RADIUM CHEMICAL COMPANY

REMOVAL ACTION

ADMINISTRATIVE RECORD

SUBJECT INDEX

ADMINISTRATIVE RECORD FILE AVAILABLE AT THE FOLLOWING LOCATIONS:

Queens Borough Public Library
Woodside, Queens Branch
54-22 Skillman Ave.
Woodside, NY 11377

U.S. EPA - Region II
Removal Program Office
Woodbridge Ave.
Edison, NJ 08837

U.S. EPA - Community Relations Trailer
Woodside, Queens, NY

RADIUM CHEMICAL COMPANY

REMOVAL ACTION

ADMINISTRATIVE RECORDS

DOCUMENT INDEX

Document Number: 2-2.10-01

Title: Letter requesting assistance to obtain Federal EPA's Toxic Waste Superfund money for a removal action

Author: Ivan Lafayette, New York Assembly, Albany
Recipient: Honorable Alfonse M. D'Amato, U.S. Senator
Date: 10/16/87
Type: correspondence
Category: 2.10 Site Identification, Correspondence

Document Number: 2-2.10-02

Title: Cover letter forwarding letter referenced above (Document # 2-2.10-01) by U.S. Senator, Alfonse M. D'Amato to U.S. EPA in N.Y.

Author: Alfonse M. D'Amato, U.S. Senator
Recipient: U.S. EPA, Region II
Date: 11/04/87
Type: Correspondence
Category: 2.10 Site Identification, Correspondence

Document Number: 2-2.10-03

Title: Letter response to correspondence referenced above (Document # 2-2.10-02) Re: Request for monies from CERCLA funds

Author: Christopher J. Daggett, Regional Administrator
Recipient: Alfonse M. D'Amato, U.S. Senator
Date: 12/17/87
Type: Correspondence
Category: 2.10 Site Identification, Correspondence

Document Number: 2-2.10-04

Title: Letter Re: Radium Chemical Company's disposal procedures

Author: Mr. Philip M. Lorio, Health Physicist
Recipient: Robert Braunschweig, Esq., Wachtell Manhiem and Grouf
Date: 12/2/87
Type: Correspondence
Category: 2.10 Site Identification,Correspondence

Document Number: 2-2.10-05

Title: Letter stating EPA's response to concerns raised at meeting on June 28, 1988 between representatives of EPA, Radium Chemical Company, and New York State
Author: Paul Giardina, EPA Regional Radiation Representative
Recipient: Robert Braunschweig, Esq., Wachtell Manhiem and Grouf
Date: 06/30/88
Type: Correspondence
Category: 2.10 Site Identification, Correspondence

Document Number: 2-2.10-06

Title: Letter Re: Recommendations in the event of fire at the Radium Chemical Company Site

Author: Carroll C. Trail, Professor, Brooklyn College Physics Dept.
Recipient: Honorable Maurice D. Hinchey, Chairman of the N.Y. Environmental Conservation Committee
Date: 06/30/88
Type: Correspondence
Category: 2.10 Site Identification, Correspondence

Document Number: 2-2.10-07

Title: Radium Chemical Questions

Author: Paul A. Giardina, EPA Regional Radiation Representative
Recepient: Conrad Simon, Director, EPA Air and Waste Management Division
Date: 11/12/87
Type: Memorandum
Category: 2.10 Site Identification, Correspondence

Document Number: 2-2.20-01

Title: Radium Chemical Backround Report

Author: Unknown
Recipient: EPA
Date: Unknown
Type: Report
Category: 2.20 Site Identification, Backround Report

Document Number: 2-2.30-01

Title: Radium Chemical Company Radiological Briefing

Author: Shawn W. Googins, Certified Health Physicist,
Federal Technical Advisor
Recipient: EPA
Date: 1/30/88
Type: Report
Category: 2.30 Site Identification, Preliminary Site Assessment

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Document Number: 2-2.30-02

Title: Facility Wipe Sample Results, Radium Chemical Company

Author: Shawn W. Googins, Certified Health Physicist, Federal
Technical Advisor
Recipient: EPA
Date: 10/13/87
Type: Report
Category: 2.30, Site Investigation, Preliminary Site Assessment

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Document Number: 3-3.20-01

Title: Radiation Fact Sheet

Author: Shawn Googins, Certified Health Physicist, USEPA
Recipient: N/A
Date: 11/30/88
Type: Reference Document
Category: 3.20 Health Assessments, Radiation Fact Sheet,
Radiological Terms

Document Number: 3-3.2-02

Title: Instruction Concerning Risks from Occupational Radiation Exposure

Author: U.S. Nuclear Regulatory Commission

Recepient: N/A
Date: 02/82
Type: Reference Document
Category: 3.20 Health Assessments, Radiation Fact Sheet

Document Number: 3-3.20-03

Title: Radiation Limits/Concentration Tables 5 and 6

Author: Unknown
Recipient: N/A
Date: N/A
Type: Reference Document
Category: 3.20 Health Assessments, Radiation Fact Sheet

Document Number: 4-4.10-01

Title: Consent Judgement

Author: United States District Court, Middle District of Georgia, Athens Division
Recipient: Luminous Processes, Inc.; Radium Chemical Co.,Inc.; Joseph A. Kelly Jr.; Robert F. Bischoff; William G. Koegl.
Date: June 15, 1984
Type: Legal Notice
Category: 4.10 Enforcement, Backround.

Document Number: 4-4.20-01
Title: Memorandum from the New York Department of Labor with an Order to Comply attached

Author: (Memo) F. J. Bradley, Ph.D., State Department of Labor N.Y.
Recipient: N.Y. Committee on Licensing and Observers (see memo for recipients)
Date: 08/19/87
Type: Memorandum with attachments
Category: 4.20 Enforcement, Order to Comply

Document Number: 4-4.30-01

Title: Stipulation and Order

Author: Honorable Angelo Graci, Supreme Court of the State of New York, County of Queens
Recipient: Radium Chemical Company Inc. and Joseph A. Kelly Jr.
Date: 10/19/87
Type: Legal Notice
Category: 4.30 Enforcement, Stipulation and Order

Document Number: 4-4.30-02

Title: Stipulation and Order with cover letter and attachment
Author: (memo) Paul A. Giardina, EPA Regional Radiation Representative
(S&O) Supreme Court of New York
Recipient: (memo) EPA (see memo for recipients)
(S&O) Radium Chemical Company and Joseph A. Kelly, Jr.
Date: (memo) 07/26/88
(S&O) 07/25/88
Type: Legal Notice
Category: 4.30 Enforcement, Stipulation and Orders

Document Number: 4-4.40-01

Title: Civil Court of the City of New York, Marshal's Notice of Levy and Sale
Author: Martin A. Bienstock, New York City Marshal #75
Recipient: Special Security Inc., Radium Chemical Company
Date: 09/29/88
Type: Legal Notice
Category: 4.40 Enforcement, Marshal's Notice of Levy and Sale

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Document Number: 5-5.10-01

Title: Letter of Request from the N.Y.S. DEC for CERCLA/SARA Removal Action at Radium Chemical Site

Author: Thomas C. Jorling, Commissioner, N.Y. Department of Environmental Conservation
Recipient: Mr. Christopher J. Daggett, EPA Regional Administrator
Date: 07/01/88
Type: Correspondence
Category: 5.10 Removal Response, Correspondence

Document Number: 5-5.10-02

Title: Letter Re: Request for Removal

Author: Maurice C. Hinchey, N.Y. Assemblyman
Recipient: Christopher J. Daggett, EPA Regional Administrator
Date: 07/11/88
Type: Correspondence
Category: 5.10 Removal Response, Correspondence

Document Number: 5-5.10-03

Title: Letter reply to correspondence above (Document # 5-5.10-02
Re: Request for Removal

Author: Christopher J. Daggett, EPA Regional Administrator
Recipient: Honorable Maurice C. Hinchey, N.Y. Assemblyman
Date: / /
Type: Correspondence
Category: 5.10 Removal Response, Correspondence

Document Number: 5-5.10-04

Title: Letter reply to correspondence listed above (Document # 5-2.10-01) Re: Request for Removal

Author: Christopher J. Daggett, EPA Regional Administrator
Recipient: Mr. Thomas C. Jorling, Commissioner, N.Y.S.DEC
Date: 08/01/88
Type: Correspondence
Category: 5.10 Removal Response, Correspondence

Document Number: 5-5.10-05
Title: Letter Request for Removal

Author: William J. Muszynski, P.E., EPA Acting Regional Administrator
Recipient: Honorable Maurice C. Hinchey, N.Y. Assemblyman
Date: 08/09/88
Type: Correspondence
Category: 5.10 Removal Response, Correspondence

Document Number: 5-5.10-06

Title: Letter reply to correspondence Re: EPA's present status of removal action

Author: William J. Muszynski, P.E., EPA Acting Regional Administrator
Recipient: Honorable Claire Shulman, President of Borough of Queens, Borough Hall
Date: 09/06/88
Type: Correspondence
Category: 5.10 Removal Response, Correspondence

Document Number: 5-5.10-07

Title: Letter from N.Y., Borough of Queens Re: removal action

Author: Claire Shulman, President of the Borough of Queens
Recipient: William J. Muszynski, P.E., Acting Regional Administrator
Date: 09/12/88
Type: Correspondence
Category: 5.10 Removal Response, Correspondence

Document Number: 5-5.20-01

Title: Action Memorandum, request for rapid authorization of additional trust monies for CERCLA Removal Action at the Radium Chemical Company, Woodside Queens, New York

Author: Christopher A. Militscher, EPA On-Scene Coordinator
Through: Richard Salkie, Associate Director, EPA Removal Program Office
Recipient: Stephen D. Luftig, Director of EPA Emergency and Remedial Response Division
Date issued: 09/02/88 Date approved: 09/02/88
Type: Decision Document
Category: 5.20 Removal Response, Action Memorandum

Document Number: 5-5.30-01

Title: Amended Action Memorandum for Radium Chemical Site

Author: Christopher A. Militscher, EPA On-Scene Coordinator
Through: Stephen D. Luftig, Director of EPA Emergency and Remedial Response Division
Recipient: William J. Muszynski, P.E., EPA Action Regional Administrator
Date issued: 09/06/88 Date Approved: N/A
Type: Decision Document
Category: 5.30 Removal Response, Amendments to Action Memorandum

Document Number: 5-5.40-01

Title: Request for ceiling increase and exemption from $2,000,000 funding limitation for the Radium Chemical Company removal action

Author: William J. Muszynski, P.E., EPA Acting Regional Administrator
Through: Henry L. Longest II, Director of EPA Office of Emergency and Remedial Response and Timothy Fields, Jr. Director of EPA Emergency Response Division

Recipient: J. Winston Porter, Assistant Admimistrator, EPA Office of Solid Waste and Emergency Response
Date issued: 11/15/88 Date Approved:
Type: Decision Document
Category: 5.40 Removal Response, Request for Ceiling Increase

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Document Number: 5-5.50-01

Title: Request for Army assistance for the removal and disposal of radioactive materials at the Radium Chemical Company Site

Author: Christopher A. Militscher, EPA On-Scene Coordinator and Shawn W. Googins, EPA Radiation Safety Officer
Recipient: Army Commander, C/O James C. Tritz
Date: 10/04/88
Type: Correspondence
Category: 5.50 Removal Response, Request for Assistance

Document Number: 5-5.60-01

Title: Pollution Report #1

Author: Christopher A. Militscher, On-scene Coordinator, EPA Region II, Response and Prevention Branch
Recipient: EPA and NYSDEC (see report for list of recipients)
Date: 10/13/87
Type: Report
Category: 5.60 Removal Response, Pollution Reports

Document Number: 5-5.60-02

Title: Pollution Report #2

Author: Christopher A. Militscher, On-scene Coordinator, EPA Region II, Response and Prevention Branch
Recipient: EPA and NYSDEC (see report for list of recipients)
Date: 08/04/88
Type: Report
Category: 5.60 Removal Response, Pollution Reports

Document Number: 5-5.60-03

Title: Pollution Report #3

Author: Christopher A. Militscher, On-scene Coordinator,
EPA Region II, Response and Prevention Branch
Recipient: EPA and NYSDEC (see report for list of recipients)
Date: 08/29/88
Type: Report
Category: 5.60 Removal Response, Pollution Reports

Document Number: 5-5.60-04

Title: Pollution Report #4

Author: Christopher A. Militscher, On-Scene Coordinator,
EPA Region II, Response and Prevention Branch
Recipient: EPA and NYSDEC (see report for list of recipients)
Date: 09/23/88
Type: Report
Category: 5.60 Removal Response, Pollution Reports

Document Number: 5-5.60-05

Title: Pollution Report #5

Author: Christopher A. Militscher, On-Scene Coordinator,
EPA Region II, Response and Prevention Branch
Recipient: EPA and NYSDEC (see report for list of recipients)
Date: 10/12/88
Type: Report
Category: 5.60 Removal Response, Pollution Reports

Document Number: 5-5.60-06

Title: Pollution Report #6

Author: Christopher A. Militscher, On-Scene Coordinator,
EPA Region II, Response and Prevention Branch
Recipient: EPA and NYSDEC (see report for list of recipients)
Date: 11/09/88
Type: Report
Category: 5.60 Removal Response, Pollution Reports

Document Number: 5-5.60-07

Title: Pollution Report #7

Author: Christopher A. Militscher, On-Scene Coordinator
EPA Region II, Response and Prevention Branch
Recipient: EPA and NYSDEC (see report for list of recipients)
Date: 11/16/88
Type: Report
Category: 5.60 Removal Response, Pollution Reports

Document Number: 5-5.60-08

Title: Pollution Report #8

Author: Christopher A. Militscher, On-Scene Coordinator,
EPA Region II, Response and Prevention Branch
Recipient: EPA and NYSDEC (see report for list of recipients)
Date: 11/28/88
Type: Report
Category: 5.60 Removal Response, Pollution Reports

Document Number: 5-5.70-01

Title: Request for Transfer of OSC Role to ERT

Author: William Muszynski, P.E., EPA Acting Regional
Administrator

Recipient: Winsten J. Porter, Associate Administrator EPA Office
of Solid Waste and Emergency Response
Date: 01/03/89
Type: Decision Document
Category: 5.70 Removal Response, Transfer of OSC role to ERT

Document Number: 6-6.10-01

Title: Emergency Contingency Plan

Author:
Recipient:
Date:
Type:
Category: 6.10 Contingency Planning,

Document Number: 7-7.10-01

Title: Community Relations Plan for Radium Chemical Site

Author: George Beckey and William Kowalski of the Technical Assistance Team, Weston SPER Division
Recipient: Christopher Militscher, EPA OSC
Date: 12/05/88
Type: Plan
Category: 7.10 Public Relations, Community Relations Plan

Document Number: 7-7.20-01

Title: Press Release Re: EPA's Removal Action at Radium Chemical Site, Woodside Queens N.Y.

Author: EPA Office of External Programs
Recipient: General Public
Date: Unknown
Type: Press release
Category: 7.20 Public Relations, Press Releases

Document Number: 7-7.20-02

Title: U.S. EPA Fact Sheet

Author: U.S. EPA Office of External Programs
Recipient: General Public
Date: 08/ /88
Type: Fact Sheet
Category: 7.20 Public Relations, Press Release and Fact Sheet

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2-2.10-01

THE ASSEMELY
STATE OF NEW YORK
ALBANY

IVAN C. LAFAYETTE
34TH DISTRICT
ALBANY OFFICE:
ROOM 627
LEGISLATIVE OFFICE BUILDING
ALBANY, NEW YORK 12248
(518) 455-4545

DISTRICT OFFICE:
74-09 37TH AVENUE
JACKSON HEIGHTS, NEW YORK 11372
(718) 457-0384

CHAIRMAN
STANDING COMMITTEE
ON RACING AND WAGERING

COMMITTEES
WAYS AND MEANS
RULES
COMMERCE
INSURANCE
TRANSPORTATION

October 16, 1987

Honorable Alfonse M. D'Amato
United States Senator
1 Penn Plaza Room 1635
New York, New York 10001

Dear Senator D'Amato:

I am writing to you in regard to the Radium Chemical Company factory, located at 60-06 27th Avenue, Woodside, Queens, where illegal radiation emmissions have recently been discovered.

I respectfully request your assistance in obtaining the Federal Environmental Protecttion Agency's Toxic Waste Superfund money to have this life threatening material immediately removed from the community.

I hope that you will join with New York State and City officials in resolving this highly dangerous situation.

Sincerely,

IVAN LAFAYETTE

IL/mg

2-2.10-02

ALFONSE M. D'AMATO
NEW YORK

United States Senate

WASHINGTON, DC 20510

11/4/87

TO: Environmental Protection Agency
26 Federal Plaza
New York, NY 10028

FROM: Alfonse M. D'Amato
United States Senator

Because of the desire of this office to be responsive to all inquiries and communications, your consideration of the attached is requested.

PLEASE TRY TO RESPOND WITHIN 4 WEEKS OF YOUR RECEIPT OF THIS REQUEST. YOUR FINDINGS AND VIEWS, IN DUPLICATE, ALONG WITH THE RETURN OF THIS MEMO, WILL BE APPRECIATED.

SEND ALL CORRESPONDENCE ON THIS MATTER DIRECTLY TO MY NEW YORK CITY OFFICE, SEVEN PENN PLAZA, SEVENTH AVENUE, SUITE 600, NEW YORK, NEW YORK, 10001.

Thank you.

mm

THE ASSEMBLY
STATE OF NEW YORK
ALBANY

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IL/mg

copy [illegible]

2-2.10-03

Steve

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION II
26 FEDERAL PLAZA
NEW YORK, NEW YORK 10278

CC: [illegible]
Farhos

DEC 17 1987

Honorable Alfonse M. D'Amato
United States Senator
Seven Penn Plaza
Seventh Avenue
Suite 600
New York, New York 10001

Dear Senator D'Amato:

This is in response to your letter of November 4, 1987, on behalf of Assemblyman Ivan Lafayette, in which he requested monies from the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) fund to remove the radioactive materials from the Radium Chemical Company (RCC), located at 60-06 27th Avenue, Woodside, New York.

Currently, the U.S. Environmental Protection Agency (EPA) is assisting the State of New York, the present lead authority, by serving as the co-chair of the RCC Task Force, by providing technical support, and by conducting joint inspections of the facility with New York State and City Agencies. The State and City of New York, have issued a Stipulation and Order (S&O) to RCC to reduce exposure to within State code levels outside the building, improve security, make plans to dispose of the radium sources, and decontaminate the facility. To date, RCC has reduced exposure rates, installed fencing, provided a 24-hour security guard, and is developing plans to dispose of the radium sources. The company has shown what appears to be a good faith effort to comply with the current State and City requests to reduce exposures and provide security. The ability of the company to provide for disposal and decontamination will be determined within the next month as they will hopefully continue to comply with the State's order.

At the present time, EPA is precluded from utilizing CERCLA funds because no materials are being released to the environment, the company has not abandoned the facility, and the current conditions at, and immediately around the facility, do not pose an imminent and substantial endangerment to the public. However, EPA has been an active participant with the State and City and has developed an understanding of the facility so that if EPA becomes the lead agency and CERCLA funding is required, we will be prepared to provide for the safe removal of the materials.

You can see we share your concern regarding this facility and the protection of the public as well as the environment surrounding Radium Chemical Company (RCC) and are working to be prepared to take further action if warranted.

Sincerely,

William J. Muszynski

Christopher J. Daggett
Regional Administrator

cc: Mr. Thomas C. Jorling, Commissioner
New York State Department of Environmental Conservation w/encl.

Thomas F. Hartnett, Commissioner
New York State Department of Labor w/encl.

Stephen Joseph, Commissioner
New York City Department of Health w/encl.

bcc: Alice Green, Office of Congressional Correspondence
Conrad Simon, AWM
Paul A. Giardina, AWM-RAD
Stephen Luftig, ERRD
Doug Blazey, ORC

ALFONSE M. D'AMATO
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United States Senate

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Thank you.

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I hope that you will join with New York State and City officials in resolving this highly dangerous situation.

Sincerely,

IVAN LAFAYETTE

IL/mg

PHILIP M. LORIO
Health Physicist
244-39 86th Road
Bellerose, N.Y. 11426

Re: Radium Disposal Procedures

Robert Braunschweig, Esq.
Wachtell Manheim & Grouf
30 Rockefeller Plaza
New York, N.Y. 10112

Dear Mr. Braunschweig:

Since our last meeting, Radium Chemical Company has made the following progress in preparing for the disposal of some of their radium inventory:

1. Radium Chemical Company has reviewed their inventory and has designated 4 grams of radiographic sources for disposal in the first four DOT 6M containers prior to December 31, 1987.

2. Radium Chemical Company has requested and received the additional material (packaging cement, pipe joint compound, labels, manifests) necesary for packaging the radium in the DOT 6M containers.

3. On December 29, 1987, Radium Chemical Company will load at least 1 gram of the radiographic sources in each 6M container.

4. Each person who will be involved in this operation will wear a personnel monitoring badge to measure their whole body exposure and a wrist badge to measure their extremity exposure. In addition each person will have a direct reading dosimeter taped to their wrist in order to ascertain, at any time, that the permissible quarterly extremity doses do not exceed the limits specified in Industrial Code Rule No. 38.

5. The procedures specified in NDL Organization's "Radium Packaging Instructions" will be complied with exactly as specified.

6. On Thursday, December 31, 1987, after 48 hours of drying time, the containers will be closed, surveyed and wipe tested.

7. Upon completion of all the packaging procedures, NDL will be notified to pick-up these containers for disposal.

Enclosed are copies of these NDL procedures. If you have any questions regarding this matter, please feel free to contact me.

Sincerely,

Philip M. Lorio

Philip M. Lorio
Health Physicist

the Organization, Inc.

post office box 791
peekskill, new york 10566
(914) 737-7330

Radium Packaging Instructions
DOT 6M Container

1. Open the 55 gal. 6M Type B drum lid and remove fiberboard spacers and the 2R inner container. By separate package you should have received the following:

   a. packaging cement
   b. pipe joint compound (luting compound)
   c. labels
   d. manifest and instructions

2. Open 2R pipe and remove lead shield plug. Using appropriate radiation protection procedures place Radium-226 sources into the cavity in the lead shield.

3. Add one liter of water to the contents of packaging cement bottle. Replace cap and shake until thoroughly mixed.

4. Using a stapler, make a funnel out of heavy manila or similar material and pour the cement mix into the cavity in the lead pig containing the Radium sources. Fill the cavity as much as possible without overfilling. Be careful not to get the cement on the lip of the pig. If, by accident this does happen, it must be wiped away before hardening to allow proper seating of the plug. Use appropriate caution in wiping the lip.

5. Allow the cement to harden for 48 hours. Do not replace plug or 2R pipe cap during this period. Use the plug or other available lead shielding to shield the opening, if necessary while still allowing air to circulate to the cement.

6. After the 48 hour drying time, seal the 2R pipe by coating at least four threads of the 2R cap with the non-hardening luting compound.

7. Replace lead shield plug, making sure it is seated properly. Screw on 2R pipe cap. Hand tighten cap as far as it will go, then using appropriate tools, tighten cap one full turn beyond that point.

8. Return 2R pipe to drum and replace packing material and drum lid. Bolt the ring in place.

9. Perform radiation survey of all sides of the drum including top and bottom. Radiation level must not exceed 1 R/hr at the surface.

10. Apply Yellow III labels to opposite sides of the drum. One of the labels should be next to the proper shipping name.

11. Perform a wipe test of the drum by wiping a 300 cm^2 area of the top and sides. If results are less than 2.2 dpm/cm^2, no further action is required.

12. Fill out Radioactive Manifest according to the instruction sheet. Do not separate copies. Forward a xerox copy of the top page to NDL with a request to pick up the containers.

FBF, Incorporated
DOT 6 M

Come in various sizes to meet your specific need, with various 2-R Closures: eg(Pipe Cap, for 5" ID 2R — Screw Plug, for 5 1/4" ID 2-R & Flange for various sizes 2-R). Also with Lead Shielding inside of 2-R or outside of 2-R or both inside & outside.

Sizes Available: 10 Gal., 15 Gal., 30 Gal., 55 Gal., 110 Gal., or any size between 55 & 110 Gal.

DOT 6M 55 Gal w/8" ID 2-R

DOT 6M 10 Gal w/8" ID 2-R and Lead Shielding Insert

RCC's
dum

Lead Shielding available to fit inside or outside of 2-R Tube or both inside & outside.

2-2.10-05

9/11/88

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION II
26 FEDERAL PLAZA
NEW YORK, NEW YORK 10278

JUN 30 1988

Robert Braunschweig, Esquire
WACHTELL MANHEIM and GROUF
30 Rockerfeller Plaza
New York, New York 10112

Re: Radium Chemical Company

Dear Mr. Braunschweig:

This will serve to confirm our meeting of June 28, 1988. Those in attendance included representatives from New York State as well as the United States Environmental Protection Agency ("EPA") and Radium Chemical Company.

You indicated at the meeting that Radium Chemical Company is out of money and can no longer afford to pay for a guard service to protect the building or to pay its employees or to properly dispose of the radium sources. At the meeting, you specifically requested three things, as follows: (1) whether EPA can take a response action at the Radium Chemical Company's building located at 60-06 27th Avenue, Woodside, Queens, New York; (2) whether EPA will allow Mr. Kelly to sell the radium sources if he identifies a buyer in the near future; and (3) whether Mr. Kelly can avoid liability for the cost of any action EPA takes at the Queens facility.

We advised you that EPA has not, to date, received a request from the State of New York to undertake a response action at the site, but that once we received a request we would evaluate the site and most likely take a response action pursuant to the authorities set forth in Section 104 of the Comprehensive Environmental Response Compensation and Liability Act, 42 U.S.C. §9604 as amended (hereinafter "CERCLA"). We advised you further, however, that any immediate response action that EPA takes will most likely be limited to removal of the radium sources and will not address de-contamination of the building. From a legal perspective, we advised you that Radium Chemical Company should stipulate that it has no money to continue in business or to dispose of the radium needles properly and as a result the company is effectively abandoning the radium sources.

With respect to Mr. Kelly selling the radium sources, we advised you that EPA will be flexible on this issue. We advised you further that EPA will not permit a sale if it will interfer with our response action, a determination left solely with EPA. In that regard, we advised you that the disposal facility where the sources will most likely go will not be available as of November, 1989. Consequently, given that time constraint, coupled with the time it will take to

package the radium sources and ship them cross country, Mr. Kelly will have to identify a bona fide purchaser in the very near future. We also advised you that any money that Mr. Kelly may realize from any sale of the materials must be used to satisfy any expenses incurred by the EPA, including the unsatisfied judgement from EPA's Region IV office.

[illegible] costs incurred by EPA in taking a response action at the Site, we advised you that as an owner and manager of Radium Chemical Company, Mr. Kelly is liable for all response costs. We told you that we were not in a position to give you any assurances that EPA will not try to recover any costs from Mr. Kelly. At an appropriate time, EPA will evaluate whether to bring an action against Mr. Kelly, taking into consideration all appropriate factors, including without limitation, the liklihood of actually recovering our costs.

I believe that the above accurately reflects Radium Chemical Company's concerns and EPA's responses at the meeting. If it does not or if you have any questions, please feel free to call me at 212-264-4418 or Lynn Wright at 212-264-3773.

Very truly yours,

Paul Giardina
Regional Radiation Representative

cc: Gordon Johnson, Esquire
Lynn Wright, Esquire

Physics Department
Brooklyn College
June 30, 1988

Hon. Maurice D. Hinchey, chairman
Environmental Conservation Committee
Legislative Office Building Room 625
Albany, NY 12248

Dear Mr. Hinchey:

I am responding to your request for me to estimate the hazards which may result from a fire at the Radium Chemical plant, 60-06 27th Ave., Woodside, Queens. Because of the serious nature of the problem, I will use a "worse case" scenario. Specific information concerning the nature of the materials stored in the plant has been supplied by Ms. Gail MacFarland-Benedict of your staff, and I have discussed these matters extensively with Prof. George Skorinko at Brooklyn College, a radiation technician, and other members of the scientific community. Ms. MacFarland-Benedict, Prof. Skorinko, the technician, and I visited the site May 23, but were unable to enter the premises.

Our recommmendations are simple: 1. Remove all radiation materials from the plant and decontaminate the area. In the meantime, in case of an emergency: 2. have the fire and police departments carry to the site radiation monitoring equipment, for both neutrons and gamma rays; 3, have the departments develop plans for evacuating the area; 4, have the departments develop plans for securing the area after an emergency.

It is not easy to predict how a fire can start. Arson, vandalism, or sabotage come immediately to mind. Ignition from another fire in the neighborhood is another possibility. A plane crash similar to the Mexican Air Line disaster in Los Angeles, a vehicle accident with a gasoline truck on the Brooklyn-Queens Expressway, faulty wiring, or a lightning strike to the building or to the wiring to the building are other possibilities. Another possibility is the penetration of the building from an automobile out of control on 27th Ave. I understand two such events have happened in the past. [Letter, Leonard R. Solon, Bureau of Radiation Control, to Francis J. Bradley, Department of Labor, September 22, 1986]. In any event, we assume there is a serious fire at the plant.

