Radiological Issues at ISR Facilities
Uranium Recovery Workshop
January 11-12, 2011

Ronald A. Burrows, CHP, RRPT
Health Physicist
Uranium Recovery Licensing Branch
U.S. Nuclear Regulatory Commission

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

Health Physics Topics

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

- Meteorological data collection and use
- Compliance issues associated with 10 CFR 40.65(a)(1)
- Beta surveys
- Using qualified designees to perform health physics tasks
- Compliance issues associated with 10 CFR 20.1301/1302/Subpart C
- Demonstrating compliance with 10 CFR 20 exposure limits for Rn-222 and daughters (Duane Schmidt)
- NRC Inspection Program (Linda Gersey)

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

Your facility

- Provide data representative of atmospheric conditions into which material will be released and transported.
- Provide data for discussion of general climatology and comparison of local and regional data.

National Weather Service station (or other off-site station)

- Evaluate long-term meteorological conditions in vicinity of the site.
- Substantiate that the period of on-site data collection represents long-term meteorological conditions.

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

Your facility

Regulatory Guide 3.63 describes:

- meteorological parameters,
- siting considerations,
- accuracy specifications,
- system calibration and inspection frequency

National Weather Service station (or other off-site station)

Regulatory Guide 3.63 describes:

- selection criteria for the National Weather Service (NWS) station,
- what to compare to determine if site data is representative of long-term meteorological conditions

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

Several issues have impeded the evaluation of meteorological data from applicants:

1. Lack of a clearly articulated basis for substantiating off-site meteorological data as representing on-site meteorological conditions,

2. Lack of a demonstration that meteorological data collected for on-site analysis is during a period that represents long-term meteorological conditions,

3. Lack of a discussion on system accuracy, maintenance, calibration and data recovery parameters

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

Analysis of issues –

1. Lack of a clearly articulated basis for substantiating off-site meteorological data as representing on-site meteorological conditions.
   - Applicants are not precluded from using off-site meteorological data to represent long-term meteorological conditions at and near the site.
   - It is the responsibility of the applicant to substantiate the use of off-site data for this purpose (NUREG-1569, Acc. Crit. 2.5.3(3)).
   - This is consistent with NRC staff letter to High Plains Uranium, Inc. (NRC 2006).

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

Analysis of issues, cont'd –

- No NRC guidance (for staff or applicants) exists for this purpose.
- Regarding the representativeness of meteorological data, EPA stated "Though it remains a possibility…a quantitative method does not exist for determining representativeness absolutely." (EPA 2000).
- Through a Technical Assistance Request, NRC meteorological staff reached the same conclusion.

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

Analysis of issues, cont'd –

Conclusions

- While applicants are not precluded from utilizing off-site meteorological data to represent long-term meteorological conditions at and near the site, NRC staff has no criteria to evaluate this data.
- NRC staff has observed wide variations in meteorological data at close distances (~5 miles).
- Relying on EPA's conclusion and analysis from NRC meteorological staff, along with observations of actual data, NRC staff considers it a difficult task for applicants to substantiate the use of off-site data for this purpose.
- NRC staff recommends the use of on-site data.

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

Analysis of issues, cont'd –

2. Lack of a demonstration that meteorological data collected for on-site analysis is during a period that represents long-term meteorological conditions.

- Regulatory Guide 3.63 provides the general methodology for determining if the data used for on-site analysis is representative of long-term meteorological conditions in the site vicinity.

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

Analysis of issues, cont'd –

- The NWS station (or other approved weather station) is used for this purpose.

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

Analysis of issues, cont'd –

Example

Assumption

On-site data collected during calendar years 2008 – 2010 (36 months of data).

To determine that this data represents long-term meteorological conditions in the site vicinity:

1. You will need two sets of meteorological data from the NWS station selected for this analysis-

   A) One data set from calendar years 2008 – 2010 (36 months of data). This is the "concurrent" period discussed in RG 3.63.

   B) Long-term (e.g., 30 years) data from the **same** NWS station.

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

Analysis of issues, cont'd –

2. Compare these two sets of NWS station data to each other to determine if the data collected for on-site analysis represents long-term meteorological conditions in the site vicinity.

Q. How exactly is this done and what does staff find acceptable?

A. Currently, no NRC guidance (for staff or applicants) exists for this purpose. Therefore, determinations will be handled an a case-by-case basis.

