UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION III
799 ROOSEVELT ROAD
GLEN ELLYN, ILLINOIS 60137

December 31, 1992

MEMORANDUM FOR: Charles E. Norelius, Director, Division of Radiation Safety and Safeguards

FROM: A. Bert Davis, Regional Administrator

SUBJECT: WORKSHOPS ON ESTABLISHMENT OF RADIOLOGICAL CRITERIA FOR DECOMMISSIONING OF NRC-LICENSED FACILITIES

Enclosed is a memorandum to Regional Administrators from Hugh Thompson on this subject. I request that your Division provide any support that Mr. Cameron may need in the conduct of the Chicago Workshop. Please also determine what regional managers are expected to attend, if any.

A. Bert Davis
Regional Administrator

Enclosure: As stated

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Quorum

NRC SITE CLEANUP CRITERIA WORKSHOP
Draft Agenda
January 6, 1993

Day 1

9:00 Coffee

9:30 Welcome and Background

Enhanced Participatory Rulemaking and the Establishment of Site Cleanup Criteria -- Chip Cameron, NRC

- What is the Enhanced Participatory Rulemaking Process and why has NRC selected it?
- Why does NRC want to develop cleanup criteria?

9:50 Workshop Format -- Michael Lesnick, Barbara Stinson and Connie Lewis, The Keystone Center

- What are the goals and objectives?
- What is the agenda?
- What are the groundrules for conducting the workshop and what is the role of the facilitators?

10:00 Participant Introductions

- Name, affiliation, and location
- Two important issues for discussion in the workshop

10:45 Break

11:00 Brief Review of the Issues Paper and International Standards -- Don Cool, NRC

- What are the issues?
- What decommissioning approaches are other countries using?

11:30 Decommissioning Process and Case Studies -- Michael Weber, NRC

- What is decommissioning?
- What practical lessons has NRC learned?

12:00 Break

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12:15 Working Lunch Introductory Discussion

- The Rulemaking Issues Paper identifies four possible fundamental objectives which could serve as the basis for a regulatory approach to site cleanup standards. In terms of the alternative regulatory approaches reflected in the four fundamental objectives, what are the relative advantages and disadvantages of developing and using generic site cleanup standards as opposed to using ~~site-specific~~ different approaches? for different types of licenses

1:15 Cross-Cutting Issues Discussion - A discussion of the cross-cutting issues that can be used to compare and contrast ~~the~~ alternative regulatory approaches for developing cleanup standards

- To what extent do ~~the~~ alternative regulatory approaches protect human health and the environment?

  -- What population(s) should be protected, in what locations, and over what timeframe? What are the relative merits of each alternative regulatory approach?

  -- What level(s) ~~is sufficient to ensure protection of population(s)~~? What are the relative merits of each alternative regulatory approach in terms of achieving this level? / health protection do we want to achieve

  -- Should human standards be used to protect natural systems?

3:00 Public comment

3:15 Break

3:30 Cross-Cutting Issues Discussion (Continued)

- How should cost and other [practical] related considerations be considered in selecting a regulatory approach for the standards?

  -- What are the cost and practical considerations that relate to each of the alternative regulatory approaches?

  -- What weight should be given to these considerations in selecting a regulatory approach?

  -- How do each of the alternative regulatory approaches affect the types and distributions of costs and benefits?

  -- If a cost-benefit approach is used, what costs and benefits should be considered? Should individual or population (or both) doses be considered? If costs are balanced against dose averted, what value should be used in evaluating the ratio (e.g., $1000 per person-rem)?

5:15 Public comment

5:30 Summary and Adjournment

Day 2

8:00 Coffee

8:30 Cross-Cutting Issues Discussion (Continued)

- What ~~technologies~~ are necessary and available for use of each of the alternative regulatory approaches?
  - -- What capabilities would be needed to implement the ~~standards~~ (e.g., remediation, modelling, site characterization, regulatory review, licensee demonstration, monitoring)?
  - -- Are they currently available? Are they expected and, if so, when?
  - -- To what extent do the technologies transfer the hazard to another medium or other populations? Is the net benefit positive (e.g., producing a smaller volume of hazardous waste to reduce a larger volume radioactive waste)?

