURGE RATE: variable (gal / min)

PURGE METHOD: Double Valve Pump

WATER QUALITY:

Time	Purged Volume (gal)	Temp (°C)	Specific Conductivity (S/cm)	Dissolved Oxygen (g/l)	pH (SU)	ORP	Turbidity (NTU)	Drive/Vent Cycle (seconds)	Drive Pressure (psi)
1100								6/7	30→41
1110	0.01	26.52	1.731	4.20	6.91	38.4	—	6/9	41
1120	0.05	26.26	1.722	2.95	6.93	14.0	—	6/9	↓
1130	0.35	26.52	1.694	8.54	7.39	27.7	—	6/12	↓
1140	0.65	26.60	1.705	8.93	7.73	48.4	—	↓	↓
1145	0.75	26.58	1.707	8.96	7.79	50.2	—	↓	33
1150	0.85	26.54	1.706	8.99	7.81	51.1	—	↓	33
1151	PUMP OFF								
1153	START SAMPLE COLLECTION								
1219	SAMPLE COMPLETED : 2 L					IPEC	Mid Quarter		
1219	PUMP OFF								

Equipment Used	Equipment Identification #
YSI 556 MPS Reader and 5563 Sonde	5
turbidity meter	—

NOTES AND OBSERVATIONS:

WELL ID: MW 30 - 69

SAMPLE ID: 032

GZA GeoEnvironmental of New York
Waterloo Sampling Data Sheet

CLIENT: Entergy - IPEC
SITE: Buchanan, NY
WEATHER: Sunny 70's

PROJECT NO: 01.0017869.92
DATE: 6/8/10
SAMPLER(S): M. BRITOS

SAMPLING INTERVAL (depth in ft below top of casing)

67.3 to 71.3

SAMPLING PORT

69

TOTAL VOLUME PURGED: 1.0 gal

PURGE RATE: variable (gal / min)

PURGE METHOD: Double Valve Pump

WATER QUALITY:

Time	Purged Volume (gal)	Temp (°C)	Specific Conductivity (S/cm)	Dissolved Oxygen (g/l)	pH (SU)	ORP	Turbidity (NTU)	Drive/Vent Cycle (seconds)	Drive Pressure (psi)
1100	0	PUMP ON						6/7	30→41
1110	0.01	26.24	0.934	8.22	8.20	23.8	—	6/9	41
1120	0.1	26.65	1.330	9.18	8.27	55.3	—	6/9	"
1130	0.35	26.57	1.381	9.46	8.29	49.1	—	6/12	"
1140	0.65	26.50	1.389	9.46	8.32	59.3	—	"	↓
1145	0.75	26.45	1.381	9.41	8.31	60.3	—	"	33
1150	0.85	26.43	1.389	9.47	8.30	61.2	—	↓	33
1151	PUMP OFF								
1153	START SAMPLE COLLECTION								
1232	SAMPLE COMPLETED: 2 L IPEC Mid Quarter								
1232	PUMP OFF								

Equipment Used	Equipment Identification #
YSI 556 MPS Reader and 5563 Sonde	4
turbidity meter	

NOTES AND OBSERVATIONS:

WELL ID: MW 31 - 63

SAMPLE ID: 024

GZA GeoEnvironmental of New York
Waterloo Sampling Data Sheet

CLIENT: Entergy - IPEC
SITE: Buchanan, NY
WEATHER: Sunny 70's

PROJECT NO: 01.0017869.92
DATE: 6/7/10
SAMPLER(S): MB

SAMPLING INTERVAL (depth in ft below top of casing)

55.8 to 63.8

SAMPLING PORT

63

TOTAL VOLUME PURGED: 1.30 gal

PURGE RATE: variable (gal / min)

PURGE METHOD: Double Valve Pump

WATER QUALITY:

Time	Purged Volume (gal)	Temp (°C)	Specific Conductivity (S/cm)	Dissolved Oxygen (g/l)	pH (SU)	ORP	Turbidity (NTU)	Drive/Vent Cycle (seconds)	Drive Pressure (psi)
1030	0	PUMP ON						6/7	28
1040	0.05	19.77	1.525	5.92	7.13	-5.8	—	7/10	30
1050	0.15	20.29	1.515	4.50	7.14	+9.7			
1100	0.30	19.85	1.520	2.39	7.12	19.2	8.76		
1105	0.40	20.27	1.520	2.00	7.11	26.1	7.88		
1113	0.55	20.19	1.535	2.06	7.10	33.9	5.45		
1122	0.75	20.26	1.560	2.11	7.11	40.8	5.32		
1130	0.95	20.60	1.580	2.10	7.11	42.5	5.35	7/10	32
1136	1.05	20.66	1.594	2.11	7.11	43.7	5.29		
1144	1.15	20.59	1.603	2.10	7.11	44.4	5.27		
1145		PUMP OFF							
1146		START SAMPLE COLLECTION							
1219		SAMPLE COMPLETED : 2 L IPEC Mid Quarter							
1219		PUMP OFF							

Equipment Used	Equipment Identification #
YSI 556 MPS Reader and 5563 Sonde	5
turbidity meter	20070429 3

NOTES AND OBSERVATIONS: Mid Quarter Sample

WELL ID: MW 31 - 49

SAMPLE ID: 024

GZA GeoEnvironmental of New York
Waterloo Sampling Data Sheet

CLIENT: Entergy - IPEC
SITE: Buchanan, NY
WEATHER: Sunny 70's

PROJECT NO: 01.0017869.92
DATE: 6/7/10
SAMPLER(S): MB

SAMPLING INTERVAL (depth in ft below top of casing)

34.8 to 49.3

SAMPLING PORT

49

TOTAL VOLUME PURGED: 2.10 gal

PURGE RATE: variable (gal / min)

PURGE METHOD: Double Valve Pump

WATER QUALITY:

Time	Purged Volume (gal)	Temp (°C)	Specific Conductivity (S/cm)	Dissolved Oxygen (g/l)	pH (SU)	ORP	Turbidity (NTU)	Drive/Vent Cycle (seconds)	Drive Pressure (psi)
1030	0	PUMP	ON					6/7	28
1040	0.20	18.69	1.980	3.17	7.02	-19.5	—	7/10	30
1050	0.70	18.96	1.500	3.02	7.03	+19.0			
1100	1.10	18.97	1.518	3.30	7.06	54.7	8.90		
1105	1.45	18.94	1.549	3.33	7.05	57.7	8.87		
1113	1.95	18.91	1.574	3.34	7.04	57.1	8.96	↓	↓
1115	PUMP OFF								
1117	START SAMPLE COLLECTION								
1130	SAMPLE COMPLETED : 2 L					IPEC	Mid Quarter		
1130	PUMP OFF								

Equipment Used	Equipment Identification #
YSI 556 MPS Reader and 5563 Sonde	4
turbidity meter	20070429 3

NOTES AND OBSERVATIONS: Mid Quarter Sample.

WELL ID: MW 31 - 85

SAMPLE ID: 024

GZA GeoEnvironmental of New York
Waterloo Sampling Data Sheet

CLIENT: Entergy - IPEC
SITE: Buchanan, NY
WEATHER: Sunny 70's

PROJECT NO: 01.0017869.92
DATE: 6/7/10
SAMPLER(S): MB

SAMPLING INTERVAL (depth in ft below top of casing)

69.8 to 85.4

SAMPLING PORT

85

TOTAL VOLUME PURGED: 1.40 gal

PURGE RATE: variable (gal / min)

PURGE METHOD: Double Valve Pump

WATER QUALITY:

Time	Purged Volume (gal)	Temp (°C)	Specific Conductivity (S/cm)	Dissolved Oxygen (g/l)	pH (SU)	ORP	Turbidity (NTU)	Drive/Vent Cycle (seconds)	Drive Pressure (psi)
1030	0	PUMP	ON					6/7	28
1040	0.05	19.52	2.056	2.52	7.06	-124.6	—	7/10	30
1050	0.10	19.90	2.083	3.41	7.07	-76.9			
1100	0.20	19.32	2.100	3.79	7.08	-35.2	8.79		
1105	0.35	19.61	2.096	3.87	7.09	-17.7	8.89		
1113	0.50	19.63	2.100	3.93	7.11	+19.6	8.99		
1122	0.80	19.70	2.105	3.91	7.11	+29.7	9.02	↓	↓
1130	1.00	19.73	2.098	3.90	7.10	31.6	9.08	7/10	32
1136	1.25	19.78	2.098	3.93	7.11	31.9	9.10	7/10	32
1137		PUMP	OFF						
1138		START							
1200		SAMPLE	COMPLETED	: 2 L		IPEC	Mid Quarter		
1200		PUMP	OFF						

Equipment Used	Equipment Identification #
YSI 556 MPS Reader and 5563 Sonde	2
turbidity meter	20070493

NOTES AND OBSERVATIONS: Mid Quarter Sample

WELL ID: MW-35
SAMPLE ID: 020

GZA GeoEnvironmental of New York
Low-Flow Sampling Data Sheet

CLIENT: Entergy - IPEC
SITE: Buchanan, NY
WEATHER: M. Sunny 70's

PROJECT NO: 01.0017869.92
DATE: 5/20/10
SAMPLER(S): M. BRITOS
PUMP DEPTH: 15 ft

WATER QUALITY: DTW = 7.77 Transducer Actual Depth = 17.64 Transd. reading = 10.551

Time	DTW or Actual Depth	Temp (^{0}C)	Specific Conductivity (S/cm)	Dissolved Oxygen (g/l)	pH (SU)	ORP	Turbidity (NTU)	Flow Rate (gal/hr)	Purged Notes H_2O (gal)
1011	17.64								
1017	17644	PUMP ON							
1027	17.600	16.04	0.683	4.43	7.05	-53.7	—	1.0	
1037	17.580	16.51	0.677	1.95	7.09	-67.6	11.43		
1047	17.580	17.04	0.675	1.68	7.12	-73.7	11.46		0.2
1054	17.582	17.37	0.674	1.63	7.11	-76.9	9.52		
1103	17.591	17.80	0.672	1.52	7.13	-81.7	10.52		
1113	17.596	18.21	0.671	1.46	7.13	-84.0	10.10		
1118	17.591	18.42	0.671	1.43	7.13	-85.9	10.07		
1123	17.595	18.51	0.670	1.40	7.14	-87.1	10.02		
1128	17.595	18.56	0.670	1.41	7.14	-87.8	10.10		0.5
1130	START SAMPLE COLLECTION								
1325	SAMPLE COMPLETED :				2	L. IPEC			
					0.5	L IPEC			
1325	PUMP OFF								

Equipment Used	Equipment Identification #
YSI 556 MPS Reader and 5563 Sonde	3
flow meter	4
turbidity meter	20070493

NOTES AND OBSERVATIONS: Total volume purged 0.65 gal

Depth and Depth to Water (DTW) measurements are given in feet from top of casing.

Groundwater Elevation measurements are given in feet msl.

WELL ID: LAF-002
SAMPLE ID: 013

GZA GeoEnvironmental of New York
Low-Flow Sampling Data Sheet

CLIENT: Entergy - IPEC
SITE: Buchanan, NY
WEATHER: Sun + clouds 60's

PROJECT NO: 01.0017869.92
DATE: 5/11/10
SAMPLER(S): M. Britos
PUMP DEPTH: _____ ft

WATER QUALITY: DTW = 74.25 Transducer Actual Depth

Time	DTW or Actual Depth	Temp (°C)	Specific Conductivity (S/cm)	Dissolved Oxygen (g/l)	pH (SU)	ORP	Turbidity (NTU)	Drive/Vent Cycle (seconds)	Drive Pressure (psi)	purged Notes H_2O (gal)
1033	74.25	PUMP ON						6/21	50	0
1050	74.25	17.70	—	—	6.94	181.2	—			0.01
1100	74.27	17.17	2.401	9.71	6.58	174.2	—			
1109	74.30	16.61	2.616	9.70	6.50	162.1	8.87			
1117	74.32	16.74	2.606	8.37	6.47	80.7	10.28			0.10
1127	74.35	16.71	2.611	5.40	6.47	40.8	8.45			
1135	74.38	17.12	2.601	4.24	6.44	35.2	9.28			0.15
1144	74.42	17.69	2.599	3.32	6.44	32.2	9.80	↓		
1151	74.45	17.86	2.606	2.85	6.46	29.6	9.74	6/24		0.20
1156	74.48	17.89	2.605	2.83	6.46	29.0	9.79	↓		
1201	74.50	18.04	2.603	2.80	6.47	28.3	9.81	↓	↓	0.25
1202		START SAMPLE COLLECTION								
1344		SAMPLE COMPLETED :				2	L	IPEC		
						0.5	L	IPEC		
1344		PUMP OFF								

Equipment Used	Equipment Identification #
YSI 556 MPS Reader and 5563 Sonde	5
turbidity meter	20070429 3

NOTES AND OBSERVATIONS:

Total volume purged 0.40 gal

Depth and Depth to Water (DTW) measurements are given in feet from top of casing.

Groundwater Elevation measurements are given in feet msl.

WELL ID: MW 60 - 176

SAMPLE ID: 013

GZA GeoEnvironmental of New York
Waterloo Sampling Data Sheet

CLIENT: Entergy - IPEC
SITE: Buchanan, NY
WEATHER: Mostly sunny, windy 60's

PROJECT NO: 01.0017869.92
DATE: 5/10/10
SAMPLER(S): M. BRITOS

SAMPLING INTERVAL (depth in ft below top of casing)

170.9 to 200.4

SAMPLING PORT

176

TOTAL VOLUME PURGED: 0.55 gal

PURGE RATE: variable (gal / min)

PURGE METHOD: Double Valve Pump

WATER QUALITY:

Time	Purged Volume (gal)	Temp (°C)	Specific Conductivity (S/cm)	Dissolved Oxygen (g/l)	pH (SU)	ORP	Turbidity (NTU)	Drive/Vent Cycle (seconds)	Drive Pressure (psi)
1050	0	PUMP	ON					6/5	31
1100	0.01	15.53	0.772	2.81	8.22	-63.1	—	↓	↑
1105	0.05	15.85	0.771	2.30	8.08	-63.6	9.37		
1113	0.10	16.25	0.765	1.53	7.85	-66.2	9.09		
1121	0.15	16.56	0.762	1.17	7.57	-56.0	8.71		
1130	0.20	16.62	0.761	0.96	7.44	-50.8	8.88		
1140	0.25	16.69	0.761	0.70	7.64	-71.8	8.26		
1150	0.30	16.81	0.760	0.56	7.74	-87.9	8.19		
1155	0.35	16.87	0.760	0.55	7.76	-89.4	8.10		
1203	0.40	16.90	0.759	0.54	7.79	-91.1	8.16	↓	↓
1204		PUMP	OFF						
1206		START	SAMPLE	COLLECTION					
1329		SAMPLE	COMPLETED	:	2	L IPEC			
					0.5	L IPEC			
1329		PUMP OFF							

Equipment Used	Equipment Identification #
YSI 556 MPS Reader and 5563 Sonde	
turbidity meter	200704293

NOTES AND OBSERVATIONS:

WELL ID: MW 60-154

SAMPLE ID: 013

GZA GeoEnvironmental of New York
Waterloo Sampling Data Sheet

CLIENT: Entergy - IPEC
SITE: Buchanan, NY
WEATHER: M. Sunny, windy 60's

PROJECT NO: 01.0017869.92
DATE: 5/10/10
SAMPLER(S): M. BRITOS

SAMPLING INTERVAL (depth in ft below top of casing)

147.4 to 164.9

SAMPLING PORT

154 2

TOTAL VOLUME PURGED: 1.95 gal

PURGE RATE: variable (gal / min)

PURGE METHOD: Double Valve Pump

WATER QUALITY:

