REMP *D*atabase and *R*eporting *T*ool (REMP-DRT) for Nuclear Power Plants

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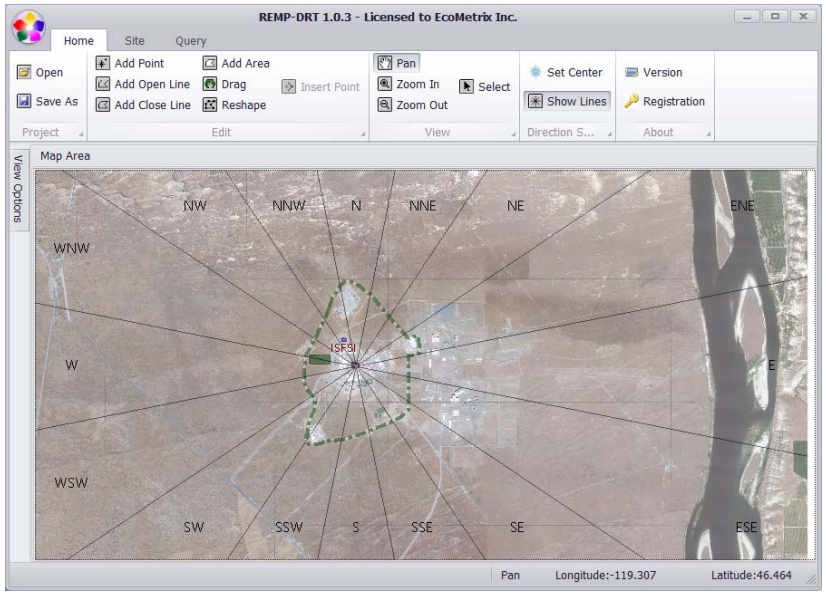
What is REMP-DRT?

- Stores and manages REMP data in a database
- Accesses data by clicking sampling locations
- Facilitates QA/QC of REMP data
- Generates annual REMP report tables
- Follows RG4.1v2-09, RG 1.109, site-specific ODCM



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Interface Overview

- Spatial referenced map and locations
- GIS features: zoom in/out, drag map, etc
- Exposure pathways are defined as recommended by RG4.1v2-09
- Sampling locations for exposure pathways are saved in layers
- Exposure pathways (layers) can be hidden/shown

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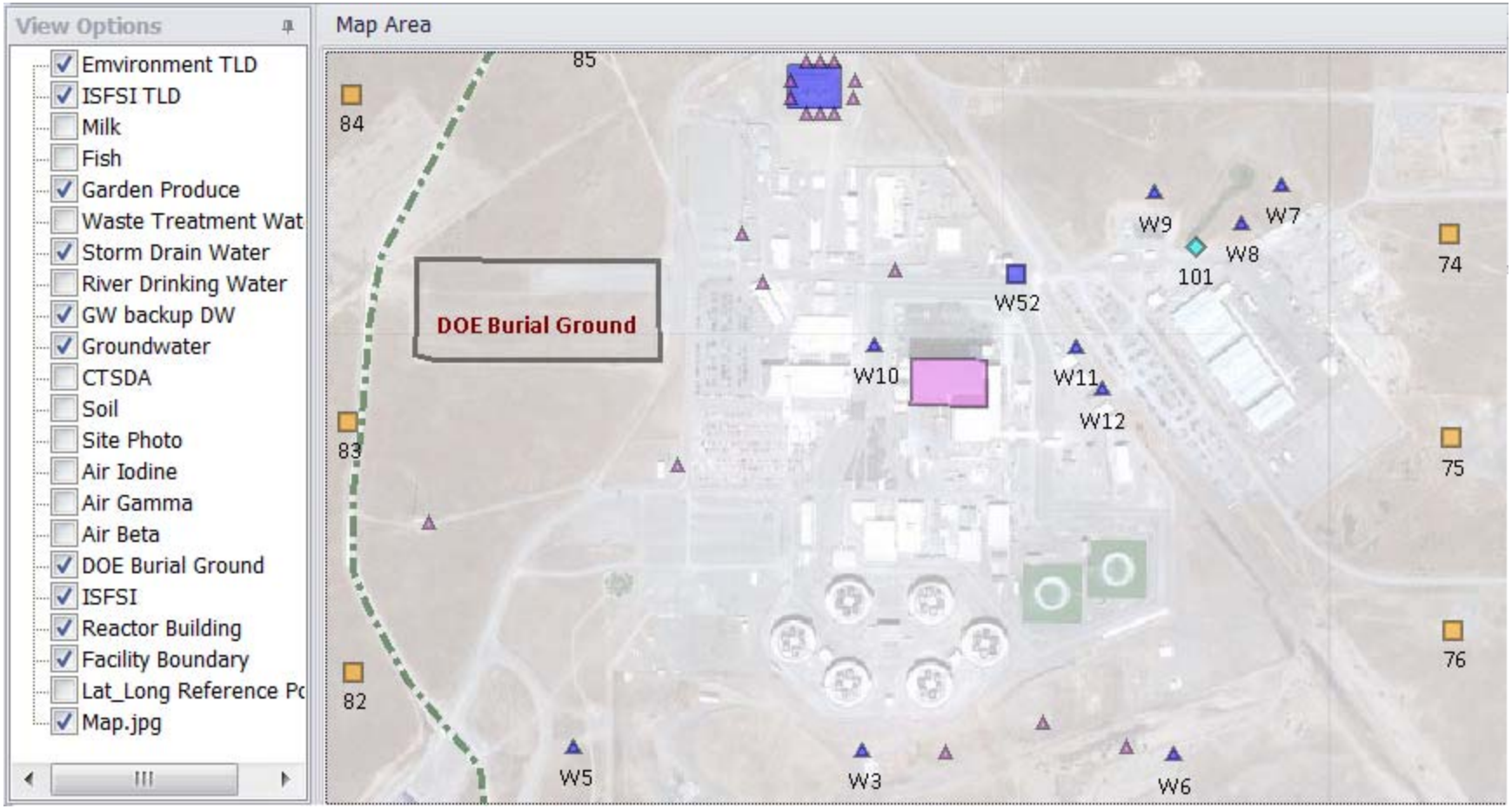
Sampling Locations