Observation: ANSI/ANS-3.11-2005 does not provide additional details on the specifics of this comparison.

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

Analysis of issues, cont'd –

3. Lack of a discussion on system accuracy, maintenance, calibration and data recovery parameters.

   - Applicants should address regulatory positions 3 and 4 in Regulatory Guide 3.63.

References

American Nuclear Society, ANSI/ANS-3.11-2005, Determining Meteorological Information at Nuclear Facilities, 2005

US EPA, Meteorological Monitoring Guidance for Regulatory Modeling Applications, EPA-454/R-99-005, February 2000.

US NRC, Regulatory Guide 3.63, Onsite Meteorological Measurement Program for Uranium Recovery Facilities-Data Acquisition and Reporting, March 1988, ML003739874 or electronic reading room at www.nrc.gov.

US NRC, NUREG-1569, Standard Review Plan for In Situ Leach Uranium Extraction License Application, June 2003, electronic reading room at www.nrc.gov.

US NRC, NRC staff letter to High Plains Uranium, Inc., dated August 30, 2006, Summary of August 22, 2006 meeting, ML062560282.

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

Questions?

10 CFR 40.65 Effluent Monitoring Reporting Requirements

Key Requirements

- The reports must specify the quantity of each of the principal radionuclides released to unrestricted areas in liquid and gaseous effluents during the previous six months of operations.
  - The reports should include sufficient information to describe how the quantities were determined.
  - Discussion on the type of monitoring and analysis, as well as the sample collection frequency and lower limit of detection.
  - Results of measurements, along with associated uncertainties. If calculations are used, parameter values, and justification, should be included.
  - Includes land application, deep well injection, and wellfield releases (liquids and gases).

Compliance issues associated with 10 CFR 40.65(a)(1)

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

- If quantities of radioactive materials released during the reporting period are significantly above the licensee's design objectives previously reviewed as part of the licensing action, the report shall cover this specifically.

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

Need to understand the difference between effluent and environmental monitoring. See NCRP-118, Radiation Protection in the Mineral Extraction Industry, for a discussion of these different programs.

NRC definition of “effluent”:

Effluent - Liquid or gaseous waste containing plant-related, licensed radioactive material, emitted at the boundary of the facility (e.g., buildings, end-of-pipe, stack, or container) ... (Regulatory Guides 1.21 and 4.1, Revised 6/09)

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

Question: What role does the environmental monitoring program play in complying with 10 CFR 40.65 reporting requirements?

Answer:

1. Initially, the environmental monitoring data collected in accordance with Regulatory Guide 4.14 has little significance in addressing data to be reported by 10 CFR 40.65.

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

a. ISR facilities generally take environmental measurements a significant distance from the boundary of the unrestricted area.

b. Environmental measurements are generally reported in units of activity concentration (e.g., µCi/ml), not total activity (e.g., µCi).

Neither of these satisfy the reporting requirements of 10 CFR 40.65(a)(1).

2. NRC staff expects that if actual effluents are not measured, then alternatives will be proposed that provide for a more extensive monitoring program. This could include, for example, measuring various process parameters and applying appropriate release assumptions. This is consistent with Regulatory Guide 4.14.

3. Long-term, licensees may be able to correlate predicted (e.g., MILDOS) effluent concentrations with the results of environmental monitoring and could apply for an amendment to their license. This is consistent with Regulatory Guide 4.14.

Compliance issues associated with 10 CFR 40.65(a)(1) - Report examples

U.S.NRC
tory Commission
Environment

Honeywell - Metropolis Works
P. O. Box 430
Metropolis, IL 62960

REPORTING PERIOD:

January 1, 2010 – June 30, 2010

GASEOUS EFFLUENTS:

1. The average release rate for the reporting period = $5.5E^{5}$ ACFM.

2. The principle radionuclides released are particulate, oxides and fluorides as follows:

		January 1 – June 30, 2010
Uranium (Nat.)	=	$4.28\ e^{-2}$ curies (measured)
Ra^{226}	=	$1.20\ e^{-5}$ curies (Note 1)
Th^{230}	=	$1.22\ e^{-4}$ curies (Note 1)

LIQUID EFFLUENTS: (Note 2)

1. The average release rate for the reporting period = 2701 GPM.

2. The principle radionuclides released are as follows:

Uranium (Nat.)	=	$9.12\ e^{-1}$ curies (measured)
Ra^{226}	=	$3.08\ e^{-3}$ curies (measured)
Th^{230}	=	$1.60\ e^{-3}$ curies (measured)

NOTE 1: Calculated from measured Th^{230} and Ra^{226} content of the various types of ore concentrates processed during the reporting period. As the ratio from exit points of these nuclides to uranium is assumed to be the same as in the concentrates, this calculation results in conservative (high) reported quantities.