Time	Purged Volume (gal)	Temp (°C)	Specific Conductivity (S/cm)	Dissolved Oxygen (g/l)	pH (SU)	ORP	Turbidity (NTU)	Drive/Vent Cycle (seconds)	Drive Pressure (psi)
1050	0	PUMP	ON					6/5	31
1100	0.01	14.72	1.833	1.70	6.71	-76.9	—		
1105	0.2	14.71	1.868	0.80	6.77	-77.1	10.98		
1113	0.4	14.72	1.896	0.49	6.89	-71.4	9.29		
1121	0.6	14.82	1.919	0.36	7.01	-58.4	8.15		
1130	0.85	14.78	1.944	0.30	7.08	-56.3	7.63		
1140	1.0	14.65	1.968	0.29	7.15	-67.1	7.09		
1150	1.2	14.72	1.969	0.27	7.18	-79.2	6.88		
1155	1.4	14.74	1.969	0.25	7.19	-84.6	6.80		
1203	1.6	14.79	1.967	0.25	7.20	-82.2	6.76		
1208	1.8	14.81	1.965	0.24	7.21	-84.7	6.72		
1209		PUMP	OFF						
1210		START SAMPLE COLLECTION							
1232		SAMPLE COMPLETED : 2 L IPEC							
					0.5 L IPEC				
1232		PUMP	OFF						

Equipment Used	Equipment Identification #
YSI 556 MPS Reader and 5563 Sonde	6
turbidity meter	200704293

NOTES AND OBSERVATIONS:

WELL ID: MW 60 - 135

SAMPLE ID: 013

GZA GeoEnvironmental of New York
Waterloo Sampling Data Sheet

CLIENT: Entergy - IPEC
SITE: Buchanan, NY
WEATHER: Sunny, windy 60's

PROJECT NO: 01.0017869.92
DATE: 5/10/10
SAMPLER(S): M. BRITOS

SAMPLING INTERVAL (depth in ft below top of casing)

124.9 to 141.4

SAMPLING PORT

135 3

TOTAL VOLUME PURGED: 1.55 gal

PURGE RATE: variable (gal / min)

PURGE METHOD: Double Valve Pump

WATER QUALITY:

Time	Purged Volume (gal)	Temp (°C)	Specific Conductivity (S/cm)	Dissolved Oxygen (g/l)	pH (SU)	ORP	Turbidity (NTU)	Drive/Vent Cycle (seconds)	Drive Pressure (psi)
1050								6/5	31
1100	0.1	14.75	2.435	1.94	5.40	-50.6	—		
1105	0.15	14.66	2.328	1.01	6.16	-67.9	13.21		
1113	0.25	14.53	2.218	0.57	7.18	-96.2	10.02		
1121	0.45	14.46	2.176	0.39	7.37	-108.9	9.04		
1130	0.70	14.39	2.208	0.26	7.39	-118.5	8.62		
1140	0.90	14.34	2.260	0.20	7.40	-138.2	8.45		
1150	1.20	14.40	2.270	0.19	7.38	-139.3	8.39		
1155	1.40	14.38	2.286	0.17	7.36	-142.0	8.47		
1156		PUMP	OFF						
1158		START	SAMPLE	COLLECTION					
1221		SAMPLE	COMPLETED	:	2 L	IPEC			
					0.5 L	IPEC			
1221		PUMP OFF							

Equipment Used	Equipment Identification #
YSI 556 MPS Reader and 5563 Sonde	3
turbidity meter	20070429 3

NOTES AND OBSERVATIONS:

WELL ID: MW 60- 72

SAMPLE ID: 013

GZA GeoEnvironmental of New York
Waterloo Sampling Data Sheet

CLIENT: Entergy - IPEC
SITE: Buchanan, NY
WEATHER: M. Sunny, windy 60's

PROJECT NO: 01.0017869.92
DATE: 5/10/10
SAMPLER(S): M. BRITOS

SAMPLING INTERVAL (depth in ft below top of casing)

66.4 to 78.2

SAMPLING PORT

72 4

TOTAL VOLUME PURGED: 3.15 gal

PURGE RATE: variable (gal / min)

PURGE METHOD: Double Valve Pump

WATER QUALITY:

Time	Purged Volume (gal)	Temp (°C)	Specific Conductivity (S/cm)	Dissolved Oxygen (g/l)	pH (SU)	ORP	Turbidity (NTU)	Drive/Vent Cycle (seconds)	Drive Pressure (psi)
1050		PUMP	ON					6/5	31
1100	0.20	14.52	4.565	1.68	7.05	-34.0	15.76		
1105	0.40	14.47	4.401	0.91	7.28	-24.8	13.10		
1113	0.75	14.45	4.236	0.69	7.37	- 6.2	1135		
1121	1.10	14.44	4.123	0.50	7.41	+ 5.3	11.02		
1130	1.50	14.39	4.088	0.50	7.43	+17.1	10.20		
1140	2.00	14.42	4.059	0.44	7.45	+29.9	9.94		
1150	2.60	14.50	4.040	0.42	7.46	+31.1	9.89		
1155	3.00	14.51	4.036	0.41	7.47	+32.3	9.98		
1156		PUMP	OFF						
1158		START							
1211		SAMPLE	COMPLETED		: 2 L	IPEC			
					0.5 L	IPEC			
1211		PUMP	OFF						

Equipment Used	Equipment Identification #
YSI 556 MPS Reader and 5563 Sonde	2
turbidity meter	20070 4293

NOTES AND OBSERVATIONS:

WELL ID: MW60 - 53

SAMPLE ID: 013

GZA GeoEnvironmental of New York
Waterloo Sampling Data Sheet

CLIENT: Entergy - IPEC
SITE: Buchanan, NY
WEATHER: Mostly Sunny, windy 60's

PROJECT NO: 01.0017869.92
DATE: 5/10/10
SAMPLER(S): M. BRITOS

SAMPLING INTERVAL (depth in ft below top of casing)

45.4 to 59.4

SAMPLING PORT

53 6

TOTAL VOLUME PURGED: 1.45 gal

PURGE RATE: variable (gal / min)

PURGE METHOD: Double Valve Pump

WATER QUALITY:

Time	Purged Volume (gal)	Temp (°C)	Specific Conductivity (S/cm)	Dissolved Oxygen (g/l)	pH (SU)	ORP	Turbidity (NTU)	Drive/Vent Cycle (seconds)	Drive Pressure (psi)
1423	0	PUMP	ON					5/7	20
1430	0.05	15.82	3.109	1.41	6.86	-4.1	—	5/7	22
1435	0.15	15.32	3.083	1.56	7.15	-9.2	8.97		
1441	0.30	15.48	3.047	1.64	7.34	+0.9	9.67		
1450	0.50	15.39	3.019	1.63	7.49	+13.6	6.15		
1455	0.70	15.34	3.012	1.63	7.51	+19.4	5.96		
1503	0.90	15.15	3.018	1.64	7.56	26.2	5.66		
1508	1.0	15.22	3.004	1.66	7.58	29.9	5.60		
1513	1.1	15.29	3.004	1.70	7.59	32.5	5.54		
1518	1.3	15.26	3.000	1.69	7.59	33.4	5.57	↓	↓
1519		PUMP	OFF						
1520		START SAMPLE COLLECTION							
		SAMPLE COMPLETED			: 2	L IPEC			
					0.5	L IPEC			
		PUMP	OFF						

Equipment Used	Equipment Identification #
YSI 556 MPS Reader and 5563 Sonde	2
turbidity meter	200704293

NOTES AND OBSERVATIONS:

WELL ID: MW 60 - 35

SAMPLE ID: 013

GZA GeoEnvironmental of New York
Waterloo Sampling Data Sheet

CLIENT: Entergy - IPEC
SITE: Buchanan, NY
WEATHER: Mostly Sunny, windy 60's

PROJECT NO: 01.0017869.92
DATE: 5/10/10
SAMPLER(S): M. BRITOS

SAMPLING INTERVAL (depth in ft below top of casing)

24.9 to 39.4

SAMPLING PORT

35 7

TOTAL VOLUME PURGED: 1.05 gal

PURGE RATE: variable (gal / min)

PURGE METHOD: Double Valve Pump

WATER QUALITY:

Time	Purged Volume (gal)	Temp (°C)	Specific Conductivity (S/cm)	Dissolved Oxygen (g/l)	pH (SU)	ORP	Turbidity (NTU)	Drive/Vent Cycle (seconds)	Drive Pressure (psi)
1423	0	PUMP ON						5/7	20
1430	0.15	15.23	3.234	1.99	6.93	251.8	—	5/7	22
1435	0.20	15.45	3.164	2.02	7.87	189.3	8.05		
1441	0.30	15.62	3.119	2.04	8.06	99.1	5.37		
1450	0.40	16.19	3.071	2.02	8.03	27.9	4.27		
1455	0.50	16.26	3.059	2.07	7.87	3.2	3.86		
1503	0.60	16.48	3.020	2.52	7.64	-3.5	3.54		
1508	0.70	16.50	3.000	2.55	7.60	-3.8	3.47		
1513	0.80	16.46	2.967	2.60	7.60	-3.4	3.39		
1518	0.90	16.43	2.943	2.62	7.59	-3.0	3.42		
1519		PUMP	OFF						
1520		START	SAMPLE COLLECTION						
1558		SAMPLE	COMPLETED		2	L IPEC			
					0.5	L IPEC			
1558		PUMP	OFF						

Equipment Used	Equipment Identification #
YSI 556 MPS Reader and 5563 Sonde	3
turbidity meter	200704293

NOTES AND OBSERVATIONS:

APPENDIX F: DOSE CALCULATIONS

Facility Groundwater Flux Calculation

Site Indian Point
Job No. 17869.92

Prepared By: JAS
Reviewed By: mjb

Parameter Values:

year: **2010**

Totals					
	Total Catchment Zone (ft^2)	**Total Improved Zone (ft^2)**	**Recharge (ft/yr)**	**Precipitation (ft/yr)**	
	3,969,765	1,432,972	0.83	3.18	
Surface Area					
Northern Clean Zone Improved (ft^2)	**Unit 2 North Improved Zone (ft^2)**	**Unit 1/2 Improved Zone (ft^2)**	**Unit 3 North Improved Zone (ft^2)**	**Unit 3 South Improved Zone (ft^2)**	**Southern Clean Improved Zone (ft^2)**
0	148,214	433,904	316,210	321,290	213,354
Northern Clean Unimproved Zone (ft^2)	**Unit 2 North Unimproved Zone (ft^2)**	**Unit 1/2 Unimproved Zone (ft^2)**	**Unit 3 North Unimproved Zone (ft^2)**	**Unit 3 South Unimproved Zone (ft^2)**	**Southern Clean Zone Unimproved (ft^2)**
106,429	204,317	438,221	323,116	268,862	585,600
Discounted Area Within Zone	**Discounted Area Within Zone**	**Discounted Area Within Zone**	**Discounted Area Within Zone**	**Discounted Area Within Zone**	**Discounted Area Within Zone**
50,265	0	291,186	106,718	17,730	144,347
Northern Clean Zone Catchment (ft^2)	**Unit 2 North Catchment Zone (ft^2)**	**Unit 1/2 Catchment Zone (ft^2)**	**Unit 3 North Catchment Zone (ft^2)**	**Unit 3 South Zone (ft^2)**	**Southern Clean Zone (ft^2)**
156,694	352,531	1,163,311	746,044	607,882	943,302
Activity (pCi/L)					
Groundwater					
Northern Clean Zone Catchment	**Unit 2 North**	**Unit 1/2**	**Unit 3 North**	**Unit 3 South Zone**	**Southern Clean Zone**
Upper Zone Before Canal					
150	337	4,088	399	711	184
Lower Zone Before Canal					
150	239	3,077	1,326	536	183
Northern Clean Zone	**Unit 2 North**	**Unit 1/2**	**Unit 3 North**	**Unit 3 South Zone**	**Southern Clean Zone**
Upper Zone After Canal					
150	256	3,290	322	711	184
Lower Zone After Canal					
150	492	968	521	536	183
Stormwater Discharging to Canal (pCi/L)					
Storm Water for Northern Clean Zone	**Storm Water for Unit 2 North**	**Storm Water for Unit 1/2**	**Storm Water for Unit 3 North**	**Storm Water for Unit 3 South**	**Storm Water for Southern Clean Zone**
	1,831		0	1,119	377
NA	*Avg MH-4a*	*NA*	*Avg CB-14 and CB-34*	*Avg U3-CB-B8*	*Avg D1, C3, E6, & E10*
Stormwater Discharging to River (pCi/L)					
Storm Water for Northern Clean Zone	**Storm Water for Unit 2 North**	**Storm Water for Unit 1/2**	**Storm Water for Unit 3 North**	**Storm Water for Unit 3 South**	**Storm Water for Southern Clean Zone**
	129	0	0		201
NA	*Avg. MH-1 and MH-12*	*Avg MH-14*	*Avg CB-15*	*NA*	*Avg E13,CB-C2*

Potential Water Received by Storm Drain System

=(Improved Area) x Precipitation

Northern Clean Area	Unit 2 North	Unit 1/2	Unit 3 North	Unit 3 South	Southern Clean Zone	Units
0	470,579	1,377,646	1,003,968	1,020,094	677,400	ft^3/yr
0	1,289	3,774	2,751	2,795	1,856	ft^3/day
0.00	6.70	19.61	14.29	14.52	9.64	GPM
0	13,325,316	39,010,581	28,429,198	28,885,854	19,181,845	L/Yr

The total amount of water available to be received by the storm system is computed as the combined area of buildings and paved areas in the catchment multiplied by the annual precipitation rate. Note this conservatively assumes that the amount of water lost to the atmosphere or other sinks after precipitation has fallen on paved or built up surfaces is zero.

Water Directly Recharged to Aquifer from Precipitation

=Unimproved Area x Recharge

Northern Clean Area	Unit 2 North	Unit 1/2	Unit 3 North	Unit 3 South	Southern Clean Zone	Units
87,857	168,664	361,752	266,732	221,946	483,413	ft^3/yr
241	462	991	731	608	1,324	ft^3/day
1.25	2.40	5.15	3.80	3.16	6.88	GPM
2,487,841	4,776,030	10,243,665	7,553,005	6,284,809	13,688,731	L/Yr

Note that this calculation reflects recharge to the aquifer in non-paved areas. The Recharge value listed above and used in this calculation reflects only that portion of precipitation that actually recharges the aquifer.

Facility Groundwater Flux Calculation

Site Indian Point
Job No. 17869.92

Prepared By: JAS
Reviewed By: mjb

Water Recharged to Aquifer (Direct Recharge Plus Storm Water Leakage Minus Building Drain Removal)

=(Direct Recharge + X% Water Received by Storm System) - (Y% x Water Removed by Building Drains)

Total Water Discharged to Aquifer

Upper and Lower Zone	[Northern Clean Area Catchment + (0% Storm Drain Water)][1]	[Unit 2 North + (50% Storm Drain Water)]-[5gpm]	[Unit 1/2 Area Catchment + (30% Storm Drain Water)]-[7.5 gpm]	[Unit 3 North Area Catchment + (60% Storm Drain Water)]-[7.5gpm]	[Unit 3 South Area + (10% Storm Drain Water)]	[Southern Clean Zone Area + (40% Storm Drain Water)]	Units
	87,857	52,641	248,077	342,144	323,955	754,373	ft^3/yr
	241	144	680	937	888	2,067	ft^3/day
	1.25	0.75	3.53	4.87	4.61	10.74	GPM
	2,487,841	1,490,627	7,024,746	9,688,431	9,173,395	21,361,469	L/Yr

[1] There are no improved surfaces in Northern Clean Zone.