However the fire starts, we assume that temperatures of upwards to 2000^{o}F or 1000^{o}C will be reached. Most of the following discussion will apply at a much lower temperature.

We understand that stored in the building are approximately 10 curies of radium-beryllium (RaBe) neutron sources and 110 grams of radium mostly in the form of radium sulfate. The radium-beryllium is a mixture, not a compound. We assume that the neutron sources are stored in paraffin to moderate the fast neutrons. In its decay, Ra-226 emits an alpha particle which bombards Be-9 which emits a fast neutron. Fast neutrons are very dangerous because they can knock an entire atom out of a molecule causing drastic changes in the molecule's function in the organism. Gamma rays, on the other hand, generally only knock electrons out of atoms. The electrons are easily replaced if the dose is not too high. The damage caused by fast neutrons is much more serious and often cannot be repaired.

Because of the hazard of fast neutrons, sources of these neutrons generally are stored in water or paraffin, some material rich in hydrogen, which moderates the speed of the neutrons, making them much safer to handle. Mixed with the hydrogenated material is usually some other material to absorb the moderated neutrons, often a boron compound such as ordinary Borax, a cleaning compound, commercially available. Boron absorbs a moderated neutron and emits a gamma ray, which is much less harmful.

If a fire starts, the paraffin will melt at 50°C to 60°C, depending upon the kind of paraffin. And at somewhat over 100°C the paraffin will ignite, fueling the fire. In any event, the neutron sources will lose their moderating material and fast neutrons will bathe the area. A fireman or policeman, for instance, can receive a yearly dose of 100 millirem in about 15 minutes if he is 3-4 feet from the source. We would not expect the firemen to be this close to the source while fighting an intense flame, but as the fire is brought under control they might move in close to finish the job or to inspect the site.

We would expect the neutron source to crack during the fire and the radium and beryllium to become airborne. Beryllium is fairly toxic if inhaled, because of its chemistry, it is not radioactive, after it has been separated from the radium. The hazards of the the airborne radium are discussed below.

The 110 grams of radium are inside platinium and/or platinum-iridium containers, or "needles" which are sealed and placed inside lead containers to reduce the gamma radiation emitted by the radium and some of the lead containers are inside a steel vault

In our visit to the building, which was locked but unguarded, we found a substantial leakage of gamma radiation from the building. We measured 0.7 mR/hr through the window facing the Brooklyn-Queens Expressway and about 0.2 mR/hr through the building. We measured about 0.1 mR/hr across the street, on 27th Ave. We also have found radium, well above background, in samples we have taken from outside the building. [Our findings are consistent with those reported by Paul Merges in a memorandum to Frank Bradley, NYS DOL, June 5, 1986, and with the radiation levels cited by Thomas F. Hartnett in his letter of August 17, 1988 to Mr. Jeffrey Hermann, the attorney for Radium Chemical.]

These results convince us that that all the radium is not inside lead shielding, that many of the seals on the platinum containers have cracked and allowed to escape radium and radioactive radon. The radioactive products of this radon, of course, are also uncontained.

In a fire, as the temperature rises, the pressure in the needles will increase and more radium and radon will escape from those needles that are cracked, and the pressure and thermal stresses on the other needles will increase causing more cracks, allowing more radioactive products to escape. None of these products will be contained in the lead or the vault, because they are not airtight.

As the temperature rises, the lead will melt at 328^{0}C or about 600^{0}F. Lead requires relatively little heat to raise its temperature and to melt it. For example, only .04 calories are needed to raise a gram of lead 1^{0}C whereas 25 times that amount is needed to raise a gram of water 1^{0}C. Further, 6 calories are needed to melt a gram of lead whereas 90 times that amount are needed to turn a gram of water into a gram of steam. (The calories used here are 1000 times smaller than the calories we use in daily conversation to discuss the energy in food.) The intensity of the fire will govern how much lead is melted, but, as I said, a little heat melts a lot of lead. For instance, the heat from burning a gallon of gasoline will melt about 3200 pounds of lead.

When the lead is melted, there is no shielding around the radium that is still in the platinum needles. In this situation, if all the radium is still in the building a fireman would receive a dose of about 10 R/hr at a distance of 3 meters or about 1 R/hr at a distance of 10 meters. This fireman will receive a yearly permissible dose of 0.5 rem in 3 minutes in the first case and in 30 minutes in the last case.

Somewhere along here the radium sulfate will probably decompose into radium oxide, RaO, and will get airborne like the soot and other debris of the fire. The final resting place of this radium is hard to estimate because it will depend upon atmospheric conditions. If the total 110 grams of radium plus the 10 grams from the neutron sources is spread uniformly over a one square-mile area, then the radiation level for a person living in that area will be about 0.4 mR/hr, about seven times the permissible level for a continuous exposure. In Queens this means about 20,000 people will be subject to this exposure. The radium would have to be spread uniformly over an area of nearly 10 square miles before the radiation level is down to a permissible level.

More serious, perhaps, is the fact that much of the airborne radium will be ingested by eating, drinking or inhaling. Radiation from internal sources is, of course, much more serious than radiation from external sources. Again, the quantitative estimates of these hazards are hard to make because they depend critically upon the atmospheric conditions at the time of the fire.

To repeat, our recommendations are that the radioactive materials be removed from the premises immediately, that the area be decontaminated, that the fire and police departments be alerted to the hazards at the plant and that they make emergency plans with the appropriate agencies of government to monitor the radioactivity from the plant in case of a fire, to prepare to evacuate the area in case of a serious emergency, and to have plans for securing the area once the emergency is over.

On Monday, June 27, 1988, I met with Ms. Gail McFarland-Benedict, Dr. Frank Bradley of the Department of Labor, and Mr. Gordon Johnson of the Attorney-General's office to discuss many of the points covered in this letter.

Sincerely,

Carroll C. Trail
Professor

Department of Physics

June 29, 1988

To: Prof. A. Halpern, chairman

From: Prof. C. C. Trail

I am requesting $10,000 to purchase radiation detection equipment and supplies so that we may continue our work with the Environmental Conservation Committee of the New York State Assembly.

During the last year, we worked with Hon. Maurice Hinchey, chairman of the Committee and Ms. Gail McFarland-Benedict from the staff of the Committee to identify radioactive hazards left by various radiochemical businesses in the New York City area, many of which are in Brooklyn.

We have found radioactive hazards in two buildings thus far and we wish to continue this work with the Committee during the coming year. I am attaching an article from the New York Times which refers to the hazard we found in Manhattan. We found another hazard in Woodside, Queens, which the Environmental Protection Agency has agreed remove this July.

We do not have at Brooklyn College the portable equipment for field studies and we have had to borrow this equipment from a colleague at a SUNY campus upstate. This arrangement will not be possible during the coming year, making it necessary to purchase our own equipment.

Your support of this request will be very much appreciated.

cc: Dr. C. Kimmich, Associate Provost

New York Times
5/5/88

High Radiation Found in Plant On East 44th St.

Danger Not Imminent at Former Radium Site

By DAVID E. PITT

Potentially hazardous radioactive contamination dating back almost 50 years has been found in a commercial building in midtown Manhattan, the head of a State Assembly committee charged yesterday.

The two-story building, at 235 East 44th Street, two and a half blocks from Grand Central Terminal, was occupied from 1939 to 1944 by the Radium Chemical Company, a family-owned radium supplier that is believed to have had offices or factories in at least a dozen addresses in the city since its founding in 1913. The pinpointing of the 44th Street site came after months of searching by investigators from the Assembly panel, the Environmental Protection Committee.

Radium Chemical, headed by Joseph A. Kelly Jr., 69 years old, of Manhattan, has been under pressure by State Attorney General Robert Abrams to empty and decontaminate its highly radioactive plant at 60-06 27th Avenue in Woodside, Queens. Mr. Kelly's father operated the Radium Dial Company of Ottawa, Ill., whose practices were blamed for the cancer deaths of scores of young watch-dial painters in the 1920's and 30's.

No Immediate Danger Seen

The committee chairman, Maurice D. Hinchey, Democrat of Kingston, said the highest radiation levels, detected April 25 in an inspection of the 44th Street building, posed no immediate danger. "But," he said, "a worker who spends eight hours a day 50 weeks a year in that building would be getting three times the maximum dose rate allowed by the State Industrial Code and public health statutes."

Mr. Hinchey said a team with a Brooklyn College physicist and a radiation expert from the State University at Binghamton had found gamma-ray radiation measuring 0.7 millirems an hour from areas of the basement. "That means," Mr. Hinchey said, "that a worker who spent much of his or her time in the basement would receive a yearly dose of 1.4 rems."

A rem is a dosage of ionizing radiation.

The State Labor Department, which is responsible for monitoring such companies as Radium Chemical, allows an exposure of 0.5 rems a year.

The building is occupied by the Merit-Kaplan Paint Supply Company, which moved in two months ago, after its lease had expired next door. The previous tenant and building owner, Thomas Franklin, operated a bookbindery for 30 years at the address, Mr. Hinchey said.

Strong Readings at Catch Drain

Mr. Hinchey said that although no radium particles had been found, gamma ray emmissions had been detected on both floors, particularly toward the rear. Some radiation, he said, was emanating from under layers of old wall paint and the linoleum floors. The strongest readings were around a basement catch drain.

"Although we don't know exactly what Radium Chemical was doing at this address," the Assemblyman said, "it would appear that radium particles were washed down through the plumbing system."

Telephone calls to representatives of Radium Chemical were not answered last night.

It is doubtful Radium Chemical could be held liable for damages from the radiation, the staff of the committee said. "They occupied the building before the Industrial Code existed," the chief research associate, Gail McFarlane Benedict, said.

'I'm Not Too Worried'

Mr. Hinchey said the inspectors had used an instrument called a scintillation counter, which is more accurate for measuring gamma rays, the chief byproduct of radium decay, than a Geiger counter. He said the inspectors were Prof. Carroll C. Trall and John Brownridge, radiation safety officer at SUNY at Binghamton.

The owners of the paint company, Lester Kaplan and his son Jeff, said they were not particularly alarmed when Mr. Hinchey's staff telephoned Tuesday to tell them of the findings.

"We're only here two months, so I'm not too worried," Lester Kaplan said as workers scurried back and forth with paint drums. "Also, Hinchey's people explained that the whole thing has to be investigated further by the State Labor Department."

The Kaplans said that they employed a dozen workers and that one regularly mixed paint "on and off" in the basement. "Still," Mr. Kaplan said, "I'm surprised that after a 50-year period, this stuff would still be around."

Radium has a half-life of 1,600 years, making it one of the longest-lasting radioactive substances.

2-2.10-07

NOV 12 1987

Radium Chemical Questions

Paul A. Giardina
Regional Radiation Representative

Conrad Simon, Director
Air & Waste Management Division

This is in response to the following items concerning Radium Chemical Company (RCC): (1) your questions to our weekly highlights of October 30, 1987 regarding where radon levels were reduced to 2 mR/hr or less during the October 27, 1987 New York City Department of Health Inspection and what remains to be done with regard to the stipulation and order of October 19, 1987; and (2) update request from Bill Muszynski; attached is an updated fact sheet. Please note that answers to your specific questions are highlighted on page 2.

cc: Chris Militscher, ERRD

Radium Chemical Company
60-06 27th Avenue
Woodside, New York
Update - November 5, 1987

Previous History

Radium Chemical Company (RCC), owned by Joseph J. Kelly Jr., is a company which leases radium sources for cancer radiation therapy. The radium is contained in sealed metal tubes often known as radium needles. The company has approximately 110-140 curies of radium on site in the form of radium needles and a few radium beryllium neutron sources. The company has been cited previously for the violation of New York State and City regulations. Exposure rates outside the facility above background have been measured, but were determined not to present a hazard to the public due to their inaccessibility. Both the State and City have ordered RCC to reduce radiation exposure levels outside the facility. The Radiation Branch has conducted surveys both inside and outside the facility. A Radium Chemical Task Force has been established which is co-chaired by Paul Giardina.

Recent Developments

October 19, 1987 - New York State Attorney General Issued a Stipulation and Order which RCC signed, and agreed to do the following:

1. Reduce the radiation in uncontrolled areas.

2. Repair fence that partially surrounds the facility, and install additional fencing.

3. Install a roof fence to prevent access to roof.

4. Provide 24 hour guard service.

5. RCC and Kelly assume full joint liability for the disposal of the radium and neutron sources located at the site.

6. RCC must advise the state within 3 weeks whether they want to sell, make a gift or otherwise transfer the radium needles. All of the needles must be transferred by Jan. 1, 1988.

7. RCC and Kelly must submit a decontamination plan to the state no later than November 30, 1987.

8. Kelly assumed liability up to $300,000 for decontamination of the building. RCC assumed unlimited liability for decontamination of the building.

Radium Chemical Company has completed the following actions:

1. Reduced exposure levels along the walls outside the facility to below 2 mR/hr.

2. Repaired Fence and Fenced off roof area.

3. Provided a 24 hour guard for the facility.

4. RCC and Kelly has submitted to the state a plan for disposal of the radioactive sources as of November 10, 1987. The New York State Attorney General's office has stated that the plan tentatively appears inadequate. A technical meeting on the suitability of this plan is scheduled for Friday, November 13th.

5. These actions appear to put them in compliance with the stipulation and order at this time with the exception of the suitability of the disposal plan.

Radium Chemical Company must do the following:

° RCC must advise the state on whether they want to sell, make a gift, or transfer radium needles by November 10, 1987 or three weeks after they have received disposal containers for shipment of radium sources.

° RCC and Kelly must submit a decontamination plan to the state as of November 30, 1987.

° Disposal of radioactive sources should be completed by January 1, 1987.

EPA's Involvement

° Paul Giardina serves as Co-Chairman of the Radium Chemical Task Force

° EPA receives information on weekly surveys conducted by the City DOH and State DOL. EPA can participate in the surveys if we feel that it is necessary.

Radium Chemical Company
60-60 27 Ave.
Woodside, Queens

History

Company handles radium "needles" or sealed sources used for cancer therapy. Due to violations of New York State Department of Labor Regulations on Radiation protection (see attached NYS DOL News Release dated August 19, 1987) the company was ordered to stop operations in January of 1983. More recently, Radium Chemical Company attempted to have its license reinstated by NYS DOL. These requests for reinstatement were denied by NYS DOL and the DOL ordered the company to remove the radium sources to a licensed disposal facility.

Radioactive Materials on Site

Based on NYS DOL information It is estimated that the company has approximately 110-140 curies of radium-226 in the form of sealed sources (mostly radium salts encased in platinum seeds). Some of the sources are located in a "vault" inside the facility. Some of the sources, approximately 250 millicuries, are leaking slightly and have been further contained in glass vials. Slight leakage from this type of source is common and leaking sources are removed from service and disposed.

To the best of our knowledge, and that of the DOL which has taken surveys of the area, no radioactive materials have leaked from the building. Measurements taken by EPA on September 17, 1987 detected no contamination outside the facility.

Radiation Levels Outside the Building (Survey attached)

Measurements of gamma and x-ray exposure rates were taken outside the facility and by nearby businesses in the area. Measurements taken by EPA essentially confirmed measurements taken outside the building by the NYSDOL and Department of Environmental Conservation. The exposure rates ranged from background to approximately 1.5 -> 4.0 mR per hour. The maximum readings were taken at direct contact with the outside of the building and it is highly unlikely that members of the public would be exposed to this level of radiation.

On the sidewalk, immediately outside the wall at which the highest readings were made, the exposure rate ranged from 300-450 $uRhr^{-1}$ (0.3 -> 0.45mRh^{-1}). Across the street from this location, the exposure rate ranged from 50-100 uRh^{-1} (0.05 -> 0.1 mRh^{-1}).

Exposure rate measurements on the side of the building parallel to the Brooklyn Queens Expressway (BQE) were not made due to safety concerns. Measurements at that location would require access to a narrow shoulder of the BQE and would place EPA personnel at risk of being struck by a high speed motor vehicle. Because other EPA measurements correlated with those taken by NYSDOL, we will use their results for estimating

exposure rates on the BQE itself. Since DOL exposure rate measurements were comparable to those taken by EPA on 27th Avenue, it is reasonable to estimate the exposure rate in the far right lane of the BQE to be no more than 500 uRh^{-1} (0.5 mRh^{-1}). NYS-DOL measurements indicated exposure rates of approximately 2.0 mRh^{-1} on contact with the building parellel to the BQE. If exposure rates are as high as 80 mRh^{-1} on contact, exposure rates on the BQE would be as high as 10 mRh^{-1}.

Access to the roof of the building was not obtained by EPA. Previous NYS DOL measurements indicate an exposure rate of 50 mRh^{-1} on the roof above the Radium Chemical Company.

Exposure Assessment

1. Motorists on the BQE

Motorists normally passing by on the BQE would receive exposures which are completely undetectable and inconsequential. In normal circumstances, this exposure would be much less than the 8-10 uR which is received by an individual every hour by merely sitting at a desk in 26 Federal Plaza from natural and cosmic background radiation.

To exceed the exposure limits for members of the public (500 mrem per year) it would be necessary to continuously stand at the same location outside the building on the BQE for 10.4 days (at 2mRh^{-1}) or 42 days if the exposure rate was 0.5 mRh^{-1}. It is very difficult to imagine this ever occurring, even during congested traffic periods.

Dose Equivalent Estimates (mrem/year)	Dose Equivalent Estimates (10 mRh^{-1} on BQE)
Normal Traffic - 0.2	Normal Traffic 4 mrem
Congestion - 5.0	Congestion 100 mrem

2. Pedestrians on Sidewalk

Pedestrians walking along the sidewalk nearest Radium Chemical Company would be exposed for brief periods to rates of 450 uRh^{-1}. It is unlikely that the sidewalk in this area would get much usage since it ends by abutting the BQE. If an individual spent 5 minutes per day at this location for an entire year (365 days) their exposure would be for a period of 30.4 hours resulting in a dose of 14 mrem. A more realistic scenario would be a worker eating lunch for one hour per day, 50 weeks per year. The worker eating lunch would receive approximately 113 mrem.

Dose Equivalent Estimates (mrem/year)	
Casual Pedestrian	14
Worker at Lunchtime	113

3. Employees in Nearby Buildings

Exposure rates of 50 to 70 uRh^{-1} were measured immediately outside walls of buildings across the street from Radium Chemical Company. Without taking credit for shielding provided by the masonry/concrete buildings across the street, the yearly dose equivelent estimates is 140 mrem. This assumes an 8 hour day, 50 work week year, and a 5 day work week. The total exposure:

Dose Estimate (mrem/year)	
Normal Work schedule (8 hour work day) -	140 mrem
10 Hour Workday	175 mrem

4. Employees of Solux (Company occupying other portion of Radium Chemical Building)

NYS DOL has told us that they have measured areas inside the building in the offices of Solux Inc. Since we did not obtain access to Solux's offices, we must rely on NYS DOL.

Dose Estimates (mrem/year)
Solux Employees - Background

Recommendations

From our analysis and measurements, it appears highly unlikely that any member of the public would be exposed in excess of the dose-equivalent limit for the general public (500 mrem/year) or even the limit used for individuals for cleanup of uranium mill tailings sites or guidance used in Montclair/Glen Ridge or West Orange (170 mrem/year).

If and when the radium needles are removed, pursuant to the NYSDOL order, the source of gamma ray exposure will be eliminated.

However, in an extreme circumstance, the possibility exists that the limits might be exceeded. For this reason, we recommend that additional shielding be placed around the sources to eliminate this possibility. The security at the site appears to be adequate as the building has a chain link fence topped with barbed wire and an ADT alarm system which will notify an ADT security office in the event of a break-in.

No immediate action is required by EPA outside of recommending to the State that good radiation safety practice dictates increased radiation shielding to reduce or eliminate the possibility of exposure to the public above established limits. This is consistent with principle that radiation exposures should be as low as reasonable achievable.

During the evening of September 17, 1987, Paul Giardina discussed with Paul Merges of the New York State Department of Environmental Conservation (NYSDEC) discussed the future strategy in dealing with the site. It was agreed that it would be advantageous for the involved State and City agencies to meet to do the following:

- review each group's statutory authorities
- determine a strategy for the future

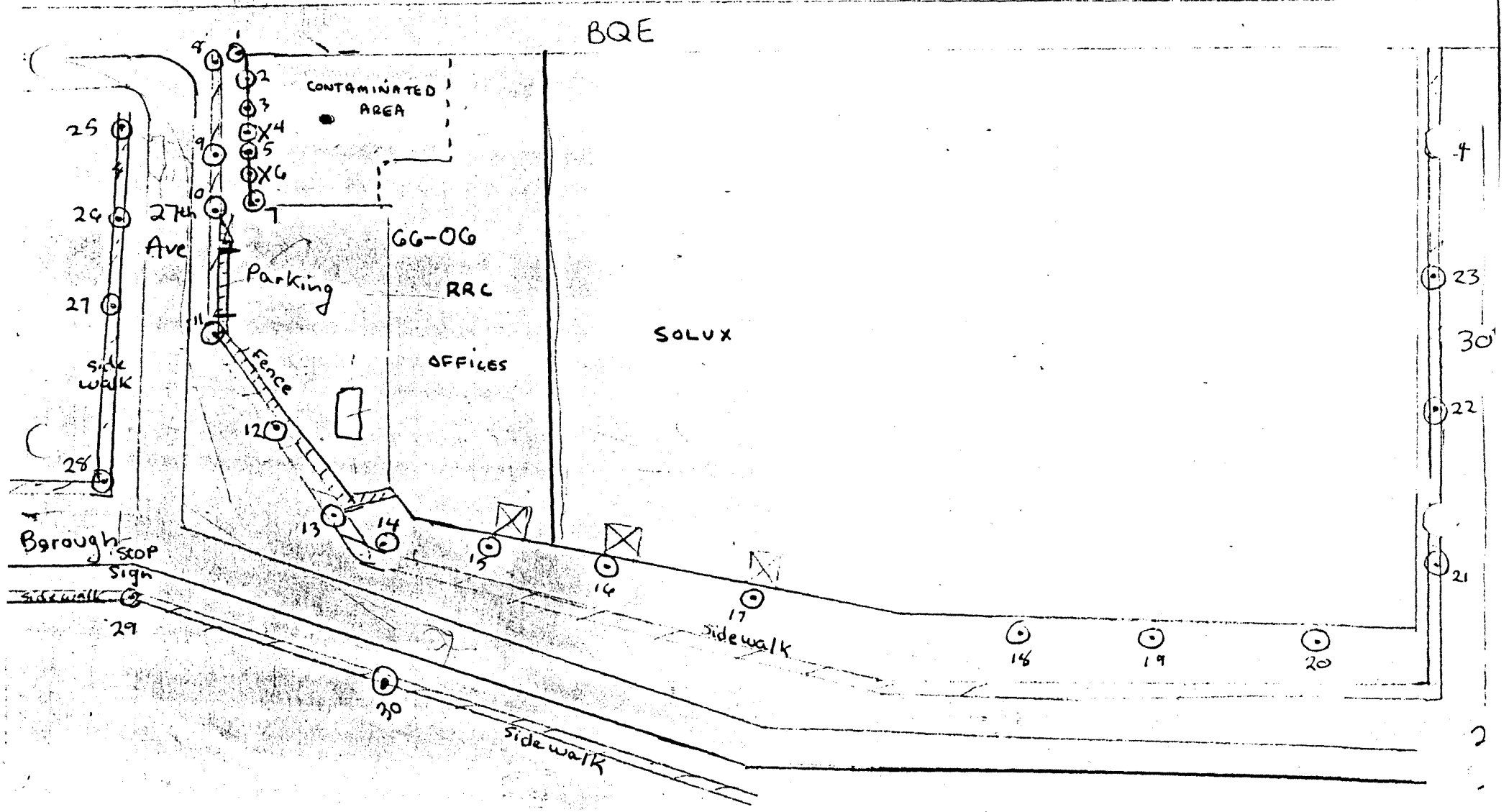
We made the offer that the radiation office could help facilitate or even coordinate such a meeting. We appear to be in agreement that the State is the lead on this site and is exercising its regulatory authority. We are proceeding to set up a meeting on September 28th or 29th.


BRONX CO.
QUEENS CO.
MANHATTAN
CON-EDISON
ASTORIA
STEIN
HELL GATE
WEST CHANNEL
EAST CHANNEL
ROOSEVELT ISLAND
WELFARE ISLAND
RAVENSWOOD
HOUSES
LONG ISLAND
CITY
BROADWAY
NORTHERN
BOULEVARD
CONRAIL
WOODSIDE
SKILLMAN
QUEENS
BLVD
CALVARY
CEMETERY
NEW
CALVARY
CEMETERY
MT. ZION
CEMETERY
EXPRESSWAY
BORDEN
SEWAGE
TREATMENT
PLANT
GREENPOINT
29
35
44
5
2
3
1
4
77
278
495
25

X window sidewalk 1"≈40 ft.

Door

66-06 27th Ave.
Woodside, Queens



micro-R meter ~ γ-ray

9/17/07

Measurement Lcn.	Reading μR/hr	Measurement Lcn.	Reading μR/hr
1	250-280	16	20
2	1000	17	20-10
3	500-600	18	10-15
4	1000-1800	19	10-15
5	300-500	20	10-15
6	4000	21	10-12
7	900	22	"
8	290	23	"
9	290-300	24	"
10	400-450	25	80-100
11	150-200	26	80-100
12	100-120	27	80-100
13	70	28	70
14	50	29	50
15	30-40	30	50

SHAWN W. GOOGINS

11-30-88 2-2.30-01

RADIUM CHEMICAL COMPANY

RADIOLOGICAL BRIEFING

1. RADIOLOGICAL INFORMATION

a) Units

Exposure: Roentgens (R), milliRoentgens (mR)

Dose: rads, millirads

Dose Equivalent: rems, millirems, effective dose equivalent

Radioactivity: Curie, millicurie, microcurie, nanocurie, picocurie

b) Standards & Guidance

Occupational: Radiation Workers

Non-Occupational: General Public

Concentrations of radionuclides in air

Surface Contamination Limits

Protective Action Guides (PAGs)

c) Normal Radiation/Radioactivity Background

Soil

Air

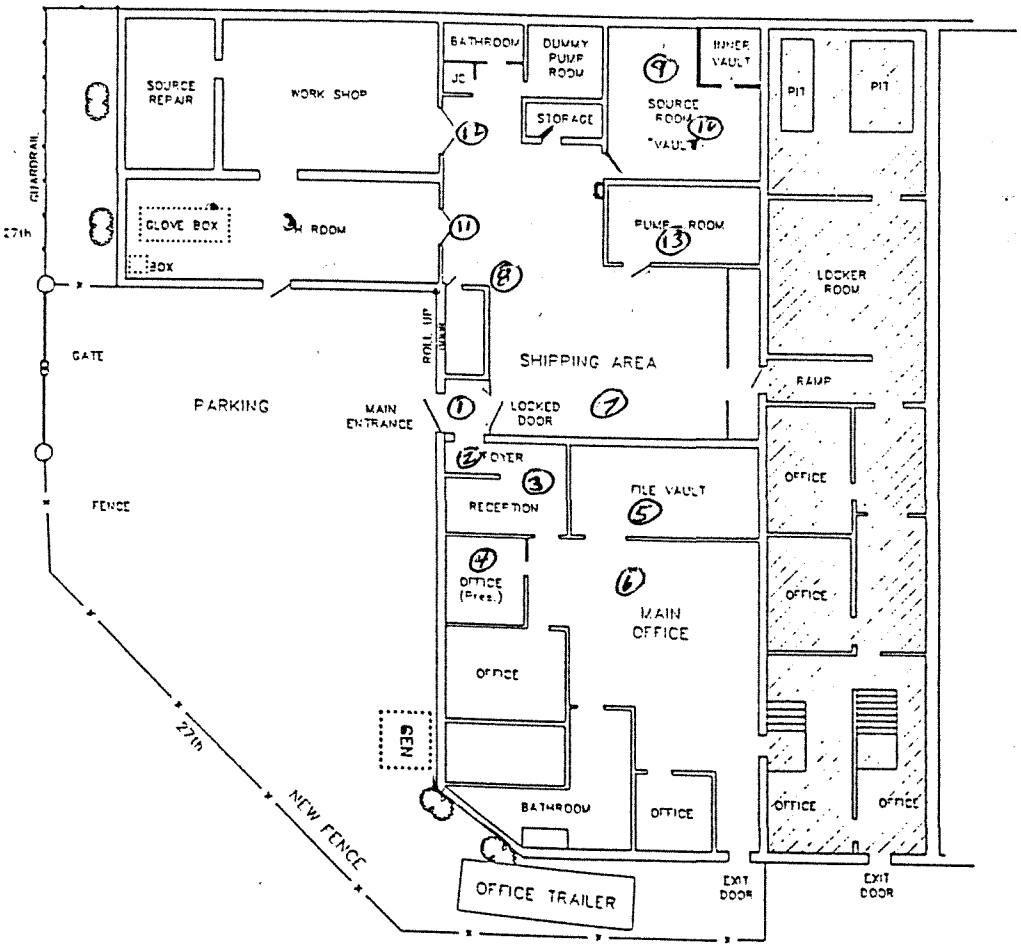
Dose Equivalent to General Public

Effective Dose Equivalent

NLC Streams 10-13-87 Sht

2-3.20-02

RADIUM CHEMICAL COMPANY
60-06 27th AVE.
WOODSIDE, NY 11377



Sample ID R2SF88.01050
Sample type FILTER
Collection date, time 10/13/87 0:00
Location NY:WOODSIDE
Other ID's #1
Comments RADIUM CHEMICAL CO.
Report to CHICK PHILLIPS