NOTE 2: Quantities include stormwater effluent discharge.

Compliance issues associated with 10 CFR 40.65(a)(1) - Report examples

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

February 28, 2008

Dear Sir:
Subject: SNM-1107/70-1151

The following report fulfills regulatory requirements as listed in 10CFR 40.65 and 10CFR 70.59 "Effluent Monitoring Requirements." For the six-month period July 1, 2007 through December 31, 2007, the following quantities of radionuclides were released to the unrestricted area by the Westinghouse Electric Company's Columbia, South Carolina Nuclear Fuel Plant:

A. Gaseous	265.5 uCi Uranium (Analyzed as gross alpha)
B. Liquid Effluent	3186.7 uCi - U-234
	112.5 uCi - U-235
	449.9 uCi - U-238

Gaseous effluent results were obtained from point source gross alpha analysis of stack gas effluent, and the individual radionuclide activity composition (85.0% U-234, 3.0% U-235, and 12.0% U-238) is inferred from the calculated average enrichment. A detailed summary report by stack is provided as Attachment "A."

Liquid effluent values were obtained by analysis of composite proportional samples prior to discharge to the Congaree River and basing the activity on the calculated average enrichment. All liquid discharges are pumped through a single discharge line to Congaree River. A detailed summary liquid discharge report is provided as Attachment "B."

Compliance issues associated with 10 CFR 40.65(a)(1) - Report examples

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

A. Report Period: July 1, through December 31, 2007
B. Sample Location: Composite Sampler at Waste Treatment, prior to discharge to Congaree River
C. Total Liquid Flow: 7.642 E+07 liters
D. Sample Collection: Effluent Composite Sampler

Radioisotope	Concentration		LLD, uCi/ml	Quantity Released, uCi
	uCi/ml	Error		
U-234	4.17 E-08	+/-0.28 E-08	6.00 E-10	3186.7
U-235	0.15 E-08	+/-0.07 E-08	6.00 E-10	112.5
U-238	0.59 E-08	+/-0.11 E-08	6.00 E-10	449.9
Total				3749.1

Note:

1. Liquid effluent composites were analyzed by alpha spectroscopy, and significant quantities of U-236 were not detected using this method.

