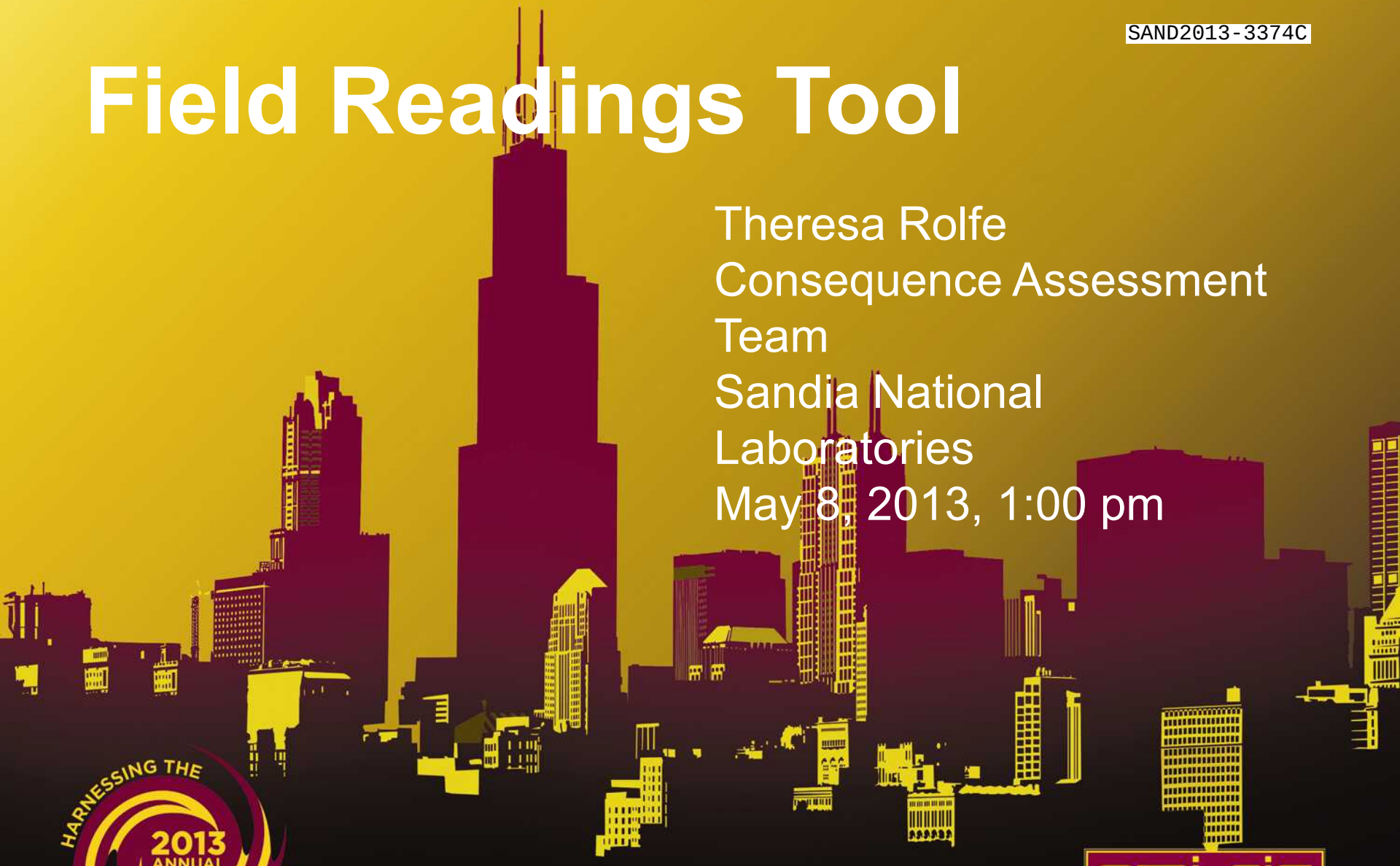
SAND2013-3374C

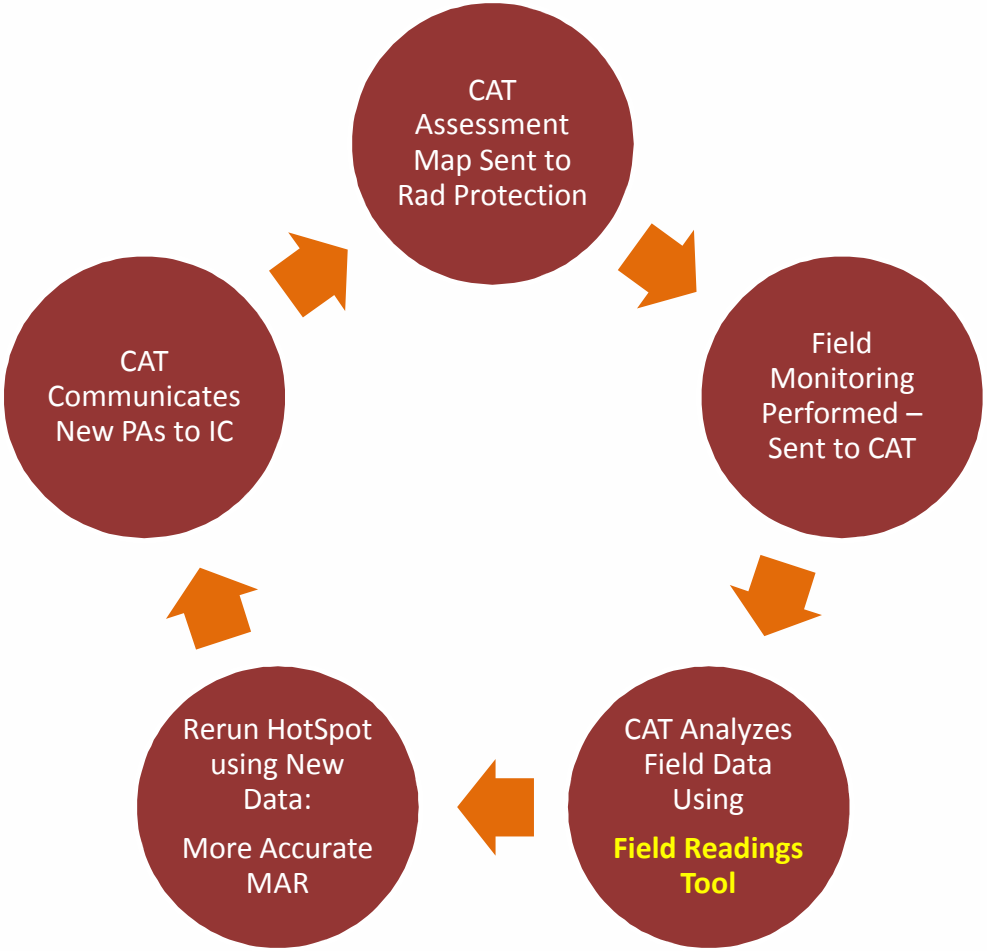
Field Readings Tool

Theresa Rolfe
Consequence Assessment Team
Sandia National Laboratories

May 8, 2013, 1:00 pm



Field Monitoring Data



Initial Ground Deposition Map

Send to Rad Protection Field Monitoring Team (FMT)

Based on TIA

- **25 Ci Cs-137**
- **N→S Winds**
- **D/4 mph**

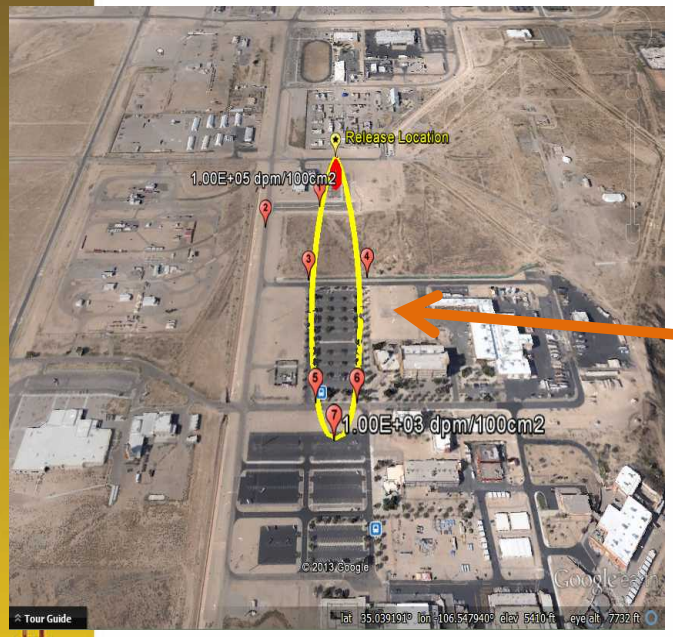
CAT Assessment Map Sent to Rad Protection

Field Monitoring Team

FMT Data Points

Field Monitoring Performed – Sent to CAT

Field Readings Tool



Field Monitoring Data for CAT

INSTRUCTIONS

1.0 RP Personnel Complete this sheet. Do not make any edits to the sheet named "CAT".

2.0 Enter LAT and LON as values (e.g. 35.123456 and 106.123456).

3.0 After Field Monitoring Data is populated, save under a new file name.

4.0 Click on the hyperlink shown below and attach the saved file (from step 3 above) to the email, and send. You may also include any pertinent information within the body of the email.

CAT Team and RPPOC

Date:

Incident:

Provided By:

Readings:

Field Monitoring Point	Latitude: N	Longitude: W	dpm/100cm^2
1			
2			
3			
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RP CAT

Field Monitoring Performed – Sent to CAT

Field Readings Tool

Field Monitoring Data for CAT

Date: 4/3/2013