10:00 Public comment

10:15 Break

10:30 Cross-Cutting Issues Discussion (Continued)

- To what extent are the alternative regulatory approaches ~~compatible with~~ existing regulatory structures?
  - -- ~~Do they need to be compatible? What are the advantages and disadvantages?~~
  - -- To what extent do the alternative regulatory approaches achieve long-term, regulatory stability?
  - -- Does each alternative regulatory approach promote regulatory compliance? Does each provide sufficient incentives for timely and effective decommissioning?
  - -- ~~How easily~~ can the alternative regulatory approach be integrated with the existing nuclear regulatory framework? other relevant federal and state legislation and regulations?

12:00 Public Comment

12:15 Break

12:30 Working Lunch - Cross-Cutting Issues Discussion (Continued)

- What are the waste management implications of each alternative regulatory approach?

  -- How do each of the alternative regulatory approaches relate to the quantity and types of wastes produced? ~~Is sufficient capacity available or expected to be available?~~

  -- To what extent does each alternative regulatory approach ~~merely~~ transfer the risk to another population?

  -- How should each alternative regulatory approach apply to former waste disposals ~~under 10 CFR 20.304 and 302?~~

  -- To what extent does each alternative regulatory approach address other options for waste management, including recycling and reuse?

2:15 Public Comment

2:30 Break

2:45 Other Key Issues (Remainder of issues not already covered)

  -- Should the standards ~~consider~~ address the effects of radon releases? If so, how should this be done?

  -- Should criteria be established ~~for protecting specific~~ pathways or resources (e.g., groundwater)?

  -- Will there be cases where release for "unrestricted use" may not be feasible? How should these situations be addressed?

3:45 Public Comment

4:00 Summary of Wo hop Issues

4:30 Adjourn

NRC SITE CLEANUP CRITERIA WORKSHOP
Draft Agenda
(As of January 19, 1993)

WEDNESDAY, JANUARY 27, 1993

9:00 Coffee

9:30 Welcome and Background

Enhanced Participatory Rulemaking and the Establishment of Site Cleanup Criteria -- Chip Cameron, NRC

* What is the Enhanced Participatory Rulemaking Process and why has NRC selected it?

* Why does NRC want to develop cleanup criteria?

9:50 EPA activities regarding the establishment of site cleanup criteria -- Allan Richardson, EPA

* What are the key EPA activities and timeframe?

* In what ways is EPA interacting with NRC?

10:00 Workshop Format -- Michael Lesnick, Barbara Stinson and Connie Lewis, The Keystone Center

* What are the goals and objectives?

* What is the agenda?

* What are the groundrules for conducting the workshop and what is the role of the facilitators?

10:10 Participant Introductions

* Name, affiliation, and location

* Two important issues for discussion in the workshop

11:00 Break

11:15 Decommissioning Process -- Michael Weber, NRC

* What is decommissioning?

* What licensed facilities are affected?

11:30 Brief Review of the Issues Paper and International Standards -- Don Cool, NRC

11:45 Public Comment

12:00 noon Lunch (on your own)

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12:45 Introductory Discussion

* The Rulemaking Issues paper identifies four possible fundamental objectives which could serve as the basis for a regulatory approach to site cleanup standards. The four fundamental objectives reflect alternative regulatory approaches to the development of decommissioning standards, either separately or in some combination with one another. What are the relative advantages and disadvantages of developing generic standards through rulemaking as opposed to continuing the present case-by-case approach?

1:45 Cross-cutting Issues Discussion - A discussion of the cross-cutting issues that can be used to compare and contrast the alternative regulatory approaches for developing cleanup standards

* In what ways do the alternative regulatory approaches protect human health, safety and the environment?

  -- How will populations(s) and individuals(s) be protected, in what locations, and over what timeframe? What are the relative merits of each alternative regulatory approach?

  -- What level(s) of health protection should be sought? What are the relative merits of each alternative regulatory approach in terms of achieving this level?

  -- Should a separate set of standards be established to protect natural systems? If so, how?

3:15 Public Comment

3:30 Break

3:45 Cross-Cutting Issues Discussion (continued)

* What technical capabilities are necessary and available for use in the alternative regulatory approaches?

  -- What technical capabilities would be needed to implement the approaches (e.g., remediation, site characterization, modelling, regulatory review, measurement, and monitoring)?

  -- Specifically, what cleanup technologies for lands, structures, and groundwater would be needed to implement the approach?