Groundwater Discharged to Canal

=Water Recharged to Aquifer x X% flowing to Canal

Upper and Lower Zone	Northern Clean Area Catchment x 0%	Unit 2 North x 15.2%	Unit 1/2 Area Catchment 24.2%	Unit 3 North Area Catchment x 22.9%	Unit 3 South Area x68.4%	Southern Clean Zone Area x 0%	Units
	0	8,001	60,035	78,351	221,585	0	ft^3/yr
	0	22	164	215	607	0	ft^3/day
	0.00	0.11	0.85	1.12	3.15	0.00	GPM
	0	226,575	1,699,989	2,218,651	6,274,602	0	L/Yr

Groundwater Discharged to River

=Water Recharged to Aquifer x X% flowing to River x Y% Flowing in Appropriate Vertical Zone

	Northern Clean Area Catchment x 100% x 59.3%	Unit 2 North x 84.8% x 15.1%	Unit 1/2 Area Catchment x 75.8% x 11.7%	Unit 3 North Area Catchment x 77.1% x 47.9%	Unit 3 South Area x 31.6% x 31.3%	Southern Clean Zone Area x 100% x 55.2%	Units
Upper Zone	52,099	6,741	22,001	126,357	32,042	416,414	ft^3/yr
	143	18	60	346	88	1,141	ft^3/day
	0.74	0.10	0.31	1.80	0.46	5.93	GPM
	1,475,290	190,872	622,997	3,578,025	907,322	11,791,531	L/Yr
	Northern Clean Area Catchment x 100% x 40.7%	**Unit 2 North x 84.8% x 84.9%**	**Unit 1/2 Area Catchment 75.8% x 88.3%**	**Unit 3 North Area Catchment x 77.1% x 52.1%**	**Unit 3 South Area x 31.6% x 68.7%**	**Southern Clean Zone Area x 100% x 44.8%**	**Units**
Lower Zone	35,758	37,899	166,041	137,436	70,328	337,959	ft^3/yr
	98	104	455	377	193	926	ft^3/day
	0.51	0.54	2.36	1.96	1.00	4.81	GPM
	1,012,551	1,073,180	4,701,761	3,891,756	1,991,471	9,569,938	L/Yr

Water Remaining in Storm Drains and Discharged to Canal

=Storm Drain Water x X% Not Leaking to Groundwater and Not Discharging to River

Northern Clean Area Catchment (0% Storm Drain Water)	Unit 2 North (45% Unit 2 North and 30% of Unit 1/2 Storm Drain Water). Plus 5 gpm (351k cf/yr) from U2 footing drain.	Unit 1/2 Area Catchment (0% Storm Drain Water)	Unit 3 North Area Catchment (3% Unit 3 North Storm Drain Water)	Unit 3 South Area (3% Unit 3 North and 42% Unit 3 South Storm Drain Water)	Southern Clean Zone Area (30% Unit 1/2, 27% Unit 3 North, 43% Unit 3 South, and 55% Southern Clean Zone Storm Drain Water)	Units
0	976,054	0	30,119	458,559	1,495,576	ft^3/yr
0	2,674	0	83	1,256	4,097	ft^3/day
0	13.89	0.00	0.43	6.53	21.29	GPM
0	27,640,118	0	852,876	12,984,935	42,349,990	L/Yr

Water Remaining in Storm Drains and Discharged to River

Northern Clean Area Catchment (0% Storm Drain Water)	Unit 2 North (5% Storm Drain Water)	Unit 1/2 Area Catchment (10% Storm Drain Water)	Unit 3 North Area Catchment (7% Storm Drain Water)	Unit 3 South Area (5% Storm Drain Water)	Southern Clean Zone Area (5% Storm Drain Water)	Units
0	23,529	137,765	70,278	51,005	33,870	ft^3/yr
0	64	377	193	140	93	ft^3/day
0	0.33	1.96	1.00	0.73	0.48	GPM
0	666,266	3,901,058	1,990,044	1,444,293	959,092	L/Yr

Facility Groundwater Flux Calculation

Site Indian Point
Job No. 17869.92

Prepared By: JAS
Reviewed By: mjb

Flux Calculations

Conceptual Model: Migration Pathway Summary

	Northern Clean Area	Unit 2 North	Unit 1/2	Unit 3 North	Unit 3 South	Southern Clean Zone
GW	100% Upper and Lower Zone To River	84.8% Upper Zone and Lower Zone Flow To River. 15.2% Upper Zone and Lower Zone Flow to Canal	75.8% Upper Zone and Lower Zone To River. 24.2% Upper Zone and Lower Zone to Canal	77.1% Upper Zone and Lower Zone To River. 22.9% Upper Zone and Lower Zone to Canal	31.6% Upper Zone and Lower Zone To River. 68.4% Upper Zone and Lower Zone to Canal	100% Upper and Lower Zone To River
SW	NA	To Canal (Storm Water Considered Clean; Estimated at 5.5 GPM) and To River (5% Storm Water)	To Canal (60% Storm Water) and To River (10% Storm Water)	To Canal (33% Storm Water) and To River (7% Storm Water)	To Canal (85% Storm Water) and To River (5% Storm Water)	To Canal (55% Storm Water) and To River (5% Storm Water)

Flux (pCi/Yr)

	North Clean Area	Unit 2 North	Unit 1/2	Unit 3 North	Unit 3 South	South Clean Zone	Total
GW to River-Upper Zone	2.21E+08	4.88E+07	2.05E+09	1.15E+09	6.45E+08	2.17E+09	**6.28E+09**
GW to River-Lower Zone	1.52E+08	5.28E+08	4.55E+09	2.03E+09	1.07E+09	1.75E+09	**1.01E+10**
GW to Canal	0.00E+00	7.64E+07	6.95E+09	8.84E+08	4.46E+09	0.00E+00	**1.24E+10**
SW to Canal	NA	5.06E+10	0.00E+00	0.00E+00	1.45E+10	1.60E+10	**8.11E+10**
SW to River	NA	8.61E+07	0.00E+00	0.00E+00	0.00E+00	1.93E+08	**2.79E+08**
						Curies/Yr ==>	**0.11**

Notes:

The recharge rate used herein, 26% of precipitation (~10 in/yr), is within the range of values discussed in the USGS modeling report[1]. The reported recharge ranged from 3.6 inches/year to 7.5 inches/year for a till to 20 inches per year for coarse grained glacially stratified deposits. A yearly rolling average precipitation value measured at the Facility meteorological station is also used in the computations. The catchment area was defined using an AutoCAD topo map for the Site and surrounding area. The catchment was defined by starting at the area marked "line of water grant" and tracking east, away from the River, to define portions of the land surface contributing water to the selected discharge zone. Calculations assume that run-off or overland flow in unimproved areas of the Site is negligible, there are no changes in storage and the Hudson River is a gaining stream.

1. USGS. Water Use, Ground-Water Recharge and Availability, and Quality of Water in the Greenwich Area, Fairfield County, Connecticut and Westchester County, New York, 2000-2002

APPENDIX G: UNIT 2 TRITIUM PLUME TREND ANALYSES

TABLE G1
MANN-KENDALL TREND EVALUATION SUMMARY
TRITIUM IN GROUNDWATER NEAR UNIT 2
INDIAN POINT ENERGY CENTER
BUCHANAN, NY

Well ID	Number of Data Points	Number of Times below MDC	Minimum Tritium Activity (pCi/L)	Maximum Tritium Activity (pCi/L)	Mann-Kendall Statistic (S)	Normalized Test Statistic (Z)	Probability	Trend at 95% Level of Significance
MW-30-69	36	0	7.36E+04	6.01E+05	-159	-2.15	0.984	decreasing
MW-30-84	23	0	3.78E+03	1.25E+04	35	0.90	0.815	no trend
MW-31-49	35	0	2.98E+02	4.84E+04	-3	-0.03	0.511	no trend
MW-31-63	23	0	5.00E+03	7.35E+04	64	1.66	0.952	increasing
MW-31-85	23	0	3.17E+02	2.25E+04	102	2.67	0.996	increasing
MW-32-59	22	0	4.13E+02	1.55E+05	31	0.85	0.801	no trend
MW-32-85	21	0	5.42E+03	1.26E+04	30	0.88	0.809	no trend
MW-32-149	18	0	1.99E+02	1.05E+04	-25	-0.91	0.818	no trend
MW-32-173	16	0	4.31E+02	5.89E+03	-38	-1.67	0.952	decreasing
MW-32-190	20	0	1.59E+03	1.13E+04	-124	-3.99	1.000	decreasing
MW-33	24	0	2.30E+04	2.64E+05	-121	-2.98	0.999	decreasing
MW-35	20	0	1.04E+03	1.19E+05	-88	-2.82	0.998	decreasing
MW-36-24	16	2	1.54E+02	3.42E+04	20	0.86	0.804	no trend
MW-36-41	11	0	6.11E+03	5.52E+04	-32	-2.41	0.992	decreasing
MW-36-52	16	0	5.97E+03	2.68E+04	-84	-3.74	1.000	decreasing
MW-37-22	18	0	2.26E+03	3.49E+04	-43	-1.59	0.944	no trend
MW-37-32	18	0	2.49E+03	3.01E+04	-55	-2.05	0.980	decreasing
MW-37-40	17	0	4.22E+03	1.70E+04	-100	-4.08	1.000	decreasing
MW-37-57	18	0	4.05E+03	4.48E+04	-93	-3.48	1.000	decreasing
MW-42-49	18	0	1.12E+03	7.22E+04	-41	-1.52	0.935	no trend
MW-42-78	13	0	3.46E+02	1.28E+03	-26	-1.53	0.936	no trend
MW-49-26	20	0	2.82E+03	1.54E+04	-158	-5.09	1.000	decreasing
MW-49-42	20	0	2.20E+03	1.13E+04	-148	-4.77	1.000	decreasing
MW-49-65	20	0	1.26E+03	5.76E+03	-129	-4.15	1.000	decreasing
MW-50-42	21	4	1.01E+02	9.75E+03	-42	-1.24	0.892	no trend
MW-50-66	25	0	2.08E+03	1.08E+04	-202	-4.69	1.000	decreasing
MW-53-82	15	0	4.54E+02	1.32E+04	-5	-0.20	0.578	no trend
MW-53-120	18	0	4.10E+03	9.61E+03	-93	-3.48	1.000	decreasing
MW-55-24	14	0	7.82E+02	3.08E+03	-14	-0.71	0.762	no trend
MW-55-35	13	0	8.53E+02	9.04E+03	-28	-1.65	0.950	decreasing
MW-55-54	14	0	5.47E+03	1.31E+04	-31	-1.64	0.950	no trend
MW-111	33	0	6.81E+03	5.78E+05	-219	-3.38	1.000	decreasing
DOWNGRADIENT WELLS								
MW-66-21	13	0	8.28E+01	3.57E+03	-18	-1.04	0.850	no trend
MW-66-36	12	0	3.05E+03	9.10E+03	-52	-3.50	1.000	decreasing
MW-67-39	11	0	2.55E+03	5.07E+03	-35	-2.65	0.996	decreasing
MW-67-105	12	0	1.54E+03	2.93E+03	-34	-2.26	0.988	decreasing
MW-67-173	12	0	6.73E+02	1.05E+03	-29	-1.92	0.973	decreasing
MW-67-219	11	0	9.22E+02	1.44E+03	-1	0.00	0.500	no trend
MW-67-276	11	0	6.79E+02	1.18E+03	0	0.00	0.500	no trend
MW-67-323	11	0	3.13E+02	1.29E+03	17	1.25	0.894	no trend
MW-67-340	11	0	3.69E+02	6.69E+02	31	2.34	0.990	increasing

Notes: Calculations based on Mann-Kendall trend evaluations as presented in U.S. EPA Practical Methods for Data Analysis, U.S. EPA QA/G-9 QA00 UPDATE, July 2000, Section 4.3.4

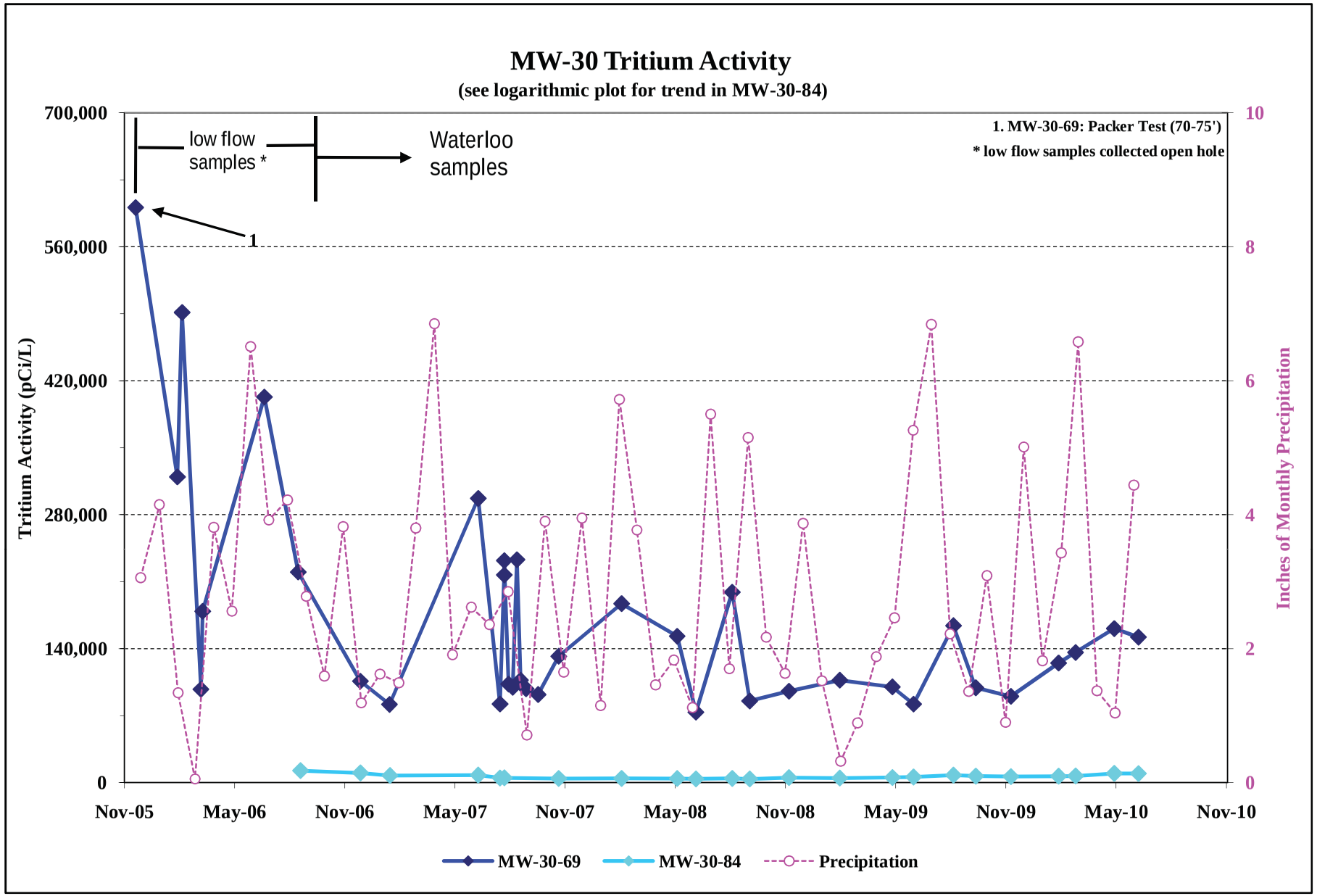

MW-30 Tritium Activity
(see logarithmic plot for trend in MW-30-84)
low flow samples *
Waterloo samples
1
1. MW-30-69: Packer Test (70-75')
* low flow samples collected open hole
Tritium Activity (pCi/L)
Inches of Monthly Precipitation
700,000
560,000
420,000
280,000
140,000
0
10
8
6
4
2
0
Nov-05
May-06
Nov-06
May-07
Nov-07
May-08
Nov-08
May-09
Nov-09
May-10
Nov-10
MW-30-69
MW-30-84
Precipitation