Compliance issues associated with 10 CFR 40.65(a)(1) - Report examples

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

Attachment "A" GASEOUS EFFLUENT DISCHARGES - JULY 1 THROUGH DECEMBER 31, 2007

	2007 SECOND HALF GASEOUS EFFLUENTS STACK IDENTIFICATION	QUANTITY RELEASED uCi URANIUM/ 6months	GROSS ALPHA (URANIUM) Conc., uCi/ml		ERROR	LLD, uCi/ml	Flow Rate Meters/sec	Derived Isotopic Concentration uCi/ml U234	U235	U238	DERIVED ISOTOPIC DISCHARGE, uCi U234	U235	U238
1	FURNACE EX LINE 1	5.06	1.10E-13	+/-	3.75E-14	8.00E-14	2.78	9.35E-14	3.30E-15	1.32E-14	4.30	0.15	0.61
2	FURNACE EX LINE 2	7.55	1.01E-13	+/-	3.60E-14	8.00E-14	2.78	8.59E-14	3.03E-15	1.21E-14	6.42	0.23	0.91
3	FURNACE EX LINE 3	5.23	9.63E-14	+/-	3.51E-14	8.00E-14	2.78	8.19E-14	2.89E-15	1.16E-14	4.44	0.16	0.63
4	FURNACE EX LINE 4	4.90	9.10E-14	+/-	3.41E-14	8.00E-14	2.78	7.74E-14	2.73E-15	1.09E-14	4.16	0.15	0.59
5	FURNACE EX LINE 5	7.41	1.05E-13	+/-	3.67E-14	8.00E-14	2.78	8.93E-14	3.15E-15	1.26E-14	6.30	0.22	0.89
6	NEW DECON RM	3.25	5.70E-13	+/-	1.37E-13	8.00E-14	1.64	4.85E-13	1.71E-14	6.84E-14	2.77	0.10	0.39
7	MET LAB EX	4.67	2.91E-13	+/-	9.82E-14	8.00E-14	0.56	2.47E-13	8.73E-15	3.49E-14	3.97	0.14	0.56
8	INCINER EX	3.09	1.12E-13	+/-	6.09E-14	8.00E-14	1.89	9.52E-14	3.36E-15	1.34E-14	2.63	0.09	0.37
9	SUPPL INC EX	6.12	1.63E-13	+/-	7.35E-14	8.00E-14	0.94	1.39E-13	4.89E-15	1.96E-14	5.20	0.18	0.73
10	CONVERS 1-A EX	19.10	1.70E-13	+/-	4.67E-14	8.00E-14	4.17	1.45E-13	5.10E-15	2.04E-14	16.23	0.57	2.29
11	CONVERSION 1-B	0.26	3.84E-13	+/-	7.01E-14	8.00E-14	4.17	3.26E-13	1.15E-14	4.61E-14	0.22	0.01	0.03
12	S-1030-A	15.46	1.94E-13	+/-	4.99E-14	8.00E-14	7.50	1.65E-13	5.82E-15	2.33E-14	13.14	0.46	1.86
13	S-1030-B	3.21	3.64E-13	+/-	6.83E-14	8.00E-14	7.50	3.09E-13	1.09E-14	4.37E-14	2.73	0.10	0.39
14	MAINT ENCL 4B	0.00	1.10E-12	+/-	1.19E-13	8.00E-14	3.89	9.35E-13	3.30E-14	1.32E-13	0.00	0.00	0.00
15	CONV ENCL EX 4C	10.41	1.91E-13	+/-	4.95E-14	8.00E-14	3.89	1.62E-13	5.73E-15	2.29E-14	8.85	0.31	1.25
16	CONV ENCL EX 4D	0.00	1.98E-13	+/-	5.04E-14	8.00E-14	3.89	1.68E-13	5.94E-15	2.38E-14	0.00	0.00	0.00
17	CONV EMERG EX 4E	1.95	3.94E-13	+/-	7.10E-14	8.00E-14	3.89	3.35E-13	1.18E-14	4.73E-14	1.66	0.06	0.23
18	CHEM LAB FILTERED EX	10.13	8.93E-14	+/-	3.38E-14	8.00E-14	5.56	7.59E-14	2.68E-15	1.07E-14	8.61	0.30	1.22
19	DECON ROOM EX	12.05	1.00E-12	+/-	1.13E-13	8.00E-14	1.42	8.50E-13	3.00E-14	1.20E-13	10.24	0.36	1.45
20	CAL COMBGAS LN 1	0.95	4.07E-13	+/-	7.22E-14	8.00E-14	0.16	3.46E-13	1.22E-14	4.88E-14	0.81	0.03	0.11
21	CAL COMBGAS LN 2	1.01	7.07E-13	+/-	1.13E-13	8.00E-14	0.16	6.01E-13	2.12E-14	8.48E-14	0.86	0.03	0.12
22	CAL COMBGAS LN 3	0.94	2.15E-13	+/-	5.25E-14	8.00E-14	0.16	1.83E-13	6.45E-15	2.58E-14	0.80	0.03	0.11
23	CAL COMBGAS LN 4	0.77	2.10E-13	+/-	5.19E-14	8.00E-14	0.16	1.79E-13	6.30E-15	2.52E-14	0.66	0.02	0.09
24	CAL COMBGAS LN 5	1.16	6.95E-13	+/-	9.44E-14	8.00E-14	0.16	5.91E-13	2.09E-14	8.34E-14	0.99	0.03	0.14

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

Questions?

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

Q. Will beta surveys be required for personnel release?

A. Yes. NRC staff has determined that beta contamination at uranium recovery facilities is a potential radiological hazard.

Discussion –

- Compliance driver: 10 CFR 20.1501, Surveys and Monitoring. This is NRC staff's justification for requiring beta surveys.

Beta surveys

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

- As discussed at the 2009 uranium recovery workshop, the potential for beta contamination exists at uranium recovery facilities. In evaluating potential hazards, the following was discussed:

> "All aspects of operations and maintenance need to be assessed, not just the end product."
>
> "NRC staff is unaware of site specific survey data fully characterizing contamination in work areas…"
>
> "Current survey practices do not allow for the determination of all potential radiological hazards consistent with 10 CFR 20.1501."