Type of analysis	********** ALPHA	**********		
NUCLIDE	ACTIVITY	2 SIG ERROR	UNITS	DATE
ALPHA	0.0000E+00	0.00 %	PCI/FILT	10/13/87

Sample ID R2SF88.01050X
Sample type FILTER
Collection date, time 10/13/87 0:00
Location NY:WOODSIDE
Other ID's #1
Comments RADIUM CHEMICAL CO.
Report to CHICK PHILLIPS

Type of analysis	********** ALPHA	**********		
NUCLIDE	ACTIVITY	2 SIG ERROR	UNITS	DATE
ALPHA	0.0000E+00	0.00 %	PCI/FILT	10/13/87

Sample ID R2SF88.01051
Sample type FILTER
Collection date, time 10/13/87 0:00
Location NY:WOODSIDE
Other ID's #2
Comments RADIUM CHEMICAL CO.
Report to CHICK PHILLIPS

Type of analysis	********** ALPHA	**********		
NUCLIDE	ACTIVITY	2 SIG ERROR	UNITS	DATE
ALPHA	2.5590E+01	6.00 %	PCI/FILT	10/13/87

Sample ID R2SF88.01052
Sample type FILTER
Collection date, time 10/13/87 0:00
Location NY:WOODSIDE
Other ID's #3
Comments RADIUM CHEMICAL CO.
Report to CHICK PHILLIPS

Type of analysis	********** ALPHA	**********		
NUCLIDE	ACTIVITY	2 SIG ERROR	UNITS	DATE

ALPHA	3.5770E+01	5.00 %	PCI/FILT	10/13/87

Sample ID R2SF88.01053
Sample type FILTER
Collection date, time 10/13/87 0:00
Location NY:WOODSIDE
Other ID's #4
Comments RADIUM CHEMICAL CO.
Report to CHICK PHILLIPS

Type of analysis ********** ALPHA **********

NUCLIDE	ACTIVITY	2 SIG ERROR	UNITS	DATE
ALPHA	1.0040E+01	9.00 %	PCI/FILT	10/13/87

Sample ID R2SF88.01054
Sample type FILTER
Collection date, time 10/13/87 0:00
Location NY:WOODSIDE
Other ID's #5
Comments RADIUM CHEMICAL CO.
Report to CHICK PHILLIPS

Type of analysis ********** ALPHA **********

NUCLIDE	ACTIVITY	2 SIG ERROR	UNITS	DATE
ALPHA	3.0940E+01	5.00 %	PCI/FILT	10/13/87

Sample ID R2SF88.01055
Sample type FILTER
Collection date, time 10/13/87 0:00
Location NY:WOODSIDE
Other ID's #6
Comments RADIUM CHEMICAL CO.
Report to CHICK PHILLIPS

Type of analysis ********** ALPHA **********

NUCLIDE	ACTIVITY	2 SIG ERROR	UNITS	DATE
ALPHA	2.7840E+01	6.00 %	PCI/FILT	10/13/87

Sample ID R2SF88.01056
Sample type FILTER
Collection date, time 10/13/87 0:00
Location NY:WOODSIDE
Other ID's #7
Comments RADIUM CHEMICAL CO.
Report to CHICK PHILLIPS

Type of analysis ********** ALPHA **********

NUCLIDE	ACTIVITY	2 SIG ERROR	UNITS	DATE

ALPHA	1.5660E+01	8.00 %	PCI/FILT	10/13/87

Sample ID R2SF88.01057
Sample type FILTER
Collection date, time 10/13/87 0:00
Location NY:WOODSIDE
Other ID's #8
Comments RADIUM CHEMICAL CO.
Report to CHICK PHILLIPS

Type of analysis ********** ALPHA **********

NUCLIDE	ACTIVITY	2 SIG ERROR	UNITS	DATE
ALPHA	2.1349E+02	2.00 %	PCI/FILT	10/13/87

Type of analysis ********** PB **********

NUCLIDE	ACTIVITY	2 SIG ERROR	UNITS	DATE
PB-210	4.5640E+01	28.98 %	PCI/FILT	4/ 4/88

Type of analysis ********** PO-AUTO **********

NUCLIDE	ACTIVITY	2 SIG ERROR	UNITS	DATE
PO-210	3.1968E+01	11.50 %	PCI/FILT	4/ 4/88

Type of analysis ********** RA226 **********

NUCLIDE	ACTIVITY	2 SIG ERROR	UNITS	DATE
RA-226	1.1780E+02	1.00 %	PCI/FILT	10/13/87

Sample ID R2SF88.01058
Sample type FILTER
Collection date, time 10/13/87 0:00
Location NY:WOODSIDE
Other ID's #9
Comments RADIUM CHEMICAL CO.
Report to CHICK PHILLIPS

Type of analysis ********** ALPHA **********

NUCLIDE	ACTIVITY	2 SIG ERROR	UNITS	DATE
ALPHA	5.2515E+04	0.92 %	PCI/FILT	10/13/87

Type of analysis ********** PB **********

NUCLIDE	ACTIVITY	2 SIG ERROR	UNITS	DATE
PB-210	8.0021E+03	15.07 %	PCI/FILT	4/ 4/88

Type of analysis ********** RA **********

NUCLIDE	ACTIVITY	2 SIG ERROR	UNITS	DATE
RA-226	2.7373E+04	1.00 %	PCI/FILT	10/13/87

Type of analysis ********** PO-AUTO **********

NUCLIDE	ACTIVITY	2 SIG ERROR	UNITS	DATE
PO-210	5.4907E+03	8.62 %	PCI/FILT	4/ 4/88

Sample ID R2SF88.01059

Sample type FILTER
Collection date, time 10/13/87 0:00
Location NY:WOODSIDE
Other ID's #10
Comments RADIUM CHEMICAL CO.
Report to CHICK PHILLIPS

Type of analysis	********** ALPHA		**********
NUCLIDE	ACTIVITY	2 SIG ERROR	UNITS	DATE
ALPHA	3.7950E+01	5.00 %	PCI/FILT	10/13/87

Sample ID R2SF88.01060
Sample type FILTER
Collection date, time 10/13/87 0:00
Location NY:WOODSIDE
Other ID's #11
Comments RADIUM CHEMICAL CO.
Report to CHICK PHILLIPS

Type of analysis	********** ALPHA		**********
NUCLIDE	ACTIVITY	2 SIG ERROR	UNITS	DATE
ALPHA	8.3290E+01	3.00 %	PCI/FILT	10/13/87

Sample ID R2SF88.01060X
Sample type FILTER
Collection date, time 10/13/87 0:00
Location NY:WOODSIDE
Other ID's #11
Comments RADIUM CHEMICAL CO.
Report to CHICK PHILLIPS

Type of analysis	********** ALPHA		**********
NUCLIDE	ACTIVITY	2 SIG ERROR	UNITS	DATE
ALPHA	8.6730E+01	3.00 %	PCI/FILT	10/13/87

Sample ID R2SF88.01061
Sample type FILTER
Collection date, time 10/13/87 0:00
Location NY:WOODSIDE
Other ID's #12
Comments RADIUM CHEMICAL CO.
Report to CHICK PHILLIPS

Type of analysis	********** ALPHA		**********
NUCLIDE	ACTIVITY	2 SIG ERROR	UNITS	DATE
ALPHA	7.2800E+01	3.00 %	PCI/FILT	10/13/87

Sample ID R2SF88.01062

Sample type FILTER
Collection date, time 10/13/87 0:00
Location NY:WOODSIDE
Other ID's #13
Comments RADIUM CHEMICAL CO.
Report to CHICK PHILLIPS

Type of analysis ********** ALPHA **********

NUCLIDE	ACTIVITY	2 SIG ERROR	UNITS	DATE
ALPHA	3.7440E+01	5.00 %	PCI/FILT	10/13/87

Sample ID R2SF88.01063
Sample type FILTER
Collection date, time 10/13/87 0:00
Location NY:WOODSIDE
Other ID's #14
Comments RADIUM CHEMICAL CO. (BLANK)
Report to CHICK PHILLIPS

Type of analysis ********** ALPHA **********

NUCLIDE	ACTIVITY	2 SIG ERROR	UNITS	DATE
ALPHA	1.4000E-01	136.00 %	PCI/FILT	10/13/87

D) Effects of Radiation Exposure

Prompt Effects: Acute Radiation Exposure Syndrome, Others

Delayed Effects: Cancer Risk, Genetic Risk

Teratogenic Effects

E) Facility Status (Inside)

Diagram

Location of Sources, anticipated activity (Ci), # sources

Radiation Exposure Levels

Radon Levels

Contamination Levels (surfaces)

F) Facility Status (outside)

Diagram

Exposure Rates

Radon Levels

Radium in Soil

Contamination levels (surfaces)

G) Accident/Incident Impacts

Inadvertant Intruder

1. Direct exposure
2. Stolen sources

H) Explosion Analysis (Lawrence Livermore Model & EPA)

1. Inhalation
2. Ground Shine-Exposure from Deposition
3. Re-suspension: Inhalation
4. Exclusion Zone: dispersal of sources-radius
5. Transport of Sources from Exclusion Zone

I) Fire Analysis (Lawrence Livermore Model)

1. Inhalation
2. Ground Shine-Exposure From Deposition
3. Resuspension

J) Disposal

1. Method
2. Packaging
3. Shipping
4. Possible Disposal Sites

Radiation Standards & Guidance

Occupational Radiation Exposure:

a) Primary Standard: 5 rem/y, 1.25 rem/quarter

b) Secondary Standard: 12 rem/y, 3 rem/quarter if lifetime dose does not exceed the formula 5(N-18) rem, where N is age in years.

Non-Occupational Exposure (General Public)

a) 500 mrem/y (individuals)

b) 170 mrem/y (large segments of the population)

Concentrations of Radionuclides in Air

Restricted Areas (Radiation Workers-Occupational Exposure)
Radon-222: 30 pCi/liter, 0.3 Working Levels, 4 Working Level Months/year (WLM).

Unrestricted Areas (Non-Radiation Workers-General Public)
Radon-222: 3 pCi/liter, 0.03 Working Levels, 2.0 WLMs/y.

Surface Contamination Limits

Occupational: No real Limits, dependent upon the facility's license and operation within the regulations.

Non-Occupational-Unrestriced Use:

a)Alpha Emitters (e.g. Ra-226, Po-210)

Removeable:

average: 15 pCi per 100 square centimeters

maximum: 45 pCi per 100 square centimeters

Fixed (non-removable):

average: 450 pCi per 100 square centimeters

maximum: 2250 pCi per 100 square centimeters

Surface contamination is also expressed in decays per minute per 100 square centimeters. 15 pCi is equal to 33 decays per minute (dpm), 45 pCi is approximately 100 dpm.

Protective Action Guides:

Guidance of the U.S. EPA used to determine the necessity of taking protective actions during a radiation emergency to protect the public from radiation exposure. Actions to be considered can include evacuation, sheltering, or other measures to reduce radiation exposure. The dose equivalent PAG for whole body ranges from 1 to 5 rem. Usually the lower level of 1 rem is used. The range in recommended DE is used because other mitigating circumstances (weather, fires, other natural disasters).

PAG Whole Body: 1 to 5 rem

Background Radiation/Radioactivity

Concentration of radionuclides in environmental media.

Soil: Ra-226 0.6 to 2 pCi/gram

Air: Rn-222 (outdoor average) 0.10 to 0.15 pCi/l

Rn-222 (indoor average) 0.80 to 1.5 pCi/l.

Effective Dose Equivalent to General Public

Cosmic	27 mrem
Terrestrial	28 mrem
Cosmogenic	1 mrem
Inhaled (Rn)	200 mrem
In Body (K,Ra)	39 mrem
Total (apprx.)	300 mrem

Effects of Radiation Exposure

Prompt Effects

Acute Radiation Exposure Syndrome: (Whole Body Exposure)

Syndrome	Dose Threshold	Death Threshold
Hemopoetic	100 rad	200 rad
GI	500 rad	1000 rad
CNS	2000 rad	5000 rad

Lethal Dose LD-50 400 to 450 rad

Above 25 rad changes seen in blood cells

Radiation Burns/Tissue Necrosis

Erythema Dose (skin reddening) 200 rad

Radiation Burns 600 rad

Tissue Necrosis/blisters 1000 rad

Complete Tissue Death/loss >3000 rad

Serility 50 rad- temporary sterility

300-400 rem (permanent sterility single exposure)

1000-2000 rem (perm. sterility exp. 10-14 days)

Catatacts 200 rad threshold single exposure, 1,000-2000 rad fractionated exposure.

Delayed Effects

Risk

1 to 4 in 10,000 fatal cancer risk per rem

1 to 2 in 10,000 genetic effect per rem

< 1 in 1,000 developmental abnormalities per rem (during gestation)

4.6 in 10,000 fatal lung cancers per working level month

A working level month is exposure at 1 working level for a period of 170 hours.

Interior Facility Status

Location	Exposure mR/h	Rn pCi/l	Contamination dpm/100 cm 2
Main Off	0.02-.06	1-10	< 33 (R)
Kelly	0.06-.25	NS	8k to 1.6 M (T)
Kaufman	0.06-.6	NS	<33 (R), 73-333K (T)
Bathroom	0.01-.02	NS	<33 (R)
Recpt.	.05-.06	1-6	<33 (R)
Shipping	0.5-70	1-300	110 (R)
Luminous	0.5-50	200	16K-1M (T)
Wkshop	0.5-100	200	1K-1M (T)
Vault	70-2500	200-305	24K (R)
Leased	.015-2	14-117	13K-15K (T)

(R=removable, F=Fixed, T=Total F+R, NS=Not sampled)

Exterior Facility Status

Location	Exposure mR/h	Rn pCi/l	Contamination dpm/100 cm 2
Roof Ex 1	1-2	195	ND
Roof Ex 2	50-80	305	ND
BQE	< 2.0	NS	ND

OTHER SAMPLES

Soil by BQE & RCC 28.0 pCi/g Radium-226

Tree Bark	1.0 pCi/g Radium-226
Tree Limb	0.36 pCi/g Radium-226
Tree Leaves	0.58 pCi/g Radium-226

Accident & Impact Analysis

Intruder

Direct Exposure-No source contact

Exposure Rate: 100-2500 mR/h: 12 mins to 5 hours to exceed 500 mrem

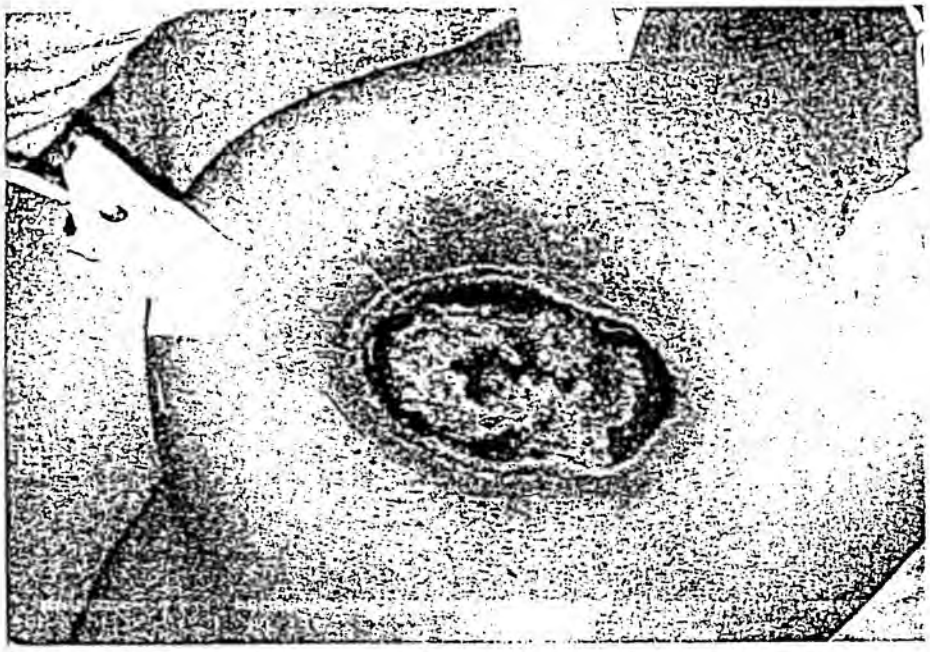
Rn: 200-300 pCi/l (0.8-1.5 WL): 88 mrem to lung in 1 hour in facility, results in 4 in 1 million lifetime risk of fatal lung cancer for a one hour exposure.

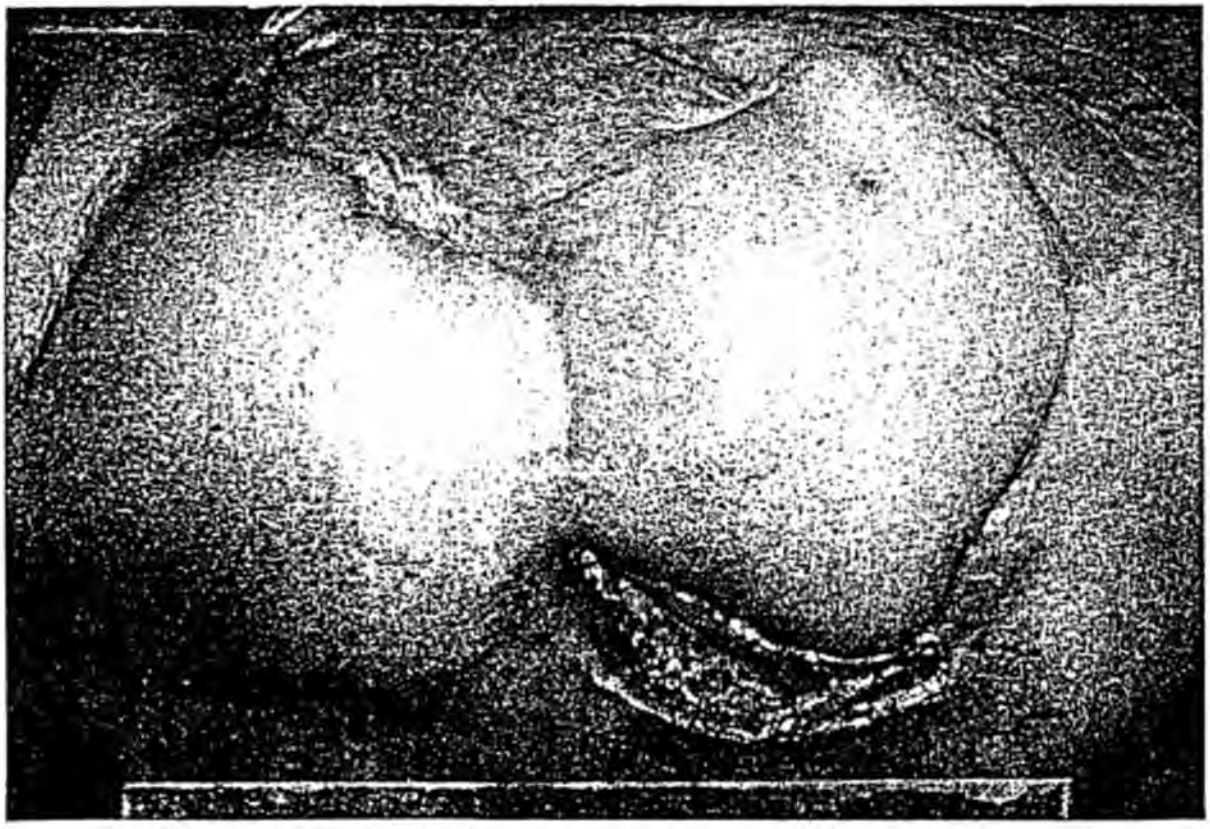
Direct Exposure Source Theft

Exposure Rate: 10 mg source 8,250 mR per hour at 1mm, serious radiation burns in 10 minutes.

100 mg source 82,500 mR per hour at 1mm, serious radiation burns in one minute.

Potential for lethal radiation exposures if multiple sources are stolen from the facility. In addition, if the souces are leaking internal exposure/contamination can result in serious radiation exposure problems.





DISPERSION MODELING

Low probability occurrence of accidents with a large impact and high cost to remediate. Modeling conducted by Lawrence Livermore National Laboratory (Modeled Chernobyl).

EXPLOSION

Explosion: Assume 10 lbs TNT in facility (Bomb Threat has been received at the facility).

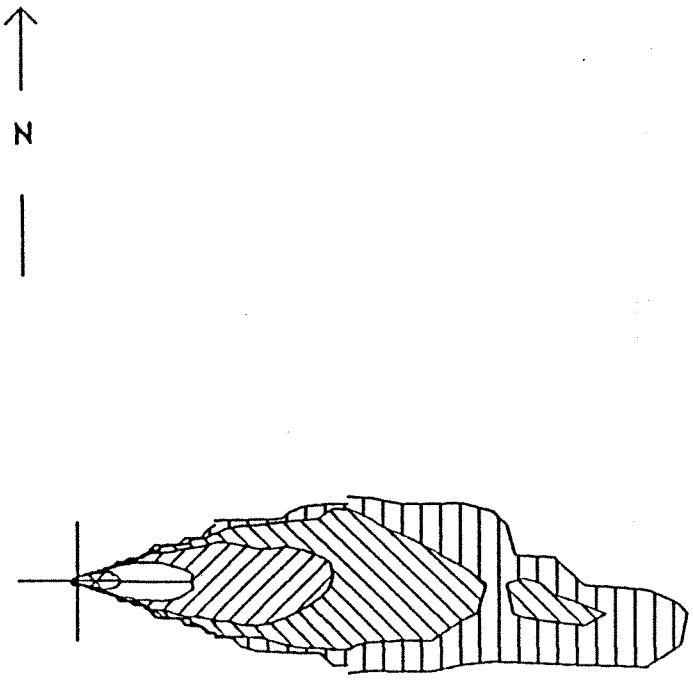
Exclusion Zone: 300 meters (1,000) ft actual sources may be dispersed and present problems with direct radiation exposure problems. Such a dispersion would require the closing of the Brooklyn Queens Expressway (BQE).

Doses exceeding the U.S. EPA Protective Action Guides (PAGs) are likely to occur at distances of up to 300 meters (1000 ft). Suggested protective actions (sheltering) up to 1 kilometer (3300 ft) would be highly reccommended.

Resuspension of the deposited material could result in exposures of 1 mrem per hour (500 mrem in 20 days).

21-NOV

(1)



Worst Winds: 1 mph, F Stab

EXPL:

50YR COMM. EFF. WB DOSE EQ

PROBLEM START	1NOV88 0900 GMT
LAST METDATA	1NOV88 0900 GMT
INTEGRATED FROM	1NOV88 0900 GMT
TO	1NOV88 1900 GMT

MATERIAL - RA-226

CALCULATIONAL HEIGHT - 1.5 M

CONTOUR VALUES (IN MREM/CI)

> 1.0E+02 AREA COVERS	0.03 SQ KM
> 1.0E+01 AREA COVERS	0.20 SQ KM
> 1.0E+00 AREA COVERS	0.86 SQ KM
> 1.0E-01 AREA COVERS	2.21 SQ KM
> 1.0E-02 AREA COVERS	3.74 SQ KM

3 KM

9000 FT

ARAC

FIRE

Fire: Assume that gasoline tanker containing 5000 gallons and crashes into RCC radium storage area.

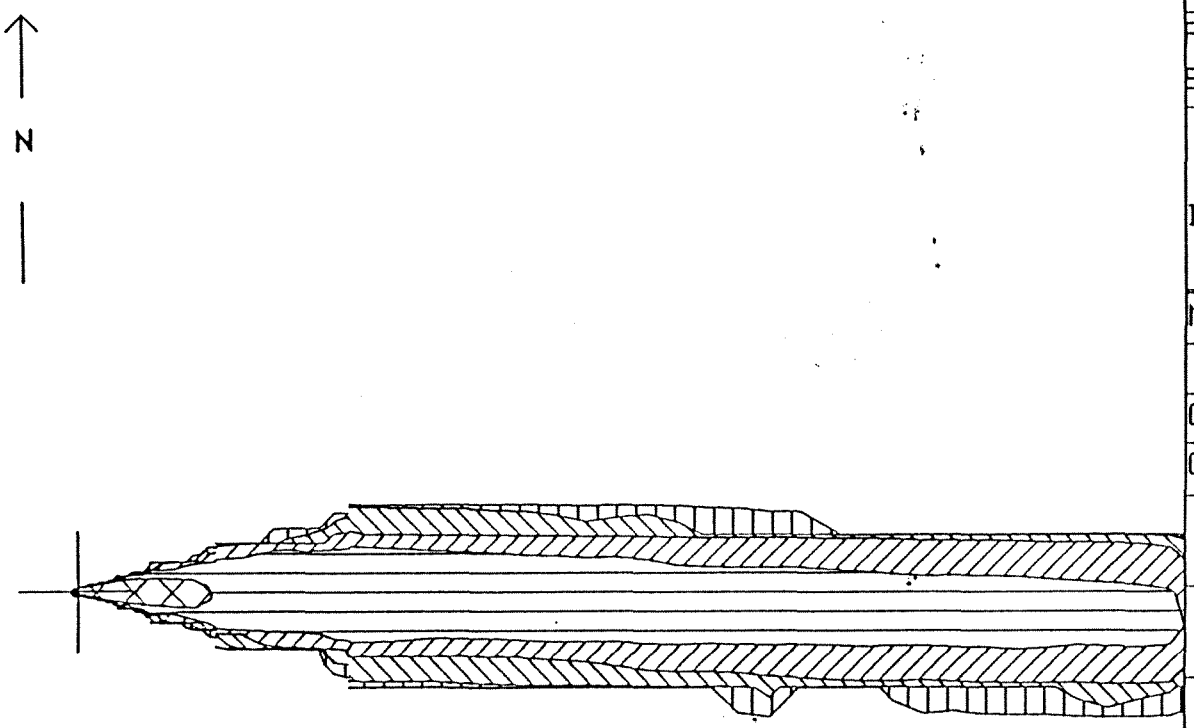
Dispersal of sources: 300 to 1000 meters (1000 to 3500 ft) would require an exclusion zone. This distance depends upon the burning or detonation of the gasoline tanker.

Dose equivalents in excess of PAGs are likely to occur at distances in excess of 800 meters (essetially 1 kilometer). It is suggested that protective action (sheltering) be enacted at distances of 8 kilometers (5 miles). Dose Equivalents of 100 mrem would occur at up to 6 kilometers.

DE of greater than 1 mrem per hour (500 mrem in 20 days) at distances of up to 1 or more kilometers.

21-NOV

(4)



Worst Winds: 1 mph, F Stab

FIRE:

50YR COMM. EFF. WB DOSE EQ

PROBLEM START	1NOV88 0900 GMT
LAST METDATA	1NOV88 0900 GMT
INTEGRATED FROM	1NOV88 0900 GMT
TO	1NOV88 1900 GMT

MATERIAL - RA-226

CALCULATIONAL HEIGHT - 1.5 M

CONTOUR VALUES (IN MREM/CI)

> 1.0E+02 AREA COVERS	0.16 SQ KM
> 1.0E+01 AREA COVERS	4.77 SQ KM
> 1.0E+00 AREA COVERS	7.36 SQ KM
> 1.0E-01 AREA COVERS	8.75 SQ KM
> 1.0E-02 AREA COVERS	9.53 SQ KM

3 KM

9000 FT

ARAC

DISPOSAL

Commercial Disposal Sites:

Beatty, Nevada

Sources: 7.5 cubic foot container method: $350,000

Cask Method: $100,000

Debris: $120,000 (Includes transport & Disposal)

Richland, Washington (Hanford Reservation)

Sources: 1.5 Million (disposal fees only)

Debris: $125,000 (includes transport & disposal)

Additional Option: DOE facility through Army Support agreement is available if the material is excluded from a commercially available site.