FIGURE G1

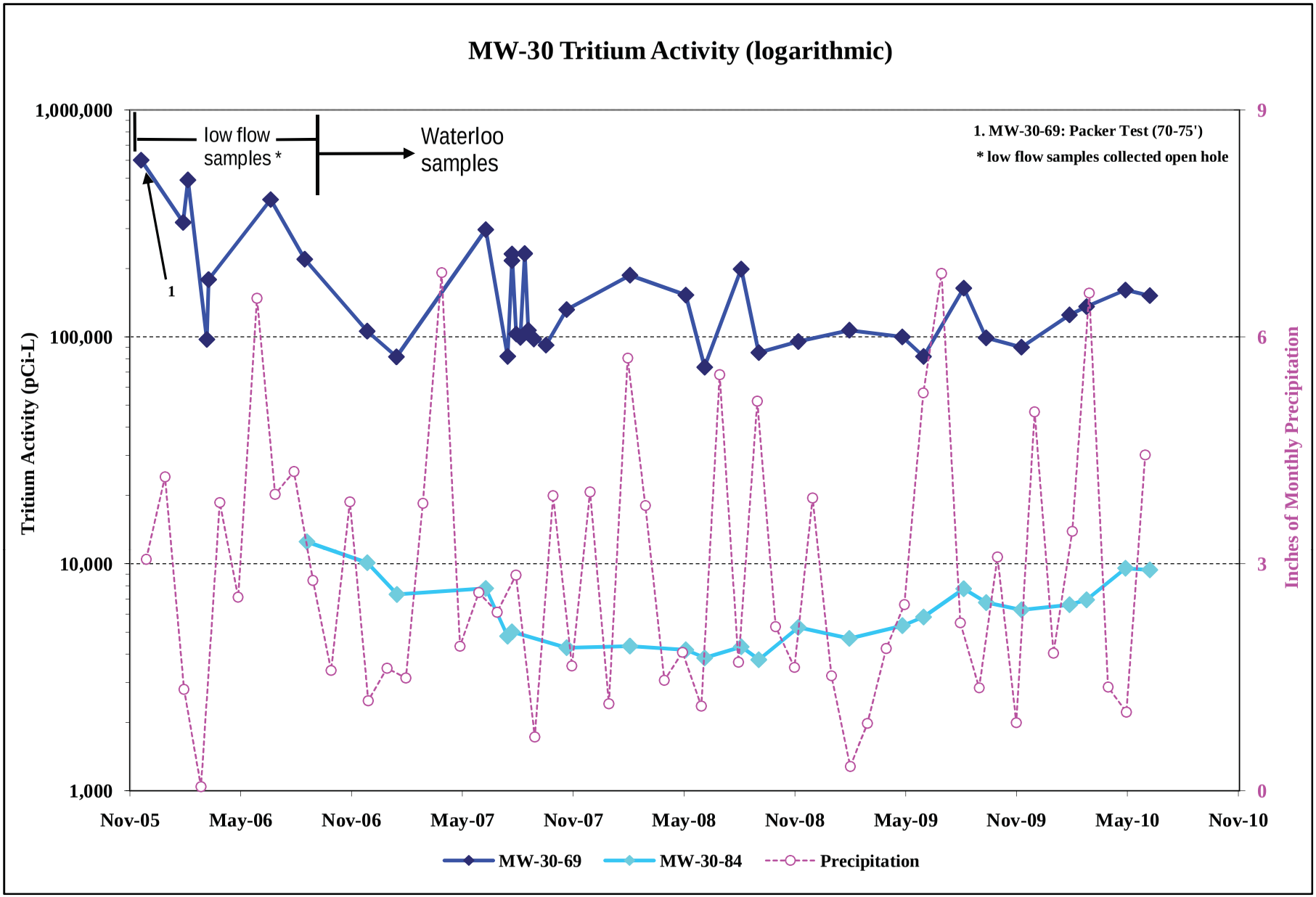

MW-30 Tritium Activity (logarithmic)
1,000,000
100,000
10,000
1,000
Tritium Activity (pCi-L)
9
6
3
0
Inches of Monthly Precipitation
low flow samples *
Waterloo samples
1
1. MW-30-69: Packer Test (70-75')
* low flow samples collected open hole
Nov-05
May-06
Nov-06
May-07
Nov-07
May-08
Nov-08
May-09
Nov-09
May-10
Nov-10
MW-30-69
MW-30-84
Precipitation

FIGURE G1a

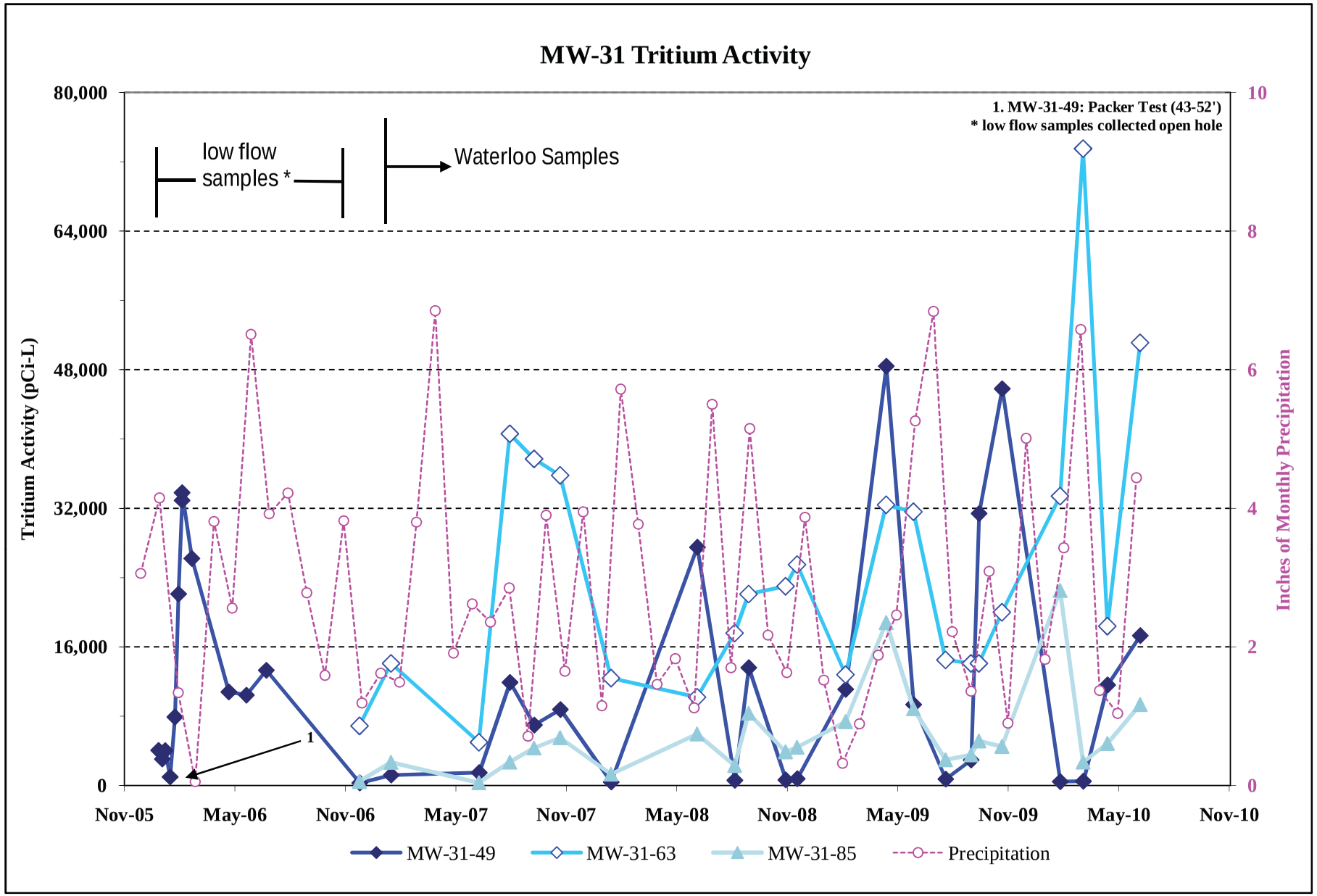

MW-31 Tritium Activity
1. MW-31-49: Packer Test (43-52')
* low flow samples collected open hole
low flow samples *
Waterloo Samples
Tritium Activity (pCi-L)
Inches of Monthly Precipitation
80,000
64,000
48,000
32,000
16,000
0
10
8
6
4
2
0
1
Nov-05
May-06
Nov-06
May-07
Nov-07
May-08
Nov-08
May-09
Nov-09
May-10
Nov-10
MW-31-49
MW-31-63
MW-31-85
Precipitation

FIGURE G2

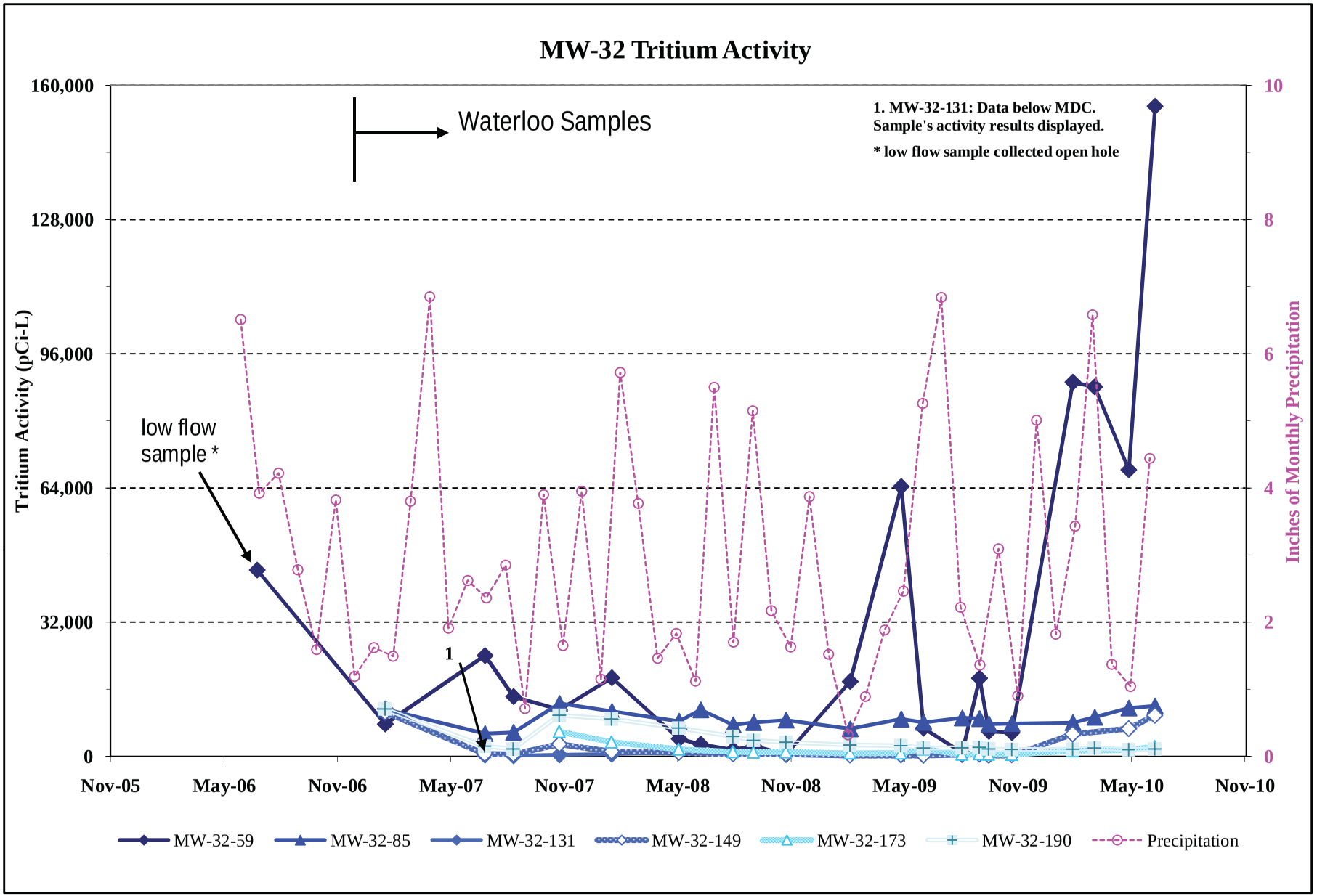

MW-32 Tritium Activity
Waterloo Samples
1. MW-32-131: Data below MDC.
Sample's activity results displayed.
* low flow sample collected open hole
low flow sample *
1
Tritium Activity (pCi-L)
Inches of Monthly Precipitation
160,000
128,000
96,000
64,000
32,000
0
10
8
6
4
2
0
Nov-05
May-06
Nov-06
May-07
Nov-07
May-08
Nov-08
May-09
Nov-09
May-10
Nov-10
MW-32-59
MW-32-85
MW-32-131
MW-32-149
MW-32-173
MW-32-190
Precipitation

FIGURE G3

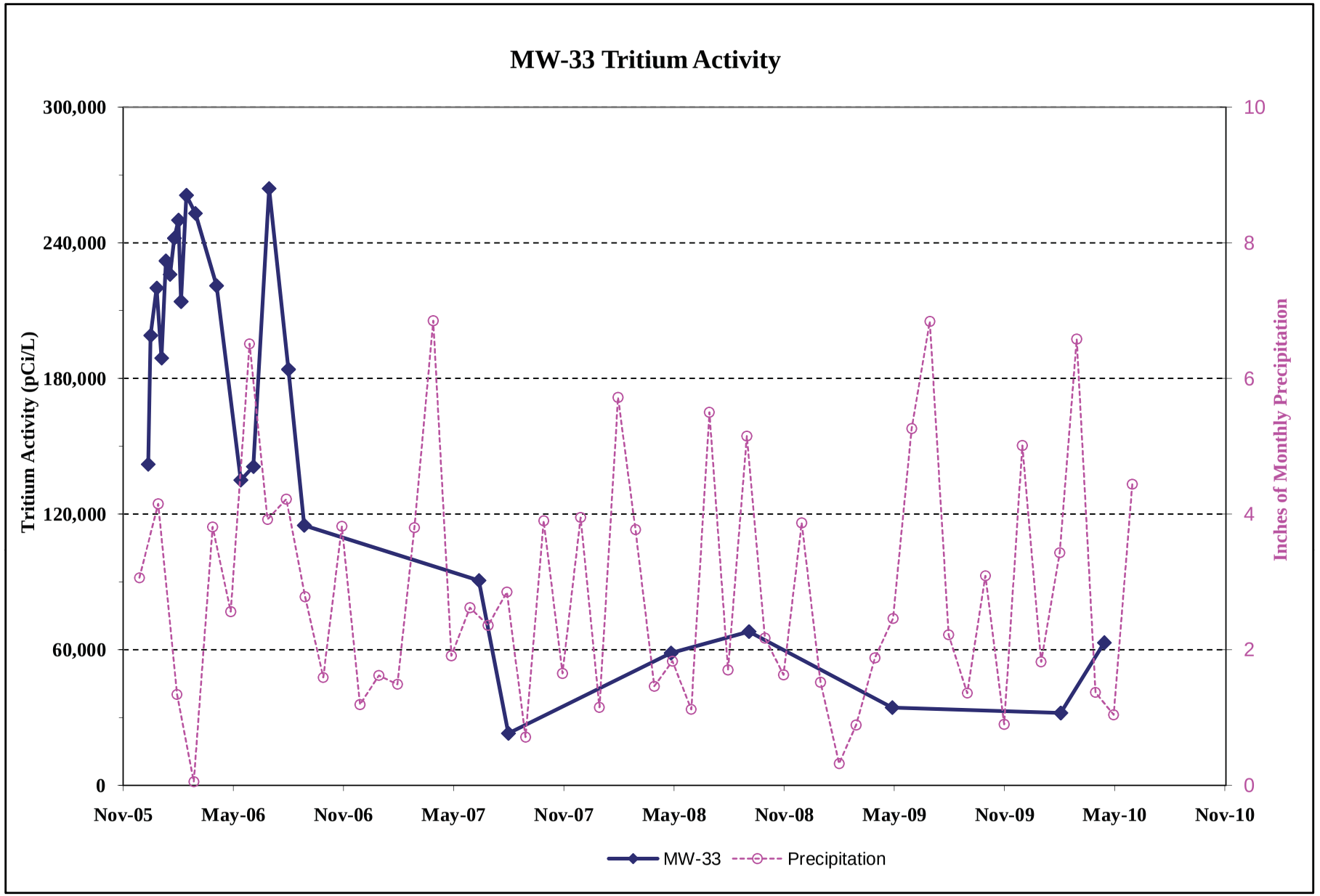

MW-33 Tritium Activity
300,000
240,000
180,000
120,000
60,000
0
Tritium Activity (pCi/L)
10
8
6
4
2
0
Inches of Monthly Precipitation
Nov-05
May-06
Nov-06
May-07
Nov-07
May-08
Nov-08
May-09
Nov-09
May-10
Nov-10
MW-33
Precipitation

