STATE OF ILLINOIS
DEPARTMENT OF NUCLEAR SAFETY
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George H. Ryan
Governor

Thomas W. Ortciger
Director

November 12, 1999

Office of State Programs
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001
Attn: Frederick C. Combs, Deputy Director, OSP

Re: State Agreements Program Letter, SP-99-074; "Request for Technical Information", Additional Illinois Responses

Dear Mr. Combs:

The Illinois Department of Nuclear Safety (Department) hereby provides additional answers to six (6) questions asked in the above-identified Agreement States letter. The attached responses supplement the information provided by the Department in a previous letter (November 9, 1999) regarding SP-99-074.

Should you have any questions regarding the Department's concerns, please contact me at (217) 785-9947.

Sincerely,

for Joseph G. Klinger, Chief
Division of Radioactive Materials

JGK:DSP

cc: Jim Lynch, State Agreements Officer

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1. How were your State's radiological criteria derived and to what type of materials (e.g., medical, pipe scale) do they apply? If Regulatory Guide 1.86 was used as a basis please indicate so, if another technical basis was used, please provide that basis.

Attached is a copy of Title 32 Illinois Administrative Code (32 IAC) *"SECTION 340.APPENDIX A Decontamination Guidelines."* No distinction is made regarding material types (medical, pipe scale, etc); only the physical forms are specified ("air", "water", "soil and other materials.")

The following references were used in the development of the guidelines:

- Regulatory Guide 1.86
- "Health Physics Considerations in Decontamination and Decommissioning", *(Health Physics Society, Midyear Symposium, 1986)*
  Papers
  - Development of Residual Radioactivity Criteria
  - National and International Considerations of a *De Minimis* Dose
  - Dose Guidelines for Decontamination and Decommissioning Projects
  - A Manual for Implementing Residual Radioactivity Guidelines
  - Residual Surface Contamination Limits: Problems in Interpretation and Implementation
  - Legal and Ethical Issues Raised in Considering Residual Decontamination Options for Technologically-Enhanced Radioactive Contamination
  - Public Information Experience in the Uranium Mill Tailings Remedial Action (UMTRA) Project
  - Decontamination and Decommissioning of a Luminous Dial Painting Facility: Radiological Characterization, Segregation and Disposal of Building Materials
- 40 CFR 192 (10 CFR 40 Appendix)
- ANSI documents developed by HPS Standards Committee

Note that the NRC "Unrestricted Release Criteria" table (dated September 1993) erroneously references Appendix A to 32 IAC Part 330. Appendix A lists license-exempt concentration limits, not release criteria. Part 330, "Licensing of Radioactive Material," establishes when a license is required, defines types of licenses and describes the license application process. No section of Part 330 addresses releases or disposal of licensed material. The use of Appendix A is limited to license application issues as described in Sections 330.40 and 330.280. Part 330 license-exemption provisions do not authorize unrestricted release of licensed material concentrations less-than-or-equal-to §330.Appendix A limits.

2. How are your State's radiological criteria applied (e.g., through guidance, licensing actions, regulations)?

Radiological criteria are applied through regulation and licensing action. Attached are quotes from 32 IAC Subparts K and N. Subpart K specifies requirements for waste disposal (*Section 340.1010 - General Requirements.*) Note that Subpart K addresses the release of air and liquid effluents, and does not authorize the release of solid materials.

Subpart N requires area/installation decontamination when ordered by the Department (*Section 340.1320 Removal of Radioactive Contamination.*) Decontamination criteria are established by the Department through case-by-case review. The reference in the Decontamination Guidelines to "concentrations in soil and other materials except water" applies to contamination in the form of residual *(in situ)* radioactivity. This shall not be construed to authorize transfer, disposal or off-site relocation of these materials.

Application proposals for decontamination activities are reviewed by the Department on a case-by-case basis. Upon Departmental determination of the adequacy of a remediation proposal, authorizations for radiological criteria and decontamination activities are established by license amendment. After remediation, the Department verifies adequate decontamination of the installation, and conditions of release are established by license action.

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3. What surveying/monitoring methodologies are used? If NUREG/CR-5849 or MARSSIM are used, please indicate so. If a State developed or another method is used, please provide that method.

Historically, the methodologies provided in NUREG/CR-5849 have been used in licensees' remediation applications. The Department has not received licensee applications based on MARSSIM, but will accept such for consideration.

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4. What type of instruments (e.g., manual versus automated, hand-held versus stationary, barrel counters versus conveyor systems) and what sensitivity (i.e., lower limit of detection) values are used as selection criteria for instruments used in demonstrating compliance with the radiological criteria provided in response to Question 1?

The selection of field and laboratory instrumentation (including geometry and sensitivity characteristics) has been left to the licensee, as long as they can satisfactorily demonstrate to the Department that the selection and conditions-of-use are appropriate and results are reproducible. Performance-based review by the Department generally requires advance demonstration that the licensee can

reliably detect and measure residual contamination at levels less-than-or-equal-to 50 percent of the Department-authorized decontamination or release standard.

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5. If your release criterion is zero, how do you have your licensees determine that a solid to be released is not radioactive or meets the zero criterion?