Debris: $20,000

Sources $10,000

Packaging:

Sources; Type B Package-high integrity containers (Casks)

Debris; Type A package- 55 gallon steel Drum (Spec 17 H)

Shipping: Tractor Trailer

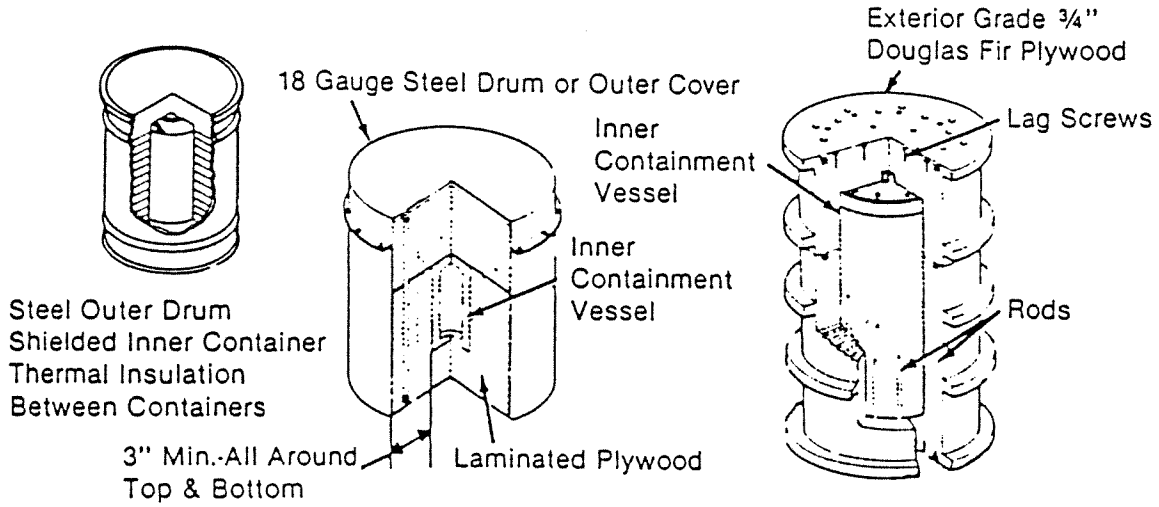
1. Type B Packaging

Type B Packaging (see Figure 6), must meet the general packaging requirements and all of the performance standards for Type A packages. In addition, it must withstand certain serious accident damage test conditions. After the tests, there must be only limited loss of shielding capability and essentially no loss of containment. The performance criteria which the package designer must use to assess Type B packaging against these empirically established hypothetical accident test conditions of the transport are prescribed in the Nuclear Regulatory Commission regulations (10 CFR 71.73) and include the following:

1. A 30-foot free drop onto an unyielding surface.
2. A puncture test which is a free drop (over 40 inches) onto a six-inch diameter steel pin.
3. Thermal exposure at 1,475°F for 30 minutes.
4. Water immersion for eight hours (for fissile materials packaging only).

Figure 6 - Typical Type B Packagings

Package Must Stand Both Normal (173.465) and Accident (10 CFR Part 71) Test Conditions Without Loss of Contents.



Specialized Disposal Containers

Chem-Nuclear maintains an extensive inventory of disposable radwaste containers which complement our cask fleet and meet the varying needs of the nuclear industry. These containers are not only available in various sizes and materials, such as stainless steel, carbon steel and cross-linked polyethylene, but also with varied internals for demineralization, dewatering, solidification, or encapsulation.

In addition to industry standard containers, we regularly design and fabricate specialized containers to meet the requirements of individual customers. This combination of inventory and ability to expedite production of special containers enables us to respond without costly delays in processing or shipping.

Quality and safety to meet the highest standards

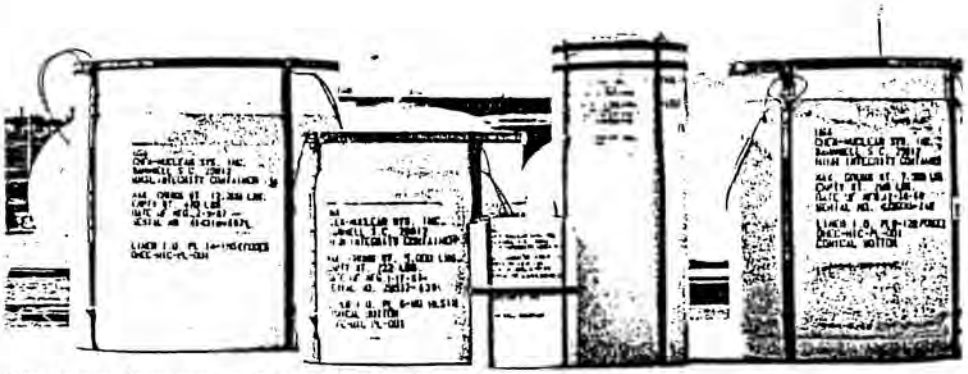
All Chem-Nuclear containers comply fully with state and federal regulations, while meeting our own stringent standards of quality. Our Quality Assurance Division monitors their design, manufacture, and application. A complete inspection, including document compliance, is conducted on each container during fabrication, at completion, and prior to release for delivery to a customer.

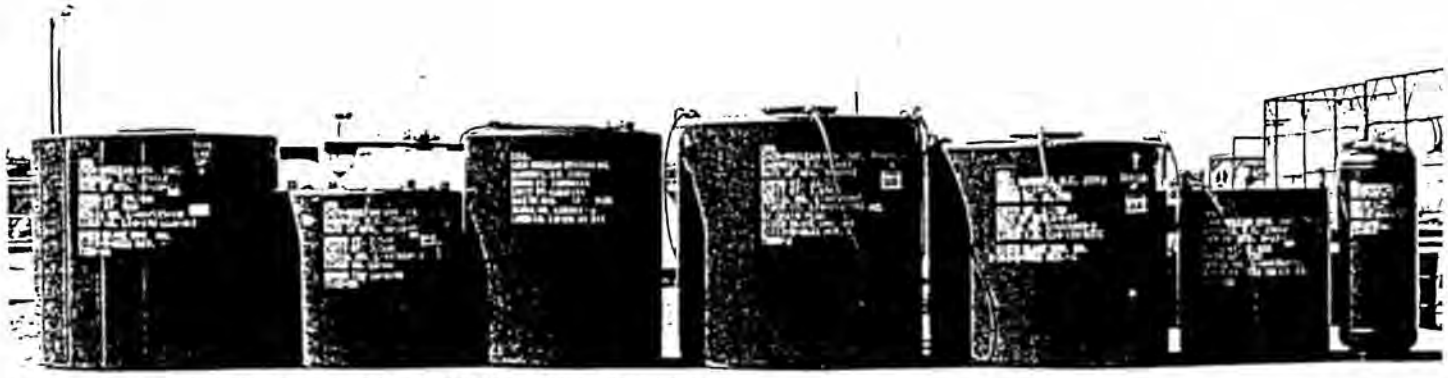
High Integrity Containers—economical alternatives

Chem-Nuclear's High Integrity Container—another industry first—is the economical alternative to solidifying low-level radioactive wastes. We developed this container specifically to assist our customers in regulatory compliance and in minimizing disposal volumes.

Chem-Nuclear is committed to improving the technologies used in designing and fabricating disposal containers. Customers are assured that our containers meet or exceed the high quality standards the nuclear industry demands.

Each container is thoroughly tested and inspected prior to release


High Integrity Containers and Overpacks are available in a variety of configurations


Chem-Nuclear maintains an extensive inventory of disposal containers to meet the varying needs of the nuclear industry

Transportation

Chem-Nuclear's radwaste and spent fuel transportation services are the industry's finest, most reliable, and most professional. Because our customers require flexibility in scheduling and equipment use, we develop transportation plans to meet their individual requirements—ranging from per trip service to dedication of equipment. Our fleet of tractors, trailers and casks can meet all the transportation needs of the industry—today and in the future.

The vital link in radwaste management

Chem-Nuclear owns, maintains, and operates a fleet of distinctively designed vehicles including specialty trailers such as shielded vans, drop decks and lowboys. Our transportation terminals are strategically located to create a nationwide network of service outlets for increased efficiency.

Our Transportation Division provides safe, reliable shipment of low-level radioactive waste and spent fuel. Chem-Nuclear's disabling device is NRC-approved for meeting the disabling requirements of 10CRF73.37.

Rigorous safety inspections are performed on every tractor and trailer before each trip. Three distinct examinations—by inspectors and the driver-technicians—are made before a Chem-Nuclear vehicle is cleared for the highway. And all equipment meets or exceeds Department of Transportation standards.

Casks designed for flexibility

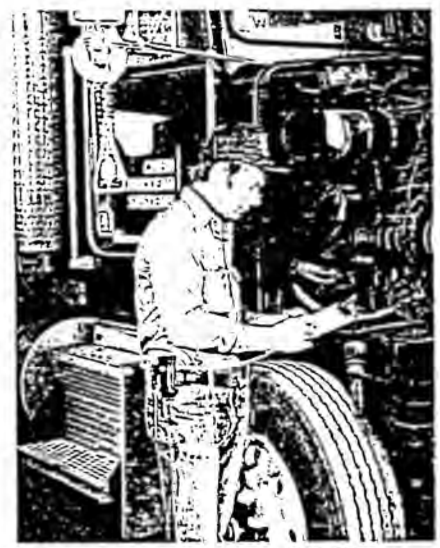
Chem-Nuclear owns the industry's largest and most varied fleet of low-level radwaste transport casks, compatible with a wide variety of disposable containers. This flexibility allows the shipper to maximize the amount of radwaste transported per shipment.

We manage our fleet of over 60 NRC-licensed shipping casks carefully, for even more flexibility and reliability. This fleet is continuously monitored to ensure both regulatory acceptance and expansion in anticipation of industry needs.

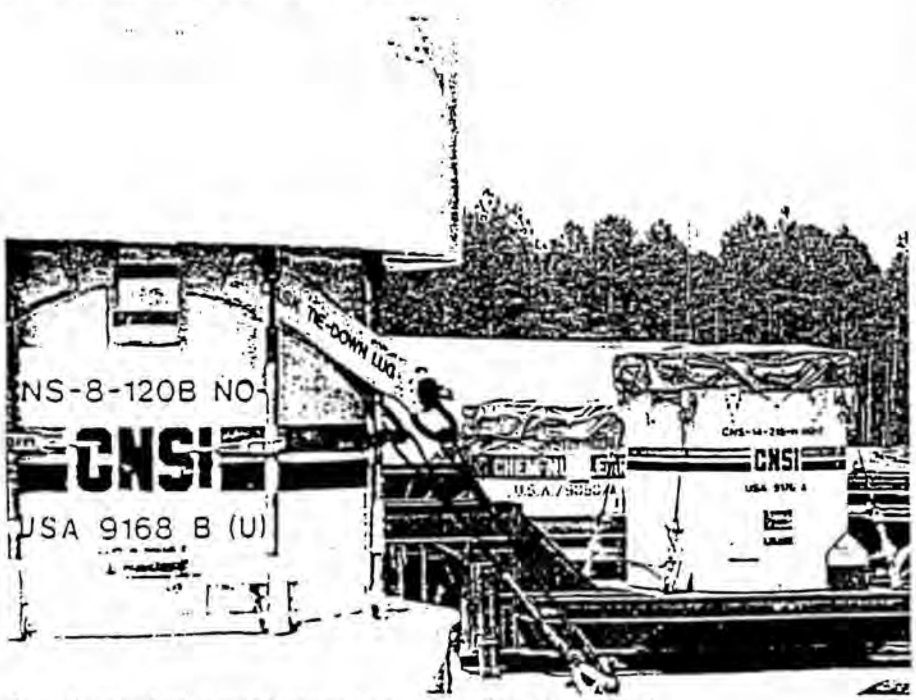
Drivers who are also technicians

Our driver-technicians are the most important element in our transportation system—so we carefully choose the finest personnel in the industry. Beyond the requirements of proven professional experience and background, our driver-technicians take part in an intensive ongoing training program in radiological controls, driver safety, accident prevention, and spent fuel and hazardous material transportation regulations.

The combination of highly trained driver-technicians and the best equipment means that our customers and the public can have confidence in the reliability, safety and integrity of Chem-Nuclear's transportation services.



Rigorous safety inspections are performed before every trip



Chem-Nuclear's NRC-licensed shipping casks make up the largest and most varied fleet in the industry

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION II
EDISON, NEW JERSEY 08817

3-3.20-01

RADIATION FACT SHEET

RADIATION EXPOSURE

I. UNITS:

a) Roentgens; milli Roentgens, micro Roentgens, Coulombs/kg
(R) (mR) (uR)
$1/1000^R$ $7/1,000,000^R$ $1R=2.58 \times 10^{-4} C/$

II. DEFINITION:

a) A measure of radiation intensity, relating to the ionization of air caused by x-ray and gamma-ray radiation. Background radiation exposure rates in the U.S. typically range from 0.006 mR/hr to 0.015 mR/hr. Average radiation exposure from cosmic radiation and terrestrial radiation (exposure from radioactivity contained in the earth's crust) result in a yearly exposure of approximately 80 to 120 mR. Exposure to 1R produces an absorbed dose of approximately one rad.

RADIATION DOSE

I. UNITS:

a) rads, millirads, microrads, grams
1 rad = 0.01 grams

II. DEFINITION:

a) A measure of the energy absorbed by matter which is produced by ionizing radiation (including electrons, betas, x-rays, gamma rays, alphas, neutrons). 1 rad is equal to 100 ergs/gram or 0.01 Joules/kg.

RADIATION DOSE EQUIVALENT (DE)

I. UNITS:

a) rem, millirem, microrem, sievert (SV)
1 rem = 0.01 SV

II. DEFINITION:

a) The rem is a special unit which expresses biological damage produced by all types of radiation through the use of a quality factor (QF). The quality factors are as follows:

Radiation	QF
electrons, betas, x-rays, gamma-rays	1
neutrons	1-10
alphas, heavy ions	20

The rem is equal to the absorbed dose in rads times the quality factor. Therefore:

1 rad (x, gamma, betas, electrons) = 1 rem

1 rad (neutrons) = 1-10 rem depending on the energy of the neutrons

1 rad (alphas) = 20 rem

RADIOACTIVITY

I. UNITS:

a) Curie, millicurie, microcurie, Becquerel, picocurie
Ci mCi uCi Bq pCi

1 Ci = 3,70 x 10^{10} Bq

1 Bq = 1 decay per second (dps)

II. DEFINITION:

a) Radioactivity is the property of materials (nuclides) which are physically (atomically) unstable, and release radiation in the process of becoming more stable. This process is called radioactive decay, during which the many forms of radiation are produced. Depending upon the radionuclide, a single decay may result in the production of one or more emissions of radiation. The unit of radioactivity is called the curie, which represents 3.7 x 10^{10} decays per second. One gram of radium - 226 is approximately equal to one curie. Radioactivity in the earth, water and air is often expressed in terms of picocuries/gram (pCi/g) or picocuries per liter (pCi/l). Some examples of typical naturally occurring radioactivity level are:

Media	Radionuclide	Concentration
Outdoor Air	Rn-222	0.05-->0.5 pCi/l
Indoor Air	Rn-222	0.8-->1.5 pCi/l
Soil	Ra-226	0.5-->2 pCi/g
Water	Ra-226	0.01-->2 pCi/l

BIOLOGICAL EFFECTS

The following is a list of some biological effects from various radiation absorbed doses:

Biological Effect	Absorbed Dose (rads)
Death $LD_{50/30}$	450 rads (single dose, whole body)
Sterility	50-->300 rads (single dose to gonads)
Radiation Burns	600-1,000 rads (single dose to various body parts - hands, skin, etc.)
Fatal Cancer Risk	1--4/10,000 per rad (cumulative lifetime risk)

Attachment B

HANDOUT X:
ORIGINAL
FEBRUARY, 1982

U.S. NUCLEAR REGULATORY COMMISSION

APPENDIX TO REGULATORY GUIDE 8.29

INSTRUCTION CONCERNING RISKS FROM OCCUPATIONAL RADIATION EXPOSURE

This instructional material is intended to provide the user with the best available information concerning what is currently known about the health risks from exposure to ionizing radiation.[1] A question and answer format has been used. The questions were developed by the NRC staff in consultation with workers, union representatives, and licensee representatives experienced in radiation protection training. Risk estimates have been compiled from numerous sources generally recognized as reliable. A bibliography is included for the user interested in further study.

The biological effects that are known to occur after exposure to high doses (hundreds of rems[2]) of radiation are discussed early in the document; discussions of the estimated risks from the low occupational dose (<5 rems per year) follow. It is intended that this information will help develop an attitude of healthy respect for the risks associated with radiation, rather than unnecessary fear or lack of concern. Additional guidance is being or will be developed concerning other topics in radiation protection training.

1. What is meant by risk?

Risk can be defined in general as the probability (chance) of injury, illness, or death resulting from some activity. However, the perception of risk is affected by how the individual views its probability and its severity. The intent of this document is to provide estimates of and explain the basis for possible risk of injury, illness, or death resulting from occupational radiation exposure. (See Questions 9 and 10 for estimates of radiation risk and comparisons with other types of risk.)

2. What are the possible health effects of exposure to radiation?

Some of the health effects that exposure to radiation may cause are cancer (including leukemia), birth defects in the future children of exposed parents, and cataracts.[3] These effects (with the exception of genetic effects) have been observed in studies of medical radiologists, uranium miners, radium workers, and radiotherapy patients who have received large doses of radiation. Studies of people exposed to radiation from atomic weapons have also provided data on radiation effects. In addition, radiation effects studies with laboratory animals have provided a large body of data on radiation-induced health effects, including genetic effects.

The observations and studies mentioned above, however, involve levels of radiation exposure that are much higher (hundreds of rems) than those permitted occupationally today (<5 rems per year). Although studies have not shown a cause-effect relationship between health effects and current levels of occupational radiation exposure, it is prudent to assume that some health effects do occur at the lower exposure levels.

3. What is meant by prompt effects, delayed effects, and genetic effects?

a. Prompt effects are observable shortly after receiving a very large dose in a short period of time. For example, a whole-body[4] dose of 450 rems (90 times the annual dose limit for routine occupational exposure) in an hour to an average adult will cause vomiting and diarrhea within a few hours; loss of hair, fever, and weight loss within a few weeks; and about a 50 percent chance of death within 60 days without medical treatment.

b. Delayed effects such as cancer may occur years after exposure to radiation.

c. Genetic effects can occur when there is radiation damage to the genetic material. These effects may show up as birth defects or other conditions in the future children of the exposed individual and succeeding generations, as demonstrated in animal experiments. However, excess genetic effects clearly caused by radiation have not been observed in human populations exposed to radiation. It has been observed, however, that radiation can change the genes in cells of the human body. Thus, the possibility exists that genetic effects can be caused in humans by low doses even though no direct evidence exists as yet.

4. In worker protection, which effects are of most concern to the NRC?

The main concern to the NRC is the delayed incidence of cancer. The chance of delayed cancer is believed to depend

[1] Ionizing radiation consists of energy or small particles such as gamma, beta, or alpha radiation emitted from radioactive materials which, when absorbed by living tissue, can cause chemical and physical damage.

[2] The rem is the unit of measure for radiation dose and relates to the biological effect of the absorbed radiation.

[3] Cataracts differ from other radiation effects in that a certain level of dose to the lens of the eye (~200 rems) is required before they are observed.

[4] It is important to distinguish between whole-body and partial-body exposure. 100 rems to the whole body will have more effect than 100 to a hand. For example, exposure of a hand would affect a small fraction of the bone marrow and a limited portion of the skin.

on how much radiation exposure a person gets, therefore, every reasonable effort should be made to keep exposures low.

Immediate or prompt effects are very unlikely since large exposures would normally occur only if there were a serious radiation accident. Accident rates in the radiation industry have been low, and only a few accidents have resulted in exposures exceeding the legal limits. The probability of serious genetic effects in the future children of workers is estimated in the BEIR[5] report, based on animal studies, at less than one-third that of delayed cancer (5-65 genetic effects per million rems compared to 160-450 cancer cases). A clearer understanding of the cause-effect relationship between radiation and human genetic effects will not be possible until additional research studies are completed.

5. What is the difference between acute and chronic exposure?

Acute radiation exposure, which causes prompt effects and may also cause delayed effects, usually refers to a large dose of radiation received in a short period of time; for example, 450 rems received within a few hours or less. The effects of acute exposures are well known from studies of radiotherapy patients, some of whom received whole-body doses; atomic bomb victims; and the few accidents that have occurred in the early days of atomic weapons and reactor development, industrial radiography, and nuclear fuel processing. There have been few occupational incidents that have resulted in large exposures. NRC data indicate that, on the average, 1 accidental overexposure in which any acute symptoms are observed occurs each year. Most of these occur in industrial radiography and involve exposures of the hands rather than the whole body.

Chronic exposure, which may cause delayed effects but not prompt effects, refers to small doses received repeatedly over long time periods, for example, 20-100 mrem (a mrem is one-thousandth of a rem) per week every week for several years. Concern with occupational radiation risk is primarily focused on chronic exposure to low levels of radiation over long time periods.

6. How does radiation cause cancer?

How radiation causes cancer is not well understood. It is impossible to tell whether a given cancer was caused by radiation or by some other of the many apparent causes. However, most diseases are caused by the interaction of several factors. General physical condition, inherited traits, age, sex, and exposure to other cancer-causing agents such as cigarette smoke are a few possible contributing factors. One theory is that radiation can damage chromosomes in a cell, and the cell is then directed along abnormal growth patterns. Another is that radiation reduces the body's normal resistance to existing viruses which can then multiply and damage cells. A third is that radiation activates an existing virus in the body which then attacks normal cells causing them to grow rapidly.

What is known is that, in groups of highly exposed people, a higher than normal incidence of cancer is observed. Higher than normal rates of cancer can also be produced in laboratory animals by high levels of radiation. An increased incidence of cancer has not been demonstrated at radiation levels below the NRC limits.

7. If I receive a radiation dose, does that mean I am certain to get cancer?

Not at all. Everyone gets a radiation dose every day (see Question 25), but most people do not get cancer. Even with doses of radiation far above legal limits, most individuals will experience no delayed consequences. There is evidence that some radiation damage can be repaired. The danger from radiation is much like the danger from cigarette smoke. Only a fraction of the people who breathe cigarette smoke get lung cancer, but there is good evidence that smoking increases a person's chances of getting lung cancer. Similarly, there is evidence that the larger the radiation dose, the larger the increase in a person's chances of getting cancer.

Radiation is like most substances that cause cancer in that the effects can be seen clearly only at high doses. Estimates of the risks of cancer at low levels of exposure are derived from data available for exposures at high dose levels and high dose rates. Generally, for radiation protection purposes these estimates are made using the linear model (Curve 1 in Figure 1). We have data on health effects at high doses as shown by the solid line in Figure 1. Below about 100 rems, studies have not been able to accurately measure the risk, primarily because of the small numbers of exposed people and because the effect is small compared to differences in the normal incidence from year to year and place to place. Most scientists believe that there is some degree of risk no matter how small the dose (Curves 1 and 2). Some scientists believe that the risk drops off to zero at some low dose (Curve 3), the threshold effect. A few believe that risk levels off so that even very small doses imply a significant risk (Curve 4). The majority of scientists today endorse either the linear model (Curve 1) or the linear-quadratic model (Curve 2). The NRC endorses the linear model (Curve 1), which shows the number of effects decreasing as the dose decreases, for radiation protection purposes.

It is prudent to assume that smaller doses have some chance of causing cancer. This is as true for natural cancer-causers such as sunlight and natural radiation as it is for those that are man made such as cigarette smoke, smog, and man-made radiation. As even very small doses may entail some small risk, it follows that no dose should be taken without a reason. Thus, a principle of radiation protection is to do more than merely meet the allowed regulatory

[5] The National Academy of Sciences established a committee on the Biological Effects of Ionizing Radiation (BEIR) whose 1980 report on the effects on populations of exposure to low levels of ionizing radiation provides much of the background for this guide.

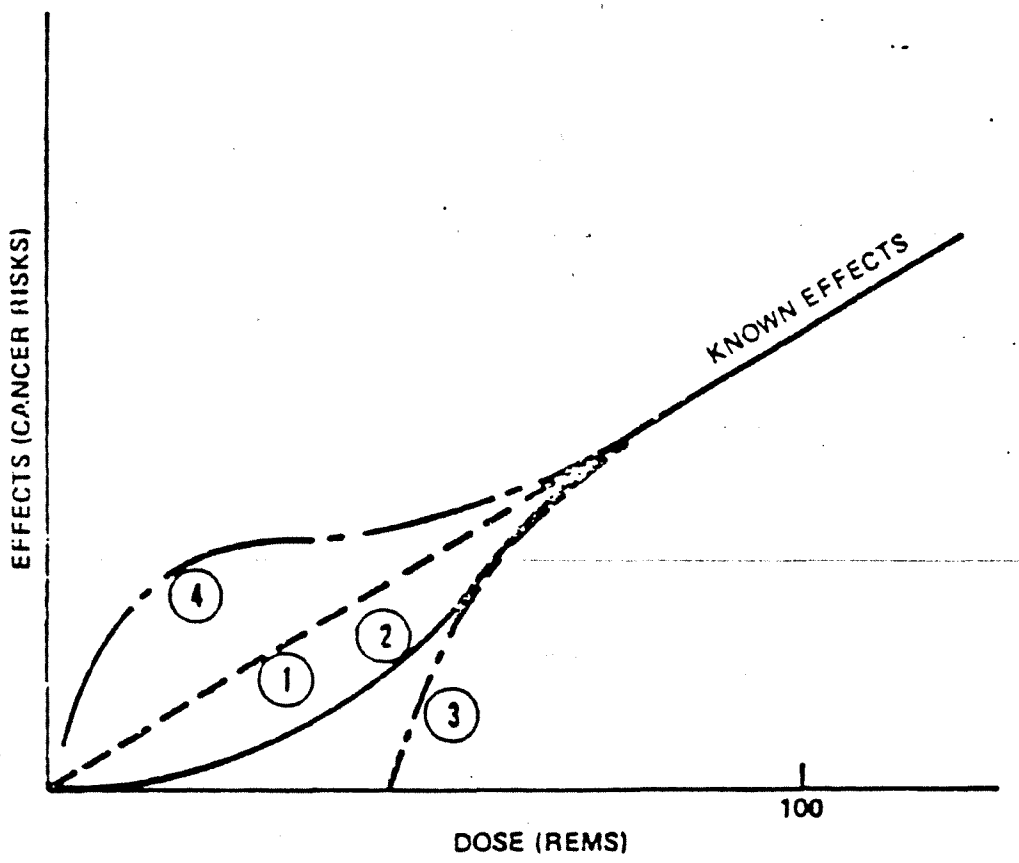

Figure 1. Some proposed models for how the effects of radiation vary with doses at low levels.

limits; doses should be kept as low as is reasonably achievable (ALARA).

We don't know exactly what the chances are of getting cancer from a low-level radiation dose, but we can make estimates based on extensive scientific knowledge. The estimates of radiation risks are at least as reliable as estimates for the effects from any chemical hazard. Being exposed to typical occupational radiation doses is taking a chance, but that chance is reasonably well understood.

It is important to understand the probability factors here. A similar question would be: If you select one card from a full deck, will you get the ace of spades? This question cannot be answered with a simple yes or no. The best answer is that your chances are 1 in 52. However, if 1000 people each select one card from full decks, we can predict that about 20 of them will get an ace of spades. Each person will have 1 chance in 52 of drawing the ace of spades, but there is no way that we can predict which persons will get the right card. The issue is further complicated by the fact that in 1 drawing by 1000 people, we might get only 15 successes and in another perhaps 25 correct cards in 1000 draws. We can say that if you receive a radiation dose, you will have increased your chances of eventually developing cancer. It is assumed that the more radiation exposure you get, the more you increase your chances of cancer.

Not all workers incur the same level of risk. The radiation risk incurred by a worker depends on the amount of dose received. Under the linear model explained above, a worker who receives 5 rems in a year incurs 10 times as much risk as another worker (the same age) who receives only 0.5 rem. The risk depends not only on the amount of dose, but also on the age of the worker at the time the dose is received. This age difference is due, in part, to the fact that a young worker has more time to live than an older worker, and the risk is believed to depend on the number of years of life following the dose. The more years left, the larger the risk. It should be clear that, even within the regulatory dose limits, the risk may vary a great deal from one worker to another. Fortunately, only a very few workers receive doses near 5 rems per year; as pointed out in the answer to Question 19, the average annual dose for all radiation workers is less than 0.5 rem.

A reasonable comparison involves exposure to the sun's rays. Frequent short exposures provide time for the skin to repair. An acute exposure to the sun can result in painful burning, and excessive exposure has been shown to cause skin cancer. However, whether exposure to the sun's rays is short term or spread over time, some of the injury is not repaired and may eventually result in skin cancer.

The effect upon a group of workers occupationally exposed to radiation may be an increased incidence of cancer over and above the number of cancers that would normally be expected in that group. Each exposed individual has an increased probability of incurring subsequent cancer. We can say that if 10,000 workers each receive an additional 1 rem in a year, that group is more likely to have a larger incidence of cancer than 10,000 people who do not receive the additional radiation. An estimate of the increased probability of cancer from low radiation doses delivered to large groups is one measure of occupational risk and is discussed in Question 9.

8. What groups of expert scientists have studied the risk from exposure to radiation?

In 1956, the National Academy of Sciences established advisory committees to consider radiation risks. The first of these was the Advisory Committee on the Biological Effects of Atomic Radiations (BEAR) and more recently it was renamed the Advisory Committee on the Biological Effects of Ionizing Radiation (BEIR). These committees have periodically reviewed the extensive research being done on the health effects of ionizing radiation and have published estimates of the risk of cancer from exposure to radiation (1972 and 1980 BEIR reports). The International Commission on Radiological Protection (ICRP) and the National Council on Radiation Protection and Measurement (NCRP) are two other groups of scientists who have studied radiation effects and published risk estimates (ICRP Publication 26, 1977). These two groups have no government affiliation. In addition, the United Nations established an independent study group that published an extensive report in 1977, including estimates of cancer risk from ionizing radiation (UNSCEAR, 1977).