FIGURE G4

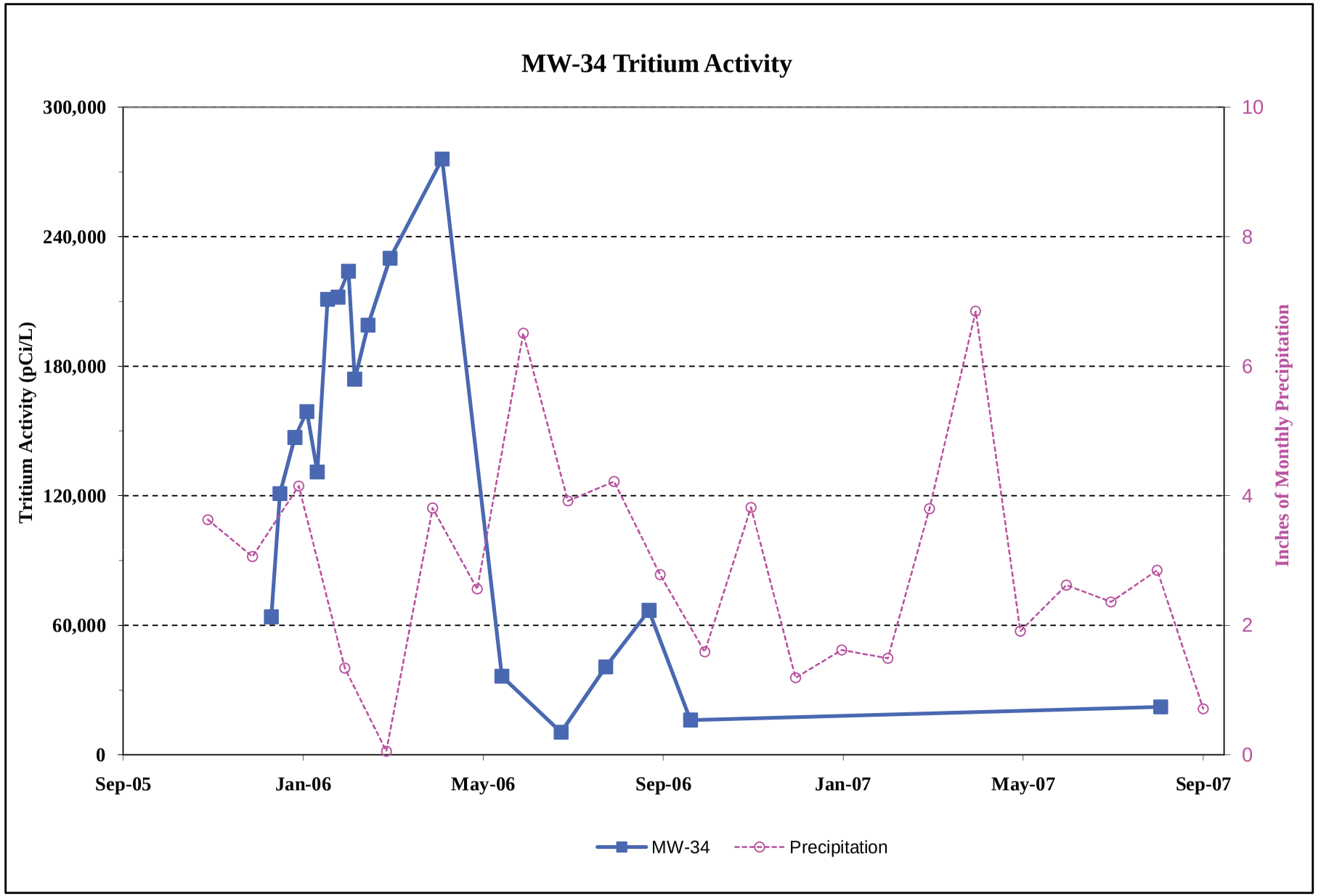

MW-34 Tritium Activity
300,000
240,000
180,000
120,000
60,000
0
Tritium Activity (pCi/L)
10
8
6
4
2
0
Inches of Monthly Precipitation
Sep-05
Jan-06
May-06
Sep-06
Jan-07
May-07
Sep-07
MW-34
Precipitation

FIGURE G5

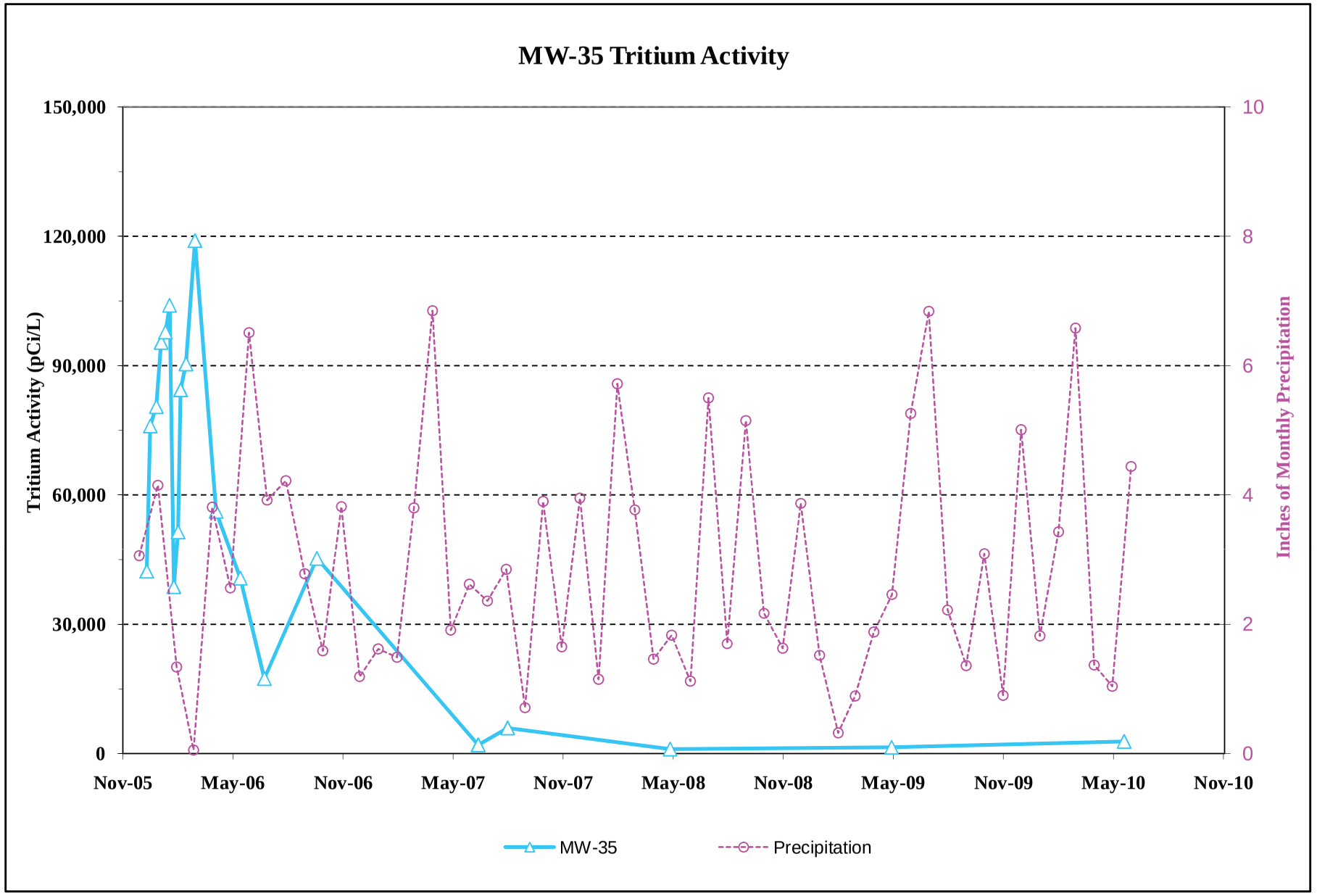

MW-35 Tritium Activity
150,000
120,000
90,000
60,000
30,000
0
Tritium Activity (pCi/L)
10
8
6
4
2
0
Inches of Monthly Precipitation
Nov-05
May-06
Nov-06
May-07
Nov-07
May-08
Nov-08
May-09
Nov-09
May-10
Nov-10
MW-35
Precipitation

FIGURE G6

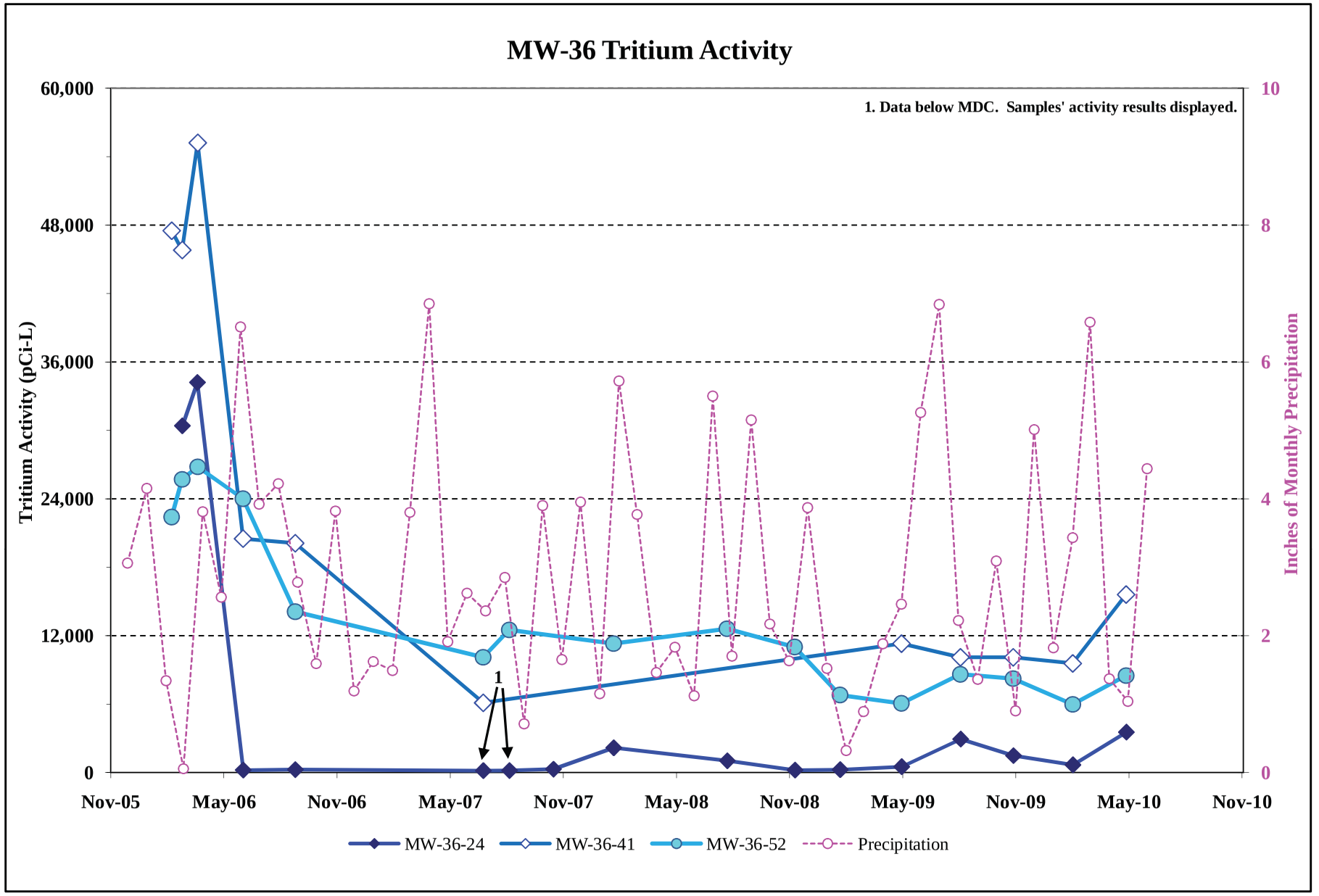

MW-36 Tritium Activity
1. Data below MDC. Samples' activity results displayed.
Tritium Activity (pCi-L)
Inches of Monthly Precipitation
60,000
48,000
36,000
24,000
12,000
0
10
8
6
4
2
0
Nov-05
May-06
Nov-06
May-07
Nov-07
May-08
Nov-08
May-09
Nov-09
May-10
Nov-10
1
MW-36-24
MW-36-41
MW-36-52
Precipitation

FIGURE G7

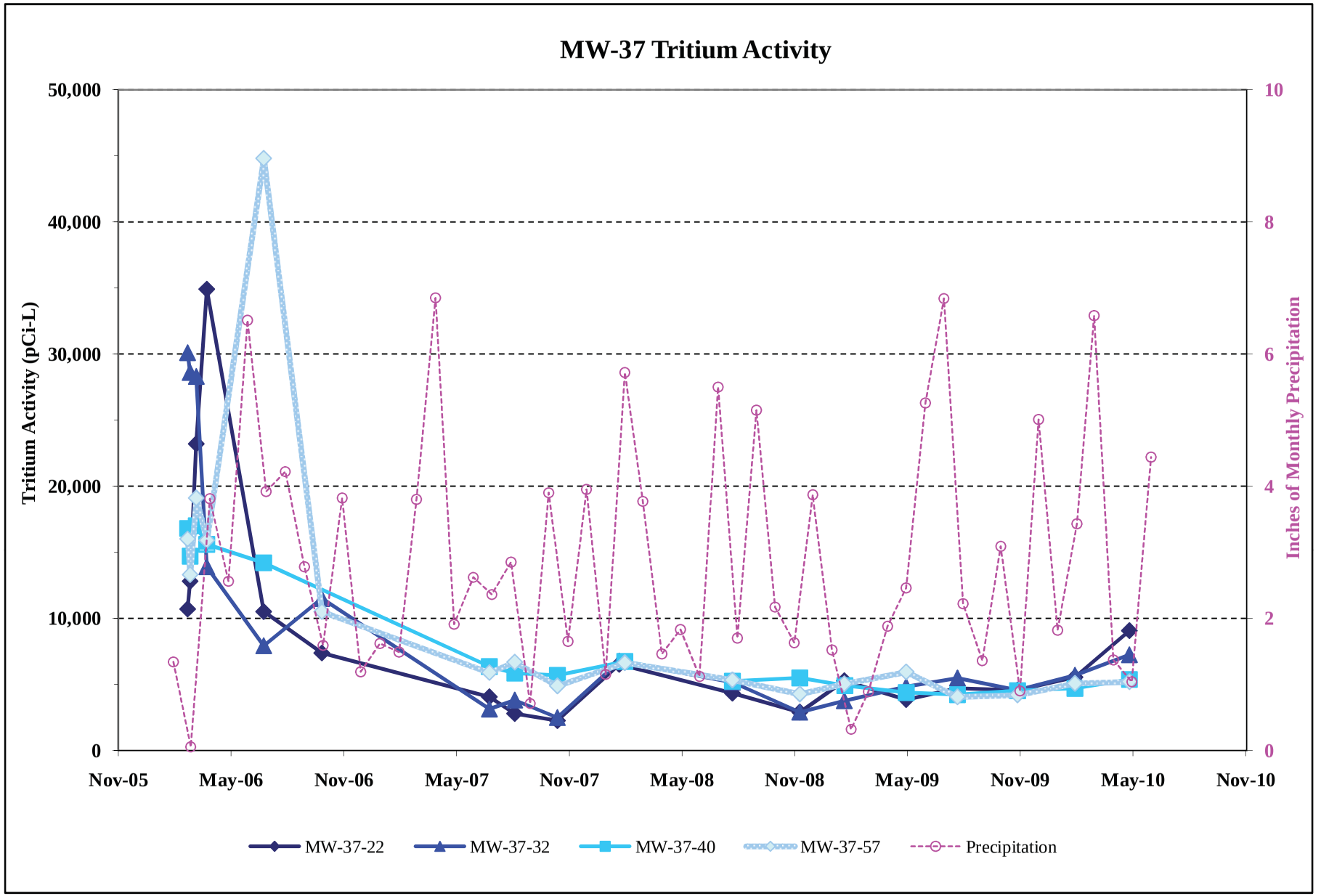

MW-37 Tritium Activity
Tritium Activity (pCi-L)
Inches of Monthly Precipitation
50,000
40,000
30,000
20,000
10,000
0
10
8
6
4
2
0
Nov-05
May-06
Nov-06
May-07
Nov-07
May-08
Nov-08
May-09
Nov-09
May-10
Nov-10
MW-37-22
MW-37-32
MW-37-40
MW-37-57
Precipitation