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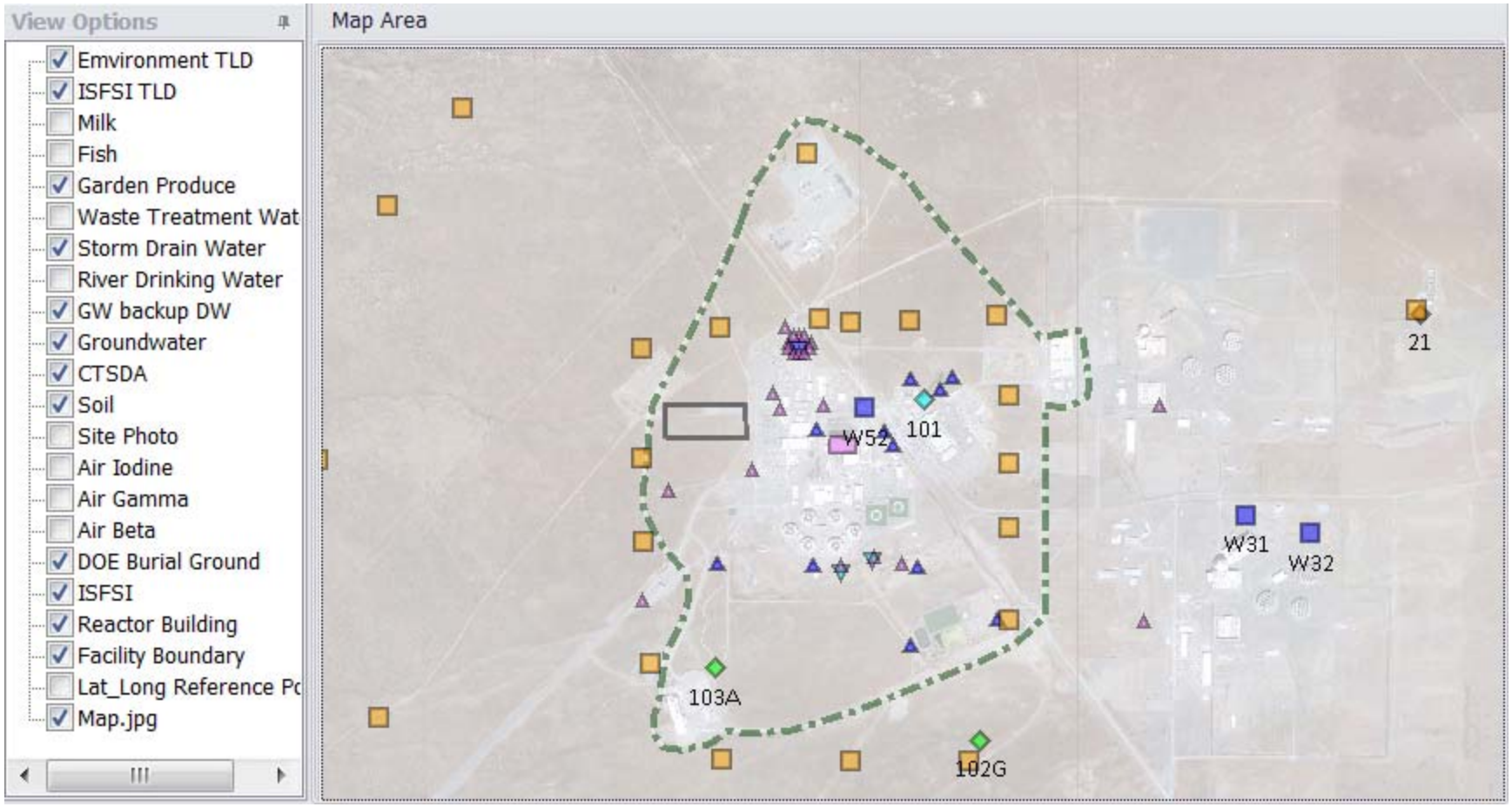
Exposure Pathways (Media)



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Data Accessing

- Click to query: query data by clicking on selected sampling locations
- Flexible data query methods: grouping, sorting, filtering, making pivot tables, etc
- Make temporal graphs on query data