Several individual research groups or scientists such as Alice Stewart, E.S. Gilbert, T.F. Mancuso, T.W. Anderson, to name a few, have published studies concerning low-level radiation effects. The bibliography to this appendix includes several articles for the reader who wishes to do further study. The BEIR-80 report includes analysis of the work of many independent researchers.

9. What are the estimates of the risk of cancer from radiation exposure?

The cancer risk estimates (developed by the organizations identified in Question 8) are presented in Table 1.

In an effort to explain the significance of these estimates, we will use an approximate average of 300 excess cancer cases per million people, each exposed to 1 rem of ionizing radiation. If in a group of 10,000 workers each receives 1 rem, we could estimate that three would develop cancer because of that exposure, although the actual number could be more or less than three.

TABLE 1

Estimates of Excess Cancer Incidence from Exposure to Low-Level Radiation

Source	Number of Additional[a] Cancers Estimated to Occur in 1 Million People After Exposure of Each to 1 Rem of Radiation
BEIR, 1980	160-450[b]
ICRP, 1977	200
UNSCEAR, 1977	150-350

[a] Additional means above the normal incidence of cancer.

[b] All three groups estimated premature deaths from radiation-induced cancers. The American Cancer Society has recently stated that only about one-half of all cancer cases are fatal. Thus, to estimate incidence of cancer, the published numbers were multiplied by 2. Note that the three groups are in close agreement on the risk of radiation-induced cancer.

The American Cancer Society has reported that approximately 25 percent of all adults in the 20- to 65-year age bracket will develop cancer at some time from all possible causes such as smoking, food, alcohol, drugs, air pollutants, and natural background radiation. Thus in any group of 10,000 workers not exposed to radiation on the job, we can expect about 2,500 to develop cancer. If this entire group of 10,000 workers were to receive an occupational radiation dose of 1 rem each, we could estimate that three additional cases might occur which would give a total of about 2,503. This means that a 1-rem dose to each of 10,000 workers might increase the cancer rate from 25 percent to 25.03 percent, an increase of about 3 hundredths of one percent.

As an individual, if your cumulative occupational radiation dose is 1 rem, your chances of eventually developing cancer during your entire lifetime may have increased from 25 percent to 25.03 percent. If your lifetime occupational dose is 10 rems, we could estimate a 25.3 percent chance of developing cancer. Using a simple linear model, a lifetime dose of 100 rems may have increased your chances of cancer from 25 to 28 percent.

The normal chance of developing cancer if you receive no occupational radiation dose is about equal to your chance of getting any spade on a single draw from a full deck of playing cards, which is one chance out of four. The additional chance of developing cancer from an occupational exposure of 1 rem is less than your chances of drawing an ace from a full deck of cards three times in a row.

Since cancer resulting from exposure to radiation usually occurs 5 to 25 years after the exposure and since not all cancers are fatal, another useful measure of risk is years of

life expectancy lost on the average from a radiation-induced cancer. It has been estimated in several studies that the average loss of life expectancy from exposure to radiation is about 1 day per rem of exposure. In other words, a person exposed to 1 rem of radiation may, on the average, lose 1 day of life. The words "on the average" are important, however, because the person who gets cancer from radiation may lose several years of life expectancy while his coworkers suffer no loss. The ICRP estimated that the average number of years of life lost from fatal industrial accidents is 30 while the average number of years of life lost from a fatal radiation-induced cancer is 10. The shorter loss of life expectancy is due to the delayed onset of cancer.

It is important to realize that these risk numbers are only estimates. Many difficulties are involved in designing research studies that can accurately measure the small increases in cancer cases due to low exposures to radiation as compared to the normal rate of cancer. There is still uncertainty and a great deal of controversy with regard to estimates of radiation risk. The numbers used here result from studies involving high doses and high dose rates, and they may not apply to doses at the lower occupational levels of exposure. The NRC and other agencies both in the United States and abroad are continuing extensive long-range research programs on radiation risk.

Some members of the National Academy of Sciences BEIR Advisory Committee and others feel that risk estimates in Table 1 are higher than would actually occur and represent an upper limit on the risk. Other scientists believe that the estimates are low and that the risk could be higher. However, these estimates are considered by the NRC staff to be the best available that the worker can use to make an informed decision concerning acceptance of the risks associated with exposure to radiation. A worker who decides to accept this risk should make every effort to keep exposure to radiation ALARA to avoid unnecessary risk. The worker, after all, has the first line responsibility for protecting himself from radiation hazards.

10. How can we compare radiation risk to other kinds of health risks?

Perhaps the most useful unit for comparison among health risks is the average number of days of life expectancy lost per unit of exposure to each particular health risk. Estimates are calculated by looking at a large number of persons, recording the age when death occurs from apparent causes, and estimating the number of days of life lost as a result of these early deaths. The total number of days of life lost is then averaged over the total group observed.

Several studies have compared the projected loss of life expectancy resulting from exposure to radiation with other health risks. Some representative numbers are presented in Table 2.

These estimates indicate that the health risks from occupational radiation exposure are smaller than the risks associated with many other events or activities we encounter and accept in normal day-to-day activities.

TABLE 2

Estimated Loss of Life Expectancy from Health Risks[a]

Health Risk	Estimates of Days of Life Expectancy Lost, Average
Smoking 20 cigarettes/day	2370 (6.5 years)
Overweight (by 20%)	985 (2.7 years)
All accidents combined	435 (1.2 years)
Auto accidents	200
Alcohol consumption (U.S. average)	130
Home accidents	95
Drowning	41
Natural background radiation, calculated	8
Medical diagnostic x-rays (U.S. average), calculated	6
All catastrophes (earthquake, etc.)	3.5
1 rem occupational radiation dose, calculated (industry average for the higher-dose job categories is 0.65 rem/yr)	1
1 rem/yr for 30 years, calculated	30

[a] Adapted from Cohen and Lee, "A Catalogue of Risks," *Health Physics*, Vol. 36, June 1979.

A second useful comparison is to look at estimates of the average number of days of life expectancy lost from exposure to radiation and from common industrial accidents at radiation-related facilities and to compare this number with days lost from other occupational accidents. Table 3 shows average days of life expectancy lost as a result of fatal work-related accidents. Note that the data for occupations other than radiation related do not include death risks from other possible hazards such as exposure to toxic chemicals, dusts, or unusual temperatures. Note also that the unlikely occupational exposure at 5 rems per year for 50 years, the maximum allowable risk level, may result in a risk comparable to the average risks in mining and heavy construction.

Industrial accident rates in the nuclear industry and related occupational areas have been relatively low during the entire history of the industry (see Table 4). This is believed to be due to the early and continuing emphasis on tight safety controls. The relative safety of various occupational areas can be seen by comparing the probability of death by accident per 10,000 workers over a 40-year working lifetime. These figures do not include death from possible causes such as exposure to toxic chemicals or radiation.

11. Can a worker become sterile or impotent from occupational radiation exposure?

Observation of radiation therapy patients who receive localized exposures, usually spread over a few weeks, has

TABLE 3

Estimated Loss of Life Expectancy from Industrial Hazards[a]

Industry Type	Estimates of Days of Life Expectancy Lost, Average
All industry	74
Trade	30
Manufacturing	43
Service	47
Government	55
Transportation and utilities	164
Agriculture	277
Construction	302
Mining and quarrying	328
Radiation accidents, death from exposure	51
Radiation dose of 0.63 rem/yr (industry average) for 30 years, calculation	20
Radiation dose of 5 rems/yr for 50 years	250
Industrial accidents at nuclear facilities (nonradiation)	58

[a] Adapted from Cohen and Lee, "A Catalogue of Risk," *Health Physics*, Vol. 36, June 1979; and World Health Organization, *Health Implications of Nuclear Power Production*, December 1975.

TABLE 4

Probability of Accidental Death by Type of Occupation[a]

Occupation	Number of Accidental Deaths for 10,000 Workers for 40 Years
Mining	252
Construction	228
Agriculture	216
Transportation and public utilities	116
All industries	56
Government	44
Manufacturing industry (1975 data excluding construction)	40
Manufacturing	36
Services	28
Wholesale and trade	24

[a] Adapted from National Safety Council, *Accident Facts*, 1979, and Atomic Energy Commission, *Reactor Accidents and Radiation Exposure Experience*, WASH-1192, 1975.

shown that a dose of 500-800 rems to the gonads can produce permanent sterility in males or females (an acute whole-body dose of this magnitude would probably result in death within 60 days). An acute dose of 20 rems to the testes can result in a measurable but temporary reduction in sperm count. Such high exposures on the job could result only from serious and unlikely radiation accidents. Although high doses of radiation can affect fertility, they have no effect on the ability to function sexually. Likewise, exposure to permitted occupational levels of radiation has no observed effect on fertility and also has no effect on the ability to function sexually.

12. What are the NRC external radiation dose limits?

Federal regulations currently limit occupational external whole-body radiation dose to 1¼ rems in any calendar quarter or specified 3-month period. However, when there is documented evidence that a worker's previous occupational dose is low enough, a licensee may permit a dose of up to 3 rems per quarter or 12 rems per year. The accumulated dose may not exceed 5(N - 18) rems[b] where N is the person's age in years, i.e., the lifetime occupational dose may not exceed an average of 5 rems for each year above the age of 18.

An additional whole-body dose of approximately 5 rems per year is permitted from internal exposure. (See Question 28.)

13. What is meant by ALARA?

In addition to providing an upper limit on a person's permissible radiation exposure, the NRC also requires that its licensees maintain occupational exposures as far below the limit as is reasonably achievable (ALARA). This means that every activity at a nuclear facility involving exposure to radiation should be planned so as to minimize unnecessary exposure to individual workers and also to the worker population. A job that involves exposure to radiation should be scheduled only when it is clear that the benefit justifies the risks assumed. All design, construction, and operating procedures should be reviewed with the objective of reducing unnecessary exposures.

14. Has the ALARA concept been applied if, instead of reaching dose limits during the first week of a quarter, the worker's dose is spread out over the whole quarter?

No. For radiation protection purposes, the risk of cancer from low doses is assumed to be proportional to the amount of exposure, not the rate at which it is received. Thus it is assumed that spreading the dose out over time or over larger numbers of people does not reduce the overall risk. The ALARA concept has been followed only when the individual and collective doses are reduced by reducing the time of exposure or decreasing radiation levels in the

[b] The NRC has published a proposed rule change for public comment that would eliminate the 5(N-18) formula. This proposal is currently under consideration by a task force reviewing all of 10 CFR Part 20. Recent EPA guidance recommends eliminating the 5(N-18) formula. If adopted, the maximum allowed annual dose will be 5 rems rather than 12.

individual and collective doses are reduced by reducing the time of exposure or decreasing radiation levels in the working environment.

15. What is meant by collective dose and why should it be maintained ALARA?

Nuclear industry activities expose an increasing number of people to occupational radiation in addition to the radiation doses they receive from natural background radiation and medical radiation exposures. The collective occupational dose (person-rems) is the sum of all occupational radiation exposure received by all the workers in an entire worker population. For example, if 100 workers each receive 2 rems, the individual dose is 2 rems and the collective dose is 200 person-rems. The total additional risk of cancer and genetic effects in an exposed population is assumed to depend on the collective dose.

It should be noted that, from the viewpoint of risk to a total population, it is the collective dose that must be controlled. For a given collective dose, the number of health effects is assumed to be the same even if a larger number of people share the dose. Therefore, spreading the dose out may reduce the individual risk, but not that of the population.

Efforts should be made to maintain the collective dose ALARA so as not to unnecessarily increase the overall population incidence of cancer and genetic effects.

16. Is the use of extra workers a good way to reduce risks?

There is a "yes" answer to this question and a "no" answer. For a given job involving exposure to radiation, the more people who share the work, the lower the average dose to an individual. The lower the dose, the lower the risk. So, for you as an individual, the answer is "yes."

But how about the risk to the entire group of workers? Under assumptions used by the NRC for purposes of protection, the risk of cancer depends on the total amount of radiation energy absorbed by human tissue, not on the number of people to whom this tissue belongs. Therefore, if 30 workers are used to do a job instead of 10, and if both groups get the same collective dose (person-rems), the total cancer risk is the same, and nothing was gained for the group by using 30 workers. From this viewpoint the answer is "no." The risk was not reduced but simply spread around among a larger number of persons.

Unfortunately, spreading the risk around often results in a larger collective dose for the job. Workers are exposed as they approach a job, while they are getting oriented to do the job, and as they withdraw from the job. The dose received during these actions is called nonproductive. If several crew changes are required, the nonproductive dose can become very large. Thus it can be seen that the use of extra workers may actually increase the total occupational dose and the resulting collective risks.

The use of extra workers to comply with NRC dose limits is not the way to reduce the risk of radiation-induced cancer for the worker population. At best, the total risk remains the same, and it may even be increased. The only way to reduce the risk is to reduce the collective dose, that can be done only by reducing the radiation levels, the working times, or both.

17. Why doesn't the NRC impose collective dose limits?

Compliance with individual dose limits can be achieved simply by using extra workers. However, compliance with a collective dose limit (such as 100 person-rems per year for a licensee) would require reduction of radiation levels, working times, or both. But there are many problems associated with setting appropriate collective dose limits.

For example, we might consider applying a single collective dose limit to all licensees. The selection of such a collective dose limit would be almost impossible because of the wide variations in collective doses among licensees. A power reactor could reasonably be expected to have an average annual collective dose of several hundred person-rems. However, a small industrial radiography licensee could very well have a collective dose of only a few person-rems in a year.

Even choosing a collective dose limit for a group of similar licensees would be almost as difficult. Radiography licensees as a group had an average collective dose in 1977 of 9 person-rems. However, the smallest collective dose for a radiography licensee was less than 1 person-rem, and the largest was 401 person-rems.

Setting a reasonable collective dose limit for each individual licensee would also be very difficult. It would require a record of all past collective doses on which to base such limits. Setting an annual collective dose limit would then amount to an attempt to predict a reasonable collective dose for each future year. In order to do this, it would be necessary to be able to predict changes in each licensed activity that would increase or decrease the collective dose. In addition, annual collective doses vary significantly from year to year according to the kind and amount of maintenance required, which cannot generally be predicted in advance. Following all such changes and revising limits up and down would be very difficult if not impossible. However, these efforts would be necessary if a collective dose limit were to be reasonable and help minimize doses and risks.

18. How are radiation dose limits established?

The NRC establishes occupational radiation dose limits based on guidance to Federal agencies from the Environmental Protection Agency (EPA) and, in addition, considers NCRP and ICRP recommendations. Scientific reviews of research data on biological effects such as the BEIR report are also considered.

For example, recent EPA guidance recommended that the annual whole-body dose limit be established at 5 rems per year and indicated that exposure, year after year, 5 rems would involve a risk to a worker comparable to the average risks incurred by workers in the higher risk jobs

such as mining. In fact, few workers ever reach such a limit, much less year after year, and the risks associated with actual exposures are considered by the EPA to be comparable to the safer job categories. A 5-rem-per-year limit would allow occasional high dose jobs to be done without excessive risk.

19. What are the typical radiation doses received by workers?

The NRC requires that certain categories of licensees report data on annual worker doses and doses for all workers who leave employment with licensees. Data were received on the occupational doses in 1977 of approximately 100,000 workers in power reactors, industrial radiography, fuel processing and fabrication facilities, and manufacturing and distribution facilities. Of this total group, 85 percent received an annual dose of less than 1 rem; 95 percent received less than 2 rems, fewer than 1 percent exceeded 5 rems in 1 year. The average annual dose of those workers who were monitored and had measurable exposures was about 0.65 rem. A study completed by the EPA, using 1975 exposure data for 1,260,000 workers, indicated that the average annual dose for all workers who received a measurable dose was 0.34 rem.

Table 5 lists average occupational exposures for workers (persons who had measurable exposure above background levels) in various occupations, based on the 1975 data.

TABLE 5

U.S. Occupational Exposure Estimates[a]

Occupational Subgroup	Average Whole-Body Dose (millirems)	Collective Dose (person-rems)
Medicine	320	51,400
Industrial Radiography	580	5,700
Source Manufacturing	630	2,500
Power Reactors	760	21,400
Fuel Fabrication and Reprocessing	560	3,100
Uranium Enrichment	70	400
Nuclear Waste Disposal	920	100
Uranium Mills	380	760
Department of Energy Facilities	300	11,800
Department of Defense Facilities	180	10,100
Educational Institutions	206	1,500
Transportation	200	2,300

[a] Adapted from Cook and Nelson, *Occupational Exposures to Ionizing Radiation in the United States: A Comprehensive Summary for 1975*, Draft, Environmental Protection Agency.

20. What happens if a worker exceeds the quarterly exposure limit?

Radiation protection limits, such as 3 rems in 3 months, are not absolute limits below which it is safe and above which there is danger. Exceeding a limit does not imply that you have suffered an injury. A good comparison is with the highway speed limit, which is selected to limit accident risk and still allow you to get somewhere. If you drive at 75 mph, you increase your risk of an auto accident to levels that are not considered acceptable by the people who set speed limits, even though you may not actually have an accident. If a worker's radiation dose repeatedly exceeds 3 rems in a quarter, the risk of health effects could eventually increase to a level that is not considered acceptable to the NRC. Exceeding an NRC protection limit does not mean that any adverse health effects are going to occur. It does mean that a licensee's safety program has failed in some respect and that the NRC and the licensee should investigate to make sure the problems are corrected.

If an overexposure occurs, the regulations prohibit any additional occupational exposure to that person during the remainder of the calendar quarter in which the overexposure occurred. The licensee is required to file an overexposure report to the NRC and may possibly be subject to a fine, just as you are subject to a traffic fine for exceeding the speed limit. In both cases, the fines and, in some serious or repetitive cases, suspension of license are intended to encourage efforts to operate within the limits. The safest limits would be 0 mph and 0 rem per quarter. But then we wouldn't get anywhere.

21. Why do some facilities establish administrative limits that are below the NRC limits?

There are two reasons. First, the NRC regulations state that licensees should keep exposures to radiation ALARA. By requiring specific approval for worker doses in excess of set levels, more careful risk-benefit analysis can be made as each additional increment of dose is approved for a worker. Secondly, a facility administrative limit that is set lower than the quarterly NRC limit provides a safety margin designed to help the licensee avoid overexposures.

22. Several scientists have suggested that NRC limits are too high and should be lowered. What are the arguments for lowering the limits?

In general, those critical of present dose limits say that the individual risk is higher than is estimated by the BEIR Committee, the ICRP, and UNSCEAR. Based on studies of low-level exposures to large groups, some researchers have concluded that a given dose of radiation may be more likely to cause biological effects than previously thought. Some of these studies are listed in the bibliography (Mancuso, Archer) and the BEIR-80 report includes a section analyzing the findings of these and other studies. Scientific opinion differs on the validity of the research methods used and the methods of statistical analysis. The problem is that the expected additional incidence of radiation-caused effects such as cancer is difficult to detect in comparison with the much larger normal incidence. It cannot be shown without question that these effects were more frequent in the exposed study group than in the unexposed group used for comparison, or that the observed effects were caused

by radiation. The BEIR committee concluded that claims of higher risk had "no substance."

The NRC staff continually reviews the results of research on radiation risks. With respect to large scale studies of radiation induced health effects in human populations exposed to low-level ionizing radiation, the NRC and EPA have recently concluded that there is no one population group available for which such a study could be expected to provide a more meaningful estimate of the low-level radiation risk. This is due, in large part, to the observed and estimated low incidence of radiation health effects from low doses. However, the results of ongoing studies, such as that on nuclear shipyard workers will be carefully reviewed and the development of a radiation-worker registry is being considered as a possible data base for future studies.

23. What are the reasons for not lowering the NRC dose limits?

Assuming that the 5-rem-per-year limit is adopted, there are three reasons:

a. Health risks are already low.

The estimated health risks associated with current average occupational radiation doses (e.g., 0.5 rem/yr for 50 years) are comparable to or less than risk levels in other occupational areas considered to be among the safest. If a person were exposed to the maximum of 5 rems per year for 50 years, which virtually never occurs, he or she might incur a risk comparable to the average risks in mining and heavy construction. An occasional 5-rem annual dose might be necessary to allow some jobs to be done without a significant increase in the collective dose. If the dose limits were lowered significantly, the number of people required to complete many jobs would increase. The collective dose would then increase since more individuals would be receiving nonproductive exposure while entering and leaving the work area and preparing for the job. The total number of health effects might go up as the collective dose increased.

b. The current regulations are considered sound.

The regulatory standards for dose limits are based on the recommendations of the Federal Radiation Council. At the time these standards were developed, about 1960, it was considered unlikely that exposure to these levels during a working lifetime would result in clinical evidence of injury or disease different from that occurring in the unexposed population. The scientific data base for the standards consisted primarily of human experience (x-ray exposures to medical practitioners and patients, ingestion of radium by watch dial painters, early effects observed in Japanese atomic bomb survivors, radon exposures of uranium miners, occupational radiation accidents) involving very large doses delivered at high dose rates. The data base also included the results of a large number of animal experiments involving high doses and dose rates. The animal experiments were particularly useful in the evaluation of genetic effects. The observed effects were related to low-level radiation according to the linear model explained in Question 7. Based on this approach, the regulations in 10 CFR Part 20, "Standards for Protection Against Radiation," also state that licensees should maintain all radiation exposures, and releases of radioactive materials in effluents, as low as is reasonably achievable. More recent scientific reviews of the large body of experimental data, such as the BEIR-80 and the recent EPA guidance, continue to support the view that use of a 5-rem-per-year limit is acceptable in practice. Experience has shown that, under this limit, the average dose to workers is near 0.5 rem/yr with very few workers consistently approaching the limit.

c. There is little to gain.

Reducing the dose limits, for example, to 0.5 rem/yr has been analyzed by the NRC staff. An estimated 2.6 million person-rems could be saved from 1980 through the year 2000 by nuclear power plant licensees if compliance with the new limit were achieved by lowering the radiation levels, working times, or both, rather than by using extra workers. It is estimated that something like $23 billion would be spent toward this purpose. Spending $23 billion to save 2.6 million person-rems would amount to spending $30 to $90 million to prevent each potential radiation-induced premature cancer death. Society considers this cost unacceptably high for individual protection.

24. Are there any areas of concern about radiation risks that might result in changing the NRC dose limits?

Yes. Three areas of concern to the NRC staff are specifically identified below:

a. An independent study by Rossi and Mays and other biological research have indicated that a given dose of neutron radiation may be more likely to cause biological effects than was previously thought. Other recent studies cast doubt on the issue. The NCRP is currently studying the data related to the neutron radiation question and is expected to make recommendations as to whether neutron dose limits should be changed. Although the scientific community has not yet come to agreement on this question, workers should be advised of the possibility of higher risk when entering areas where exposure to neutrons will occur.

b. It has been known for some time that rapidly growing living tissue is more sensitive to injury from radiation than tissue in which the cells are not reproducing rapidly. Thus the embryo or fetus is more sensitive to radiation injury than an adult. The NCRP recommended in Report No. 39 that special precautions be taken when an occupationally exposed woman could be pregnant in order to protect the embryo or fetus. In 1975, the NRC issued Regulatory Guide 8.13, "Instruction Concerning Prenatal Radiation Exposure," in which it is recommended that licensees instruct all workers concerning this special risk. The guide recommends that all workers be advised that the NCRP recommended that the maximum permissible dose to the embryo or fetus from occupational exposure of the mother should not exceed 0.5 rem for the full 9-month pregnancy period. In addition, the guide suggests options

available to the female employee who chooses not to expose her embryo or fetus to this additional risk.

The United States Department of Health and Human Services is similarly concerned about prenatal exposure from medical x-rays. In 1979 they published proposed guidelines for physicians concerning abdominal x-rays for possibly pregnant women. The guidelines in effect encourage the x-ray staff to make efforts to determine whether a female patient is pregnant and to defer x-rays if possible until after the child is born.

Also of special interest is the indication that female workers are subject to more risk of cancer incidence than male workers. In terms of all types of cancer except leukemia, the BEIR-80 analysis indicates that female workers have a risk of developing radiation-induced cancer that is approximately one and one-half times that for males. This increased risk is primarily due to the incidence of breast and thyroid cancer in women. These types of cancer, however, have a high cure rate. Thus the difference between men and women in cancer mortality is not great. Incidence of radiation-induced leukemia is about the same for both sexes. Female workers should be aware of this difference in the risks of radiation-induced cancer in deciding whether or not to seek work involving exposure to radiation.

25. *How much radiation does the average person who does not work in the nuclear industry receive?*

We are all exposed from the moment of conception to ionizing radiation from several sources. Our environment, and even the human body, contains naturally occurring radioactive materials that contribute some of the background radiation we receive. Cosmic radiation originating in space and in the sun contributes additional exposure. The use of x-rays and radioactive materials in medicine and dentistry adds considerably to our population exposure.

Table 6 shows estimated average individual exposure in millirems from natural background and other sources.

TABLE 6

U.S. General Population Exposure Estimates (1978)[6]

Source	Average Individual Dose (mrem/yr)
Natural background (average in U.S.)	100
Release of radioactive material in natural gas, mining, milling, etc.	5
Medical (whole-body equivalent)	90
Nuclear weapons (primarily fallout)	5-8
Nuclear energy	0.28
Consumer products	0.03
Total	~200 mrem/yr

[6] Adapted from a report by the Interagency Task Force on the Health Effects of Ionizing Radiation published by the Department of Health, Education, and Welfare.

Thus, the average individual in the general population receives about 0.2 rem of radiation exposure each year from sources that are a part of our natural and man-made environment. By the age of 20 years, an individual has accumulated about 4 rems. The most likely target for reduction of population exposure is medical uses.

26. *Why aren't medical exposures considered as part of a worker's allowed dose?*

Equal doses of medical and occupational radiation have equal risks.[7] Medical exposure to radiation should be justified for reasons quite different, however, from those applicable to occupational exposure. A physician prescribing an x-ray should be convinced that the benefit to the patient of the resulting medical information justifies the risk associated with the radiation. Each worker must decide on the acceptance of occupational radiation risk just as each worker must decide on the acceptability of any other occupational hazard.

For another point of view, consider a worker who receives a dose of 2 rems from a series of x-rays or a radioactive medicine in connection with an injury or illness. This dose and the implied risk should be justified on medical grounds. If the worker had also received a dose of 2 rems on the job, the combined dose of 4 rems would not incapacitate the worker. A dose of 4 rems is not especially dangerous and is not large compared to the cumulative lifetime dose. Restricting the worker from additional job exposure during the remainder of the quarter would have no effect one way or the other on the risk from the 2 rems already received from medical exposure. If the individual worker accepts the risks associated with the x-rays on the basis of the medical benefits and the risks associated with job-related exposure on the basis of employment benefits, it would be unfair to restrict the individual from employment in radiation areas for the remainder of the quarter.

Some therapeutic medical doses such as those received from cobalt-60 treatment can range as high as 6000 rems to a small part of the body, spread over a period of several weeks or months.

27. *What is meant by internal exposure?*

The total radiation dose to the worker is the external dose (measured by the film badge and reported as "whole-body dose") plus the dose from internal emitters. The monitoring of the additional internal dose is difficult. Because there is the possibility of internal doses occurring, a good air-monitoring program should be established when warranted.

The uptake of radioactive materials by workers is generally due to breathing contaminated air. Radioactive materials may be present as fine dust or gases in the workplace atmosphere. The surfaces of equipment and workbenches

[7] It is likely that a significant portion of reported medical x-ray exposure is to parts of the body only. An exposure of 100 mrem to the whole body is more significant than a 100-mrem chest x-ray.

may be contaminated. Radioactive materials may enter the body by being breathed in, taken in with food or drink, or being absorbed through the skin, particularly if the skin is broken.

After entering the body, the radioactive material will migrate to particular organs or particular parts of the body depending on the biochemistry of the material. For example, uranium will tend to deposit in the bones where it will remain for a long time. It is slowly eliminated from the body, mostly by way of the kidneys. Radium will also tend to deposit in the bones. Radioactive iodine will seek out the thyroid glands (located in the neck) and deposit there.

The dose from these internal emitters cannot be measured either by the film badge or by other ordinary dosimeters carried by the worker. This means that the internal radiation dose must be separately monitored using other detection methods.

Internal exposure can be estimated by measuring the radiation emitted from the body or by measuring the radioactive materials contained in biological samples such as urine or feces. Dose estimates can also be made if one knows how much radioactive material is in the air and the length of time during which the air was breathed.

28. How are the limits for internal exposure set?

Standards have been established for the maximum permissible amount of each radionuclide that may be accumulated in the critical organs[8] of the worker's body.

Calculations are made to determine the quantity of radioactive material that has been taken into the body and the total dose that would result. Then, based on limits established for particular body organs similar to 1¼ rems in a calendar quarter for whole-body exposure, the regulations specify maximum permissible concentrations of radioactive material in the air to which a worker can be exposed for 40 hours per week over 13 weeks or 1 calendar quarter. The regulations also require that efforts be made to keep internal exposure ALARA.

Internal exposure is controlled by limiting the release of radioactive material into the air and by carefully monitoring the work area for airborne radioactivity and surface contamination. Protective clothing and respiratory (breathing) protection should be used whenever the possibility of contact with loose radioactive material cannot be prevented.