FIGURE G8

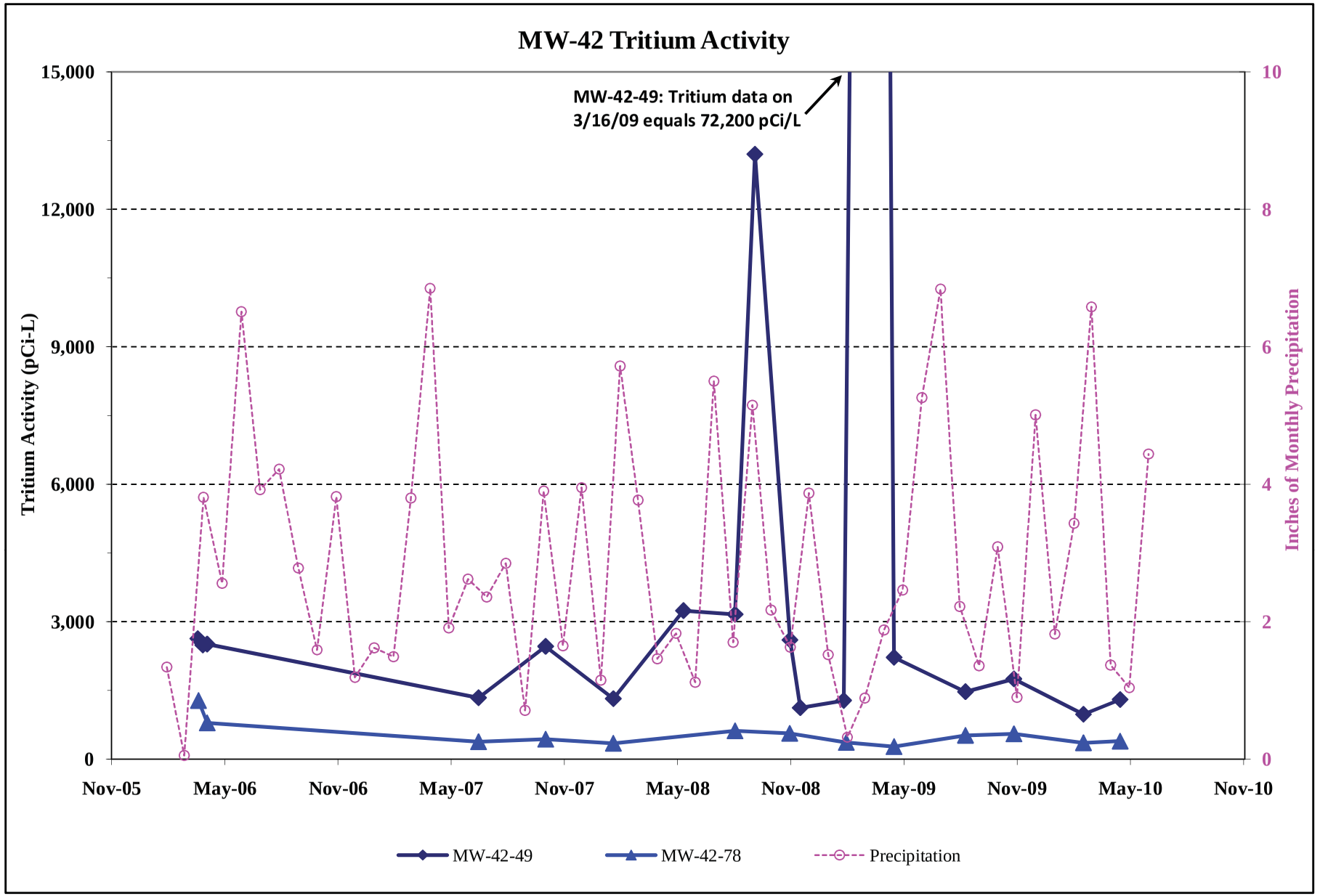

MW-42 Tritium Activity
MW-42-49: Tritium data on
3/16/09 equals 72,200 pCi/L
Tritium Activity (pCi-L)
Inches of Monthly Precipitation
15,000
12,000
9,000
6,000
3,000
0
10
8
6
4
2
0
Nov-05
May-06
Nov-06
May-07
Nov-07
May-08
Nov-08
May-09
Nov-09
May-10
Nov-10
MW-42-49
MW-42-78
Precipitation

FIGURE G9

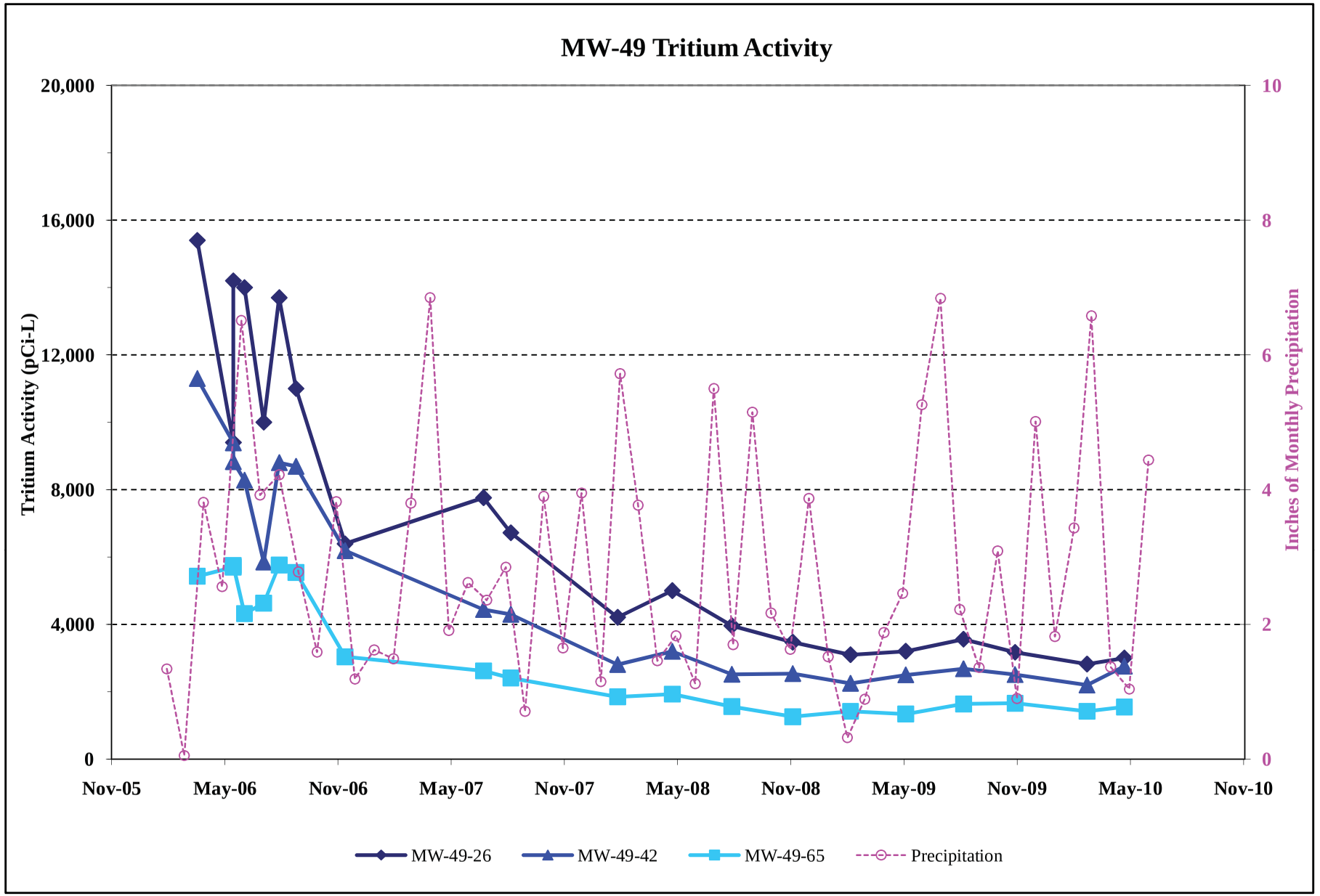

MW-49 Tritium Activity
Tritium Activity (pCi-L)
Inches of Monthly Precipitation
20,000
16,000
12,000
8,000
4,000
0
10
8
6
4
2
0
Nov-05
May-06
Nov-06
May-07
Nov-07
May-08
Nov-08
May-09
Nov-09
May-10
Nov-10
MW-49-26
MW-49-42
MW-49-65
Precipitation

FIGURE G10

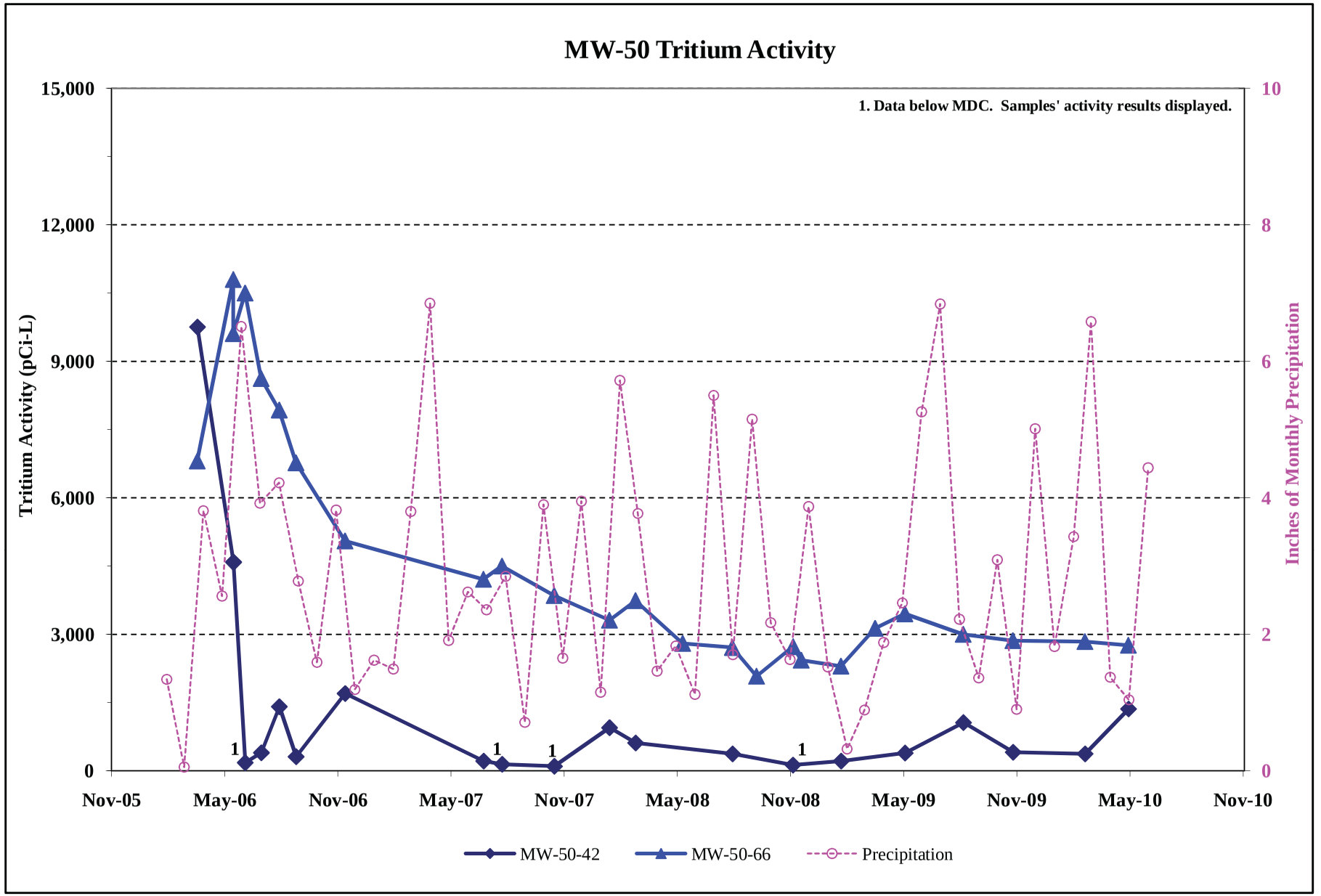

MW-50 Tritium Activity
1. Data below MDC. Samples' activity results displayed.
Tritium Activity (pCi-L)
Inches of Monthly Precipitation
15,000
12,000
9,000
6,000
3,000
0
10
8
6
4
2
0
Nov-05
May-06
Nov-06
May-07
Nov-07
May-08
Nov-08
May-09
Nov-09
May-10
Nov-10
1
1
1
1
MW-50-42
MW-50-66
Precipitation