  -- Are these technological and technical capabilities currently available? Are they expected and, if so, when?

5:15 Public comment

5:45 Summary and Adjournment

THURSDAY, JANUARY 28, 1993

8:00 Coffee

8:30 Cross-Cutting Issues Discussion (continued)

- How do the alternative regulatory approaches relate to existing federal, regional, state and local regulatory frameworks?
  - To what extent do the alternative regulatory approaches achieve long-term, regulatory stability? What should be the effect of new standards or information on prior decommissioning actions?
  - Does each alternative regulatory approach facilitate regulatory compliance?
  - Does each provide sufficient incentives for timely and effective decommissioning?
  - Will there be cases where release for "unrestricted use" may be difficult to achieve? How should these situations be addressed?

10:00 Public comment

10:15 Break

10:30 Cross-Cutting Issues Discussion (continued)

- To what extent should cost and other implementation considerations, including nonradiological risks and costs, be considered in selecting a regulatory approach for the standards?
  - What are the implementation considerations, including cost, that relate to alternative regulatory approaches?
  - What weight should be given to these considerations in selecting a regulatory approach?
  - How do each of the alternative regulatory approaches affect the types and distributions of costs and benefits?
  - If a cost-benefit approach is used, what cost and benefits should be considered? Should individual or population (or both) doses be considered? If costs are balanced against dose averted, what value should be used in evaluating the ratio?

12:00 Public Comment

12:15 Lunch (on your own)

1:00 Cross-Cutting Issues Discussion (continued)

- What are the waste management implications of each alternative regulatory approach?
  - -- How do each of the alternative regulatory approaches relate to the quantity and types of wastes produced?
  - -- To what extent would each alternative regulatory approach transfer the risk to another medium or population?
  - -- How should each alternative regulatory approach apply to former waste disposals?
  - -- To what extent does each alternative regulatory approach address other options for waste management, including recycling and reuse?

2:30 Public Comment

2:45 Break

3:00 Other Key Issues (remaining issues not already covered)

- -- How should the standards address the effect of radon releases?
- -- Should criteria be established for protecting specific pathways or resources (e.g., groundwater)?

4:00 Public Comment and Summary of Workshop Issues

4:30 Adjourn

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Enhanced Participatory Rulemaking
Simulation Workshop
January 11 - 12, 1993

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SITE CLEANUP WORKSHOPS-ANTICIPATED QUESTIONS TO NRC STAFF

- What is the relationship of the site cleanup rulemaking to the BRC Policy/Isn't this an attempt to sneak through a BRC Policy?
- What are the implications of the BRC provision in the National Energy Policy Act for the site cleanup rulemaking?
- How and when will the NRC address the issues of the disposal of waste and the recycle of radioactive material from site cleanup efforts?
- How and when will the issue of state compatibility in the site cleanup area be addressed?
- What is the EPA-NRC risk harmonization program and what are the implications for the site cleanup rulemaking?
- How will the public be involved in efforts to establish the compliance methodologies, models, environmental impact statements, and other actions that are necessary supplements to the rulemaking?
- Will the NRC develop a draft text of the proposed rule for participant review? Will the draft proposed rule that is submitted to the Commission for review be provided to workshop participants?
- Why isn't the EPA developing these rules?
- In what way, if any, will these rules be applicable to DOE sites?

NUCLEAR REGULATORY COMMISSION RADIOLOGICAL CRITERIA WORKSHOP

WORKSHOP ATTENDANCE/HOTEL RESERVATION RESPONSE FORM
January 27-28, 1993
Chicago, Illinois

Please return this form by faxing it to Denise Siebert at The Keystone Center, 303-262-0152, no later than Monday, January 11, 1993.

Name: _____

Organization: _____
(Please provide any recent changes to your address/phone/fax below.)