Incident: Rad Container Spill

Provided By: RPPOC

Readings:

Field Monitoring Point	Latitude	Longitude	dpm/100cm^2
1	35.039475	-106.545151	300
2	35.039044	-106.54625	0
3	35.038047	-106.545328	1100
4	35.03809	-106.544217	280
5	35.036199	-106.54514	4100
6	35.036198	-106.544468	3800
7	35.035733	-106.54484	4700
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Field Monitoring Performed – Sent to CAT

Field Readings Tool

Field Readings

	From Radiation Protection			HotSpot Input				From CAT		Release Latitude	Release Longitude
Field Monitoring Point	Lat. (Y coor)	Long. (X coor)	Field Reading (dpm/100 cm2)	X (mi)	Y (mi)	X (km)	Y (km)	New HotSpot Output (dpm/100 cm2)	Scaling Factor	35.04065	-106.544819
1	35.039475	-106.545151	300	-0.02281	-0.08073	-0.03671	-0.12993				
2	35.039044	-106.54625	0	-0.09832	-0.11035	-0.15824	-0.17759				
3	35.038047	-106.545328	1100	-0.03497	-0.17885	-0.05628	-0.28783				
4	35.03809	-106.544217	280	0.041363	-0.1759	0.066568	-0.28308				
5	35.036199	-106.54514	4100	-0.02206	-0.30583	-0.0355	-0.49218				
6	35.036198	-106.544468	3800	0.024117	-0.3059	0.038813	-0.49229				
7	35.035733	-106.54484	4700	-0.00144	-0.33785	-0.00232	-0.54371				
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17											
18											
19											
20											

	From CAT
Initial MAR (Ci)	2.50E+01
Adjusted MAR (Ci)	