Beta surveys

- NUREG-1736 states that “Each licensee is required to perform evaluations of the actual and potential radiological hazards presented by their activities involving radioactive materials.”

- NUREG-1569 (SRP) and Regulatory Guide 3.46 (Std. Format and Content) address exposure calculations for nonroutine operations, maintenance, and cleanup activities as well as routine activities.

Beta surveys

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

NRC staff answered this question in terms of "surveys" because that is the question posed by industry. If the question had been asked in terms of "monitoring", it would be different.

- Regulatory differences (10 CFR 20.1003) between the terms "survey" and "monitor". While surveys may include measurements, monitoring requires it.

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

Licensees may use operational data to derive beta contamination levels. However, the technical basis must be clearly documented. For example, if measured alpha surface activity is used to derive a correlation for beta surface activity:

- Demonstrate the alpha-to-beta relationship for all areas of the facility.
- Demonstrate the minimum detectable concentration for alpha measurements under all conditions (e.g., alpha scan of the bottom of wet shoes).
- May take the most restrictive case and apply to all.

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

This approach is consistent with the agreement stated in the National Mining Association's letter dated September 16, 2010 (ML102640020) regarding the characterization of *all* radionuclides in any application.

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

Observation -

Applicants leave out many of the details of their analyses. Lacking specific guidance on a topic, NRC staff requires a comprehensive description of processes and assumptions in order to make a determination.

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

Conclusion –

Once a potential radiological hazard has been identified, monitoring may not be required but surveys will be required for the life of the operations as long as that potential radiological hazard exists.

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

Questions?

Using qualified designees for HP tasks

Compliance driver: standard license condition incorporates Regulatory Guide 8.31 as a “shall follow” document.

Regulatory Guide 8.31 recommends that all routine and special radiation surveys are the responsibility of the RSO and radiation safety office staff.

Using qualified designees for HP tasks

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

Due to staffing constraints, applicants are interested in utilizing other trained personnel (plant operators, etc., hereafter referred to as qualified designees) to perform selected HP duties.

Examples:

- Survey potentially contaminated items for unrestricted use
- Survey resin trucks from satellite facility to a central processing facility
- Performing daily walk-through inspections.

Using qualified designees for HP tasks

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

NRC staff guidance –

- Radiological surveys for releasing items for unrestricted use to be performed only by health physics staff.
- Radiological surveys for releasing resin trucks from one restricted area of a licensee's site to another restricted area of the same licensee's site may be performed by qualified designees.

  ➢ NRC staff will review and approve qualification programs for qualified designees on a case-by-case basis.

Using qualified designees for HP tasks

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

- Daily walkthrough inspections may be performed by qualified designees with the following restrictions:
  - Qualified designees may perform inspections no more than two days per week (three, if a Federal holiday falls on a Friday or Monday).
  - Reports from qualified designees will be reviewed by health physics staff within 48 hours of completing the report (within 72 hours if a Federal holiday falls on a Friday or Monday).

Using qualified designees for HP tasks

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

- Licensee will have a health physics staff member available by phone during inspections by qualified designees.

- NRC staff will review and approve qualification programs for qualified designees on a case-by-case basis.

Using qualified designees for HP tasks

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

Questions?

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

Three issues associated with evaluating compliance with dose limits for individual members of the public (10 CFR 20.1301/1302) and workers (Subpart C) are creating avoidable license conditions.

1. Applicants should provide an analysis of who, or what group, receives the highest public exposure and account for all occupational dose,
2. Applicants should propose appropriate surveys to support #1 above,
3. Applicants should evaluate radon progeny to support #1 above (see separate presentation).