Updated Address: _____

_____

Please check one:

_____ I plan to attend the workshop in Chicago, IL. Please make reservations for me at the Park Hyatt Hotel, where The Keystone Center (TKC) has reserved a block of rooms at the government rate of $101.00/night (inclusive of tax). Please make your reservations through TKC office by providing the following information:

Arrival Date: _____ Departure Date: _____

Credit Card # and Type: _____

Expiration Date: _____

_____ I plan to attend the workshop in Chicago, IL; however, I do not require lodging reservations.

_____ I do not plan to attend the workshop.

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NRC Radiological Criteria Workshop
Preparatory Meeting Agenda
January 11, 1993

I. Welcome, Introduction, and Overview - Chip Cameron

II. Preparatory Meeting Goals and Agenda Review - Michael Lesnick and Barbara Stinson, The Keystone Center

III. Overview of Key Workshop Components - Lesnick and Stinson

A. Review of Discussion of Overall Workshop Goals

B. Workshop Schedule and General Design

C. Types of Participants (including NRC, EPA, other agencies)

D. Role of The Keystone Center

E. Role of NRC, EPA and other agencies

F. Workshop Summaries

G. Participant Support and Interviews

H. Public Attendance and Comment

I. Hotel Logistics and Food Arrangements

IV. Discussion of NRC and EPA Participants' Roles - Lesnick and Stinson

A. Role of NRC participants (those "at the table" and those attending as observers)

B. Role of EPA participants (those "at the table" and those attending as observers)

V. Detailed, Item-by-Item Review and Discussion of Draft Workshop Agenda - Lesnick, Stinson and presenters

A. Discussion of content, style, and tone of all presentations

B. Critical analysis of issues to anticipate, responses to issues, and agency staff likely to respond for the interactive agenda items

VI. Discussion of Next Steps

A. Prior to Chicago meeting

B. During Chicago meeting

C. Between meetings

D. At conclusion of all meetings

Wall Street Journal
Monday, January 25, 1993

Closing Costs

Nuclear Utilities Face Immense Expenses In Dismantling Plants

Customers and Shareholders Face Years of Fighting Over Bearing the Burden

Respirators and Rubber Boots

By Robert Johnson
And Ann de Rouffignac
Staff Reporters of The Wall Street Journal

FORT ST. VRAIN, Colo. – Nuclear power has caused utilities so many headaches over the years that some are ready to just walk away from it. But they can't even do that.

Retiring old plants is turning out to be such a challenge that the visitors' center at a plant here, which once told schoolchildren about the marvels of atomic power, now entertains engineers who come from as far away as Japan to study the hugely costly and complex process of dismantlement.

Fort St. Vrain is the first fully operational commercial nuclear plant to be taken apart piece by piece. Its owner, Public Service Co. of Colorado, is among the growing ranks of utility companies now facing a harsh reality: Not only are some nuclear plants too expensive to run, but it may cost more to take them apart, in today's dollars, than it cost to build them in the first place.

It is a painful lesson – painful for the companies, for their shareholders and for their rate payers. Nuclear plant dismantling, says James Greene, a utilities consultant at the accounting firm of Arthur Andersen & Co., is "the big bogy out there waiting."

Costly Repairs

The Fort St. Vrain plant has become a symbol of the problem. There were no accidents here, no radiation leaks, no alarms about meltdowns. There was just a long list of temporary closings and costly repairs. The company figures the plant actually was in operation only about 15% of the time. Mark Stutz, a spokesman for the utility, says simply: "Our nuclear plant didn't work."

Fort St. Vrain was the first and only helium-cooled commercial reactor in the U.S. The rest are water-cooled, including the other 14 that have closed earlier than planned. Public Service of Colorado points out that the last straw that caused it to close Fort St. Vrain was a problem common in many water-cooled plants: cracks in the reactor's steam tubes.

The relatively small, 330-megawatt Fort St. Vrain plant cost $224 million to build in the 1970s. Taking it apart safely will cost $333 million; under an agreement with state regulators, the utility's customers will still be helping to pay for the plant's demise in the year 2005.

Larger-than-expected costs from early dismantling also loom for many of the 110 remaining U.S. nuclear plants in the U.S., threatening some utilities with huge bills for which they are utterly unprepared.

Saving for Retirement

The Nuclear Regulatory Commission requires utilities gradually to put aside as much as $135 million for each of their nuclear plants to cover the costs of dismantling – "decommissioning," in government parlance. But NRC officials acknowledge that this sum is far short of the real amount needed; they say they will soon issue sharply higher estimates of how much utilities should put away for the end of the atomic road.