Average	

CAT Analyzes Field Data Using **Field Readings Tool**

X,Y Coordinates

```
HotSpot  Version 2.07.2  General Plume
Apr 03, 2013 02:40 PM

Source Material           : Cs-137  F     30.0y
Material-at-Risk   (MAR)  : 2.5000E+01 Ci
Damage Ratio       (DR)   : 1.00
Airborne Fraction  (ARF)  : 2.00E-03
Respirable Fraction (RF)  : 3.00E-01
Leakpath Factor    (LPF)  : 1.000
Respirable Source Term    : 1.50E-02 Ci
Non-respirable Source Term : 3.50E-02 Ci
Effective Release Height  : 0.00 ft
Wind Direction            : 0.0 degrees  Wind from the North
Wind Speed (h=33 ft)      : 4.50 mph
Wind Speed (h=H-eff)      : 3.53 mph
Stability Class           : D
Respirable Dep. Vel.      : 1.00 cm/s
Non-respirable Dep. Vel.  : 8.00 cm/s
Receptor Height           : 4.9 ft
Inversion Layer Height    : 1001 ft
Sample Time               : 15.000 min
Breathing Rate            : 4.17E-04 m3/sec
Location Coordinates      : x-axis runs West-to-East, y-axis runs South-to-North

Maximum Dose Distance     : 0.006 mi
MAXIMUM  TED              : 0.758 rem
Inner  Contour Dose       : 1.00E+02 rem
Middle Contour Dose       : 1.0 rem
Outer  Contour Dose       : 0.100 rem
Exceeds Inner  Dose Out To : Not Exceeded
Exceeds Middle Dose Out To : Not Exceeded
Exceeds Outer  Dose Out To : 0.013 mi

FGR-13 Dose Conversion Data - Total Effective Dose (TED)

      Include Plume Passage Inhalation and Submersion
      Include Ground Shine (Weathering Correction Factor : Likhtarev)
      Exposure Window:(Start: 0.00 days; Duration: 4.00 days)  [100% stay time].
      Initial Deposition and Dose Rate shown
      Ground Roughness Correction Factor: 0.820
```

LOCATION x mi	LOCATION y mi	T E D (rem)	RESPIRABLE TIME-INTEGRATED AIR CONCENTRATION (Ci-sec)/m3	GROUND SURFACE DEPOSITION (dpm/100cm2)	GROUND SHINE DOSE RATE (rem/hr)	ARRIVAL TIME (hour:min)
-2.28E-02	-8.07E-02	1.9E-06	5.3E-08	5.9E+01	1.6E-08	00:01
-9.83E-02	-1.10E-01	0.0E+00	0.0E+00	0.0E+00	0.0E+00	00:01
-3.50E-02	-1.79E-01	7.7E-06	2.9E-07	2.1E+02	5.8E-08	00:03
4.14E-02	-1.76E-01	2.0E-06	7.6E-08	5.7E+01	1.5E-08	00:02
-2.21E-02	-3.06E-01	3.2E-05	1.5E-06	8.3E+02	2.2E-07	00:05
2.41E-02	-3.06E-01	3.0E-05	1.4E-06	7.6E+02	2.0E-07	00:05
-1.00E-02	-3.38E-01	3.7E-05	1.7E-06	9.3E+02	2.5E-07	00:05

Field Readings

	From Radiation Protection			HotSpot Input				From CAT		Release Latitude	Release Longitude
Field Monitoring Point	Lat. (Y coor)	Long. (X coor)	Field Reading (dpm/100 cm2)	X (mi)	Y (mi)	X (km)	Y (km)	New HotSpot Output (dpm/100 cm2)	Scaling Factor	35.04065	-106.544819
1	35.039475	-106.545151	300	-0.02281	-0.08073	-0.03671	-0.12993				
2	35.039044	-106.54625	0	-0.09832	-0.11035	-0.15824	-0.17759				
3	35.038047	-106.545328	1100	-0.03497	-0.17885	-0.05628	-0.28783				
4	35.038[illegible]	-106.544217	280	0.041363	-0.1759	0.066568	-0.28308				
5	35.036199	-106.54514	4100	-0.02206	-0.30583	-0.0355	-0.49218				
6	35.036198	-106.544468	3800	0.024117	-0.3059	0.038813	-0.49229				
7	35.035733	-106.54484	4700	-0.00144	-0.33785	-0.00232	-0.54371				
8											
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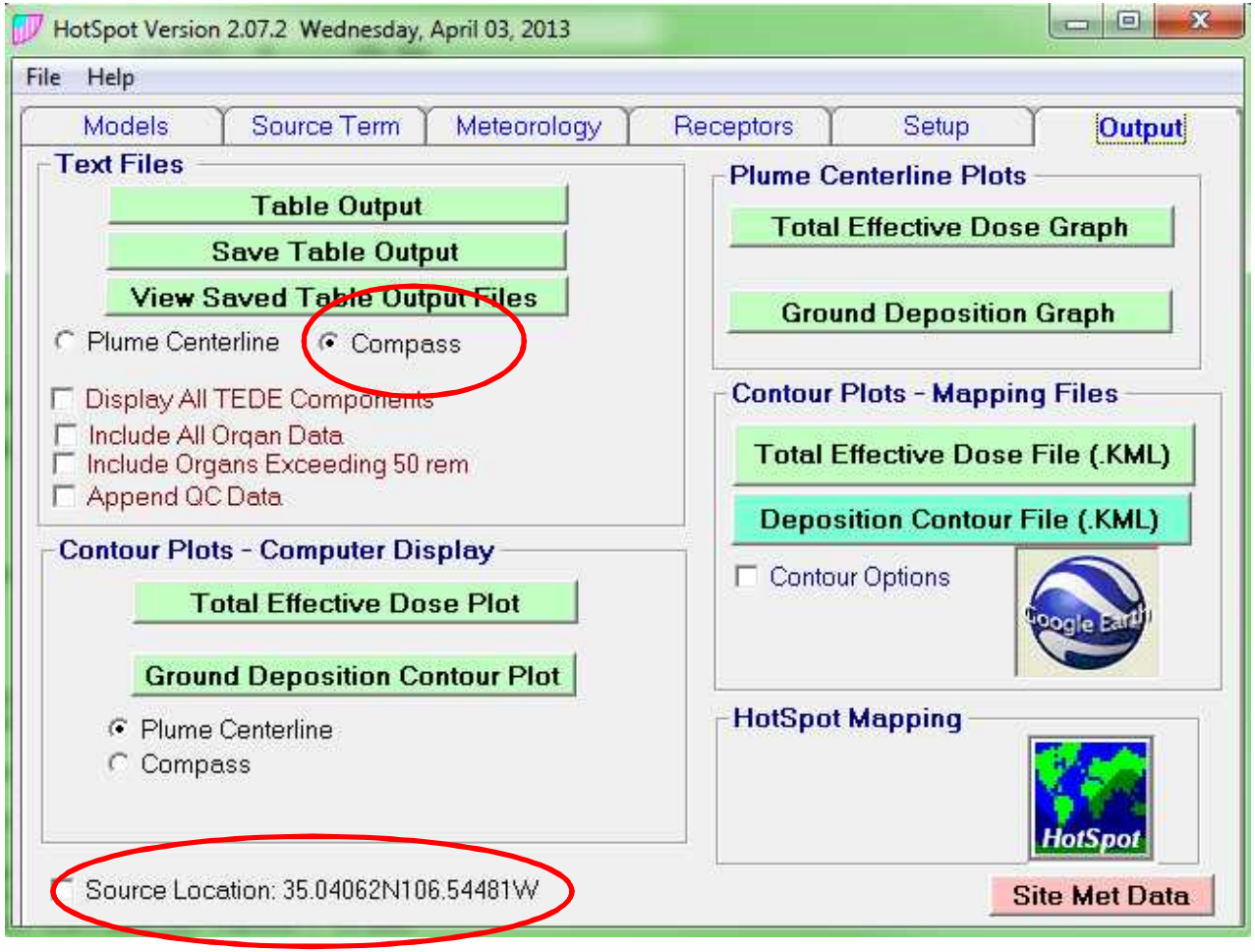
12											
13											
14											
15											
16											
17											
18											
19											
20											