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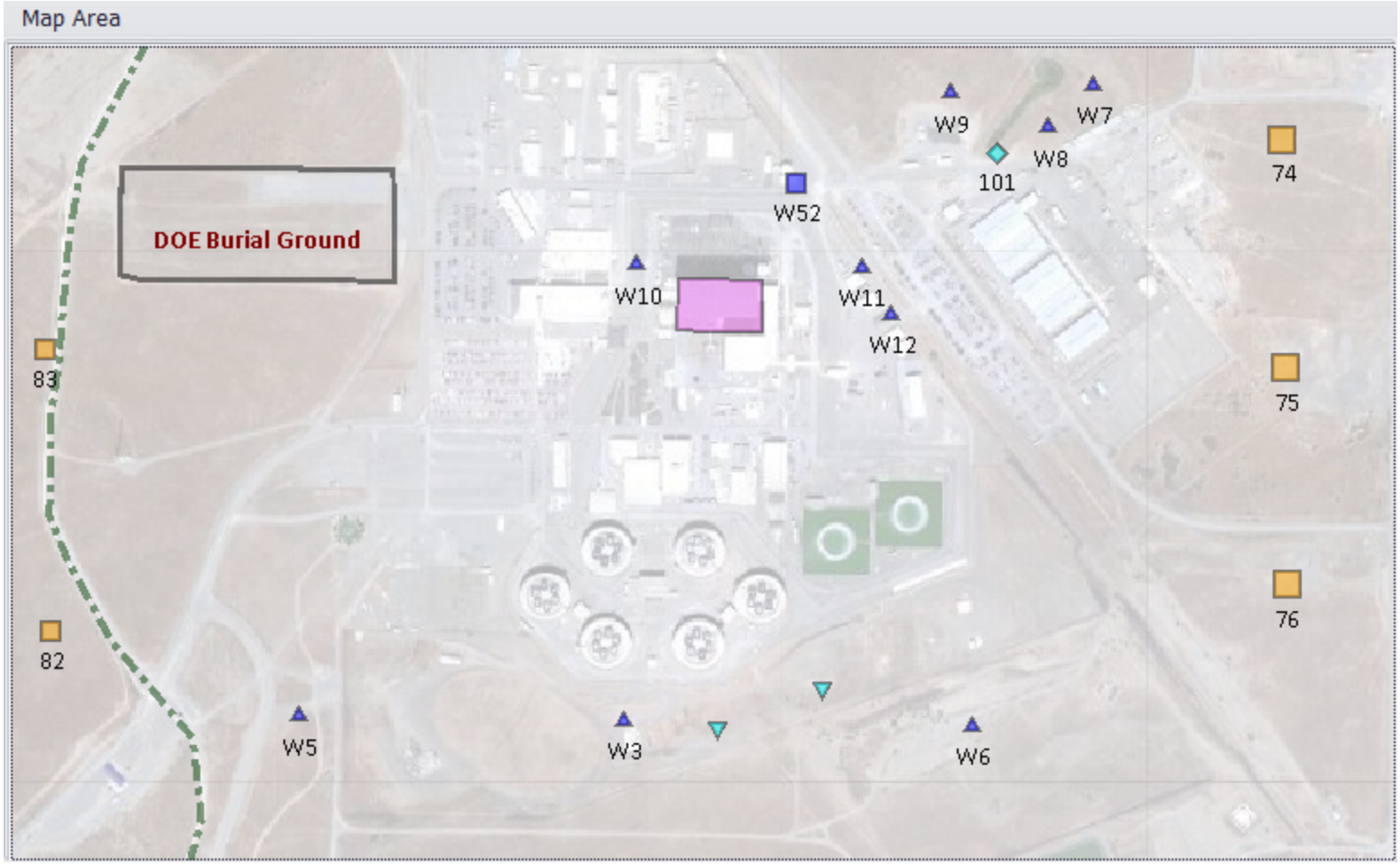
Click to Query – Select