A recent Stanford University study suggests that utilities should already have accumulated a total of $33 billion to have enough for eventual plant dismantling, but the NRC estimates that only $4 billion has been stashed so far. When Portland General Electric Co. in Oregon abruptly announced plans earlier this month to close its 67.5%-owned Trojan nuclear plant, the utility's coffers contained only 8% of the $488 million estimated to be its share of dismantling costs. It will try to wring the rest of its share from consumers in a regulatory battle that may take years.

Rising Estimates

The worst news is yet to come. Some utilities are already raising estimates of anticipated dismantling costs far higher than those forecast by the NRC. For example, American Electric Power Co., based in Columbus, Ohio, recently increased the dismantling forecast for its two nuclear units, whose combined 2,200-megawatt capacity is seven times that of Fort St. Vrain, to a sum in the range of $588 million to $1.1 billion – compared with a 1989 estimate of $340 million.

Similarly, Nebraska Public Power District, based in Columbus, Neb., more than tripled the dismantling-cost forecast for its 836-megawatt nuclear plant last year to $1.15 billion.

Moreover, the day of reckoning is far closer for many utilities than they imagined when they built their plants. Nuclear facilities are licensed by the NRC to operate for a supposed 40-year life cycle, but the 15 plants closed so far were open for an average of only 12.7 years; Fort St. Vrain ran for 10. And with the average per-kilowatt cost of running a nuclear plant now edging higher than the cost of a coal-fired plant, Department of Energy officials say privately that 25% of the remaining reactors may be closed in the next decade for economic reasons. That means utilities such as Public Service of Colorado, which planned a deliberate pace

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Closing Costs: Many Utilities Will Someday Face Huge Expense for Dismantling Nuclear Power Plants

Continued From First Page

of saving decommissioning funds over four decades, are being caught short.

Wall Street analysts say the utilities industry should have confronted the economic reality of decommissioning long ago. To be licensed to use nuclear power, utilities had to file plans showing how they would return an obsolete power plant site to pristine condition. But they didn't have to calculate the expected cost of doing so, and fewer than a dozen utilities have made such estimates public.

The financial facts of nuclear decommissioning by utilities will usher in an era of lengthy regulatory battles over how much of the costs can be passed along to customers, industry officials predict. But the utilities themselves will almost certainly have to shoulder big chunks of the cost — thus eroding their profit margins, raising their debt totals and making it more expensive for them to borrow.

"I just hope I'm retired from rating utility bonds when most of this happens," says Daniel Scotto, a utility-bond analyst at Donaldson, Lufkin & Jenrette. "Tearing away the layers of decommissioning problems is like peeling an onion. Your eyes tear more and more."

In the six years since Public Service of Colorado's Fort St. Vrain operation went officially sour with a $200 million charge against earnings, the utility's net income has plunged to 13.8% of capital from 19.3% despite a lessened corporate tax rate, and its debt rating has been reduced four times by Standard & Poor's Corp.

For now, a number of utilities caught in similar squeezes are mothballing plants until they can accumulate dismantling funds or discover lower-cost ways to dispose of the facilities. The NRC allows utilities to wait up to 60 years before they must dismantle a plant that has been taken out of service. But maintaining, inspecting and securing such a facility can still cost up to $15 million a year. Says Ron Binz, director of Colorado's Office of Consumer Counsel: "You'll need generations of Doberman pinschers."

The Age of Innocence

Such problems weren't foreseen in 1965, when Public Service of Colorado hired San Diego-based General Atomics to design the Fort St. Vrain plant at this former fur-trading post 35 miles north of Denver. This was still the age of innocence for nuclear-fueled electricity. It had been only 11 years since Lewis Strauss, chairman of the Atomic Energy Commission, predicted that nuclear power would become "too cheap to meter," and only eight years since President Eisenhower had waved a makeshift "magic wand" to open the nation's first commercial reactor near Pittsburgh. Walt Disney published a nuclear primer called "Our Friend the Atom." Utility industry brochures depicted nuclear power making the Arctic balmy enough for a tourist to sunbathe on an iceberg, sipping a tropical drink.

"We all really believed that the nuclear era would be one of declining electricity costs," says Duane Chapman, an economist at Cornell University and a former consultant to the Department of Energy. "Never in my wildest dreams did I think it would be this expensive."