FIGURE G11

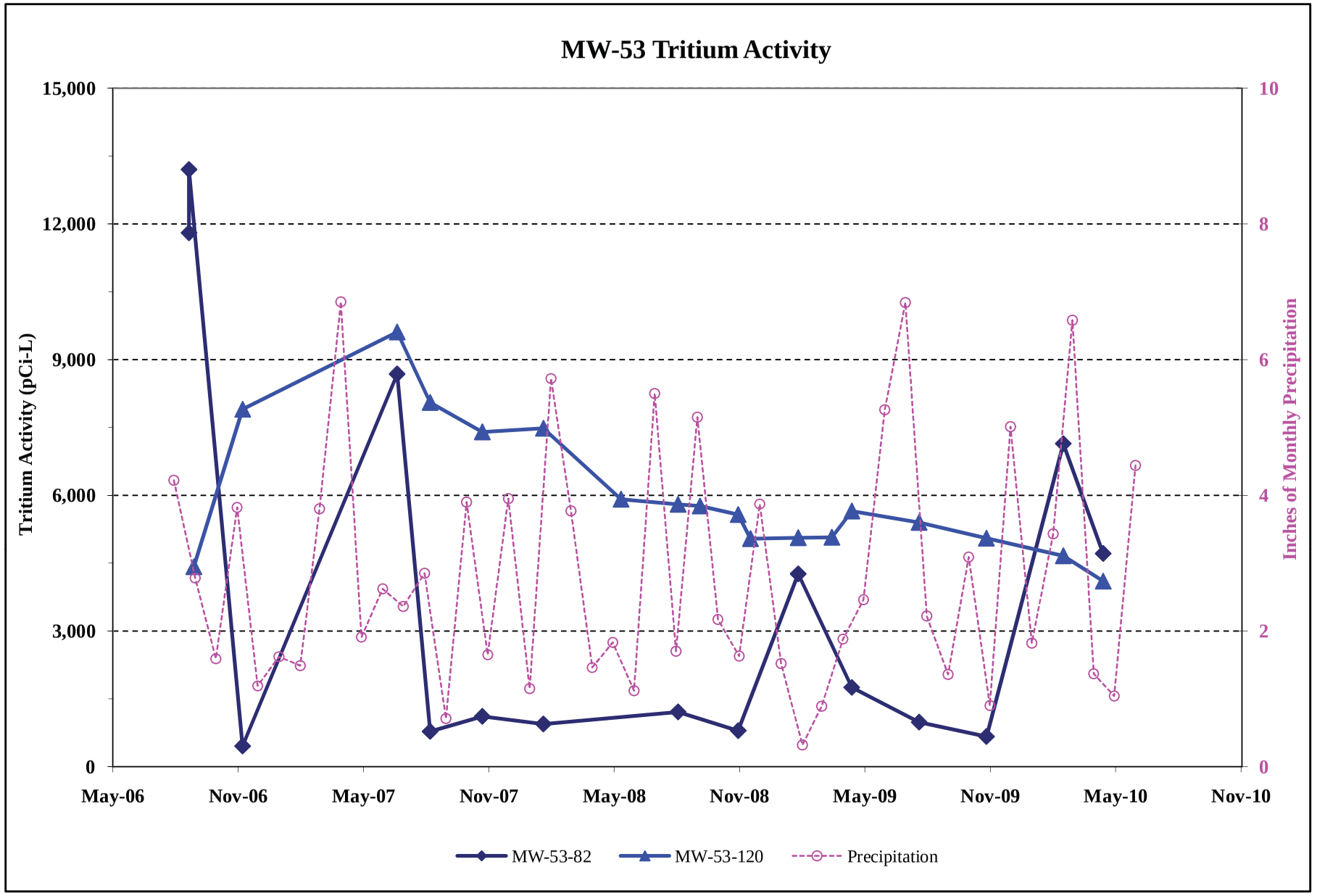

MW-53 Tritium Activity
15,000
12,000
9,000
6,000
3,000
0
Tritium Activity (pCi-L)
10
8
6
4
2
0
Inches of Monthly Precipitation
May-06
Nov-06
May-07
Nov-07
May-08
Nov-08
May-09
Nov-09
May-10
Nov-10
MW-53-82
MW-53-120
Precipitation

FIGURE G12

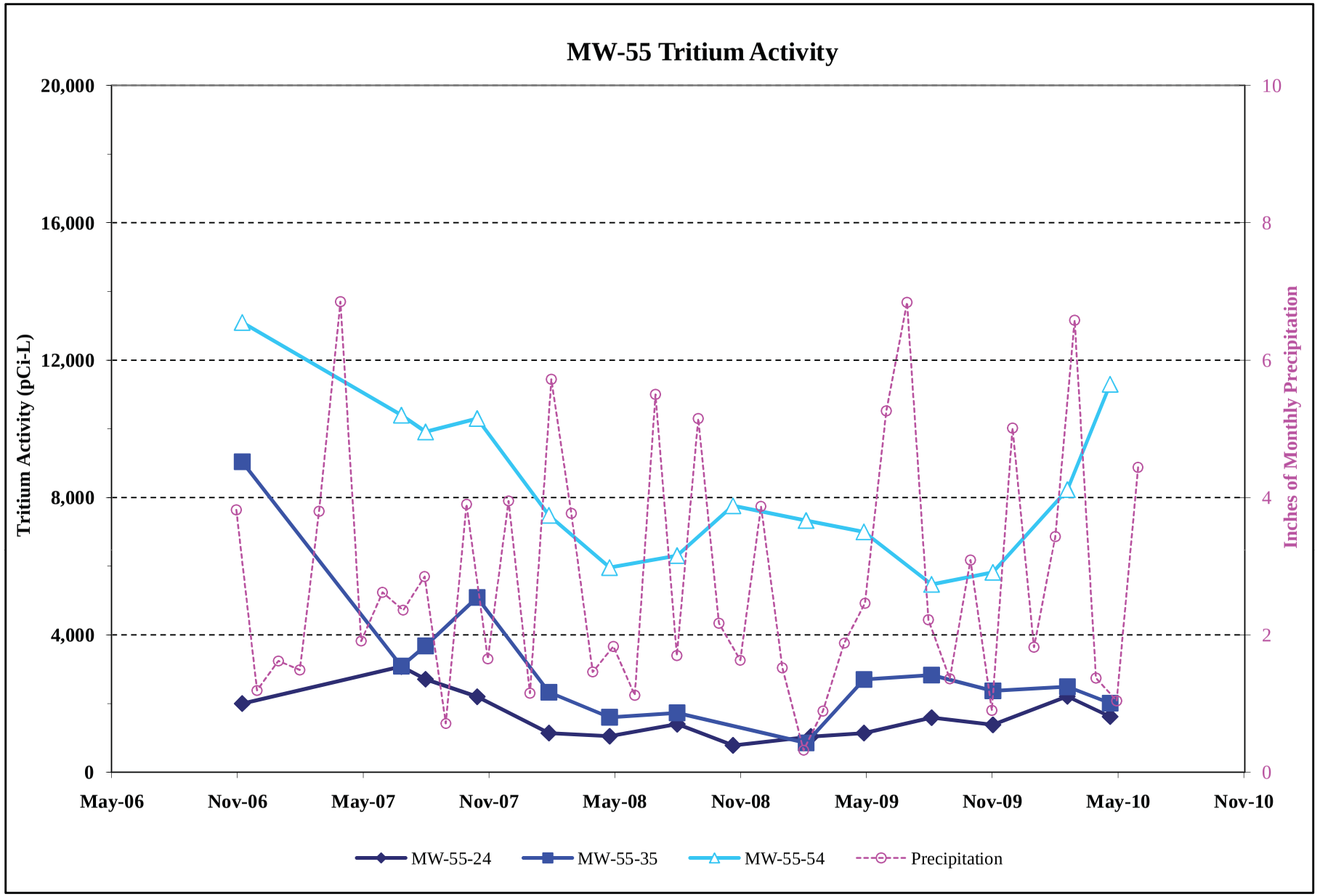

MW-55 Tritium Activity
Tritium Activity (pCi-L)
Inches of Monthly Precipitation
20,000
16,000
12,000
8,000
4,000
0
10
8
6
4
2
0
May-06
Nov-06
May-07
Nov-07
May-08
Nov-08
May-09
Nov-09
May-10
Nov-10
MW-55-24
MW-55-35
MW-55-54
Precipitation

FIGURE G13

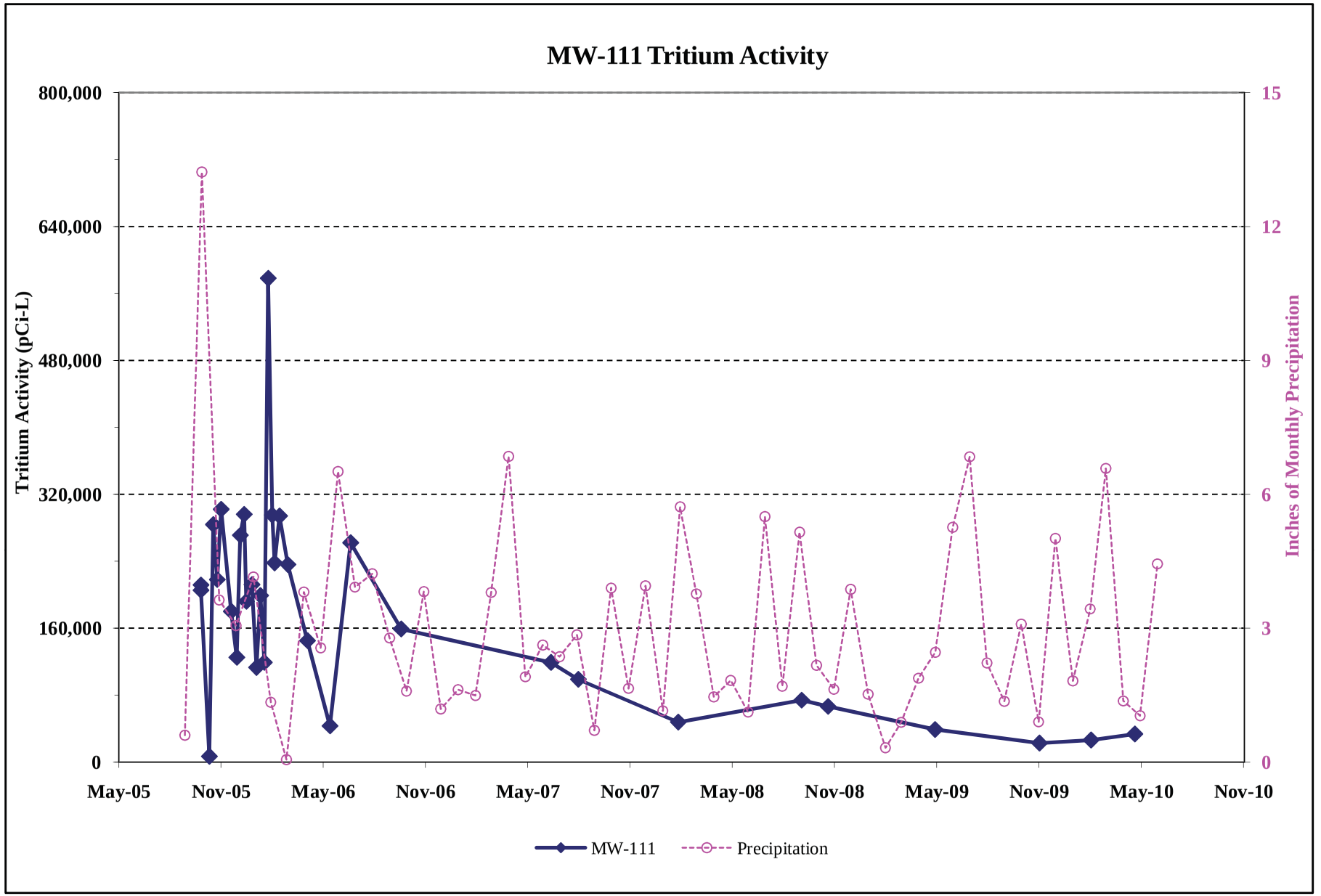

MW-111 Tritium Activity
800,000
640,000
480,000
320,000
160,000
0
Tritium Activity (pCi-L)
15
12
9
6
3
0
Inches of Monthly Precipitation
May-05
Nov-05
May-06
Nov-06
May-07
Nov-07
May-08
Nov-08
May-09
Nov-09
May-10
Nov-10
MW-111
Precipitation

FIGURE G14

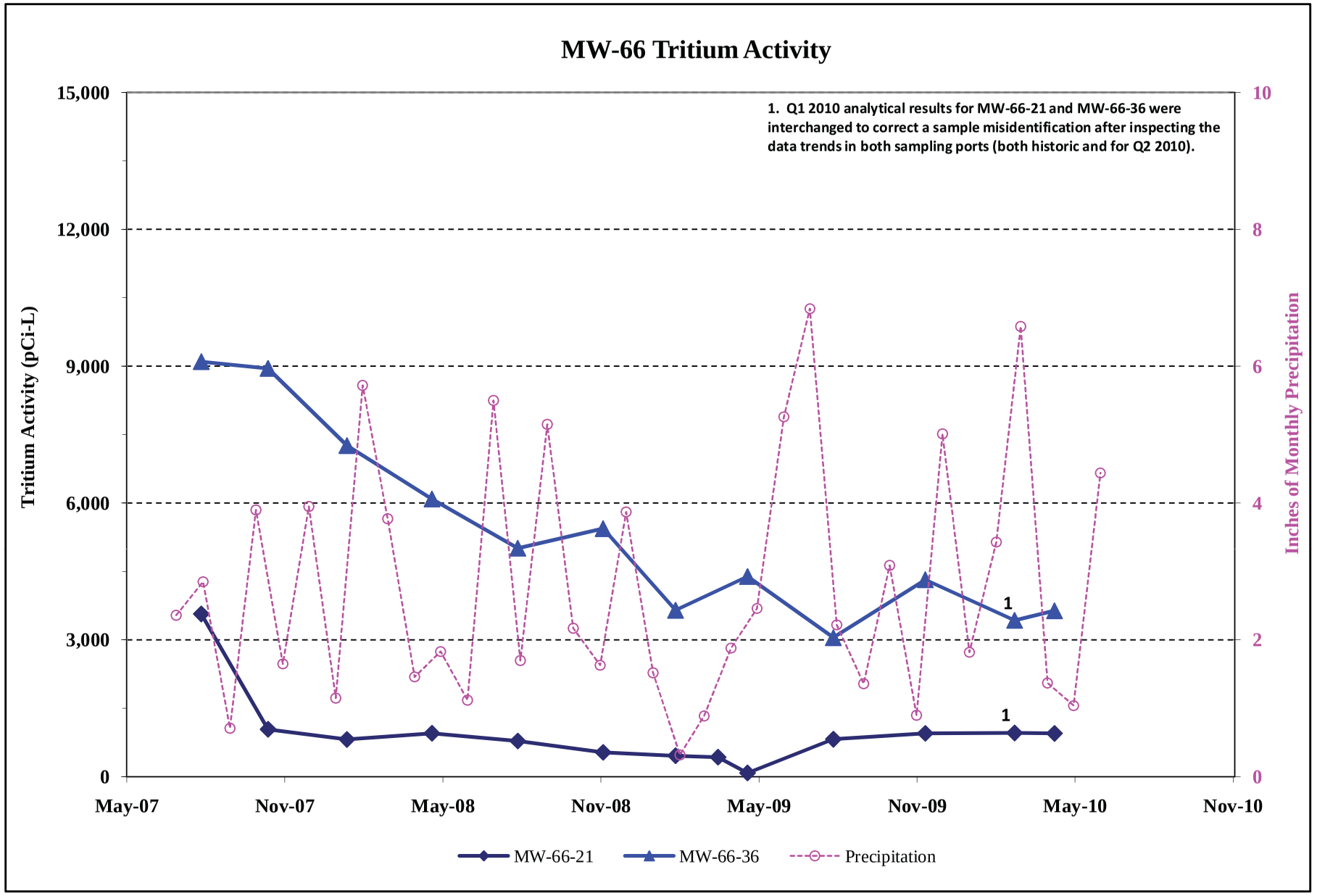

MW-66 Tritium Activity
1. Q1 2010 analytical results for MW-66-21 and MW-66-36 were interchanged to correct a sample misidentification after inspecting the data trends in both sampling ports (both historic and for Q2 2010).
Tritium Activity (pCi-L)
Inches of Monthly Precipitation
15,000
12,000
9,000
6,000
3,000
0
10
8
6
4
2
0
May-07
Nov-07
May-08
Nov-08
May-09
Nov-09
May-10
Nov-10
1
1
MW-66-21
MW-66-36
Precipitation