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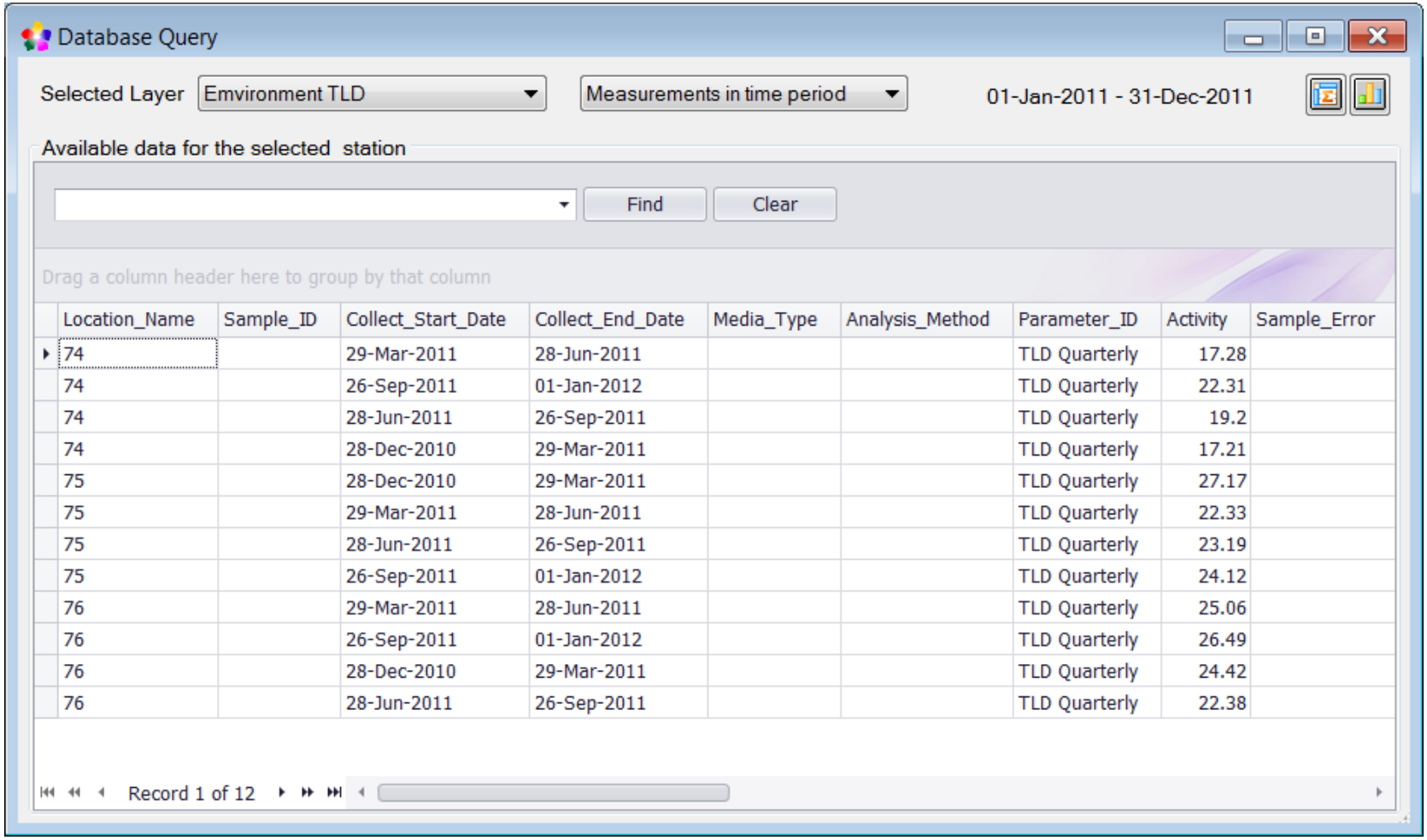
Click to Query – Retrieve Data



Location_Name	Sample_ID	Collect_Start_Date	Collect_End_Date	Media_Type	Analysis_Method	Parameter_ID	Activity	Sample_Error
74		29-Mar-2011	28-Jun-2011			TLD Quarterly	17.28	
74		26-Sep-2011	01-Jan-2012			TLD Quarterly	22.31	
74		28-Jun-2011	26-Sep-2011			TLD Quarterly	19.2	
74		28-Dec-2010	29-Mar-2011			TLD Quarterly	17.21	
75		28-Dec-2010	29-Mar-2011			TLD Quarterly	27.17	
75		29-Mar-2011	28-Jun-2011			TLD Quarterly	22.33	
75		28-Jun-2011	26-Sep-2011			TLD Quarterly	23.19	
75		26-Sep-2011	01-Jan-2012			TLD Quarterly	24.12	
76		29-Mar-2011	28-Jun-2011			TLD Quarterly	25.06	
76		26-Sep-2011	01-Jan-2012			TLD Quarterly	26.49	
76		28-Dec-2010	29-Mar-2011			TLD Quarterly	24.42	
76		28-Jun-2011	26-Sep-2011			TLD Quarterly	22.38	