When construction began on Fort St. Vrain in 1968, many environmentalists were still proclaiming nuclear power the answer to fossil-fuel pollution. The nuclear industry got one of its biggest boosts from the federal Clean Air Act of 1970, which toughened standards for coal plants. But by the time the plant opened in 1979, concerns about safety and waste disposal had long since replaced the rosy scenarios. At Fort St. Vrain, those concerns translated into mounting costs.

Public Service of Colorado had originally planned to operate the plant with 54 workers, but the number swelled to 400 even before it opened. Then the work force ballooned again, to 837, under the public scrutiny that developed after the Three Mile Island nuclear accident.

Plenty of Ammunition

Meanwhile, the plant was giving its critics plenty of ammunition. A spokesman for General Atomics says that the plant "was safe. Unfortunately, there were some bugs." The plant didn't consistently produce electricity at a cost that would provide the utility a profit under consumer-cost ceilings set by state regulators. "An economic disaster," concludes Colorado's consumer counsel, Mr. Binz.

"We were always under the gun from customers about this plant's costs," says Don Warembourg, the chief engineer. Descendants of the plant's nameseke, 1830s pioneer Marcellin St. Vrain, asked that the plant be called something else to save the family from embarrassment.

An early pamphlet about Fort St. Vrain put maintenance requirements at little more than a two-week refueling stint annually. In reality, the plant sat useless for months at a time. In 1986, the Public Service Commission of Colorado stopped the utility from charging for Fort St. Vrain's power until it got costs under control. Three years later, faced with a five-year repair job on the plant's cooling system, the utility gave up and closed the place.

Company officials mulled their option to delay dismantling for 60 years, but ultimately decided to start taking the plant apart last August. "We just couldn't see guarding the place for half a century," says Mr. Warembourg.

Why is dismantling a plant so expensive? Engineers cite the extensive safety training required, the need to rotate workers to limit radiation exposure and the lengthy planning of every move in contaminated areas. Thomas LaGuardia, an engineer who consults with utilities about dismantling plants, says, "You need up to four hours to get ready to do some jobs that would be simple in a fossil-fuel plant. Sometimes you'll have to build mock-up reactors to practice, so you don't waste time on the real thing."

Nuclear dismantling is made tougher by the plant designs, which cram all the sensitive material into the smallest possible spaces to limit radioactive contamination. "This is hot, sweaty work by people wearing protective suits, respirators and rubber boots," says Mr. LaGuardia. "Productivity will go way down on these jobs."

At Fort St. Vrain, the workers are finding that nothing is simple. Just getting access to some of the radioactive areas of the plant means sledgehammering aside tons of steel pipes and cement walls.

The huge amount of water used to cool other nuclear reactors wasn't supposed to be a problem at Fort St. Vrain's 1,400-degree core because this plant uses helium to control temperatures. But engineers have discovered they will have to pour a million gallons of water into the reactor vessel during dismantling as a radiation shie And all that water must be chemica treated to remove radioactive resins.

Untold additional amounts of wa must be used for washing workers' pro tive clothing. A quarantined laundry been set up to wash up to 250 uniform day for the three years or so the projec expected to take.

"You wash all those suits and clean i from that water. Then you cut up the wa ing machine and the dryer and pack th inside steel boxes. You chop up the fl underneath where the washer and dry were," says James Krause, a Westi house Electric Corp. engineer consulting Fort St. Vrain. "The last thing in the box the Geiger counter you used to test eve thing, and you bury that, too."

Public Service of Colorado figures will take 19 months from start to fini to complete the dismantling of the Fort Vrain nuclear plant. But it plans leave the outside walls standing, and eve tually rebuild the innards to burn natu gas. "You can still bring your children visit," says Clegg Crawford, vice preside of electric production. "We won't have nuclear reactor, of course. But we'll still making electricity."

INTERNATIONAL DECOMMISSIONING ACTIVITIES

Activities related to radiological criteria for decommissioning are occurring both in other countries and in international forums such as the International Atomic Energy Agency (IAEA). In general, the current practice is to derive decommissioning criteria on a case-by-case basis, usually using the guidance of the IAEA Safety Series No. 89, "Principles for the Exemption of Radiation Sources and Practices from Regulatory Control." The IAEA guidance is risk-based and uses exposure to natural background as a reference level. It concludes that the level of trivial individual effective dose equivalent would be on the order of some 10's of μSv [a few mrem] per year, however in consideration of multiple sources of exposure the recommendation is 10 μSv [1 mrem] in a year from each exempt practice. This assumes the practice selected is considered optimal i.e., As Low As is Reasonably Achievable (ALARA). A practice is assumed to be optimal if the estimated collective dose is less than 1 person-Sievert/y (100 person-rem/y). The IAEA's examples of practices did not include the unrestricted use of lands and structures after decommissioning but did include consumer products, waste, and recycle--reuse of materials.