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

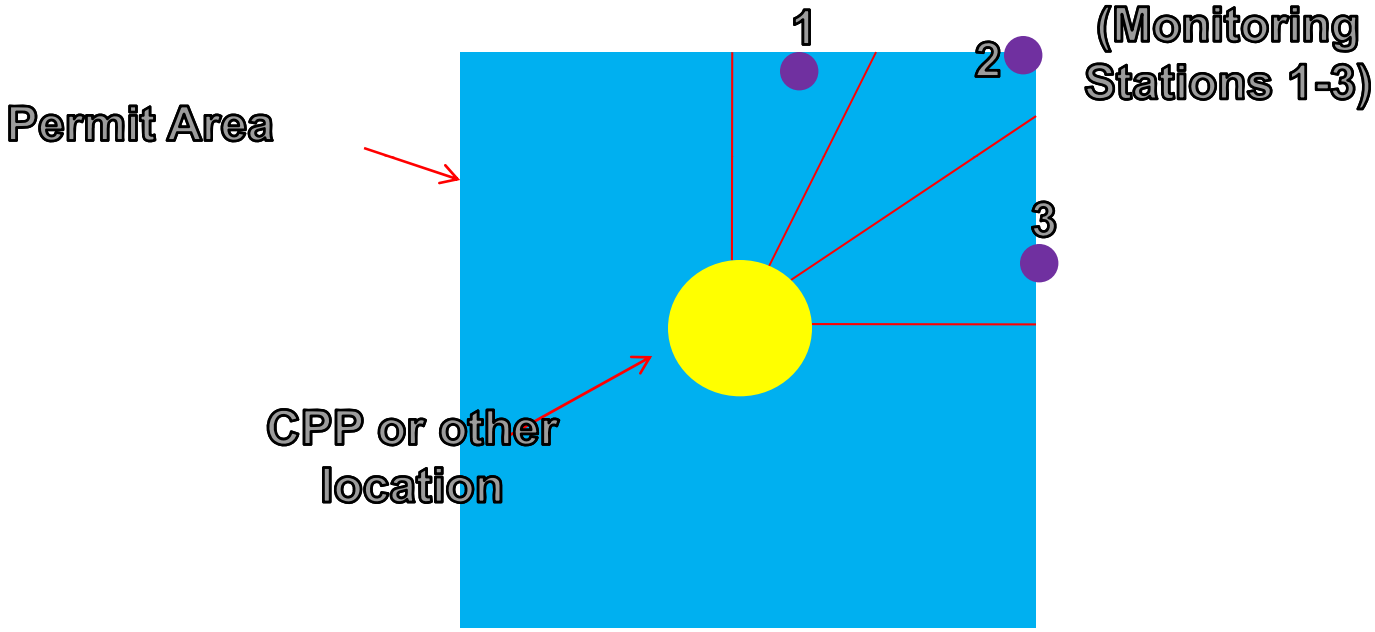
Analysis of issues –

1. Applicants should provide an analysis of who, or what group, receives the highest public exposure and account for all occupational dose. Current situation:

   - Applicants generally design their environmental monitoring program using Regulatory Guide 4.14 as a guide.
   - This results in a minimum of 5 airborne monitoring locations: 3 downwind at/near the site boundary, one at nearest residence, one at background.
   - Applicants use the results of these environmental airborne monitoring locations (particulate and radon) to demonstrate compliance with 10 CFR 20.1301/1302 by comparing to Appendix B, Table 2 values for effluent concentrations.

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

Typical facility environmental monitoring (downwind sectors):