	From CAT		Average	
Initial MAR (Ci)	2.50E+01			
Adjusted MAR (Ci)				

13,

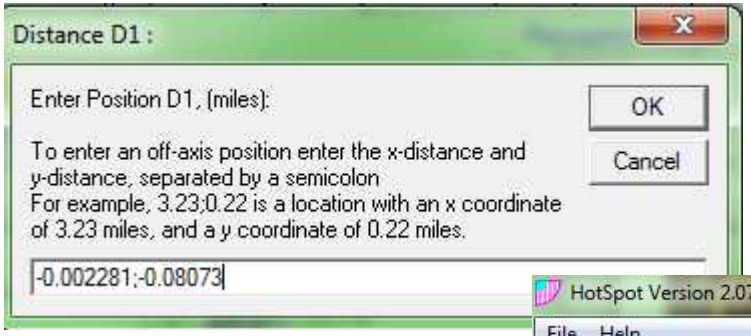
EMERGENCY MANAGEMENT ISSUES SPECIAL INTEREST GROUP

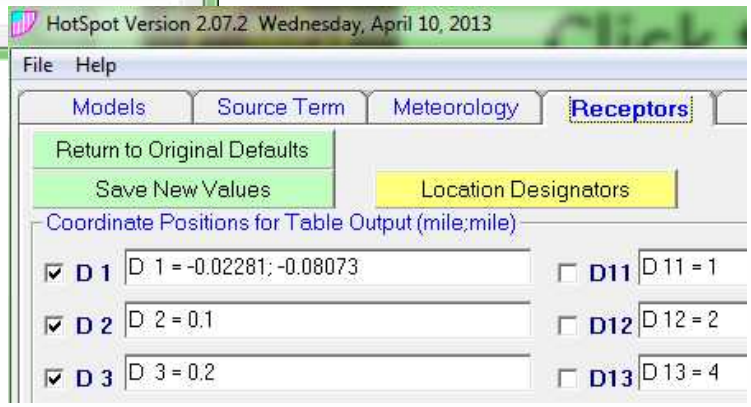
HotSpot Output Tab



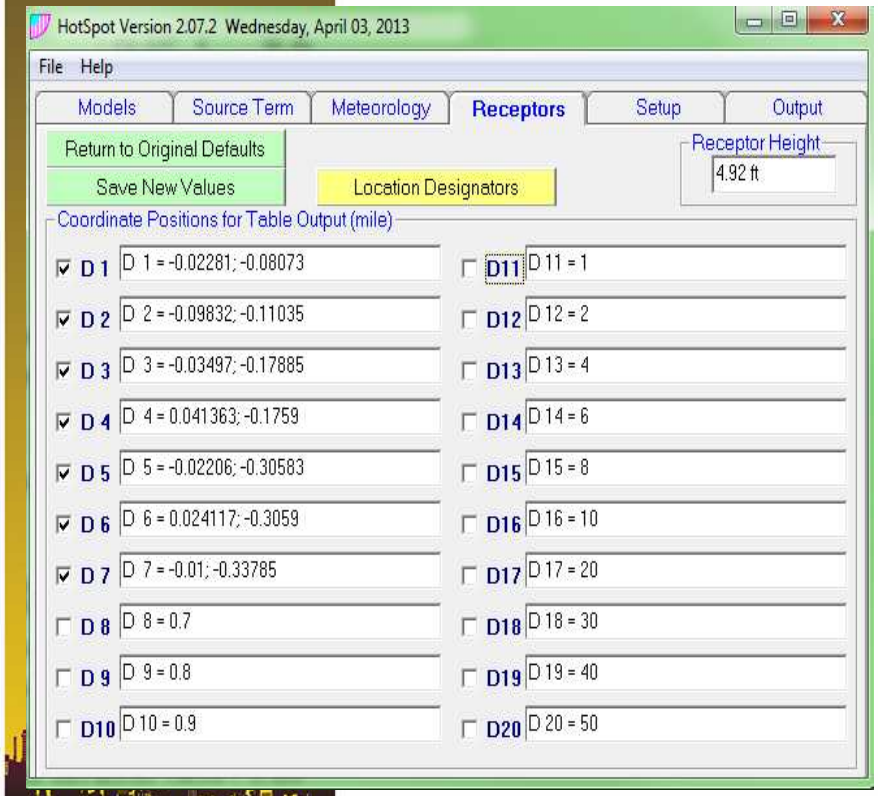
Receptors

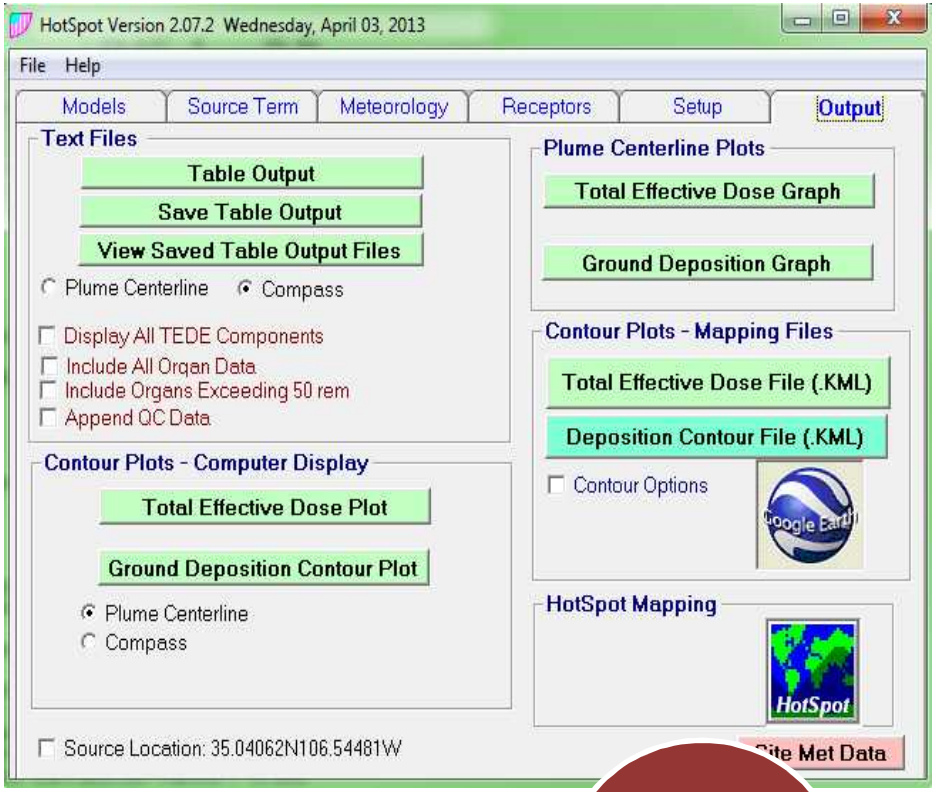
HotSpot Input			
X (mi)	Y (mi)	X (km)	Y (km)
-0.02281	-0.08073	-0.03671	-0.12993
-0.09832	-0.11035	-0.15824	-0.17759
-0.03497	-0.17885	-0.05628	-0.28783
0.041363	-0.1759	0.066568	-0.28308
-0.02206	-0.30583	-0.0355	-0.49218
0.024117	-0.3059	0.038813	-0.49229
-0.00144	-0.33785	-0.00232	-0.54371





HotSpot Tabs





CAT Analyzes Field Data Using **Field Readings Tool**

emi sig
EMERGENCY MANAGEMENT ISSUES SPECIAL INTEREST GROUP

Annual Meeting, May 6-10, 2013, Hyatt Regency Chicago, Chicago, Illinois

Table Output

```
HotSpot  Version 2.07.2  General Plume
Apr 03, 2013 02:40 PM

Source Material             : Cs-137  F     30.0y
Material-at-Risk   (MAR)    : 2.5000E+01 Ci
Damage Ratio        (DR)    : 1.00
Airborne Fraction  (ARF)    : 2.00E-03
Respirable Fraction (RF)    : 3.00E-01
Leakpath Factor    (LPF)    : 1.000
Respirable Source Term      : 1.50E-02 Ci
Non-respirable Source Term  : 3.50E-02 Ci