29. Is the dose a person received from internal exposure added to that received from external exposure?

Exposure to radiation that results from radioactive materials taken into the body is measured, recorded, and reported to the worker separately from external dose. The internal dose to the whole body or to specific organs does not at this time count against the 3-rem-per-calendar-quarter limit. ICRP recommends that the internal and external doses should be appropriately added. This recommendation is currently under study by the staffs of the NRC, the EPA, and the Occupational Safety and Health Administration (OSHA).

30. How is a worker's external radiation dose determined?

A worker may wear three types of radiation-measuring devices. A self-reading pocket dosimeter records the exposure to incident radiation and can be read out immediately upon finishing a job involving external exposure to radiation. A film badge or TLD badge records radiation dose, either by the amount of darkening of the film or by storing energy in the TLD crystal. Both these devices require processing to determine the dose but are considered more reliable than the pocket dosimeter. A worker's official report of dose received is normally based on film or TLD badge readings, which provide a cumulative total and are more accurate.

31. What are my options if I decide not to accept the risks associated with occupational radiation exposure?

If the risks from exposure to radiation that may be expected to occur during your work are unacceptable to you, you could request a transfer to a job that does not involve exposure to radiation. However, the risks associated with exposure to radiation that workers, on the average, actually receive are considered acceptable, compared to other occupational risks, by virtually all the scientific groups that have studied them. Your employer is probably not obligated to guarantee you a transfer if you decide not to accept an assignment requiring exposure to radiation.

You also have the option of seeking other employment in a nonradiation occupation. However, the studies that have compared occupational risks in the nuclear industry to those in other job areas indicate that nuclear work is relatively safe. Thus, you will not necessarily find significantly lower risks in another job.

A third option would be to practice the most effective work procedures so as to keep your exposure ALARA. Be aware that reducing time of exposure, maintaining distance from radiation sources, and using shielding can all lower your exposure. Plan radiation jobs carefully to increase efficiency while in the radiation area. Learn the most effective methods of using protective clothing to avoid contamination. Discuss your job with the radiation protection personnel who can suggest additional ways to reduce your exposure.

32. Where can I get additional information on radiation risk?

The following list suggests sources of useful information on radiation risk:

a. Your Employer

The radiation protection or health physics office in the facility where you are employed.

[8] Critical organ refers to those parts of the body vulnerable to radiation damage such as bone, lungs, thyroid, and other systems where certain radioactive materials will concentrate if taken into the body.

b. *Nuclear Regulatory Commission*

Regional Offices

King of Prussia, PA 19406	215-337-5000
Atlanta, GA 30303	404-221-4503
Glen Ellyn, IL 60137	312-932-2500
Arlington, TX 76012	817-334-2841
Walnut Creek, CA 94596	415-943-3700

Headquarters

Occupational Radiation Protection Branch
Office of Nuclear Regulatory Research
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Telephone: 301-443-5970

c. *Department of Health and Human Services*

Office of the Director
Bureau of Radiological Health (HFX-1)
Department of Health and Human Services
5600 Fishers Lane
Rockville, MD 20857

Telephone: 301-443-4690

d. *Environmental Protection Agency*

Office of Radiation Programs
U.S. Environmental Protection Agency
401 M Street, SW
Washington, D.C. 20460

Telephone: 703-557-9710

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TABLE 5
LIMITS FOR UNCONTROLLED AREAS

(a) Surface contamination limits.

(1) Alpha emitters.

(i) Removable:

15 pCi / 100 cm²	= 33 dpm / 100 cm²	average over any one surface
45 pCi / 100 cm²	= 100 dpm / 100 cm²	maximum

(ii) Total (fixed):

450 pCi / 100 cm²	= 1000 dpm / 100 cm²	average over any one surface
2250 pCi / 100 cm²	= 5000 dpm / 100 cm²	maximum

0.25 mrem at 1 cm / hr

(2) Beta-Gamma emitters.

(i) Removable:

(all beta-gamma emitters except Hydrogen 3)	100 pCi / 100 cm²	average over any one surface
	500 pCi / 100 cm²	maximum
Removable: (Hydrogen 3)	1000 pCi / 100 cm²	average over any one surface
	5000 pCi / 100 cm²	maximum

(ii) Total (fixed): 0.25 mrem at 1 cm from surface. / hr

(b) Concentrations in air and water: Table 6, Schedule II.

(c) Concentrations in soil and other materials except water:

(1) Radioactive material except source material: Table 2, Column 2.

(2) Source material: 0.05 per cent by weight.

Note: Jurisdictional limits. The limits listed in Table 5 of this Part (rule) shall apply to those installations and property that remain subject to the jurisdiction of the Labor Law and this Part (rule).

TABLE 6
CONCENTRATIONS IN AIR AND WATER ABOVE NATURAL BACKGROUND

Element (atomic number)	*Isotope*[1]			*SCHEDULE I* Column 1 Air (μCi/ml)	*SCHEDULE I* Column 2 Water (μCi/ml)	*SCHEDULE II* Column 1 Air (μCi/ml)	*SCHEDULE II* Column 2 Water (μCi/ml)
Actinium (89)	Ac	227	S	2×10^{-12}	6×10^{-5}	8×10^{-14}	2×10^{-6}
			I	3×10^{-11}	9×10^{-3}	9×10^{-13}	3×10^{-4}
	Ac	228	S	8×10^{-8}	3×10^{-3}	3×10^{-9}	9×10^{-5}
			I	2×10^{-8}	3×10^{-3}	6×10^{-10}	9×10^{-5}
Americium (95)	Am	241	S	6×10^{-12}	1×10^{-4}	2×10^{-13}	4×10^{-6}
			I	1×10^{-10}	8×10^{-4}	4×10^{-12}	2×10^{-5}
	Am	242m	S	6×10^{-12}	1×10^{-4}	2×10^{-13}	4×10^{-6}
			I	3×10^{-10}	3×10^{-3}	9×10^{-12}	9×10^{-5}
	Am	242	S	4×10^{-8}	4×10^{-3}	1×10^{-9}	1×10^{-4}
			I	5×10^{-8}	4×10^{-3}	2×10^{-9}	1×10^{-4}
	Am	243	S	6×10^{-12}	1×10^{-4}	2×10^{-13}	4×10^{-6}
			I	1×10^{-10}	8×10^{-4}	4×10^{-12}	3×10^{-5}
	Am	244	S	4×10^{-6}	1×10^{-1}	1×10^{-7}	5×10^{-3}
			I	2×10^{-5}	1×10^{-1}	8×10^{-7}	5×10^{-3}
Antimony (51)	Sb	122	S	2×10^{-7}	8×10^{-4}	6×10^{-9}	3×10^{-5}
			I	1×10^{-7}	8×10^{-4}	5×10^{-9}	3×10^{-5}
	Sb	124	S	2×10^{-7}	7×10^{-4}	5×10^{-9}	2×10^{-5}
			I	2×10^{-8}	7×10^{-4}	7×10^{-10}	2×10^{-5}
	Sb	125	S	5×10^{-7}	3×10^{-3}	2×10^{-8}	1×10^{-4}
			I	3×10^{-8}	3×10^{-3}	9×10^{-10}	1×10^{-4}
Argon (18)	A	37	Sub[2]	6×10^{-3}	.....	1×10^{-4}	.....
	A	41	Sub[2]	2×10^{-6}	.....	4×10^{-8}	.....
Arsenic (33)	As	73	S	2×10^{-6}	1×10^{-2}	7×10^{-8}	5×10^{-4}
			I	4×10^{-7}	1×10^{-2}	1×10^{-8}	5×10^{-4}
	As	74	S	3×10^{-7}	2×10^{-3}	1×10^{-8}	5×10^{-5}
			I	1×10^{-7}	2×10^{-3}	4×10^{-9}	5×10^{-5}
	As	76	S	1×10^{-7}	6×10^{-4}	4×10^{-9}	2×10^{-5}
			I	1×10^{-7}	6×10^{-4}	3×10^{-9}	2×10^{-5}
	As	77	S	5×10^{-7}	2×10^{-3}	2×10^{-8}	8×10^{-5}
			I	4×10^{-7}	2×10^{-3}	1×10^{-8}	8×10^{-5}
Asatine (85)	At	211	S	7×10^{-9}	5×10^{-5}	2×10^{-10}	2×10^{-6}
			I	3×10^{-8}	2×10^{-5}	1×10^{-9}	7×10^{-5}
Barium (56)	Ba	131	S	1×10^{-6}	5×10^{-3}	4×10^{-8}	2×10^{-4}
			I	4×10^{-7}	5×10^{-3}	1×10^{-8}	2×10^{-4}
	Ba	140	S	1×10^{-7}	8×10^{-4}	4×10^{-9}	3×10^{-5}
			I	4×10^{-8}	7×10^{-4}	1×10^{-9}	2×10^{-5}
Berkelium (97)	Bk	249	S	9×10^{-10}	2×10^{-2}	3×10^{-11}	6×10^{-4}
			I	1×10^{-7}	2×10^{-2}	4×10^{-9}	6×10^{-4}
	Bk	250	S	1×10^{-7}	6×10^{-3}	5×10^{-9}	2×10^{-4}
			I	1×10^{-6}	6×10^{-3}	4×10^{-8}	2×10^{-4}
Beryllium (4)	Be	7	S	6×10^{-6}	5×10^{-2}	2×10^{-7}	2×10^{-3}
			I	1×10^{-6}	5×10^{-2}	4×10^{-8}	2×10^{-3}
Bismuth (83)	Bi	206	S	2×10^{-7}	1×10^{-3}	6×10^{-9}	4×10^{-5}
			I	1×10^{-7}	1×10^{-3}	5×10^{-9}	4×10^{-5}
	Bi	207	S	2×10^{-7}	2×10^{-3}	6×10^{-9}	6×10^{-5}
			I	1×10^{-8}	2×10^{-3}	5×10^{-10}	6×10^{-5}
	Bi	210	S	6×10^{-9}	1×10^{-3}	2×10^{-10}	4×10^{-5}
			I	6×10^{-9}	1×10^{-3}	2×10^{-10}	4×10^{-5}

See notes at end of table

IN THE UNITED STATES DISTRICT COURT
MIDDLE DISTRICT OF GEORGIA
ATHENS DIVISION

UNITED STATES OF AMERICA, Plaintiff, v. LUMINOUS PROCESSES, INC., RADIUM CHEMICAL COMPANY, INC.; JOSEPH A. KELLY, JR.; ROBERT F. BISCHOFF; WILLIAM G. KOEGL, Defendants.	Civil Action No. 83-96-Ath

CONSENT JUDGMENT

WHEREAS, plaintiff, the United States of America, filed a complaint in this action on September 26, 1983, seeking recovery under Section 107(a) of the Comprehensive Environmental Response, Compensation and Liability Act of 1980 ("CERCLA"), 42 U.S.C. §9607, of all costs associated with the cleanup of hazardous substances at a site maintained by Luminous Processes, Inc. ("the Luminous Site") in Athens, Georgia;

WHEREAS, the State of Georgia has filed a motion to intervene as plaintiff in this action;

WHEREAS, defendants Radium Chemical Company, Inc. ("Radium"), Joseph A. Kelly, Jr. ("Kelly"), and Robert F. Bischoff ("Bischoff"), have provided plaintiffs with statements of financial worth sworn under penalty of perjury and plaintiffs have relied on the same in joining as signatories to this Judgment;

WHEREAS, plaintiffs and defendants Radium, Kelly, and Bischoff desire to settle plaintiffs' claims against these defendants without trial on any issue of fact or law and without this Judgment constituting an admission of fact or liability with respect to these defendants;

WHEREAS, defendant Luminous Processes, Inc. consents to entry of judgment against it for the amount prayed for in the complaint less amounts recovered by plaintiffs from other defendants pursuant to this Judgment;

The Court having considered the matter and being duly advised, it is hereby

ORDERED, ADJUDGED AND DECREED as follows:

1. This Court has jurisdiction over the subject matter of this action pursuant to Section 113(b) of CERCLA, 42 U.S.C. §9613(b), and 28 U.S.C. §1345. The complaint states a claim upon which relief can be granted pursuant to Section 107(a) of CERCLA, 42 U.S.C. §9607(a).

2. The State of Georgia's motion to intervene in this case as a plaintiff is hereby granted.

3. The provisions of this Consent Judgment shall apply to and be binding upon the parties to this action, and, if applicable, to their officers, directors, agents, servants, employees, successors, and assigns.

4. Judgment is hereby entered against Luminous for $872,631.10. This represents the amount prayed for in the Complaint plus 9% interest calculated from September 2, 1982, the date the cleanup was completed. In partial satisfaction of this Judgment, Luminous shall, with the prior approval of plaintiffs and within sixty (60) days of the date of entry of this Judgment, sell its Athens property and deliver the proceeds of said sale to plaintiffs. Luminous' liability under this paragraph shall be offset by amounts recovered by plaintiffs pursuant to paragraphs 5 through 7 below.

5. Defendant Bischoff shall pay to plaintiffs five thousand dollars ($5,000). Of this amount, $2,500 shall be paid within ten (10) days of the date of entry of this Judgment. The remaining $2,500 shall be paid one (1) year from the date of entry of this Judgment.

6. Defendant Kelly shall pay to plaintiffs five thousand dollars ($5,000). Of this amount, $2,500 shall be paid within ten (10) days of the date of entry of this Judgment. The remaining $2,500 shall be paid one year following the date of entry of this Judgment.

7. Defendant Radium shall pay to plaintiffs two hundred and forty thousand dollars ($240,000). Payment shall be made in four (4) equal installments, the first to be paid one year following the date of entry of this Judgment; the remaining payments to be made on the same date for each of the three following years. To assure that the payments required

pursuant to this paragraph are made, Radium hereby grants plaintiffs a security interest in its 350 shares of stock in the 27th Avenue Corporation and in its 497 shares of stock in Luminous Processes, Limited. Within ten (10) days of the date of entry of this Judgment, Radium shall: (1) assure that the 27th Avenue Corporation and Luminous Processes, Limited make notation in their corporate books of plaintiffs' security interest in Radium-held stock and (2), in order to perfect plaintiffs' security interest, transfer the stock certificates to the official of the United States Environmental Protection Agency designated in paragraph 8, below, who will hold the certificates pending satisfaction by Radium of its obligations under this Judgment.

8. Ninety percent (90%) of each payment required pursuant to paragraphs 5 through 7, above, shall be paid by certified check to the Hazardous Substance Response Trust Fund; the remaining ten percent (10%) shall be paid by certified check to the Georgia Department of Natural Resources. Payments made to plaintiffs pursuant to this Judgment shall be forwarded to following addresses:

J. Leonard Ledbetter
Commissioner
Georgia Department of
Natural Resources
270 Washington Street, SW
Atlanta, Georgia 30334

Director
Financial Management Division
Office of Administration and
Resources Management
U.S. Environmental Protection
Agency
401 M Street, S.W.
Washington, D.C. 20460

9. This Judgment has been executed in two or more counterparts, each of which shall be deemed an original, but together which constitute a single instrument.

10. This Judgment shall be a final judgment between the parties with respect to the claims and allegations stated in the complaint.

11. This Court shall have continuing jurisdiction over this Judgment for purposes of construing and enforcing any provision herein.

The undersigned hereby consent to the form and entry of the foregoing Consent Judgment without further notice.

LUMINOUS PROCESSES, INC.

By: _____
Joseph A. Kelly, Jr.
President

RADIUM CHEMICAL COMPANY, INC.

By: _____
Joseph A. Kelly, Jr.
President

_____
JOSEPH A. KELLY, JR.

_____
ROBERT F. BISCHOFF

UNITED STATES OF AMERICA

_____
F. HENRY HABICHT, II
Assistant Attorney General
Land and Natural Resources

JOE D. WHITLEY
U.S. Attorney
Middle District of Georgia

By: _____
JOHN L. LYNCH
Assistant United States Attorney
Middle District of Georgia

SCOTT C. FULTON
Attorney, Environmental
Enforcement Section
Land and Natural Resources
Division

KEITH CASTO
U.S. Environmental Protection
Agency
Region IV

STATE OF GEORGIA

By: _____

4-4.20-01

STATE OF NEW YORK
DEPARTMENT OF LABOR

ONE MAIN STREET
BROOKLYN, NY 11201

MEMORANDUM

To: Committee on Licensing
K. Rimawi J. Dunkleberger
P. Merges
L. Solon
Observers: J. McGrath, U.S. NRC
P. Giardina, U.S. EPA
R. Bernacki, U.S. FDA

From: F.J. Bradley, Ph.D.

Date: August 19, 1987

Subject: Radium Chemical Company, Inc.

The attached two documents were sent out to Radium Chemical Company, Inc. on August 17, 1987 and are self explanatory. The Order to Comply reinstates May 1983 order and the letter of August 17, 1987 summarizes the actions that the Department and Radium Chemical Company, Inc. have taken since that time. Our resulting determination based on all factors is a denial of the license application for reinstatement. A copy of the press release is also included.

F.J. Bradley, Ph.D.
Principal Radiophysicist

FJB:hr
Attachment

LH 6 (3-86)

STATE OF NEW YORK
DEPARTMENT OF LABOR

GOVERNOR W. AVERELL HARRIMAN
STATE OFFICE BUILDING CAMPUS
ALBANY, NEW YORK 12240

ORDER TO COMPLY

August 17, 1987

RADIUM CHEMICAL COMPANY, INC.
60-06 27th Avenue
Woodside, New York 11377

Based on past and present violations of Industrial Code Rule 38, including, most recently, violations of Sections 38.20, 38.26(b), 38.30, Table 5 and Table 6, and the Order to Comply issued thereunder on January 6, 1983, Radium Chemical Company, Inc. is hereby ordered in accordance with the provisions of Section 38.16 to remove all radioactive materials from and decontaminate the installation located at 60-06 27th Avenue, Woodside, New York 11377. Radium Chemical Company, Inc. is directed, in order to effectuate the removal and decontamination of the installation, to comply with the following conditions:

1. Radium Chemical Company, Inc. shall hire a competent Radiation Safety Officer approved by the Principal Radiophysicist of the Division of Safety and Health (DOSH) to supervise the removal of radioactive material and decontamination of the installation.

2. Under the supervision of the Radiation Safety Officer, Radium Chemical Company, Inc. shall prepare a plan for the decontamination of the installation and submit such plan to the Principal Radiophysicist for approval by September 4, 1987. The plan shall include the designation of a vendor who will perform the removal and decontamination work.

3. Under the supervision of the Radiation Safety Officer, the vendor shall decontaminate all work areas where persons will need to work to inventory the radioactive material possessed by Radium Chemical Company, Inc.

4. Under the supervision of the Radiation Safety Officer and in the presence of a Radiophysicist from DOSH, Radium Chemical Company, Inc. shall inventory all radioactive material in its possession and provide such inventory to the Principal Radiophysicist.

5. Under the supervision of the Radiation Safety Officer and in the presence of a Radiophysicist from DOSH, Radium Chemical Company, Inc. shall dispose of all inventoried radioactive material to authorized recipients.

6. Radium Chemical Company, Inc. shall provide to the Principal Radiophysicist a list of all persons who presently possess radioactive material under lease from Radium Chemical Company, Inc., and shall notify all such persons that it has suspended all commercial operations involving the transfer and receipt of radioactive materials.

7. Under the supervision of the Radiation Safety Officer, the vendor shall decontaminate the installation in accordance with the approved plan and Section 38.16 of Industrial Code Rule 38.

8. Upon completion of the approved decontamination work, the Radiation Safety Officer shall submit to the Principal Radiophysicist a final decontamination survey as provided in Industrial Code Rule 38, Section 38.29. A verification survey shall be conducted by a Radiophysicist from DOSH and any additional decontamination which the Radiophysicist deems necessary to ensure compliance with Sections 38.16 and 38.29 of Industrial Code Rule 38 shall be done by the vendor.

This Order to Comply is effective immediately and shall be completed by October 2, 1987. Nothing in this Order to Comply shall affect the authority of the Commissioner of Labor to revoke, suspend or restrictively amend the licenses held by Radium Chemical Company, Inc. pursuant to Industrial Code Rule 38, namely, License Numbers 704-0120, 344-0120 and LR-0120.

Pursuant to Industrial Code Rule 38, Section 38.17(a), this Order to Comply constitutes an order for the enforcement of Industrial Code Rule 38 under Section 21 of the Labor Law. Pursuant to Section 101 of the Labor Law, any person in interest or his duly authorized agent may seek review of this Order to Comply by filing a petition with the Industrial Board of Appeals no later than sixty days after its issuance.

Thomas F. Hartnett

THOMAS F. HARTNETT
Commissioner of Labor

cc: Jeffrey M. Herrmann, Esq.

bc: Commr. Hudacs
Commr. Deinhardt
Commr. O'Connell
Stuart Schrank
Francis J. Bradle
Stuart Miller

STATE OF NEW YORK
DEPARTMENT OF LABOR
GOVERNOR W. AVERELL HARRIMAN
STATE OFFICE BUILDING CAMPUS
ALBANY, NEW YORK 12240

THOMAS F. HARTNETT
COMMISSIONER OF LABOR

August 17, 1987

Jeffrey M. Herrmann, Esq.
Wachtell, Manheim & Grouf
30 Rockefeller Plaza
New York, New York 10118

Re: Radium Chemical
Company, Inc.

Dear Mr. Herrmann:

I have reviewed your client's Application "B" for a Radioactive Materials License, dated August 30, 1985, the "Statement of Intent" Amended May 28, 1986 and signed by your client on or about September 11, 1986, the supporting documents and other materials submitted by you and your client to the Department, and reports of inspections of your client's facility. It is my determination that your client's application should be denied.

The "Statement of Intent" Amended May 28, 1986 authorized the submission of an application for a license to lease or sell sealed radium sources to authorized persons if Radium Chemical satisfied the Radiological Health Unit of the Department's Division of Safety and Health that the conditions specified in items 1 through 4 thereof were met. These conditions were met by your client, to the Department's satisfaction, by on or about September 23, 1986, and the Department then proceeded to review your client's application. However, prior to the completion of such review, conditions at your client's facility deteriorated and no longer met those specified in the Amended Statement of Intent. Inspections conducted by the Radiological Health Unit on June 2 and 18, 1987, revealed, inter alia, the following conditions: (1) a

radon concentration in the vault of 200 picocuries per liter, nearly seven times the limit of 30 picocuries per liter set by Table 6 of Industrial Code Rule 38, and agreed to by your client in the fourth condition of the Amended Statement of Intent; (2) the discontinuation of your client's film badge service, resulting in unmonitored exposure of its employees to radiation; (3) the receipt of approximately 30 shipments of packages containing sealed radium sources, in violation of the Department's Order to Comply dated January 6, 1983.

These serious violations and Radium Chemical's previous non-compliance with the requirements of Industrial Code Rule 38, including those which resulted in the issuance of the above-referenced Order to Comply directing your client to suspend all transfers of radioactive materials, establish to my satisfaction that your client's application should be denied because it has not complied with the conditions set forth in Industrial Code Rule 38, §38.8(a) for the issuance of a license.

A separate and distinct basis for determining that Radium Chemical should not be granted a license to sell or lease sealed radium sources relates to the manner of operation of facilities using radioactive materials in Athens, Georgia and Ottawa, Illinois by Luminous Processes, Inc., a Delaware corporation of which Joseph A. Kelly, Jr., Radium Chemical's President, is also President, and which you have acknowledged to be substantially owned and controlled by Mr. Kelly and other officers, directors and shareholders of your client. Consent judgments entered in the U.S. District Court for the Middle District of Georgia and the 13th Judicial Circuit Court of La Salle County, Illinois, have determined that two facilities formerly operated by Luminous Processes, Inc., were contaminated with radiation at levels which violated the limits set by the applicable statutes and regulations of Georgia and Illinois, respectively. "A consent judgment is a conclusive adjudication and has the same force and effect as a judgment after trial." Prudential Lines, Inc. v. Firemen's Insurance Company of Newark, New Jersey et al. & American Tugs, Inc. et al., 91 AD 2d 1, 3 (1st Dept. 1982). The State of Illinois and the U.S.

Environmental Protection Agency have incurred substantial costs in proceeding to decontaminate these facilities after Luminous Processes, Inc. failed to do so. With respect to the Consent Judgment entered in the Georgia case, Radium Chemical and its President, Joseph A. Kelly, Jr., have failed to pay any of the sums which they had agreed to pay thereunder over three years ago.

I therefore determine, based on the above facts, that your client's application should be denied because it has not demonstrated that its sale or lease of sealed radium sources will be under conditions which are sufficient to provide reasonable and adequate protection to life, health and safety and on the further ground that neither it nor its personnel is qualified to use such radioactive material so as to minimize danger therefrom to life, health and safety (Industrial Code Rule 38, §38.8(a)(2)).

Pursuant to Industrial Code Rule 38, §38.17(a), this determination constitutes an order for the enforcement of Industrial Code Rule 38 under Section 21 of the Labor Law and you may seek review thereof pursuant to Section 101 of the Labor Law by filing a petition with the Industrial Board of Appeals no later than sixty days after its issuance.

Simultaneously with this determination, I am causing to be issued an Order to Comply directed to your client relating to its possession of radioactive materials pursuant to Industrial Code Rule 38. This Order is reviewable in the same manner as this determination.

Sincerely,

Thomas F. Hartnett

cc: Joseph A. Kelly, Jr.
President Radium Chemical
Company, Inc.

bc: Commr. Hudacs
Commr. Deinhardt
Commr. O'Connell
Stuart Schrank
Francis J. Bradl
Stuart Miller
Gordon J. Johnso

NEW YORK LABOR News

NY State Department of Labor

Mario M. Cuomo, Governor — Thomas F. Hartnett, Commissioner

FOR IMMEDIATE RELEASE

LABOR DEPARTMENT REJECTS FIRM'S RADIOACTIVE MATERIAL LICENSE APPLICATION

Albany, N.Y. (August 19, 1987) -- State Labor Commissioner Thomas F. Hartnett today denied the application of a Queens firm to reinstate its suspended operating license to handle radioactive material and ordered the firm to remove the radioactive material from and decontaminate its establishment.

Revealing the contents of a state Labor Department letter sent today to Radium Chemical Company, Inc., of 60-06 27th Avenue, Woodside, Commissioner Hartnett said recent inspections by the department's Division of Safety and Health found major violations of Industrial Code Rule 38.

"Our inspections of June 2 and 18 and August 11, 1987 showed excessive radon concentrations--over seven times the limit set by state regulations", Commissioner Hartnett said.

The department enforces the regulations covering industrial use of radioactive material under the state Labor Law, state Industrial Code Rule 38, "Ionizing Radiation Protection," and under an agreement with the U.S. Nuclear Regulatory Commission.

Citing other violations that led to departmental action, the Labor Commissioner noted the firm had discontinued the use of film badges at the Queens site, thereby potentially exposing employees to unverifiable amounts of radiation. He also stated that the department discovered the firm has received shipments of sealed radium sources, in violation of a Jan. 6, 1983 department order suspending the firm's operating licenses in connection with radium and other radioactive materials at the facility.

Commissioner Hartnett described the firm's actions since suspension of the licenses, as well as the department's response.

"Radium Chemical Company, Inc. originally signed a Statement of Intent in December 1984 and an amended statement in September 1986. On August 30, 1985, the firm submitted an application to reactivate its license to operate. These three documents indicated steps that would be taken to correct prior Code Rule violations," Commissioner Hartnett said. "These actions met the department's satisfaction in September 1986 and the department then proceeded to review the firm's application for a license to operate.

-more-

Office of Communications, Richard D. Mullen, Director
W. Averell Harriman State Office Building Campus, Bldg. 12, Room 511, Albany, NY 12240
Albany (518) 457-5519 Brooklyn (718) 797 7830

"Prior to completion of our review, however, the situation at this facility deteriorated and no longer met our conditions," Commissioner Hartnett said.

The firm recently employed three persons in connection with handling radioactive materials.

Radium Chemical Company, Inc. distributed radium needles to physicians for use in cancer therapy. Substitute treatments are presently available and used by the medical community.

Commissioner Hartnett added that another factor in the department's decision to deny the firm's license application was the operation of facilities in Athens, Georgia and Ottawa, Illinois by Radium Chemical's president in violation of the laws and regulations of those states.

"Luminous Processes, Inc., a corporation headed by Joseph A. Kelly, Jr., also president of Radium Chemical Company, Inc., formerly operated facilities in Georgia and Illinois that were determined to be contaminated with radioactive material at levels above the limits set by the respective states," Commissioner Hartnett said.

The Labor Commissioner also directed Radium Chemical Company, Inc. to remove all radioactive materials and decontaminate its installation by Oct. 2, 1987 under Labor Department supervision.