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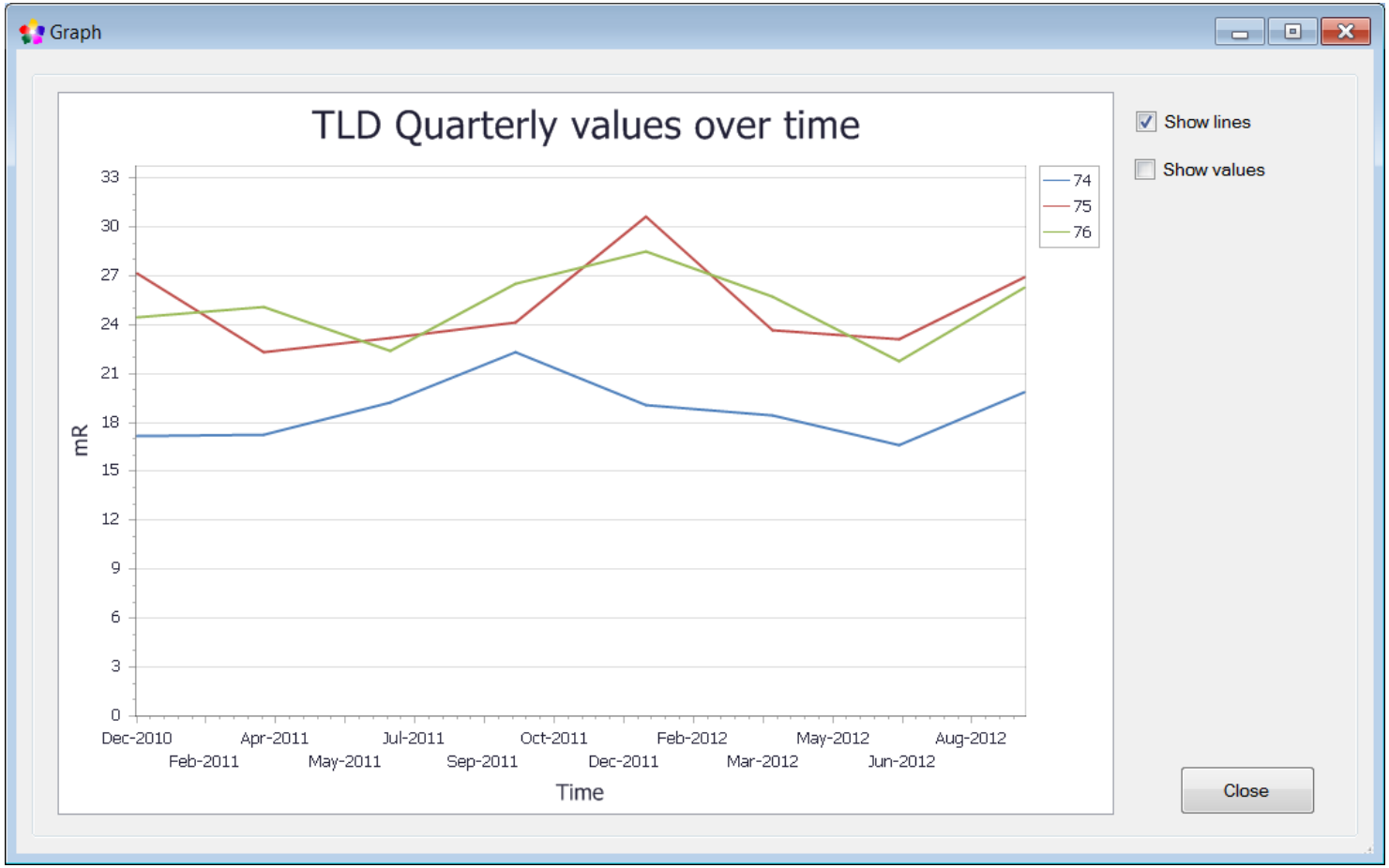
Making Graphs



Note: for three selected sampling locations

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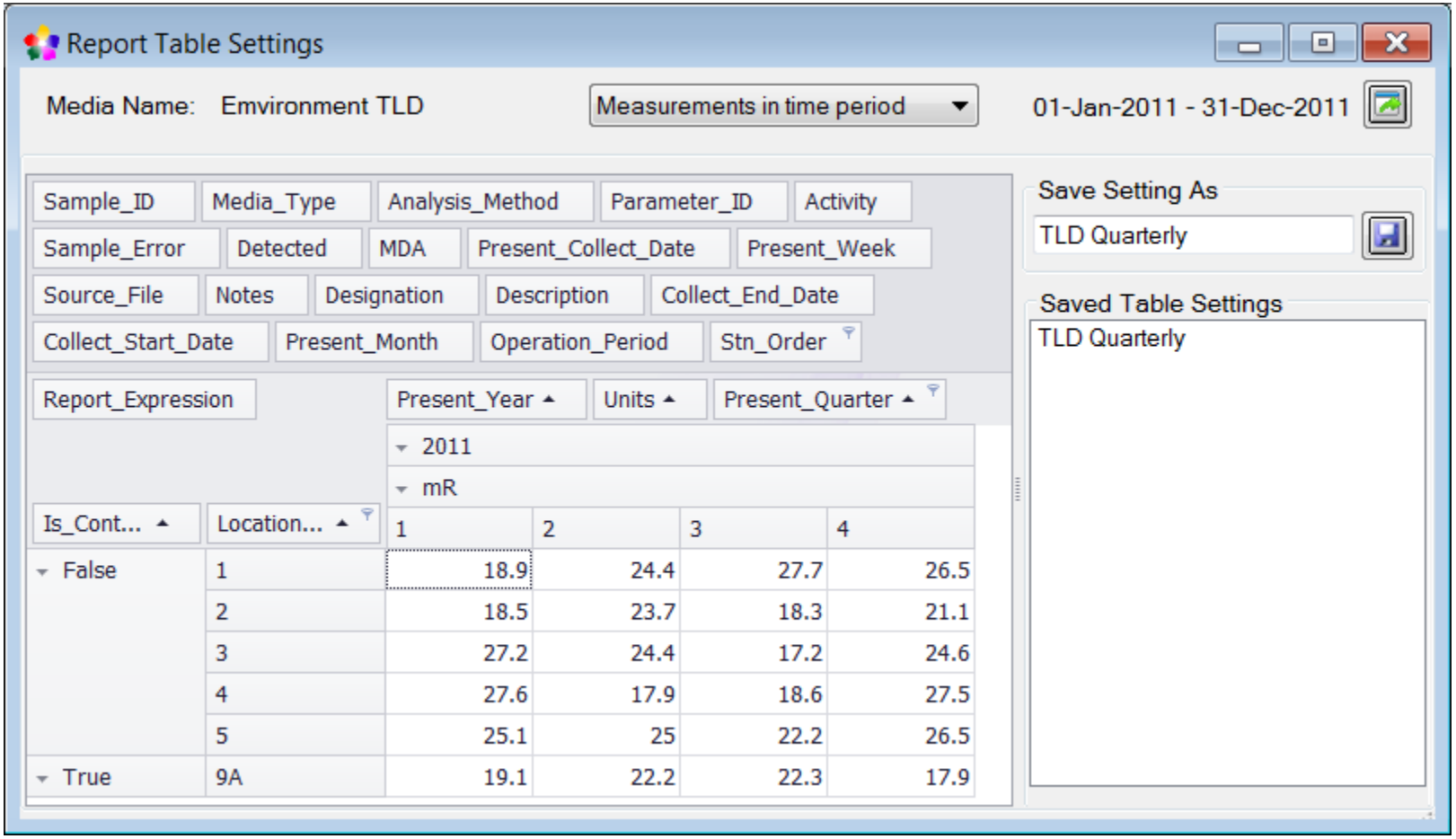
Making Pivot Table (Excel Style)