During November 1990, the IAEA convened a group of consultants to develop a draft Technical Report entitled, "Criteria for Unrestricted Release of Facilities, sites or Materials from Decommissioning." That work is on hold pending the completion of the technical basis and methodology being developed for the publication of NUREG/CR-5512, "Residual Radioactive Contamination From Decommissioning: Technical Basis for Translating Contamination Levels to Annual Dose." Separate IAEA consultants and advisory group meetings in November 1991 and June 1992, and produced a draft document, "National Policies and Regulations for Decommissioning Nuclear Facilities." This latter document is still early in its development and will require further work before it is suitable for distribution as a draft. Another consultants meeting was held in Vienna, Austria in December 1992 to work on the draft.

In a related area, there has been a recent focus upon waste disposal and recycle at the IAEA. The criterion is typically set at 10 μSv [1 mrem] per year based on the IAEA Safety Series No. 89 guidance. This work relates to decommissioning criteria to the extent that materials left on site after decommissioning, at some subsequent time, may be freely disposed or recycled or reused without restriction. An IAEA advisory group, in which the NRC is participating, is currently developing a draft document, "Exemption From Regulatory Control Recommended Unconditional Exempt Levels For Solid Radioactive Materials." This document is also in an early stage of development and is not ripe for general distribution as a draft.

Residual contamination limits for decommissioning have been developed in several European countries based on the guidance in IAEA Safety Series No. 89. The most extensive information in the literature is on decommissioning in the Federal Republic of Germany (FRG) where residual contamination limits have

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been incorporated into radiation protection ordinances. However, these ordinances are treated more as guidance to be applied, as appropriate, on a case-by-case basis rather than as regulations. In the FRG approximately 28% of the electrical power is generated by 20 operating nuclear power plants. Thirteen prototype nuclear power plants have been shut down and are in various stages of decommissioning. In addition several research reactors have been taken out of service. Estimates of total decommissioning wastes from all nuclear installations in FRG before unification range from 90,000 to 120,000 m^3. However, by the year 2000 only about 10,000 m^3 of decommissioning waste is expected to accumulate.[1]

Decommissioning in the FRG is being carried out on a case-by-case basis using the following residual contamination guidelines. Surface contamination limits may not exceed 0.37 Bq/cm^2 (10 pCi/cm^2) beta-gamma and 0.037 Bq/cm^2 (1 pCi/cm^2) alpha, and specific activity limits may not exceed 3.7 Bq/g (100 pCi/g).[2,3,4] Recycle of contaminated materials from nuclear installations is encouraged. The preferable option is to recycle this material within the nuclear industry. If this cannot be done for technical or economic reasons, recycle outside the nuclear industry is allowed if, in accordance with the principals in IAEA Safety Series No. 89, individual risks are sufficiently low as not to warrant regulatory concern.

In France most nuclear facilities are owned by the French government through various public companies and organizations. Currently 75% of the electric power is generated by 50 operating nuclear power plants. There are presently no specific regulatory criteria in place for decommissioning of nuclear facilities. However, in practice France has adopted an early CEC recommendation of 100 Bq/g (2700 pCi/g) as a residual contamination limit in cases where only small total quantities of radioactive material have been involved.[5] [The French are developing recommended residual contaminated limits for CEC under contract] Case-by-case determinations are apparently

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[1] G. Wolany, L. Weill, R. Gortz, "Regulatory aspects of Decommissioning in the Federal Republic of Germany", International Seminar on Decommissioning Policies, Paris, October 2-4, 1991.

[2] Meis, H.P., Stang, W., "Decommissioning of Nuclear Power Plant Gundremmingen Unit A," 1987 International Decommissioning Symposium, Pittsburgh, PA, October 1987.