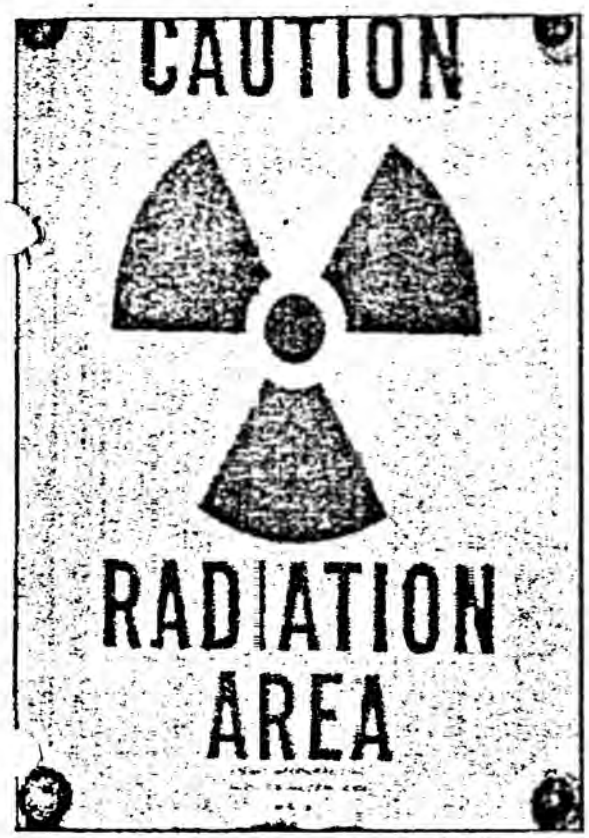
The commissioner's decontamination order includes requirements for employment of a radiation safety officer and submission of a decontamination plan for approval by the department. The order requires the firm to dispose of all radioactive material to authorized recipients in the presence of a department radiophysicist.

Under the state Labor Law, the firm may appeal the order to the state Industrial Board of Appeals within 60 days.

No. 129 ### 8/19/87

NJ Newsday 3/26/87

Medical Supply Firm Fights Closure



Newsday - Ken Schwenk

Warning in front of Radium Chemical Co.

Queens Radium Needle Maker Must Decontaminate Building

By Caryn Eve Wiener

A Queens medical supply firm closed by the state four years ago for violating regulations on handling of radioactive materials plans to challenge the state's opposition to reinstating its license to handle radioactive material.

The state Department of Labor has refused to grant a request by Radium Chemical Co. Inc., to reinstate the license. In his Aug. 19 ruling, State Labor Commissioner Thomas F. Hartnett required that the firm first dispose of the radioactive matter it has been storing at its building at 60-06 27th Ave., Woodside, and then decontaminate the building by Oct. 2.

The firm's vice-president, Donald D. Kaufman, said that the firm had hoped to reopen soon because "we thought we had met all the requirements."

Attorney Andy Marshel said that an appeal would be filed soon with the state Industrial Board of Appeals.

Before it was shut in January, 1983, the 75-year-old firm produced and distributed needles containing radium for use in some forms of cancer therapy. Kaufman said that most of the firm's former customers had been physicians and hospitals.

State labor spokesman Jack Northcutt said that the state suspended the firm's license after finding hazardous conditions, including excessively high levels of radiation, inside the building and repeated failures to require employees to wear film badges, which measure radiation exposure levels.

"We also found that about four or five workers were overexposed, and we directed that they be given body scans," Northcutt said. He said he did not know what happened to the workers, however. The employees were dismissed when the firm was closed and the commission does not keep records on employees of firms that it investigates.

Northcutt said that the firm did comply correctly with an agency request to dispose of some leaking "radium pumps," which were used to place radium into the needles.

But he said that state inspectors, visiting the site this year in June and again on August 11, found radon gas levels inside the building higher than state limits. He said that these findings were made despite two previous statements filed by the firm, in 1984 and 1986, indicating its intended compliance with state requirements. The firm reapplied for its operating license in 1985.

"In August, we found levels that were seven times the state's limit," Northcutt said. He stressed that the hazards were confined to the building's interior.

4-4.30-01

PRESENT HON. ANGELO GRACI

At Individual Assignment Part 5 of the Supreme Court of the State of New York, held in and for the County of Queens, at the General Court House, at Jamaica, New York on the 19 day of October, 1987

SUPREME COURT OF THE STATE OF NEW YORK
COUNTY OF QUEENS

STATE OF NEW YORK, THOMAS F. HARTNETT, Commissioner of the New York State Department of Labor, and THOMAS C. JORLING, Commissioner of the New York State Department of Environmental Conservation,

Plaintiffs,

-against-

RADIUM CHEMICAL CO., INC., and JOSEPH A. KELLY, JR.,

Defendants.

STIPULATION AND ORDER

Index No. 16968/87

FILE EXBT (EV) 10/19/87

The parties to this proceeding, in order to facilitate the resolution of the issues raised in this proceeding, hereby stipulate and agree:

1. If they have not already done so, defendants shall forthwith reduce radiation levels in uncontrolled areas outside the walls and windows of the facility at 60-06 27th Avenue, Woodside, New York ("the facility") to 2 millirems per hour (mrem/hr) or less. Such radiation levels shall be maintained by them at or below that level.

2. If they have not already done so, defendants shall forthwith repair the fence which partially surrounds the facility to prevent access to the facility by unauthorized parties. Defendants shall maintain the fence in good repair and condition.

3. Defendants shall forthwith install, and thereafter maintain, a secure fence on the roof of the facility to prevent access to the roof by unauthorized parties. At a minimum, such fence shall extend along the roof the full extent of the roof's boundary with the immediately-adjacent tenant (the "Solex fencing line"), and along the roof line paralleling the Brooklyn-Queens Expressway (the "BQE fencing line") from the point where the BQE fencing line joins the Solex fencing line north along the BQE fencing line a sufficient length to assure non-access from the expressway, as shown on the attached drawing.

4. If they have not already done so, defendants shall forthwith investigate and remediate excessive levels of radiation emanating through the walls or windows of the facility's "tritium room," until levels are reduced as provided in ¶1 above. Remedial measures shall include, as may be necessary, moving of sources within or from the tritium room, and/or placement of additional shielding within the room or along external walls or windows.

5. By noon on October 20, 1987, defendants shall institute, and shall maintain pending total compliance with this stipulation, 24-hour on-site guard services to ensure that no unauthorized parties gain access to the facility, and to ensure that appropriate emergency measures can be

taken and authorities notified as may be necessary or appropriate.

6. Defendants shall forthwith install signs, at the places shown on the attached drawing, warning of the presence of radioactive materials within the facility and stating "Danger - Keep Out".

7. Defendants shall forthwith provide the New York State Department of Environmental Conservation ("DEC") with an inventory of neutron sources.

8. In order to determine whether radon is escaping from the facility in amounts subject to the provisions of 6 NYCRR Part 380, defendants shall maintain radon gas monitoring equipment, in a form and manner to be approved by DEC, inside the stacks, vault, and other areas of or around the facility, and shall provide the monitoring results to DEC.

9. Defendants shall forthwith investigate the cause of excessive levels of radon in the atmosphere of the vault, shall reduce those levels to 30 picocuries/liter or less as soon as possible, and shall maintain those levels at or below 30 picocuries/liter.

10. Defendant Radium Chemical Co., Inc. ("Radium Chemical") hereby withdraws its administrative appeal from both the order and the denial of permit issued by the New York State Department of Labor ("DOL") on August 17, 1987.

11. a. For purposes of this stipulation, defendants agree that they are jointly liable for the disposal of all radioactive sources stored at the facility, and judgment requiring such disposal is hereby entered. Defendants shall dispose of all neutron sources stored at the facility, and sixty curies of radium sources, by shipment to a disposal site operated by U.S. Ecology or any other disposal facility licensed by law to accept defendants' material. If defendants inform plaintiffs by the later of three weeks following entry of this stipulation or the arrival of timely-requested disposal shipping containers at the facility that some or all of this portion of the radium sources together with the remaining sources (as specified in subparagraph (b) below) can be disposed of in the manner described in subparagraph (b) below, disposal may proceed in that manner for that portion of the sixty curies of sources. Disposal pursuant to this subparagraph shall be accomplished as soon as practicable, and shall be completed by January 1, 1988 or such date designated pursuant to ¶ 11(c) below (the "disposal deadline").

b. Defendants may seek to dispose of the remainder of their radioactive sources by sale, gift or other lawful transfer to any person authorized to possess and own said material. However, except as provided in ¶ 11(c) below, defendants shall dispose of all of their

radioactive sources by the disposal deadline. Delay a transferee may have in obtaining authorization to possess or own such transferred sources shall not excuse non-compliance with the disposal deadline, and shall not constitute a basis for invoking the provisions of ¶11(c).

c. Plaintiffs will extend the January 1, 1988 deadline for disposal of defendants' radioactive sources if compliance with that deadline is not reasonably possible. However, the deadline will not be extended if defendants delay or are not diligent in seeking or implementing means of disposal, including backup and alternative plans, or if defendants do not comply with other provisions of this stipulation.

d. Within three weeks following entry of this stipulation, defendants shall submit to plaintiffs for their review and approval a plan for the disposal of the radioactive sources. Such plan, at a minimum, shall provide for the immediate ordering of approved containers for the disposal of the neutron sources and the 60 curies of radium sources.

12. Defendants shall keep plaintiffs apprised of all activities and measurements taken pursuant to this stipulation.

13. Defendants shall allow plaintiffs, and any governmental body working with plaintiffs, unencumbered access to the facility and to defendants' records, including

financial records. Defendants shall respond promptly to plaintiffs' requests for information concerning defendants' assets, liabilities, income, debts, and matters relevant to the collection of a judgment.

14. a. For purposes of this stipulation, defendant Radium Chemical agrees that it is liable for the decontamination of the facility and related disposal of contaminated materials, and judgment requiring such decontamination and related disposal is hereby entered.

b. For purposes of this stipulation, defendant Joseph A. Kelly, Jr. ("Kelly") shall be deemed liable up to the amount of five hundred thousand dollars ($500,000) to pay for the decontamination of the facility after the radioactive sources are removed. These provisions shall not be construed to limit Radium Chemical's liability, nor shall it be construed to relieve defendant Kelly from any further liability in the event that the cost of decontamination exceeds $500,000. Any party may seek judicial resolution of the issue of further liability for decontamination.

c. Defendants shall submit a tentative decontamination plan no later than November 30, 1987, for plaintiff's review. Upon completion of the source disposal, defendants shall submit a final decontamination plan for the review and approval of plaintiffs. Following its approval, defendants shall implement the same consistent with the provisions of subparagraphs a and b of this paragraph.

15. In entering into this stipulation, defendants do not assert that they necessarily have sufficient financial resources to comply fully with all requirements of this stipulation.

16. In entering into this stipulation, defendants do not admit wrongdoing or liability, nor do plaintiffs admit the absence of wrongdoing or liability on defendants' part. This stipulation may not be used by any other person or party as an admission of any fact alleged in the complaint or in any other papers filed in this action.

17. Plaintiffs may supervise all work done by defendants pursuant to this stipulation.

18. All work done pursuant to this stipulation shall be performed in full compliance with all applicable laws, regulations, and administrative orders.

19. Performance by defendants of the requirements of this stipulation shall be deemed to satisfy the requirements of all outstanding administrative orders issued by plaintiffs.

20. Defendants shall not transfer or dispose of any business or personal assets during the pendency of this proceeding and until all requirements of this stipulation have been met. Until this proceeding is concluded and the stipulation satisfied, defendants may make reasonable expenditures for rent and maintenance of the facility and

for defendant Kelly's home, utilities, rent and/or maintenance, cooperative loan payments and other necessities; this shall include expenses incurred in order to comply with the terms of this stipulation. However, for any expenditure not expressly listed in the preceding sentence or in excess of one thousand dollars ($1,000), defendants must obtain approval from plaintiffs' attorneys, who shall grant or deny such approval promptly. Plaintiffs' attorneys shall allow all reasonable expenditures. Defendants may apply, on 24 hours notice, for an order requiring plaintiffs to approve an expenditure they have refused to approve. Defendants shall have the right to obtain and pay counsel without pre-approval of attorneys' fees, except that the State may seek from the court an order to withhold payment of such fees upon a showing that such fees are unreasonable or the services are unreasonably duplicative.

21. All papers to be served upon plaintiffs in this proceeding, with the exception of documents of a technical nature requested by DEC or DOL, shall be served upon plaintiffs' attorneys: Stuart Miller and Gordon J. Johnson, Assistant Attorneys General, New York State Department of Law, Environmental Protection Bureau, 120 Broadway, New York, New York 10271. Technical information requested by DEC or DOL shall be served upon the appropriate person at

the agency in question. All papers to be served upon defendants in this proceeding, except documents of a technical nature served by DEC or DOL, shall be served upon defendants' attorneys, Wachtell, Manheim & Grouf, 30 Rockefeller Plaza, New York, New York 10112. Defendants retain the right to change attorneys, but service upon both defendants shall be made to their attorney. DEC and DOL retain the right to serve documents of a technical nature upon defendants at the address of the facility.

22. In the event defendants fail to comply with the requirements of this stipulation, defendants shall pay to plaintiffs a fine in accordance with the following schedule:

For the first 10 days of violation	$1,000/day
For the next 20 days of violation	$2,500/day
For all further days in violation	$5,000/day

Such fines shall not be imposed unless the court finds that defendants are in knowing violation of the terms of this stipulation and have failed to comply with the stipulation after a reasonable opportunity to do so.

23. This proceeding shall be marked off the calendar, but may be restored to the calendar by any party.

24. All subpoenas issued by plaintiffs returnable in this proceeding on October 19, 1987, are withdrawn without prejudice.

25. To the extent that defendants cannot comply with any provision of this stipulation because documents necessary for such compliance are in the sole custody of state or federal authorities, defendants shall promptly notify plaintiffs and describe the needed documents. Defendants shall comply to the extent they can without those documents, and shall fully comply within a reasonable time following return of those documents or copies to them.

26. All parties agree to cooperate with each other to ensure the performance of the terms of this stipulation.

27. Upon entry of this stipulation and order, the temporary restraining order issued October 13, 1987, is vacated.

28. Upon defendants' performance of the terms of this stipulation and defendants' completion of the disposal of radium sources and decontamination of the facility and any area in its vicinity contaminated as a result of the facility's operation, this proceeding shall be discontinued with prejudice.

29. The court shall retain jurisdiction to enforce this stipulation and order. The parties may modify this

stipulation and order by writing signed on behalf of all parties.

Dated: New York, New York
October 17, 1987

JOSEPH A. KELLY, JR.

RADIUM CHEMICAL CO., INC. by:

JOSEPH A. KELLY, JR., President

STATE OF NEW YORK, THOMAS F. HARTNETT, AND THOMAS JORLING, by:

STUART MILLER
Assistant Attorney General

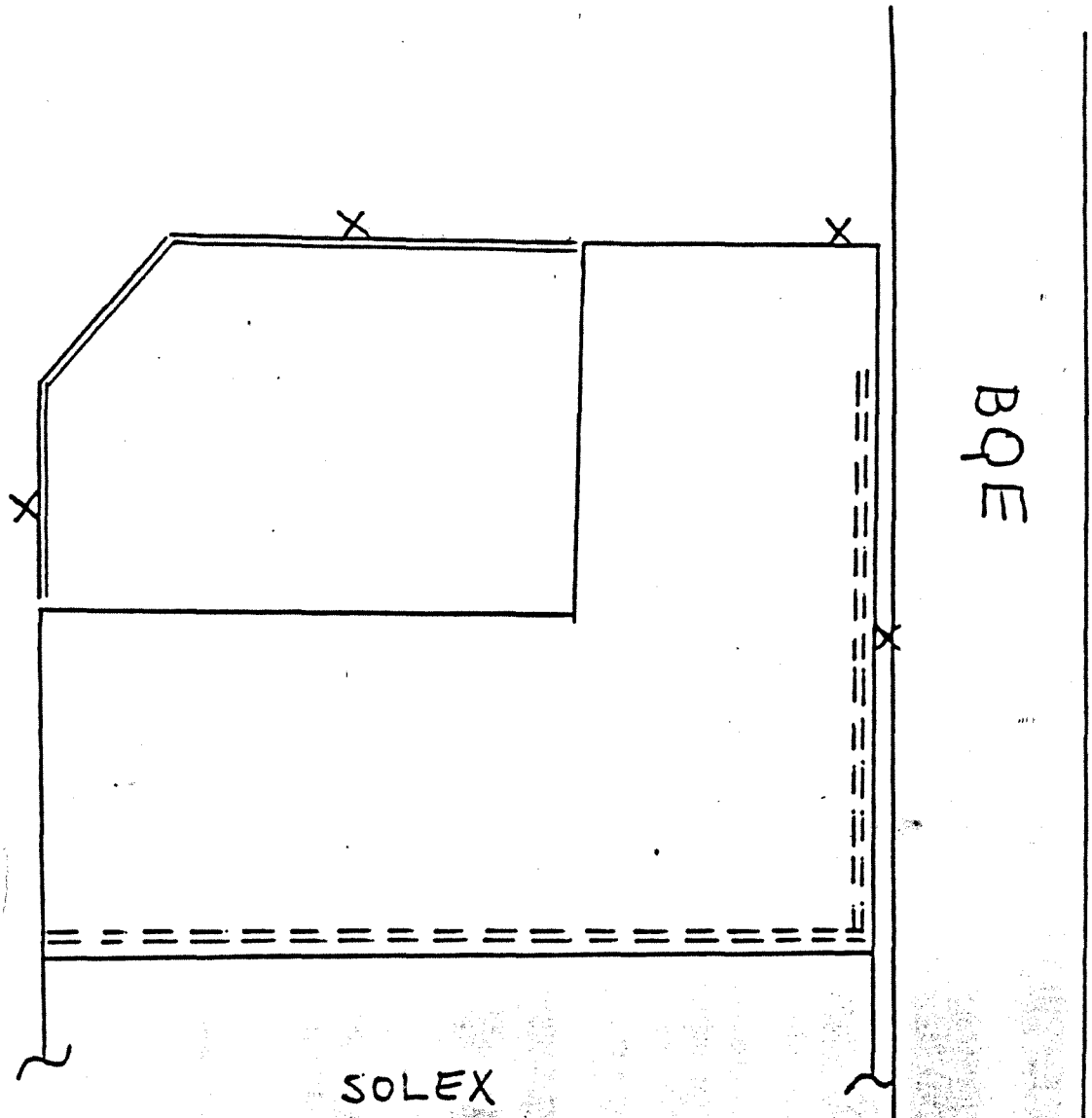
GORDON J. JOHNSON
Assistant Attorney General

SO ORDERED.

DATED: Jamaica, New York
October 19, 1987

ENTER

J.S.C.



Roof fencing to be installed

X Locations for signs

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION II

DATE: JUL 26 1988

4-4.30-02

BJECT: Stipulation & Order - Radium Chemical Company

FROM: Paul A. Giardina
Regional Radiation Representative

TO: See Addresses

Attached is a copy of the Stipulation and Order (S & O) between Radium Chemical and Joseph Kelly Jr., the defendants, and the State of New York, the plaintiffs. This S & O was ordered by the Court on July 21, 1988. The key points are as follows:

- The defendants acknowledge their inability to meet their financial commitments.
- In light of the defendant's financial conditions the parties agree that de facto abandonment has taken place.
- The state or any other governmental agency (such as EPA) can proceed to mitigate the hazards posed by the site.
- RCC can still proceed to try to sell its radium inventory unless it interferes with a clean up.
- All proceeds from such a sale will first go to satisfy governmental obligations.

Attachment

Addresses:

Richard Salkie
Chris Militscher
Lynn Wright
Eric Schaaf

cc: Shawn Googins

Of the Chief

Received
JUL 27 1988

STATE OF NEW YORK
DEPARTMENT OF LAW
120 BROADWAY
NEW YORK, NY 10271
(212) 341-2457

ROBERT ABRAMS
Attorney General

JAMES A. SEVINSKY
Assistant Attorney General in Charge
Environmental Protection Bureau

July 25, 1988

Paul Giardina
U.S. Environmental Protection
Agency
26 Federal Plaza
New York, New York 10278

Re: Radium Chemical Site

Dear Paul:

Enclosed is a certified copy of the recent Radium Chemical stipulation and order, entered July 21, 1988. A copy was telecopied to Ms. Ewall last week.

I also learned on Friday that soil surrounding the Radium Chemical building may be contaminated with radium-226. A representative from Assemblyman Maurice Hinchey's office told me that soil samples were taken and analyzed, and that preliminary results show "high" radium contamination up to either "ten times" that permitted under Labor's Code Rule 38 or background (the representative was not sure which). Further details, to the degree they may be forthcoming, may be obtained from his office. Ask for Gail McFarland-Benedict, 212-385-6662.

Yours truly,

GORDON J. JOHNSON
Assistant Attorney General

GJJ/ld
encl.

cc: Dr. Frances Bradley
Dr. Paul Merges

Attachment #2

SUPREME COURT OF THE STATE OF NEW YORK
COUNTY OF QUEENS : IAS PART 5

STATE OF NEW YORK, THOMAS F. HARTNETT, Commissioner of the New York State Department of Labor, and THOMAS C. JORLING, Commissioner of the New York State Department of Environmental Conservation,

Plaintiffs,

-against-

RADIUM CHEMICAL CO., INC., and JOSEPH A. KELLY, JR.,

Defendants.

STIPULATION AND ORDER

Index No. 16968/87

Assigned to Justice Graci

IT IS HEREBY STIPULATED by and between the parties, by their undersigned attorneys, as follows:

WHEREAS, defendant Radium Chemical Co., Inc. ("Radium Chemical") and defendant Joseph A. Kelly, Jr. ("Kelly") entered into a stipulation and order, entered October 19, 1987 ("the Order"), which required defendants to, inter alia, (a) remove radium sources from the plant at 60-06 27th Avenue, Woodside, New York ("the facility") by January 1, 1988 through sale of the sources or disposal of them at a lawful disposal site, (b) reduce airborne radiation at the facility and maintain it at or below specified levels, (c) perform certain monitoring of radon gas, (d) provide unencumbered access to the facility, (e) decontaminate the facility following the sources' removal, and (f) maintain

the facility in accordance with 12 NYCRR Part 38 ("Code Rule 38"); and

WHEREAS Radium Chemical's sole source of income is that provided by leasing of radium sources, which leasing currently results in gross payments to it of less than $5,500 per month; and Kelly has no source of income other than salary or fees paid to him by Radium Chemical; and

WHEREAS Radium Chemical's expenses in maintaining the facility in accordance with the Order are in excess of its gross income, in that current invoices for electrical service exceed $1,800; rental payments necessary to pay taxes, water and sewer charges, and mortgage on the facility are $1,800 per month and have not been paid; guard services necessary to maintain security at the facility in accordance with the Order cost in excess of $4,000 per month and have not been paid since April 1988, and the firm providing such services has not made a commitment to provide further services beyond July 31, 1988; the facility's radiation safety officer, as required by Code Rule 38 and necessary to the maintenance of a safe, secure facility, has not been paid since September 1987 and cannot be paid using existing income for future services; continued operations require engagement of legal counsel, but present counsel's fees have not been paid since October 1987 and future fees cannot be paid using existing income; the cost of salaries, wages and benefits for facility workers other than the radiation safety officer necessary to continued operations, which

include bookkeeping and technical services, exceed $3,000 per month and cannot be met; the cost of disposal of sources is approximately $5,000 per gram of radium for the approximately 108 grams of radium in inventory at the facility, and defendants cannot meet such costs using existing income; decontamination of areas of the facility used for shipping of sources, as well as the entire facility, cannot be paid for using existing sources of income; and

WHEREAS Kelly lives alone and must meet reasonable costs for his shelter, food and medical experts, including medical expenses arising from medical services and supplies resulting from a coronary infarction suffered in late December 1987; and

WHEREAS defendants have no assets other than the company's premises, land and inventory which is radioactively contaminated or radioactive, and have debts in excess of $600,000; and

WHEREAS the Internal Revenue Service has begun preparation of proceedings to seize assets and restrain the payment of income in order to satisfy alleged tax deficiencies of Radium Chemical claimed to be in excess of $40,000; and

WHEREAS radiation levels in the facility's vault room are above the 30 pCi/l standard pursuant to the Order; portions of the facility have been sealed because of radioactive contamination, which sealing the State has asserted is in violation of Code Rule 38; surface contamination in the shipping areas of the facility has made removal of

sources impossible absent decontamination or other remedial measures in that area of the facility; safe, secure operations require the presence of employees and, as required by the Order, the guard service, but defendants no longer can pay personnel to provide such services; it is hereby

ORDERED AND DETERMINED that defendants cannot maintain the facility in a manner consistent with Code Rule 38 and the public safety, and that because of defendants' inability to pay for the services of a radiation safety officer and employees adequately trained to handle company operations, and the continued presence of radioactive materials in the facility and defendants' inability to arrange for their removal, defendants have de facto abandoned their obligations and duties to adequately and safely secure the facility as of July 31, 1988, which constitutes a substantial threat of release of radioactive materials that has created an imminent and substantial danger to public health and the environment; and it is further

ORDERED that the Order entered October 19, 1987, is hereby modified to add that defendants shall not interfere with and shall cooperate with efforts by any governmental authority to respond to and remedy conditions posed by the continued, insecure presence of radioactive materials in the facility and the threat posed to public health and the environment by said de facto abandonment; and it is further

ORDERED that defendants shall have the right to arrange for the lawful sale of, and to sell all or part of the

radium sources, provided that such sale and consequent removal of the sources from the facility to the buyer(s) does not interfere with, prolong or delay, in the judgment of a responding governmental authority, the response action of that governmental authority, but that nothing herein constitutes a permit, license, or other approval for the shipment of sources to any particular buyer, and defendants shall still have the obligation to obtain all permits and licenses necessary to the lawful sale and shipment of such sources to any particular buyer in accordance with all applicable law; any and all proceeds of any sale shall be available to any responding governmental authority to reimburse it for all lawful costs incurred by it as a result of its response to or remediation of said conditions, and to satisfy any judgment already obtained against defendants by such governmental authority.

DATED: July 22 1988

ROBERT ABRAMS
Attorney General of the
State of New York
BY:

GORDON J. JOHNSON
STUART MILLER
Assistant Attorneys General
Department of Law
120 Broadway
New York, NY 10271
(212) 341-2457, 2478
Attorneys for Plaintiffs

WACHTELL, MANHEIM & GROUF
BY:

ROBERT BRAUNSCHWEIG
30 Rockefeller Plaza
New York, New York 10112
(212) 765-1700
Attorneys for Defendants

JOSEPH A. KELLY, as President of and on behalf of Radium Chemical Co., Inc.

JOSEPH A. KELLY, personally

STATE OF NEW YORK)
COUNTY OF NEW YORK) ss.:

On the 20th day of July, 1988, before me personally appeared Joseph A. Kelly to me known and known to me to be the person described in and who executed the foregoing instrument, and being duly sworn, did acknowledged to me that he executed the same; and further that he resides in New York, New York, that that he is the president of Radium Chemical Co., Inc., the corporation described in and which also executed the foregoing instrument; and that he also signed his name thereto on behalf of said corporation by order of the Board of Directors of said corpporation.

NOTARY PUBLIC

RUTH ANN STAUFFER
NOTARY PUBLIC, State of New York
No. 31-4649196
Qualified in New York County
Commission Expires April 30, 19 89

SO ORDERED.

E N T E R.

DATED: Jamaica, New York
July 21 1988

/S/ Martha Zelkman
J.S.C.

9/29/88 H3518 4-4.40-01

MARSHAL'S NOTICE OF LEVY AND SALE

Civil Court of the City of New York

County of Kings 19 83

Martin Bienstock
MARTIN A. BIENSTOCK
CITY MARSHAL #75
34-55 BELL BOULEVARD
BAYSIDE, NEW YORK 11361
718 279-3660
P. O. BOX 427

Special Security Inc.

Radium Chemical Company, Inc. Plaintiff

60-06 27th Ave.
Woodside, NY 11377

vs.

Defendant

BL

By Virtue of an Execution issued out of the above Court to me directed and delivered: PLEASE TAKE NOTICE that I have this day LEVIED upon and will expose for SALE at PUBLIC AUCTION, all the right, title and interest which the defendant had on this day, or at any time thereafter, in and to the following described chattels, sufficient to satisfy the execution together with Marshal's fees and expenses:

INVENTORY

ALL ASSETS ON PREMISES BELONGING TO THE DEFENDANT & SUBJECT TO MY LEVY

Assorted Desks, Chairs
File Cabinets, Typewriter
Manufacturing machinery
Fixtures & All other
[illegible]

Any money due to the above named defendant through rent, escrow or any other means, to be turned over to MY OFFICE.

PAY IN FULL 72 HOURS BEFORE SALE DATE OR SALE WILL BE ADVERTISED AT YOUR EXPENSE.

SALE:

Date 10/19/88

Time 10 AM

Address

Execution and Fees $ 19,687.46 plus expenses & interest

Dated, New York, 10/5/ 19 88

ALWAYS INCLUDE THIS DOCKET NO. ON ALL PAYMENTS.

H3518 H&B BY328 9/28/88

SUBJECT TO ANY AND ALL MORTGAGES, LIENS, CONSIGNMENTS CONDITIONAL BILLS OF SALE, ENCUMBRANCES, ETC., IF ANY.

Payments to be made by MONEY ORDER or CERTIFIED CHECK payable ONLY to

MARTIN A. BIENSTOCK
CITY MARSHAL #75
34-55 BELL BOULEVARD
BAYSIDE, NEW YORK 11361
718 [illegible]
P. O. BOX 427

Martin Bienstock
Marshal, City of New York

N. B. Any one who defaces this legal notice or causes same to be defaced in any way is guilty of a misdemeanor and will be punished to the full extent of the law.