Note: for more selected sampling locations

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Making Pivot Table (Advanced)

Detected	Activity	Sample...	MDA	Present_Year	Units	Present_Quarter					
				2011							
				pCi/m3							
				1				2			
Is_Cont...	Location...	Paramet...		Detected	Activity	Sample_Error	MDA	Detected	Activity	Sampl	
False	1	BALA140			-0.00547	0.0276	0.0435		0.00215		
		BE-7		True	0.0793	0.0154	0.0101	True	0.104		
		CO-60			-0.00000529	0.000554	0.000909		0		
		CS-134			0.000468	0.000485	0.000673		-0.000126	0	
		CS-137			0.000368	0.000621	0.000934		0	0	
		FE-59			-0.000502	0.0042	0.00673		0		
		K-40			0.000013	0.00721	0.0137		-0.00308		
		MN-54			-0.000105	0.000604	0.000963		0.0000841	0	
		RU-106			0.000433	0.00502	0.00814		-0.0000229		
		ZN-65			-0.000285	0.00147	0.00232		0		
		ZRNB-95			0.000192	0.000923	0.00146		-0.000147	0	
True	9A	BALA140			-0.00598	0.0258	0.0402		-0.000677		
		BE-7		True	0.0836	0.0166	0.0117	True	0.101		
		CO-60			-0.000114	0.000627	0.000993		0.000136		
		CS-134			0.000275	0.000503	0.000759		0.000241	0	

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Data QA/QC

- Compatible with LIMS (Laboratory Information Management System)
- Import/verify lab analysis results
- Raw data spreadsheets are stored

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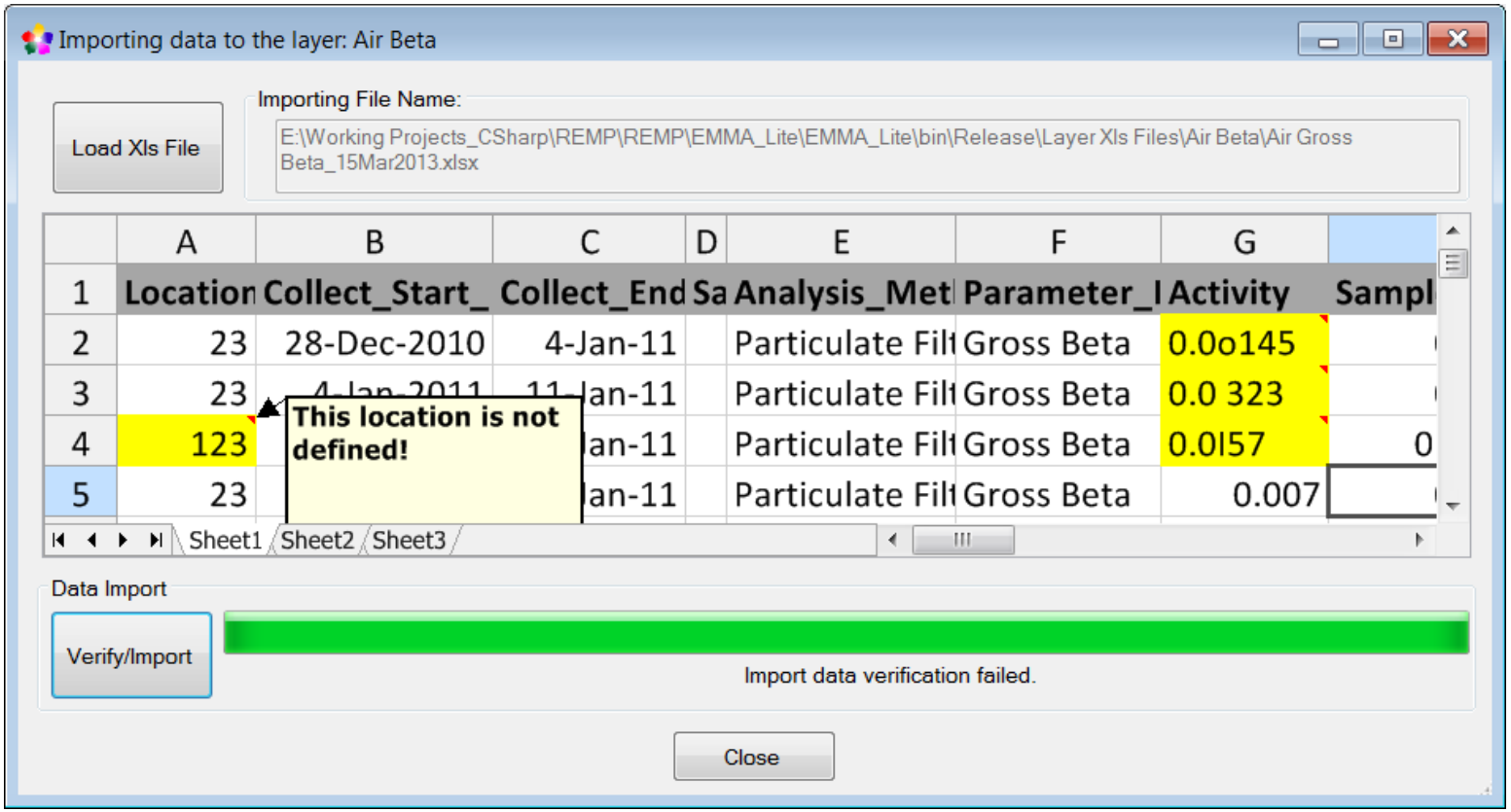
An Example QA/QC Result