FIGURE G15

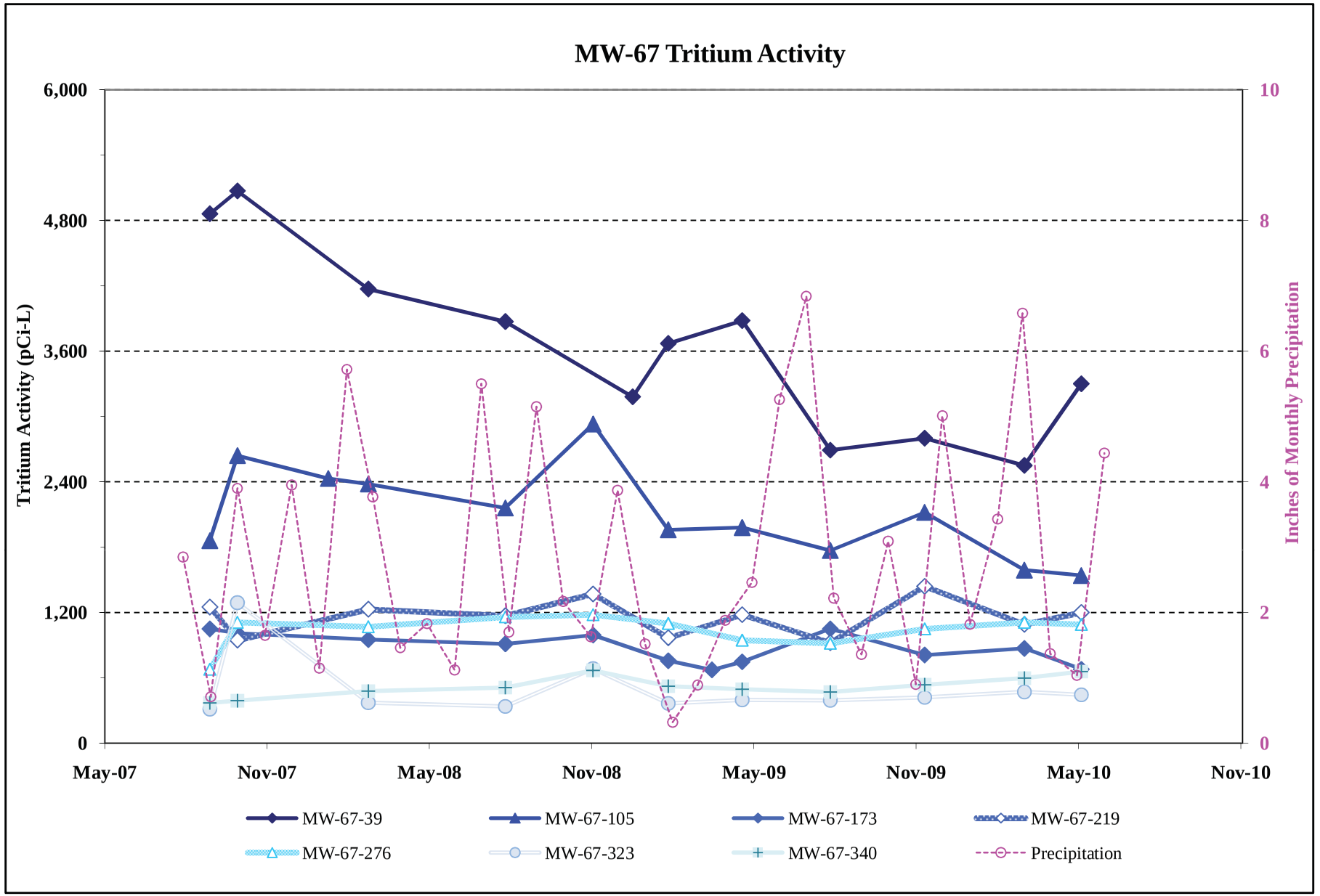
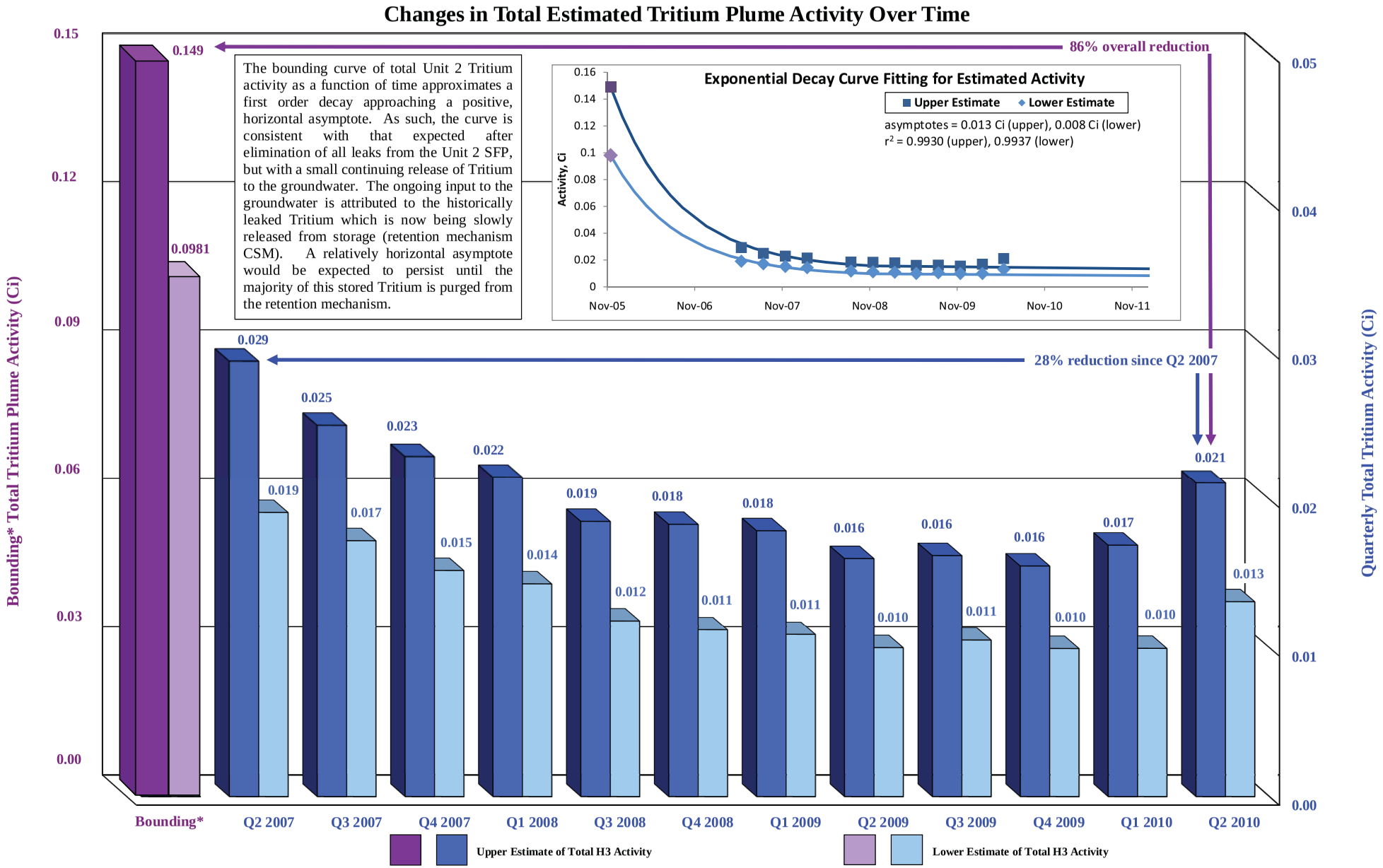

MW-67 Tritium Activity
Tritium Activity (pCi-L)
Inches of Monthly Precipitation
6,000
4,800
3,600
2,400
1,200
0
10
8
6
4
2
0
May-07
Nov-07
May-08
Nov-08
May-09
Nov-09
May-10
Nov-10
MW-67-39
MW-67-105
MW-67-173
MW-67-219
MW-67-276
MW-67-323
MW-67-340
Precipitation

FIGURE G16

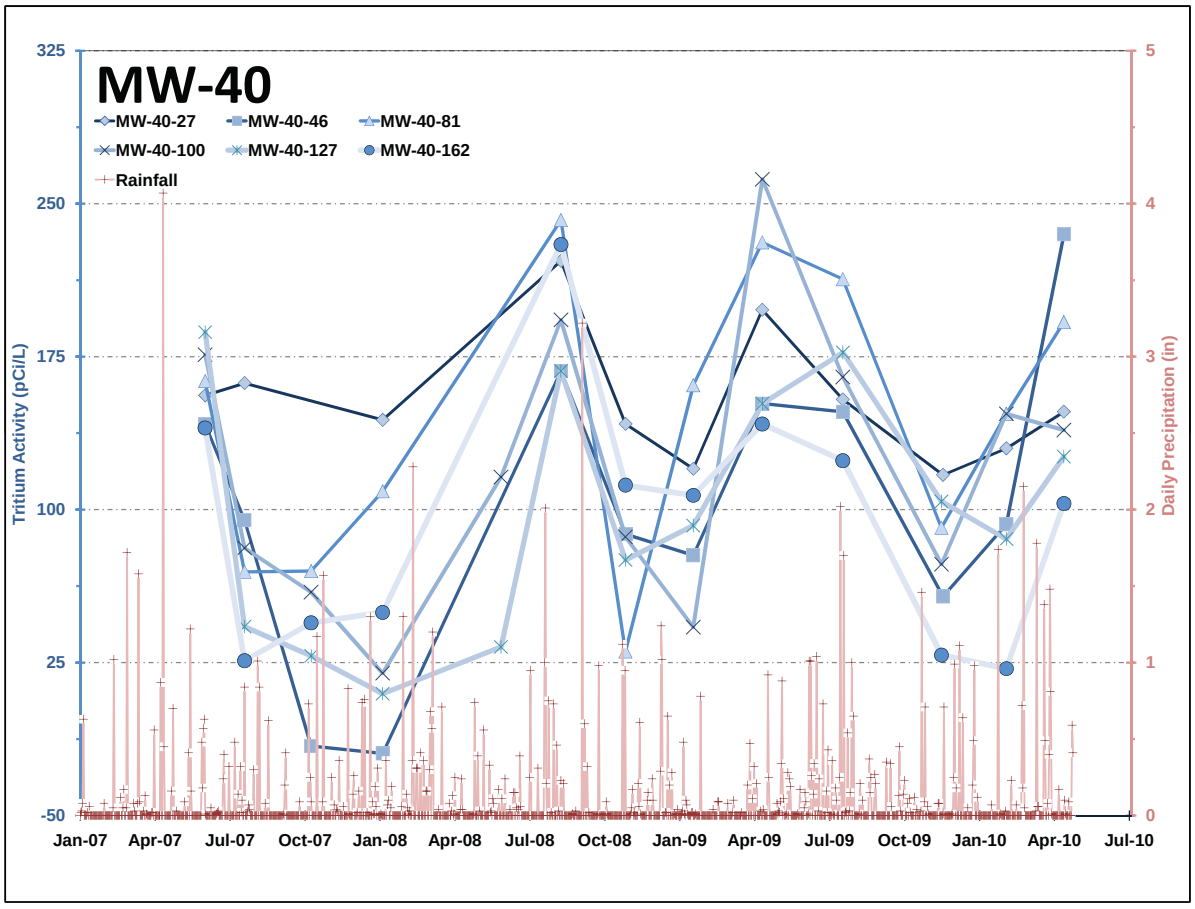


Note: Lower estimate is based on a porosity of 0.0003 which was derived from a pumping test conducted in 2006. Upper estimate is based on a porosity of 0.003 derived from a tracer test conducted in 2007. The Q2 2007 to Q1 2010 Tritium plume activity estimates are each based on Tritium levels measured in the groundwater monitoring installations at individual, quarterly "snapshots" in time. *The bounding activity estimate, however, encompasses a longer period of time, and is focused on the Tritium levels existing during the earliest portions of the groundwater investigation. During this period of time, before termination of all the identified SFP leaks, Tritium concentrations were at their highest levels, but the network of monitoring installations was still being installed. Therefore, measurements made at a multiple times were required to capture early data covering the full extent of the Tritium plume; primarily over the period from Nov 20005 through Nov 2006 (a smaller percentage of the Tritium levels required inclusion of measurements through Sept 07). For the bounding Tritium plume activity estimate, the highest value recorded for each monitoring location during this time period was used in the analysis. For further discussion see Sections 6.0, 7.0 and 8.0 of the Final Hydrogeologic Site Investigation Report, prepared by GZA and dated January 7, 2008.

Figure G-17

APPENDIX H: SOUTHERN BOUNDARY WELLS

TEMPORAL TRITIUM TRENDS IN SOUTHERN BOUNDARY WELLS



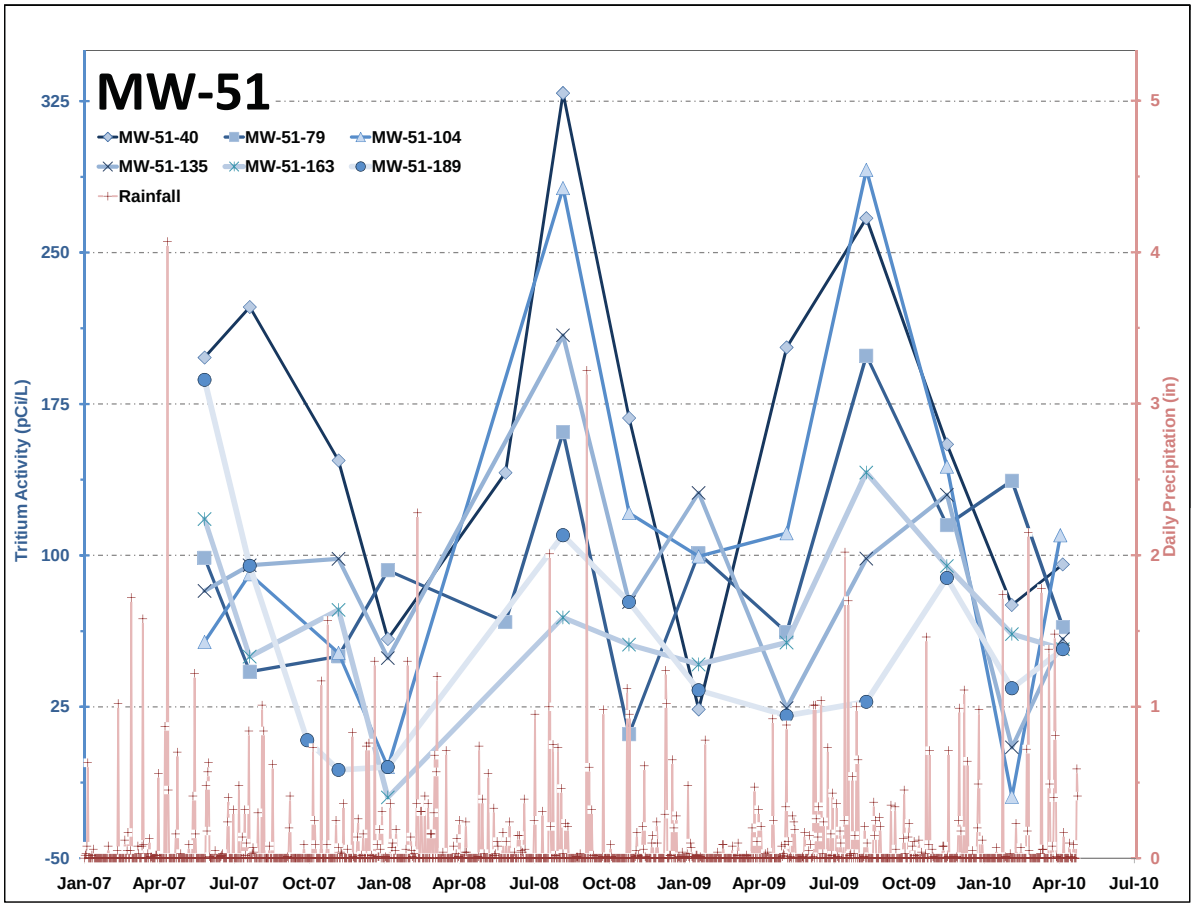


FIGURE H1