Effective Release Height    : 0.00 ft
Wind Direction              : 0.0 degrees  Wind from the North
Wind Speed (h=33 ft)        : 4.50 mph
Wind Speed (h=H-eff)        : 3.53 mph
Stability Class             : D
Respirable Dep. Vel.        : 1.00 cm/s
Non-respirable Dep. Vel.    : 8.00 cm/s
Receptor Height             : 4.9 ft
Inversion Layer Height      : 1001 ft
Sample Time                 : 15.000 min
Breathing Rate              : 4.17E-04 m3/sec
Location Coordinates        : x-axis runs West-to-East, y-axis runs South-to-North

Maximum Dose Distance       : 0.006 mi
MAXIMUM  TED                : 0.758 rem
Inner  Contour Dose         : 1.00E+02 rem
Middle Contour Dose         : 1.0 rem
Outer  Contour Dose         : 0.100 rem
Exceeds Inner  Dose Out To  : Not Exceeded
Exceeds Middle Dose Out To  : Not Exceeded
Exceeds Outer  Dose Out To  : 0.013 mi

FGR-13 Dose Conversion Data - Total Effective Dose (TED)

      Include Plume Passage Inhalation and Submersion
      Include Ground Shine (Weathering Correction Factor : Likhtarev)
      Exposure Window:(Start: 0.00 days; Duration: 4.00 days)  [100% stay time].
      Initial Deposition and Dose Rate Shown
      Ground Roughness Correction Factor: 0.820
```