For facility/installation remediation activities, the licensee must, as described above, demonstrate compliance with Department guidelines for residual *in situ* radioactivity.

For the release (i.e., transfer, disposal or relocation) of soils and other solid materials, the Department's objective is that the radiological character of the materials be indistinguishable from background. Generally, the licensee must demonstrate that the radiological characteristics of the materials fall within the range of statistical variation expected in similar materials without a radiological "history." Building materials *(gypsum, stone, brick, etc.)* can be segregated from dissimilar materials, and a different standard applied for each. On a case-by-case basis, the Department establishes, by literature research, the range of naturally-occurring radioactivity found in each type of material. Materials meeting Department-established standards can be categorized by the Department as unregulated materials, and may be disposed of without regard to their radiological characteristics. Materials exceeding the standards are categorized as LLRW.

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6. If any State licensees currently have volumetric release authorization, please identify the licensees and whether the quantities released are tracked, summarize the scope of these authorized activities, and provide the criteria used in granting the authorization.

Some Illinois licensees have been granted, through license action, authority to store-for-decay certain radioactive wastes (referred to as "Decay-In-Storage" or DIS waste) for ultimate unrestricted release. Wastes appropriate for decay-in-storage are: 1) of short half-life, 2) stored for an authorized number of half-lives, and 3) surveyed before unrestricted release *[to ensure that no long half-life wastes have been inadvertently stored in DIS containers.]* All licensees are required by regulation to monitor or perform surveys adequate to confirm compliance with Department rules, and to maintain records that document these surveys. The licensee, therefore, "tracks" the radionuclides and quantities of waste released after decay-in-storage.

Title 32 Illinois Administrative Code

SUBPART K: WASTE DISPOSAL

Section 340.1010 General Requirements

a) A licensee shall dispose of licensed material only:

1) By transfer to an authorized recipient as provided in Section 340.1060 or in 32 Ill. Adm. Code 330, 332 or 601, or to the U.S. Department of Energy; or

2) By release in effluents within the limits in Section 340.310; or

3) As authorized pursuant to Sections 340.1020, 340.1030, 340.1040 or 340.1050.

SUBPART N: ADDITIONAL REQUIREMENTS

Section 340.1320 Removal of Radioactive Contamination

Notwithstanding any exemptions contained in this Part, any person who uses, possesses, or stores radioactive material in such a manner as to cause uncontrolled contamination of any area shall, upon order of the Department, remove or provide for the removal of such contaminants at his own expense through the use of an authorized transferee and shall decontaminate the installation to the lowest practicable level. Unless another value is specified in 32 Ill. Adm. Code 332, the values specified in Section 340.Appendix A may be used as guidelines for this purpose. These values, however, may be modified at specific installations at the discretion of the Department.

SECTION 340.APPENDIX A Decontamination Guidelines

a) Surface Contamination Guide

Alpha Emitters:

Removable	555	mBq per 100 cm^2 =	average
	15	pCi per 100 cm^2 =	over any
	33	dpm per 100 cm^2	one surface
	1.67	Bq per 100 cm^2 =	maximum
	45	pCi per 100 cm^2 =	
	100	dpm per 100 cm^2	
Total (fixed)	16.7	Bq per 100 cm^2 =	average
	450	pCi per 100 cm^2 =	over any
	1,000	dpm per 100 cm^2	one surface
	83.3	Bq per 100 cm^2 =	maximum
	2,250	pCi per 100 cm^2 =	
	5,000	dpm per 100 cm^2	
	2.5	microSv per hour at 1 cm from surface =	
	250	microrem per hour at 1 cm from surface	

Beta-Gamma Emitters:

Removable (all beta-gamma emitters except hydrogen-3)	3.7	Bq per 100 cm^2 =	average
	100	pCi per 100 cm^2	over any one surface
	18.5	Bq per 100 cm^2 =	maximum
	500	pCi per 100 cm^2	
Removable (hydrogen-3)	37	Bq per 100 cm^2 =	average
	1,000	pCi per 100 cm^2	over any one surface
	185	Bq per 100 cm^2 =	maximum
	5,000	pCi per 100 cm^2	
Total (fixed)	2.5	microSv per hour at 1 cm from surface =	
	250	microrem per hour at 1 cm from surface	

b) Concentration in air and water: Appendix B, Table I and II of 10 CFR 20.

c) Concentrations in soil and other materials except water:

1) Radioactive material except source material and radium: Column II of 32 Ill. Adm. Code 330.Appendix A.

2) Source material and radium: Concentration of radionuclides above background concentrations for total radium, averaged over areas of 100 square meters, shall not exceed:

A) 185 mBq (5 pCi) per gram of dry soil, averaged over the first 15 centimeters below the surface; and

B) 185 mBq (5 pCi) per gram of dry soil, averaged over layers of 15 centimeters thickness more than 15 centimeters below the surface.

d) The level of gamma radiation measured at a distance of 100 centimeters from the surface shall not exceed background.

AGENCY NOTE: This Appendix shall be used only as a guide. The Department may require lower values in specific instances, depending upon radionuclides, type of surface, intended present and future use, etc.