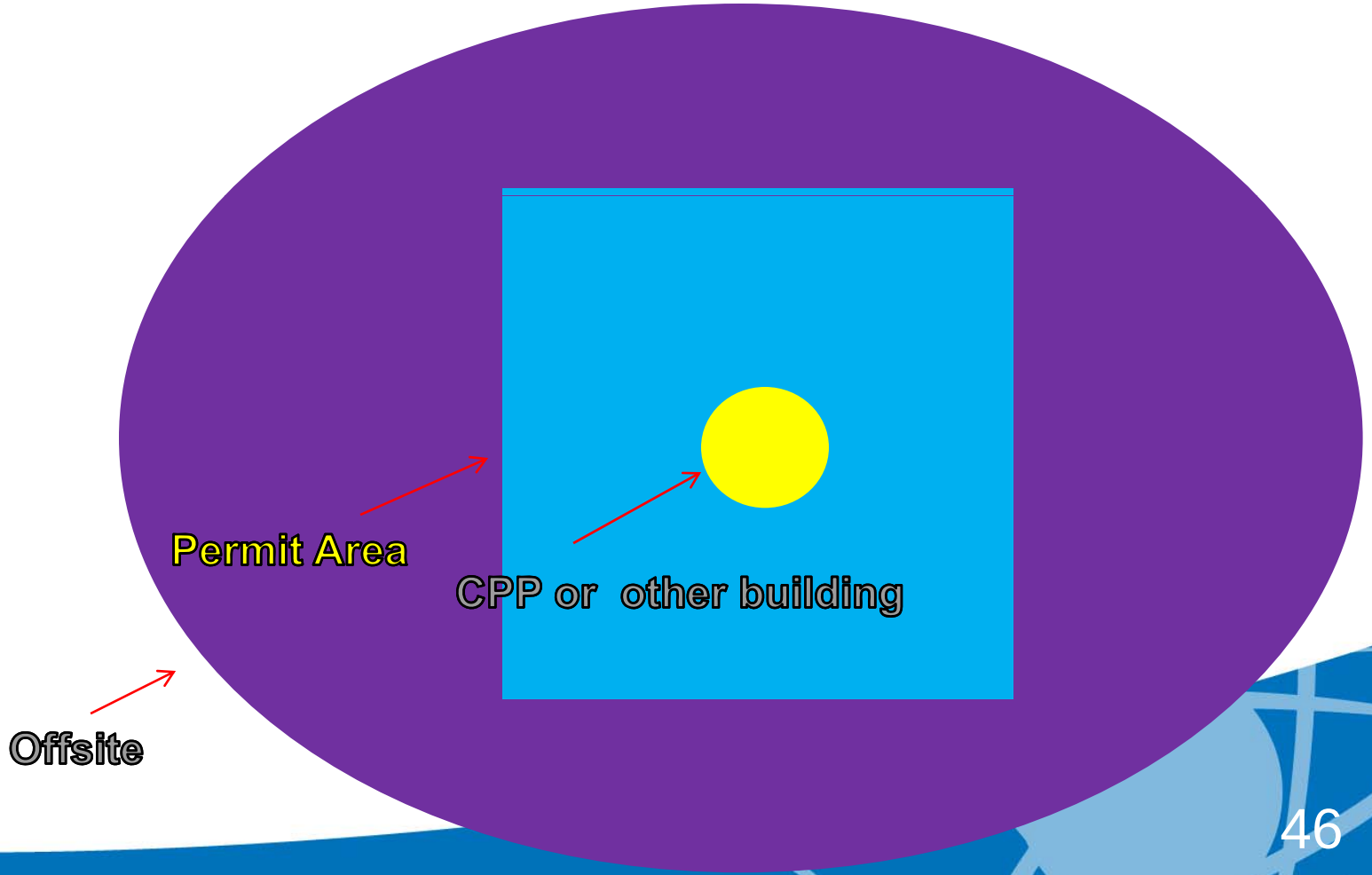
Analysis of issues, cont'd –

NRC staff requires additional information for the following reasons:

- Locations chosen for environmental monitoring may have no correlation to maximum exposure conditions for individual members of the public affected by the applicant's operations.
- Applicants are limiting their 10 CFR 20.1301/1302 analysis to their preselected environmental monitoring locations.
- Applicants are not providing an evaluation of their operations and articulating who, or what group, receives the highest public exposures with supporting calculations (NUREG-1736).

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

Public and occupational exposures must be evaluated at all locations impacted by licensed operations. This includes restricted areas for members of the public.



U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

Analysis of issues, cont'd –

- Applicants are making incorrect assumptions regarding the definition of "members of the public" where exposures are concerned. For example, providing radiological worker training does not convey occupational dose limits to an individual. The applicant must provide a clear basis for assigning dose on an occupational vs. a public dose (60 FR 36038, NUREG-1736).