LOCATION x mi	LOCATION y mi	T E D (rem)	RESPIRABLE TIME-INTEGRATED AIR CONCENTRATION (Ci-sec)/m3	GROUND SURFACE DEPOSITION (dpm/100cm2)	GROUND SHINE DOSE RATE (rem/hr)	ARRIVAL TIME (hour:min)
-2.28E-02	-8.07E-02	1.9E-06	5.3E-08	5.9E+01	1.6E-08	00:01
-9.83E-02	-1.10E-01	0.0E+00	0.0E+00	0.0E+00	0.0E+00	00:01
-3.50E-02	-1.79E-01	7.7E-06	2.9E-07	2.1E+02	5.8E-08	00:03
4.14E-02	-1.76E-01	2.0E-06	7.6E-08	5.7E+01	1.5E-08	00:02
-2.21E-02	-3.06E-01	3.2E-05	1.5E-06	8.3E+02	2.2E-07	00:05
2.41E-02	-3.06E-01	3.0E-05	1.4E-06	7.6E+02	2.0E-07	00:05
-1.00E-02	-3.38E-01	3.7E-05	1.7E-06	9.3E+02	2.5E-07	00:05

Ground Deposition Values

```
HotSpot  Version 2.07.2  General Plume
Apr 03, 2013 02:40 PM

Source Material           : Cs-137  F     30.0y
Material-at-Risk   (MAR)  : 2.5000E+01 Ci
Damage Ratio       (DR)   : 1.00
Airborne Fraction  (ARF)  : 2.00E-03
Respirable Fraction (RF)  : 3.00E-01
Leakpath Factor    (LPF)  : 1.000
Respirable Source Term    : 1.50E-02 Ci
Non-respirable Source Term : 3.50E-02 Ci
Effective Release Height  : 0.00 ft
Wind Direction            : 0.0 degrees  Wind from the North
Wind Speed (h=33 ft)      : 4.50 mph
Wind Speed (h=H-eff)      : 3.53 mph
Stability Class           : D
Respirable Dep. Vel.      : 1.00 cm/s
Non-respirable Dep. Vel.  : 8.00 cm/s
Receptor Height           : 4.9 ft
Inversion Layer Height    : 1001 ft
Sample Time               : 15.000 min
Breathing Rate            : 4.17E-04 m3/sec
Location Coordinates      : x-axis runs West-to-East, y-axis runs South-to-North

Maximum Dose Distance     : 0.006 mi
MAXIMUM  TED              : 0.758 rem
Inner  Contour Dose       : 1.00E+02 rem
Middle Contour Dose       : 1.0 rem
Outer  Contour Dose       : 0.100 rem
Exceeds Inner  Dose Out To : Not Exceeded
Exceeds Middle Dose Out To : Not Exceeded
Exceeds Outer  Dose Out To : 0.013 mi

FGR-13 Dose Conversion Data - Total Effective Dose (TED)

     Include Plume Passage Inhalation and Submersion
     Include Ground Shine (Weathering Correction Factor : Likhtarev)
     Exposure Window:(Start: 0.00 days; Duration: 4.00 days)  [100% stay time].
     Initial Deposition and Dose Rate shown
     Ground Roughness Correction Factor: 0.820
```

LOCATION x mi	LOCATION y mi	T E D (rem)	RESPIRABLE TIME-INTEGRATED AIR CONCENTRATION (Ci-sec)/m3	GROUND SURFACE DEPOSITION (dpm/100cm2)	GROUND SHINE DOSE RATE (rem/hr)	ARRIVAL TIME (hour:min)
-2.28E-02	-8.07E-02	1.9E-06	5.3E-08	5.9E+01	1.0E-08	00:01
-9.83E-02	-1.10E-01	0.0E+00	0.0E+00	0.0E+00	0.0E+00	00:01
-3.50E-02	-1.79E-01	7.7E-06	2.9E-07	2.1E+02	5.8E-08	00:03
4.14E-02	-1.76E-01	2.0E-06	7.6E-08	5.7E+01	1.5E-08	00:02
-2.21E-02	-3.06E-01	3.2E-05	1.5E-06	8.3E+02	2.2E-07	00:05
2.41E-02	-3.06E-01	3.0E-05	1.4E-06	7.6E+02	2.0E-07	00:05
-1.00E-02	-3.38E-01	3.7E-05	1.7E-06	9.3E+02	2.5E-07	00:05

Field Readings

ng	From Radiation Protection: Lat. (Y coor)	Long. (X coor)	Field Reading (dpm/100 cm2)	HotSpot Input: X (mi)	Y (mi)	X (km)	Y (km)	From CAT: New HotSpot Output (dpm/100 cm2)	Scaling Factor
	35.039475	-106.545151	300	-0.02281	-0.08073	-0.03671	-0.12993	5.90E+01	5.084745763
	35.039044	-106.54625	0	-0.09832	-0.11035	-0.15824	-0.17759	0.00E+00	
	35.038047	-106.545328	1100	-0.03497	-0.17885	-0.05628	-0.28783	2.10E+02	5.238095238
	35.03809	-106.544217	280	0.041363	-0.1759	0.066568	-0.28308	5.70E+01	4.912280702
	35.036199	-106.54514	4100	-0.02206	-0.30583	-0.0355	-0.49218	8.30E+02	4.939759036
	35.036198	-106.544468	3800	0.024117	-0.3059	0.038813	-0.49229	7.60E+02	5
	35.035733	-106.54484	4700	-0.00144	-0.33785	-0.00232	-0.54371	9.30E+02	5.053763441