	A	B	C	D	E	F	G	
1	Location	Collect_Start_	Collect_End	Sa	Analysis_Met	Parameter_I	Activity	Sampl
2	23	28-Dec-2010	4-Jan-11		Particulate Filt	Gross Beta	0.0o145	
3	23	4-Jan-2011	11-Jan-11		Particulate Filt	Gross Beta	0.0 323	
4	123		Jan-11		Particulate Filt	Gross Beta	0.0I57	0
5	23		Jan-11		Particulate Filt	Gross Beta	0.007	

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Annual REMP Reporting

- Generate annual REMP report tables
- Can be modified to match different report table formats

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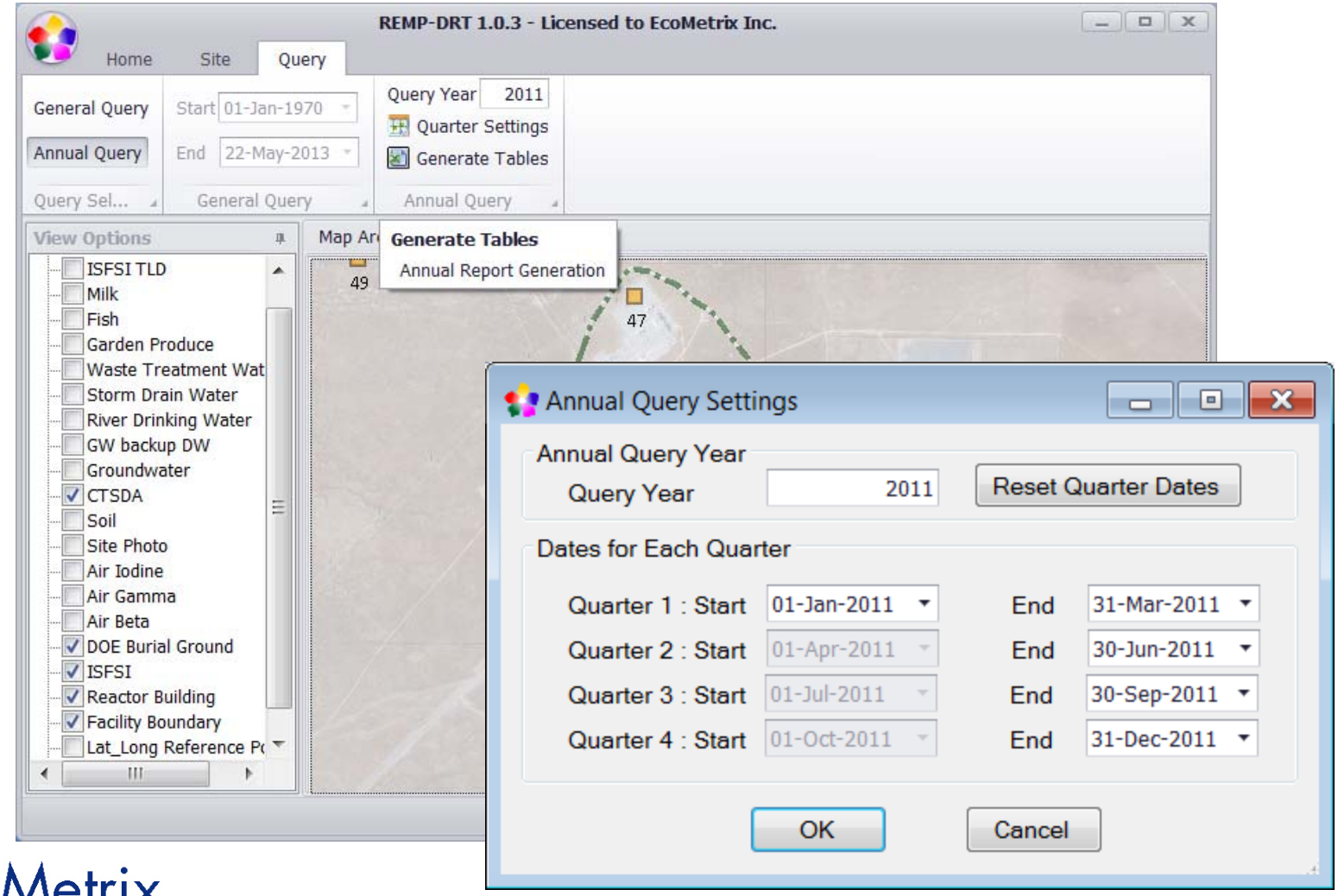
Report Period Settings