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

Analysis of issues, cont'd –

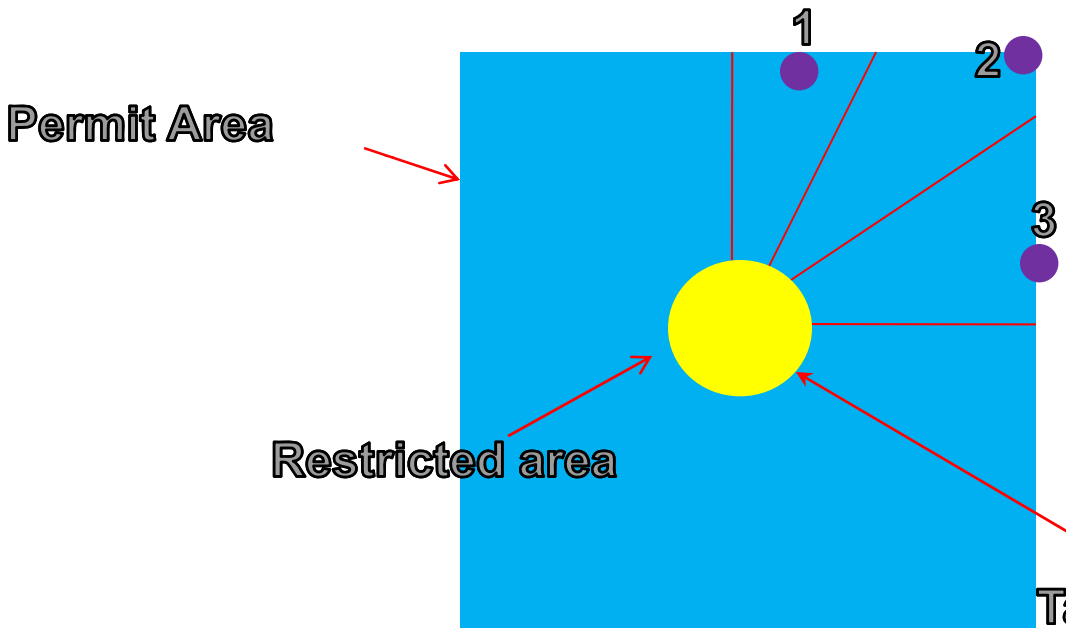
- Licensees are not updating their 10 CFR 20.1301/1302 analysis on a frequent basis. This requirement is not a one-time analysis. Licensees must evaluate changes to their facility and land use (e.g., a new neighbor) and update their analysis accordingly. It is appropriate to include this analysis in the applicant's yearly ALARA report.
  - Applicants should address this in their applications.

Analysis of issues, cont'd –

- Environmental monitoring results are not sufficient to meet the requirements of 10 CFR 20.1302(b)(2)(i).

  - 10 CFR 20, Appendix B, Table 2 values are effluent concentrations. 10 CFR 20.1302(b)(2)(i) clearly states that the point of compliance is the "boundary of the unrestricted area". See also NUREG-1736 for a discussion on monitoring for compliance with 10 CFR 20.1302.

Compliance issues associated with 10 CFR 20.1301/1302/Subpart C



U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

Analysis of issues, cont'd –

- Applicants typically assume zero internal dose to workers once they leave a restricted area. Applicants should evaluate all sources of occupational dose, including radon and its progeny, outside of restricted areas. 10 CFR 20.

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

Analysis of issues, cont'd –

2. Applicants should propose appropriate surveys to support #1 above.

- Applicants do not typically propose surveys for occupational internal dose assessment outside of restricted areas.

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

- Licensees and applicants rely on MILDOS-AREA (MILDOS) for operational dose assessments for members of the public.

  - MILDOS is a predictive model and was designed as a licensing tool to be used in the absence of monitoring data. It was not evaluated or approved as a sole means of demonstrating regulatory compliance with dose limits.
  - In regards to compliance with dose limits, existing regulatory guidance concerning MILDOS states that monitoring data should be the basis for compliance (Regulatory Guides 3.51, 3.59, NRC 1981, NRC 1982a).

Analysis of issues, cont'd –

3. Applicants should evaluate radon progeny to support #1 above (see separate presentation).

References

US NRC, Regulatory Guide 4.14, Radiological Effluent and Environmental Monitoring at Uranium Mills, Rev. 1, April 1980, ADAMS accession # ML003739941 or electronic reading room at www.nrc.gov.

US NRC, 40 CFR 190 Compliance Assessment for NRC Licensed Uranium Recovery Facilities as of December 1, 1980, February 1981, ADAMS accession # ML103000028.

US NRC, NUREG-0859, Compliance Determination Procedures for Environmental Radiation Protection Standards for Uranium Recovery Facilities 40 CFR Part 190, March 1982a, ADAMS accession # ML083110475.

US NRC, Regulatory Guide 3.51, Calculational Models for Estimating Radiation Doses to Man from Airborne Radioactive Materials Resulting from Uranium Milling Operations, March 1982b, ADAMS accession # ML003739497 or electronic reading room at www.nrc.gov.

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

References, cont'd

US NRC, Regulatory Guide 3.59, Methods for Estimating Radioactive and Toxic Airborne Source Terms for Uranium Milling Operations, March 1987, ADAMS accession # ML003739503 or electronic reading room at www.nrc.gov.

US NRC, NUREG-1736, Consolidated Guidance: 10 CFR Part 20 – Standards for Protection Against Radiation, October 2001, ADAMS accession # ML013330179 or electronic reading room at www.nrc.gov.

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

Questions?