From CAT	Average	5.04E+00
2.50E+01		
125.9526841		

Adjusted MAR

	A	B	C	D	E	F	G	H	I	J	K	L
1	**Field Readings**											
2		From Radiation Protection			HotSpot Input				From CAT		Release Latitude	Release Longitude
3	Field Monitoring Point	Lat. (Y coor)	Long. (X coor)	Field Reading (dpm/100 cm2)	X (mi)	Y (mi)	X (km)	Y (km)	New HotSpot Output (dpm/100 cm2)	Scaling Factor	35.04065	-106.544819
4	1	35.039475	-106.545151	300	-0.02281	-0.08073	-0.03671	-0.12993	5.90E+01	5.084745763		
5	2	35.039044	-106.54625	0	-0.09832	-0.11035	-0.15824	-0.17759	0.00E+00			
6	3	35.038047	-106.545328	1100	-0.03497	-0.17885	-0.05628	-0.28783	2.10E+02	5.238095238		
7	4	35.03809	-106.544217	280	0.041363	-0.1759	0.066568	-0.28308	5.70E+01	4.912280702		
8	5	35.036199	-106.54514	4100	-0.02206	-0.30583	-0.0355	-0.49218	8.30E+02	4.939759036		
9	6	35.036198	-106.544468	3800	0.024117	-0.3059	0.038813	-0.49229	7.60E+02	5		
10	7	35.035733	-106.54484	4700	-0.00144	-0.33785	-0.00232	-0.54371	9.30E+02	5.053763441		
11	8											
12	9											
13	10											
14	11											
15	12											
16	13											
17	14											
18	15											
19	16											
20	17											
21	18											
22	19											
23	20											
24												
25		From CAT							Average	5.04E+00		
26	Initial MAR (Ci)	2.50E+01										
27												
28	Adjusted MAR (Ci)	125.9526841										

CAT Analyzes Field Data Using **Field Readings Tool**

Rerun HotSpot

```
47HotSpot  Version 2.07.2  General Plume
Apr 04, 2013 08:47 AM

Source Material              : Cs-137  F      30.0y
Material-at-Risk    (MAR)    : 1.2500E+02 Ci
Damage Ratio          (DR)   : 1.00
Airborne Fraction   (ARF)    : 2.00E-03
Respirable Fraction (RF)     : 3.00E-01
Leakpath Factor     (LPF)    : 1.000
Respirable Source Term       : 7.50E-02 Ci
Non-respirable Source Term   : 1.75E-01 Ci
Effective Release Height     : 0.00 ft
Wind Direction               : 0.0 degrees  Wind from the North
Wind Speed (h=33 ft)         : 4.50 mph
Wind Speed (h=H-eff)         : 3.53 mph
Stability Class              : D
Respirable Dep. Vel.         : 1.00 cm/s
Non-respirable Dep. Vel.     : 8.00 cm/s
Receptor Height              : 4.9 ft
Inversion Layer Height       : 1001 ft
Sample Time                  : 15.000 min
Breathing Rate               : 4.17E-04 m3/sec
Location Coordinates         : x-axis runs West-to-East, y-axis runs South-to-North

Maximum Dose Distance        : 0.006 mi
MAXIMUM  TED                 : 3.8 rem
Inner  Contour Dose          : 1.00E+02 rem
Middle Contour Dose          : 1.0 rem
Outer  Contour Dose          : 0.100 rem
Exceeds Inner  Dose Out To   : Not Exceeded
Exceeds Middle Dose Out To   : 0.010 mi
Exceeds Outer  Dose Out To   : 0.025 mi

FGR-13 Dose Conversion Data - Total Effective Dose (TED)

      Include Plume Passage Inhalation and Submersion
      Include Ground Shine (Weathering Correction Factor : Likhtarev)
      Exposure Window:(Start: 0.00 days; Duration: 4.00 days)  [100% stay time].
      Initial Deposition and Dose Rate shown
      Ground Roughness Correction Factor: 0.820
```

LOCATION x mi	y mi	T E D (rem)	RESPIRABLE TIME-INTEGRATED AIR CONCENTRATION (Ci-sec)/m3	GROUND SURFACE DEPOSITION (dpm/100cm2)	GROUND SHINE DOSE RATE (rem/hr)	/
-2.28E-02	-8.07E-02	9.6E-06	2.7E-07	3.0E+02	8.0E-08	
-9.83E-02	-1.10E-01	0.0E+00	0.0E+00	0.0E+00	0.0E+00	
-3.50E-02	-1.79E-01	3.8E-05	1.5E-06	1.1E+03	2.9E-07	
4.14E-02	-1.76E-01	1.0E-05	3.8E-07	2.8E+02	7.7E-08	
-2.21E-02	-3.06E-01	1.6E-04	7.4E-06	4.1E+03	1.1E-06	
2.41E-02	-3.06E-01	1.5E-04	6.8E-06	3.8E+03	1.0E-06	
-1.00E-02	-3.38E-01	1.8E-04	8.7E-06	4.7E+03	1.3E-06	00.

Rerun HotSpot using New Data:

More Accurate MAR

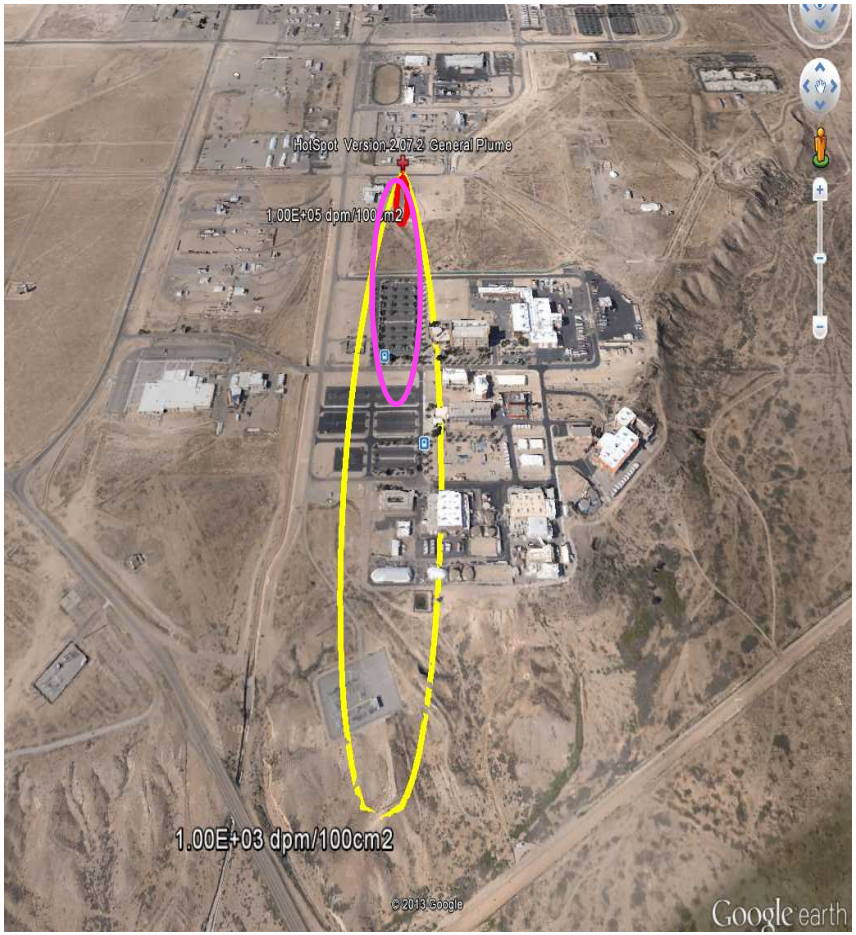
Updated Map

CAT Communicates New PAs to IC

Contamination Update

CAT Assessment Map Sent to Rad Protection

Comparison


HotSpot Version 2.07.2 General Plume
1.00E+05 dpm/100 cm2
1.00E+03 dpm/100cm2
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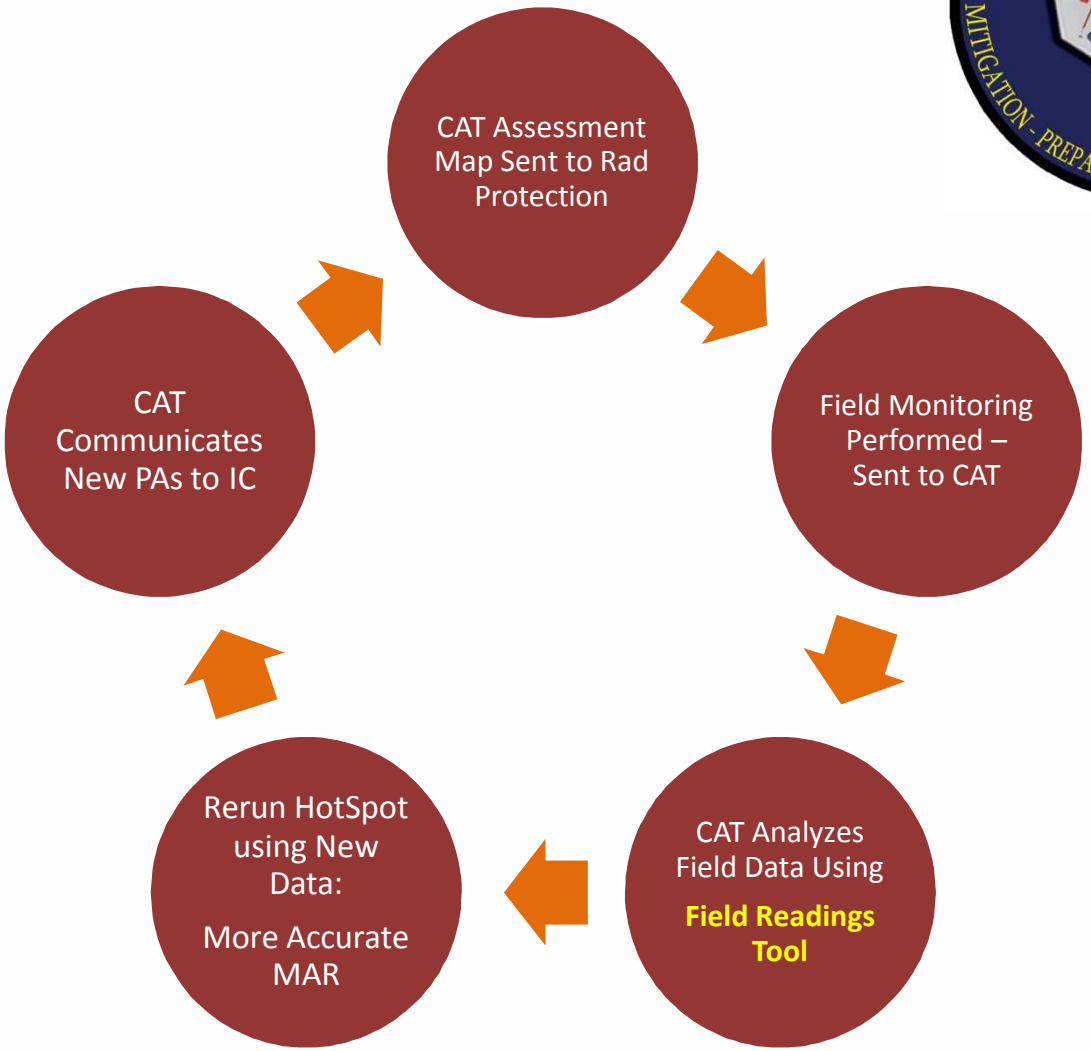
Google earth

Questions


CAT Assessment Map Sent to Rad Protection
Field Monitoring Performed – Sent to CAT
CAT Analyzes Field Data Using
Field Readings Tool
Rerun HotSpot using New Data:
More Accurate MAR
CAT Communicates New PAs to IC