[3] Hoffman, R., Leidenberger, B., "Optimization of Measurement Techniques for very Low Level Radioactive Waste Material," 1989 International Conference on the Decommissioning of Nuclear Installations, Commission of the European Communities, Brussels, October 1989.

[4] Hempelmann, W., "Treatment of Waste Metals from Decommissioning," Pittsburgh, PA, October 1987.

[5] Chapuis, A.M., Guetat, P., Garbay, H., "Exemption limits for the Recycling of Materials form the Dismantling of Nuclear Installations," 1987 International Decommissioning Symposium, Pittsburgh, PA, October 1987.

made in situations where large total quantities of radioactive materials are involved.

In the United Kingdom residual radioactivity criteria for decommissioning is developed on a case-by-case basis using the general principals set out in IAEA Safety Series No. 89.

In Finland there is a federal guide for disposal or recycle of wastes from nuclear facilities.[6] The guide adopts the dose guidelines from IAEA Safety Series No. 89 and applies the following activity constraints to unrestricted exemption: (a) Total activity concentration of 1 kBq/kg of beta or gamma activity or 100 Bq/kg of alpha activity averaged over a maximum of 1000 kg of waste, and (b) total non-fixed surface contamination (averaged over 0.1 m^2 for accessible surfaces) of 4 kBq/m^2 of beta or gamma activity or 400 Bq/m^2 of alpha activity. The guide does not specifically address whether the guidelines apply to lands and structures.

In general, disposal or recycle in European countries of materials (including lands and structures) containing residual radioactivity is carried out in accordance with the principals for limiting radiation dose to members of the public set out in IAEA Safety Series No. 89. However, specific national guidelines derived from these principles (and expressed in terms of residual radioactivity in materials to be released for unrestricted release) have so far been developed principally for recycle of materials from nuclear power plants. Current practice in most European countries is to derive residual radioactivity criteria for lands and structures on a case-by-case basis using the general principals set out in IAEA Safety Series No. 89.

The Commission of European Communities (CEC) has recommended clearance levels for mass and/or surface activity concentration for recycle of materials from dismantling of nuclear installations, based on generic assessment of individual and collective doses from recycle and use of the material.[7] There are presently no CEC guidelines for unrestricted release of lands and structures. However, the CEC preparing guidelines which are expected to be in place in 1994. Individual member countries would then be expected to adopt these guidelines.

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[6] YVL-Guide 8.2 "Exemption from Regulatory Control of Nuclear Wastes," 2nd Revised Edition, January 5, 1992, Finnish Centre for Radiation and Nuclear Safety, Helsinki, Finland.

[7] Radiation Protection No. 43 "Radiological Protection Criteria for the Recycling of Materials From Dismantling of Nuclear Installations," p 17, Commission of the European Communities", Luxembourg, November 1988.

MILESTONES
ENHANCED PARTICIPATORY RULEMAKING - SITE CLEANUP CRITERIA

SEVEN WORKSHOPS - MAY 7, 1993

WRITTEN COMMENTS ON RULEMAKING ISSUES PAPER - MAY 28, 1993

NRC STAFF SUMMARY OF ALL COMMENTS - JULY 1, 1993

GEIS SCOPING COMPLETE - JUNE 10, 1993

NRC STAFF DRAFT PROPOSED RULE AVAILABLE - OCTOBER, 1993

DRAFT RULE TO COMMISSION - DECEMBER, 1993

PROPOSED RULE /DRAFT GEIS ISSUED FOR PUBLIC COMMENT - MARCH, 1994

FINAL RULE - DECEMBER, 1994

Chip needs feed-back on these schedules.

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  (1) on-site disposal
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- MAY 28, 1993 Comment ends on Proposed Standards
- EPA - Standards
  (1) Cleanup - Rad. & Nonradiated
  (2) Waste
  (3) Recycle
- MOU - EPA/NRC
  (1) NRC Licensees exempt from EPA Stand.
- World Wide Inst. Trade ? Mary Sinclair
- C.E. - Clear & Measurable Standards provisions for individual control
- Michigan - David Miner
  (1) Protection from HARM
  (2) Waste disposal options
- A-S - Money
  (1) Reasonable Standards, clear
  (2) One agency Rule
- Chris Trapp
  (1) Waste Disposal
  (2) Economics
- ~~Cost Benefit~~ ERV Ball
  (1) Measurable Standards
  (2) Clear Authority