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Reporting – Summary table

TABLE 5-2

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM SUMMARY

COLUMBIA GENERATING STATION — **DOCKET NO. 50-397**

Benton County, Washington — **Calendar Year 2011**

Medium: Air Particulate/Air Radioiodine — **Units: pCi/m^3**

Analysis Type	Total Analyses Performed	Lower Limit of Detection (LLD)[b]	Indicator Locations Mean (f)[a] Range	Location With Highest Annual Mean: Location Information	Location With Highest Annual Mean: Mean (f)[a] Range	Control Locations Mean (f)[a] Range	Number of Nonroutine Measurements
Gross Beta	136	0.01	0.011 (99/102) (0 - 0.059)	4 SSE 15.4 miles	0.014 (33/34) (0 - 0.059)	0.013 (34/34) (0.0006 - 0.055)	0
I-131	104	0.07	0.02 (52/104) (-0.004 - 0.52)	4 SSE 15.4 miles	0.02 (26/52) (-0.004 - 0.52)		0
CS-134	16	0.05	0.0001 (9/12) (-0.0001 - 0.0005)	1 S 2 miles	0.0001 (3/4) (-0.0001 - 0.0005)	0.0001 (3/4) (-9.6e-06 - 0.0003)	0
CS-137	16	0.06	0.0001 (8/12) (-0.0001 - 0.0004)	1 S 2 miles	0.0001 (3/4) (0 - 0.0004)	0.0001 (2/4) (-0.0001 - 0.0004)	0

a. (f) is the number of positive measurements / total measurements at specified location.

b. These are the ODCM specified LLDs, actual method LLDs will be lower. See Table 4-4.

Reference Appendix A, Tables A-2.1, A-2.2, Tables A-3.1, A-3.2, and Tables A- 4.1, A-4.2.

I-131 identified is not attributed to CGS operation. See Sections 5.2 and 5.9.7 for discussion.

T 5-1a | T 5-2

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Reporting – Deviations Table

TABLE 5-1a

REMP Sample Deviations for 2011

SAMPLE MEDIA	START DATE	END DATE	LOCATION	CR ID	PROBLEM / COMMENTS
Air Beta	22/Jun/2011	28/Jun/2011	23	239315	Station OOS for ~55 hours due to BPA power outage.
Air Beta	28/Jun/2011	05/Jul/2011	23	239315	Station OOS for ~55 hours due to BPA power outage.
Air Iodine	21/Jun/2011	28/Jun/2011	1	244086	Station OOS due to BPA power outage, pump didn't restart when power restored.
Air Iodine	28/Jun/2011	05/Jul/2011	1	244086	Station OOS due to BPA power outage, pump didn't restart when power restored.

T 5-1a T 5-2

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Reporting – Details Table

TABLE A-3.1

2011 GAMMA SPECTROMETRY RESULTS OF AIR PARTICULATE FILTERS

Results in pCi/cubic meter, results decay corrected for decay during sample collection *period*

Location and Quarter			Station 1	Q1 2011
Nuclide	**RQ**	**Activity**	**Error**	**MDA**
BALA140		-5.47E-03	2.76E-02	4.35E-02
BE-7	+	7.93E-02	1.54E-02	1.01E-02
CO-60		-5.29E-06	5.54E-04	9.09E-04
CS-134		4.68E-04	4.85E-04	6.73E-04
CS-137		3.68E-04	6.21E-04	9.34E-04
FE-59		-5.02E-04	4.20E-03	6.73E-03
K-40		1.30E-05	7.21E-03	1.37E-02
MN-54		-1.05E-04	6.04E-04	9.63E-04
RU-106		4.33E-04	5.02E-03	8.14E-03
ZN-65		-2.85E-04	1.47E-03	2.32E-03
ZRNB-95		1.92E-04	9.23E-04	1.46E-03

Location and Quarter			Station 1	Q2 2011
Nuclide	**RQ**	**Activity**	**Error**	**MDA**
BALA140		2.15E-03	1.30E-02	2.02E-02
BE-7	+	1.04E-01	1.84E-02	1.29E-02
CO-60		0.00E+00	1.90E-04	3.17E-04
CS-134		-1.26E-04	5.75E-04	9.17E-04
CS-137		0.00E+00	5.91E-04	9.85E-04
FE-59		0.00E+00	1.14E-03	1.91E-03
K-40		-3.08E-03	2.05E-02	1.56E-02
MN-54		8.41E-05	5.96E-04	9.54E-04
RU-106		-2.29E-05	2.93E-03	4.80E-03
ZN-65		0.00E+00	1.93E-03	3.22E-03
ZRNB-95		-1.47E-04	8.72E-04	1.39E-03

Location and Quarter			Station 1	Q3 2011
Nuclide	**RQ**	**Activity**	**Error**	**MDA**
BALA140		0.00E+00	1.30E-02	2.16E-02

Location and Quarter			Station 1	Q4 2011
Nuclide	**RQ**	**Activity**	**Error**	**MDA**
BALA140		0.00E+00	4.87E-03	8.12E-03

T A-3.1 | T A-3.1_1 | T A-3.2

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Summary and Conclusion

- Manages REMP data in a real database
- Allows query of REMP data by clicking sampling locations
- Facilitates QA/QC
- Automates compliance reporting tables consistent with regulatory requirements

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Questions?

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