...cial Security Inc.

Plaintiff

Index No. 53059/88
H&B File No. BY328

-against-

...dium Chemical Company, Inc.

Defendant

EXECUTION
WITH NOTICE TO
GARNISHEE

****

The People of the State of New York

...MARTIN PEINSTOCK MARSHAL OF THE CITY OF NEW YORK, GREETING:

WHEREAS, in an action in the civil court of the City of New York, County of ...ens between Special Security Inc. as plaintiff and Radium Chemical Company, Inc. as defendant who are all the parties named in said action, a judgment was ...ered on September 16, 1988 in favor of Special Security Inc. judgment creditor ...st against Radium Chemical Company, Inc. judgment debtor whose last known address ... 60-06 27th AvenueWoodside, New York 11377 in the amount of $18,588.04 including ...sts of which $18,588.04 together with interest thereon from September 16, 1988 ...aining due and unpaid,

NOW THEREFORE, WE COMMAND YOU to satisfy the said judgment out of the personal property of the above named judgment debtor and the debts ...e to him, and that only the property in which said judgment debtor who is not deceased has an interest or the debts owed to him shall be ...ied upon or sold hereunder; AND TO RETURN this execution to the clerk of the above captioned court within 60 days after issuance unless ...ice of this execution is made within that time or within extensions of that time made in writing by the attorney(s) for the judgment ...ditor.

Notice to Garnishee TO: Chemical Bank
ADDRESS: 340 Madison Avenue, New York, NY

WHEREAS, it appears that you are indebted to the judgment debtor, above named, or in possession or custody of property not capable of ...ery in which the judgment debtor has an interest including, without limitation, the following specified debt and property:

)

NOW, THEREFORE, YOU ARE REQUIRED by section 5232(a) of the Civil Proactice Law and Rules forthwith to transfer to the said sheriff or ...shal all personal property not capable of delivery in which the judgment debtor is known or believed to have an interest now in or ...ter coming into your possession or custody including any propery specified in this notice; and to pay to the said sheriff or marshal, ...maturity, all debts now due or hereafter coming due from you to the judgment debtor, including any debts specified in this notice; and ...ecute any documents necessary to effect such transfer or payment;

AND TAKE NOTICE that until such transfer or payment is made or until the expiration of 90 days after the service of this execution upon ...or such further time as is provided by any order of the court served upon you whichever event first occurs, you are forbidden to make ...suffer any sale, assignment or transfer of, or any interference with, any such property, or pay over or otherwise dispose of any such ..., to any person other than said sheriff or marshal, except upon direction of said sheriff or marshal or pursuant to an order of the ...t;

AND TAKE FURTHER NOTICE THAT at the expiration of 90 days after a levy is made by service of this execution, or of such further time as ...court upon motion of the judgment creditor has provided, this levy shall be void except as to property or debts which have been ...ferred or paid to said sheriff or marshal or as to which a proceeding under sections 5225 or 5227 of the Civil Proctice Law and Rules ...been brought.

Dated: September 22, 1988

HEITNER & BREITSTEIN
Attorneys for Judgment Creditor
7620 Third Avenue
Brooklyn, NY 11209
(718) 748-8080

Herbert Heitner
Norman Breitstein

15.00
2.50 Chemical
139.42
137.50
11.657.46

→ Sathie/original

5-5.10-01

Daggett
Mugno(?)
cc. Lyzig/action
Barrack
Marshall
Simon

STATE OF NEW YORK
DEPARTMENT OF
ENVIRONMENTAL CONSERVATION
ALBANY, NEW YORK 12233-1010

THOMAS C. JORLING
COMMISSIONER

JUL 01 1988

Dear Regional Administrator Daggett:

This letter sets forth the request of the New York State Department of Environmental Conservation ("DEC") that the United States Environmental Protection Agency provide funding pursuant to the Comprehensive Environmental Response, Compensation and Liability Act of 1980 ("CERCLA") as amended by the Superfund Amendments and Reauthorization Act of 1986 to conduct a CERCLA removal action in respect to the Radium Chemical Company ("Company") facility in Woodside, Queens, as discussed more fully below.

At the present time, approximately 82.6 curies of radium are stored at this facility, in "needles" and "seeds", encased in platinum-iridium or other metals, which were formerly used in medical procedures for cancer treatment, and 7.8 curies of radium-beryllium neutron sources and 16.9 curies of other radium sources used in radiography applications.

The Company formerly held licenses issued by the New York State Department of Labor ("DOL") authorizing possession and use of radioactive material in the form of needles or seeds for commercial use in reconditioning, leasing and distribution as industrial and medical radium sources.

In 1983, due to loss of contaminated gold seeds and because levels of radiation inside the facility exceeded DOL regulatory standards, DOL issued orders directing the Company to decontaminate the facility and to suspend commercial operations involving the transfer and receipt of radioactive materials. The Company did not comply. In August 1987, DOL denied the Company's license renewal application and ordered the Company to remove all radioactive materials and to decontaminate the facility. Measurements taken at the facility in late August and early September showed radiation levels inside and outside the facility above DOL requirements. Orders compelling reduction of radiation levels were also issued by DOL.

On October 13, 1987, an action was commenced in State Supreme Court by the Attorney General on behalf of DEC and DOL in respect to the Company's non-compliance. A Stipulation and Order was entered into October 19 by the State of New York, the Company, and

Joseph A. Kelly, Jr., its President, and approved by the court. The Stipulation and Order requires the Company to perform an extensive array of remedial measures, including reduction of radiation and radon to safe levels, removal of all radioactive materials from the facility, decontamination of the facility, and allowance for State access to conduct inspections, inventories, and remedial action.

The only activities carried out by the Company to date are reduction of external gamma radiation levels and the installation of fencing and posting of signs at the facility. While the Company did provide 24-hour guard service pursuant to the Stipulation and Order, the Company has failed to make payments for this service on two occasions. As a result, the provider of guard services removed the guards from the facility from February 11, to February 25, 1988, when Radium Chemical retained another provider of guard services (apparently without paying the initial provider) as ordered by the Court.

In mid-April, it came to light that guard service might again be terminated as a result of the Company's failure to pay. On April 25, 1988, the State obtained a temporary restraining order and order to show cause compelling the Company to pay for and reinstate guard service. As a result, the guard services provider agreed to provide service without payment until June 30, 1988, as Radium Chemical could not pay.

The Company has failed to provide reliable radon measurements, an adequate disposal plan, an adequate decontamination plan, and bids for decontamination work. As to removal of radium sources and decontamination of the facility, the only activities carried out by the Company to date are removal of four containers with four grams of radium (representing four curies) and the receipt of four more containers which have not yet been put to use. Only 20% of this cost has been paid by Radium Chemical. Contamination of the shipping area of the facility must be removed or remedied before packing and disposal may continue.

During the past several months, representatives of the Company have been negotiating with various foreign nationals with the intent of selling as much of the radium material as possible. To date, there has been no tangible evidence of progress.

Except as noted above, the Company has not complied with the Stipulation and Order, in particular, the requirements for removal of all the radioactive materials by January 1, 1988, and decontamination of the facility. Remedial action by the State could not be funded by the State Hazardous Waste Remedial Fund because the material at this facility is not within the definition of hazardous waste in that Fund's authorizing statute, Environmental Conservation Law Article 27, Title 13.

Extensive financial information obtained by the Attorney General demonstrates that neither the Company nor its principal owner, Joseph A. Kelly, Jr., has sufficient assets available for the costs of remedial action or to adequately manage the Company and the facility and provide essential security. Indeed, the Company's financial inability has been further demonstrated by its failure to pay the utility company providing electric service to the facility. Electric service was terminated at the facility at 10:00 a.m. on April 11, 1988, resulting in failure of ventilation, security, lighting and other systems requiring electricity. While electric service was restored to the facility by the utility provider at 9:00 p.m. on April 11, 1988, it is unlikely that Radium Chemical will make the over $1,600 payment past due or continue to make payments for electrical service. Radium Chemical has also failed to make payments owed its Radiation Safety Officer. Finally, the failure of the Company to pay its attorneys for legal services provided has made negotiations difficult. In sum, the Company's financial position makes it unlikely that its obligations under the law and the Stipulation and Order will be met.

The amount of radium and minimum security at this facility pose a serious threat to the public in the event of fire, explosion, terrorism or vandalism. The Beatty, Nevada, disposal facility which is the only facility where disposal of this material would be economically feasible, has a license to bury radium issued by the State of Nevada which expires November 1989.

We expect that the Attorney General will obtain and enter in court a Stipulation and Order declaring that the Company cannot maintain the facility in a manner consistent with New York State Department of Labor regulations and the public safety. The Order will be predicated on the Company's and Mr. Kelly's inability to pay for the services of a radiation safety officer and employees adequately trained to handle company operations after July 1, 1988; the continued presence of radioactive materials in the facility; and the Company's and Mr. Kelly's inability to pay for removal of the radioactive materials. Accordingly, the Order will recite that the Company and Mr. Kelly have de facto abandoned the facility as of July 1, 1988, and that de facto abandonment constitutes a substantial threat of release of radioactive materials that has created an imminent and substantial danger to public health and the environment.

This material is a hazardous substance and a pollutant or contaminant within the definitions of those terms contemplated by the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (42 USC §§9601 et seq.), ("CERCLA") as amended by the Superfund Amendments and Reauthorization Act of 1986 (P.L. 99-499). Therefore, I request that the United States Environmental Protection Agency provide funding pursuant to the

Superfund Amendments and Reauthorization Act of 1986 and conduct a CERCLA removal action for the materials at this facility at this time since the facility presents a significant threat to the environment.

Since the commencement of our action in State court, we have kept various USEPA personnel apprised of developments in the case, including Messrs. Muszynski, Giardina, and Googins and Ms. Lynne Wright.

For additional information, please call Paul Merges at (518) 457-5915.

Sincerely,

Thomas C. Jorling

Mr. Christopher J. Daggett
Regional Administrator
United States Environmental Protection Agency
Region II
26 Federal Plaza
New York, New York 10278

5-5.10-02

Daggett
New York -
cc: Lyzig/action
Blazey (w/att)

THE ASSEMBLY
STATE OF NEW YORK
ALBANY

MAURICE D. HINCHEY
Assemblyman 101st District

DISTRICT OFFICE
41 Pearl Street
Kingston, New York 12401
(914) 338-0909

ALBANY OFFICE
Room 625
Legislative Office Building
Albany, New York 12248
(518) 455-4436

CHAIRMAN
Environmental Conservation Committee

COMMITTEES
Agriculture
Banks
Higher Education
Racing & Wagering
Rules

Copies Safety - Marshall
Nachos, Salkie, Simos (cover letter only)

July 11, 1988

Christopher J. Daggett
Regional Administrator
U.S. E.P.A.
26 Federal Plaza
New York, New York 10278

Dear Mr. Daggett:

The Radium Chemical Co. plant at 60-06 27th Ave., Woodside, Queens, New York, has been the subject of an intensive investigation undertaken by the New York State Environmental Conservation Committee. As a result of this investigation, I am requesting that the EPA take immediate action to remove all radiation materials from the plant and decontaminate the area.

Radium Chemical Co. has been in the sealed radium sources business for over seventy-five years. It had been a viable business until about twenty years ago when radium was replaced by less hazardous radioactive materials used for certain medical procedures. The company accumulated an excessively large supply of radium sources as use of these materials declined.

In 1983 the New York State Labor Department ordered the company to cease operations because of numerous violations of the State Industrial Code. The company appealed. However, last August, as a result of additional violations, Radium Chemical was ordered to remove all sources and decontaminate the premises.

It is now eleven months later and Radium Chemical has removed approximately 4% of its inventory. Currently, there is an estimated 108 curies of Radium 226 and perhaps thousands of discrete sources. There may be as much as 10 curies of radium beryllium neutron sources. It now seems clear that the company does not have the financial resources to dispose of the sources and decontaminate the premises affected.

I have monitored the situation carefully and I am convinced that the Attorney General's office has done everything it could to get the company to comply with its orders, but with little result. I had asked my research team to assimilate a "worse case" scenario

should a fire occur at the plant. I am duly alarmed by their submitted conclusion which I have enclosed for your review.

It is my hope that you will respond at once to the threat this situation represents. Until you have mobilized to accomplish this end, in addition to the recommendations submitted by Professor Carroll Trall (see enclosed) I feel that the circumstances warrant 24 hour surveillance of the site. I await your response.

Sincerely,

MAURICE C. HINCHEY
Member of Assembly

MDH/gmb/jm
enc.

Physics Department
Brooklyn College
June 30, 1988

Hon. Maurice D. Hinchey, chairman
Environmental Conservation Committee
Legislative Office Building Room 625
Albany, NY 12248

Dear Mr. Hinchey:

I am responding to your request for me to estimate the hazards which may result from a fire at the Radium Chemical plant, 60-06 27th Ave., Woodside, Queens. Because of the serious nature of the problem, I will use a "worse case" scenario. Specific information concerning the nature of the materials stored in the plant has been supplied by Ms. Gail MacFarland-Benedict of your staff, and I have discussed these matters extensively with Prof. George Skorinko at Brooklyn College, a radiation technician, and other members of the scientific community. Ms. MacFarland-Benedict, Prof. Skorinko, the technician, and I visited the site May 23, but were unable to enter the premises.

Our recommmendations are simple: 1. Remove all radiation materials from the plant and decontaminate the area. In the meantime, in case of an emergency: 2. have the fire and police departments carry to the site radiation monitoring equipment, for both neutrons and gamma rays; 3, have the departments develop plans for evacuating the area; 4, have the departments develop plans for securing the area after an emergency.

It is not easy to predict how a fire can start. Arson, vandalism, or sabotage come immediately to mind. Ignition from another fire in the neighborhood is another possibility. A plane crash similar to the Mexican Air Line disaster in Los Angeles, a vehicle accident with a gasoline truck on the Brooklyn-Queens Expressway, faulty wiring, or a lightning strike to the building or to the wiring to the building are other possibilities. Another possibility is the penetration of the building from an automobile out of control on 27th Ave. I understand two such events have happened in the past. [Letter, Leonard R. Solon, Bureau of Radiation Control, to Francis J. Bradley, Department of Labor, September 22, 1986]. In any event, we assume there is a serious fire at the plant.

However the fire starts, we assume that temperatures of upwards to 2000^{0}F or 1000^{0}C will be reached. Most of the following discussion will apply at a much lower temperature.

We understand that stored in the building are approximately 10 curies of radium-beryllium (RaBe) neutron sources and 110 grams of radium mostly in the form of radium sulfate. The radium-beryllium is a mixture, not a compound. We assume that the neutron sources are stored in paraffin to moderate the fast neutrons. In its decay, Ra-226 emits an alpha particle which bombards Be-9 which emits a fast neutron. Fast neutrons are very dangerous because they can knock an entire atom out of a molecule causing drastic changes in the molecule's function in the organism. Gamma rays, on the other hand, generally only knock electrons out of atoms. The electrons are easily replaced if the dose is not too high. The damage caused by fast neutrons is much more serious and often cannot be repaired.

Because of the hazard of fast neutrons, sources of these neutrons generally are stored in water or paraffin, some material rich in hydrogen, which moderates the speed of the neutrons, making them much safer to handle. Mixed with the hydrogenated material is usually some other material to absorb the moderated neutrons, often a boron compound such as ordinary Borax, a cleaning compound, commercially available. Boron absorbs a moderated neutron and emits a gamma ray, which is much less harmful.

If a fire starts, the paraffin will melt at 50°C to 60°C, depending upon the kind of paraffin. And at somewhat over 100°C the paraffin will ignite, fueling the fire. In any event, the neutron sources will lose their moderating material and fast neutrons will bathe the area. A fireman or policeman, for instance, can receive a yearly dose of 100 millirem in about 15 minutes if he is 3-4 feet from the source. We would not expect the firemen to be this close to the source while fighting an intense flame, but as the fire is brought under control they might move in close to finish the job or to inspect the site.

We would expect the neutron source to crack during the fire and the radium and beryllium to become airborne. Beryllium is fairly toxic if inhaled, because of its chemistry, it is not radioactive, after it has been separated from the radium. The hazards of the the airborne radium are discussed below.

The 110 grams of radium are inside platinium and/or platinum-iridium containers, or "needles" which are sealed and placed inside lead containers to reduce the gamma radiation emitted by the radium and some of the lead containers are inside a steel vault

Somewhere along here the radium sulfate will probably decompose into radium oxide, RaO, and will get airborne like the soot and other debris of the fire. The final resting place of this radium is hard to estimate because it will depend upon atmospheric conditions. If the total 110 grams of radium plus the 10 grams from the neutron sources is spread uniformly over a one square-mile area, then the radiation level for a person living in that area will be about 0.4 mR/hr, about seven times the permissible level for a continuous exposure. In Queens this means about 20,000 people will be subject to this exposure. The radium would have to be spread uniformly over an area of nearly 10 square miles before the radiation level is down to a permissible level.

More serious, perhaps, is the fact that much of the airborne radium will be ingested by eating, drinking or inhaling. Radiation from internal sources is, of course, much more serious than radiation from external sources. Again, the quantitative estimates of these hazards are hard to make because they depend critically upon the atmospheric conditions at the time of the fire.

To repeat, our recommendations are that the radioactive materials be removed from the premises immediately, that the area be decontaminated, that the fire and police departments be alerted to the hazards at the plant and that they make emergency plans with the appropriate agencies of government to monitor the radioactivity from the plant in case of a fire, to prepare to evacuate the area in case of a serious emergency, and to have plans for securing the area once the emergency is over.

On Monday, June 27, 1988, I met with Ms. Gail McFarland-Benedict, Dr. Frank Bradley of the Department of Labor, and Mr. Gordon Johnson of the Attorney-General's office to discuss many of the points covered in this letter.

Sincerely,

Carroll C. Trail
Professor

In our visit to the building, which was locked but unguarded, we found a substantial leakage of gamma radiation from the building. We measured 0.7 mR/hr through the window facing the Brooklyn-Queens Expressway and about 0.2 mR/hr through the building. We measured about 0.1 mR/hr across the street, on 27th Ave. We also have found radium, well above background, in samples we have taken from outside the building. [Our findings are consistent with those reported by Paul Merges in a memorandum to Frank Bradley, NYS DOL, June 5, 1986, and with the radiation levels cited by Thomas F. Hartnett in his letter of August 17, 1988 to Mr. Jeffrey Hermann, the attorney for Radium Chemical.]

These results convince us that that all the radium is not inside lead shielding, that many of the seals on the platinum containers have cracked and allowed to escape radium and radioactive radon. The radioactive products of this radon, of course, are also uncontained.

In a fire, as the temperature rises, the pressure in the needles will increase and more radium and radon will escape from those needles that are cracked, and the pressure and thermal stresses on the other needles will increase causing more cracks, allowing more radioactive products to escape. None of these products will be contained in the lead or the vault, because they are not airtight.

As the temperature rises, the lead will melt at 328^{0}C or about 600^{0}F. Lead requires relatively little heat to raise its temperature and to melt it. For example, only .04 calories are needed to raise a gram of lead 1^{0}C whereas 25 times that amount is needed to raise a gram of water 1^{0}C. Further, 6 calories are needed to melt a gram of lead whereas 90 times that amount are needed to turn a gram of water into a gram of steam. (The calories used here are 1000 times smaller than the calories we use in daily conversation to discuss the energy in food.) The intensity of the fire will govern how much lead is melted, but, as I said, a little heat melts a lot of lead. For instance, the heat from burning a gallon of gasoline will melt about 3200 pounds of lead.

When the lead is melted, there is no shielding around the radium that is still in the platinum needles. In this situation, if all the radium is still in the building a fireman would receive a dose of about 10 R/hr at a distance of 3 meters or about 1 R/hr at a distance of 10 meters. This fireman will receive a yearly permissible dose of 0.5 rem in 3 minutes in the first case and in 30 minutes in the last case.

Department of Physics

June 29, 1988

To: Prof. A. Halpern, chairman

From: Prof. C. C. Trail

I am requesting $10,000 to purchase radiation detection equipment and supplies so that we may continue our work with the Environmental Conservation Committee of the New York State Assembly.

During the last year, we worked with Hon. Maurice Hinchey, chairman of the Committee and Ms. Gail McFarland-Benedict from the staff of the Committee to identify radioactive hazards left by various radiochemical businesses in the New York City area, many of which are in Brooklyn.

We have found radioactive hazards in two buildings thus far and we wish to continue this work with the Committee during the coming year. I am attaching an article from the New York Times which refers to the hazard we found in Manhattan. We found another hazard in Woodside, Queens, which the Environmental Protection Agency has agreed remove this July.

We do not have at Brooklyn College the portable equipment for field studies and we have had to borrow this equipment from a colleague at a SUNY campus upstate. This arrangement will not be possible during the coming year, making it necessary to purchase our own equipment.

Your support of this request will be very much appreciated.

cc: Dr. C. Kimmich, Associate Provost

5-5.10-02

MAURICE D. HINCHEY
Assemblyman 101st District

DISTRICT OFFICE
41 Pearl Street
Kingston, New York 12401
(914) 338-0909

ALBANY OFFICE
Room 625
Legislative Office Building
Albany, New York 12248
(518) 455-4436

THE ASSEMBLY
STATE OF NEW YORK
ALBANY

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Environmental Con

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R

July 11, 1988

Christopher J. Daggett
Regional Administrator
U.S. E.P.A.
26 Federal Plaza
New York, New York 10278

Dear Mr. Daggett:

The Radium Chemical Co. plant at 60-06 27th Ave., Woodside, Queens, New York, has been the subject of an intensive investigation undertaken by the New York State Environmental Conservation Committee. As a result of this investigation, I am requesting that the EPA take immediate action to remove all radiation materials from the plant and decontaminate the area.

Radium Chemical Co. has been in the sealed radium sources business for over seventy-five years. It had been a viable business until about twenty years ago when radium was replaced by less hazardous radioactive materials used for certain medical procedures. The company accumulated an excessively large supply of radium sources as use of these materials declined.

In 1983 the New York State Labor Department ordered the company to cease operations because of numerous violations of the State Industrial Code. The company appealed. However, last August, as a result of additional violations, Radium Chemical was ordered to remove all sources and decontaminate the premises.

It is now eleven months later and Radium Chemical has removed approximately 4% of its inventory. Currently, there is an estimated 108 curies of Radium 226 and perhaps thousands of discrete sources. There may be as much as 10 curies of radium beryllium neutron sources. It now seems clear that the company does not have the financial resources to dispose of the sources and decontaminate the premises affected.

I have monitored the situation carefully and I am convinced that the Attorney General's office has done everything it could to get the company to comply with its orders, but with little result. I had asked my research team to assimilate a "worse case" scenario

should a fire occur at the plant. I am duly alarmed by their submitted conclusion which I have enclosed for your review.

It is my hope that you will respond at once to the threat this situation represents. Until you have mobilized to accomplish this end, in addition to the recommendations submitted by Professor Carroll Trall (see enclosed) I feel that the circumstances warrant 24 hour surveillance of the site. I await your response.

Sincerely,

MAURICE C. HINCHEY
Member of Assembly

MDH/gmb/jm
enc.

Physics Department
Brooklyn College
June 30, 1988

Hon. Maurice D. Hinchey, chairman
Environmental Conservation Committee
Legislative Office Building Room 625
Albany, NY 12248

Dear Mr. Hinchey:

I am responding to your request for me to estimate the hazards which may result from a fire at the Radium Chemical plant, 60-06 27th Ave., Woodside, Queens. Because of the serious nature of the problem, I will use a "worse case" scenario. Specific information concerning the nature of the materials stored in the plant has been supplied by Ms. Gail MacFarland-Benedict of your staff, and I have discussed these matters extensively with Prof. George Skorinko at Brooklyn College, a radiation technician, and other members of the scientific community. Ms. MacFarland-Benedict, Prof. Skorinko, the technician, and I visited the site May 23, but were unable to enter the premises.

Our recommmendations are simple: 1. Remove all radiation materials from the plant and decontaminate the area. In the meantime, in case of an emergency: 2. have the fire and police departments carry to the site radiation monitoring equipment, for both neutrons and gamma rays; 3, have the departments develop plans for evacuating the area; 4, have the departments develop plans for securing the area after an emergency.

It is not easy to predict how a fire can start. Arson, vandalism, or sabotage come immediately to mind. Ignition from another fire in the neighborhood is another possibility. A plane crash similar to the Mexican Air Line disaster in Los Angeles, a vehicle accident with a gasoline truck on the Brooklyn-Queens Expressway, faulty wiring, or a lightning strike to the building or to the wiring to the building are other possibilities. Another possibility is the penetration of the building from an automobile out of control on 27th Ave. I understand two such events have happened in the past. [Letter, Leonard R. Solon, Bureau of Radiation Control, to Francis J. Bradley, Department of Labor, September 22, 1986]. In any event, we assume there is a serious fire at the plant.

However the fire starts, we assume that temperatures of upwards to 2000^{o}F or 1000^{o}C will be reached. Most of the following discussion will apply at a much lower temperature.

We understand that stored in the building are approximately 10 curies of radium-beryllium (RaBe) neutron sources and 110 grams of radium mostly in the form of radium sulfate. The radium-beryllium is a mixture, not a compound. We assume that the neutron sources are stored in paraffin to moderate the fast neutrons. In its decay, Ra-226 emits an alpha particle which bombards Be-9 which emits a fast neutron. Fast neutrons are very dangerous because they can knock an entire atom out of a molecule causing drastic changes in the molecule's function in the organism. Gamma rays, on the other hand, generally only knock electrons out of atoms. The electrons are easily replaced if the dose is not too high. The damage caused by fast neutrons is much more serious and often cannot be repaired.

Because of the hazard of fast neutrons, sources of these neutrons generally are stored in water or paraffin, some material rich in hydrogen, which moderates the speed of the neutrons, making them much safer to handle. Mixed with the hydrogenated material is usually some other material to absorb the moderated neutrons, often a boron compound such as ordinary Borax, a cleaning compound, commercially available. Boron absorbs a moderated neutron and emits a gamma ray, which is much less harmful.

If a fire starts, the paraffin will melt at 50°C to 60°C, depending upon the kind of paraffin. And at somewhat over 100°C the paraffin will ignite, fueling the fire. In any event, the neutron sources will lose their moderating material and fast neutrons will bathe the area. A fireman or policeman, for instance, can receive a yearly dose of 100 millirem in about 15 minutes if he is 3-4 feet from the source. We would not expect the firemen to be this close to the source while fighting an intense flame, but as the fire is brought under control they might move in close to finish the job or to inspect the site.

We would expect the neutron source to crack during the fire and the radium and beryllium to become airborne. Beryllium is fairly toxic if inhaled, because of its chemistry, it is not radioactive, after it has been separated from the radium. The hazards of the the airborne radium are discussed below.

The 110 grams of radium are inside platinium and/or platinum-iridium containers, or "needles" which are sealed and placed inside lead containers to reduce the gamma radiation emitted by the

In our visit to the building, which was locked but unguarded, we found a substantial leakage of gamma radiation from the building. We measured 0.7 mR/hr through the window facing the Brooklyn-Queens Expressway and about 0.2 mR/hr through the building. We measured about 0.1 mR/hr across the street, on 27th Ave. We also have found radium, well above background, in samples we have taken from outside the building. [Our findings are consistent with those reported by Paul Merges in a memorandum to Frank Bradley, NYS DOL, June 5, 1986, and with the radiation levels cited by Thomas F. Hartnett in his letter of August 17, 1988 to Mr. Jeffrey Hermann, the attorney for Radium Chemical.]

These results convince us that that all the radium is not inside lead shielding, that many of the seals on the platinum containers have cracked and allowed to escape radium and radioactive radon. The radioactive products of this radon, of course, are also uncontained.

In a fire, as the temperature rises, the pressure in the needles will increase and more radium and radon will escape from those needles that are cracked, and the pressure and thermal stresses on the other needles will increase causing more cracks, allowing more radioactive products to escape. None of these products will be contained in the lead or the vault, because they are not airtight.

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When the lead is melted, there is no shielding around the radium that is still in the platinum needles. In this situation, if all the radium is still in the building a fireman would receive a dose of about 10 R/hr at a distance of 3 meters or about 1 R/hr at a distance of 10 meters. This fireman will receive a yearly permissible dose of 0.5 rem in 3 minutes in the first case and in 30 minutes in the last case.

Somewhere along here the radium sulfate will probably decompose into radium oxide, RaO, and will get airborne like the soot and other debris of the fire. The final resting place of this radium is hard to estimate because it will depend upon atmospheric conditions. If the total 110 grams of radium plus the 10 grams from the neutron sources is spread uniformly over a one square-mile area, then the radiation level for a person living in that area will be about 0.4 mR/hr, about seven times the permissible level for a continuous exposure. In Queens this means about 20,000 people will be subject to this exposure. The radium would have to be spread uniformly over an area of nearly 10 square miles before the radiation level is down to a permissible level.

More serious, perhaps, is the fact that much of the airborne radium will be ingested by eating, drinking or inhaling. Radiation from internal sources is, of course, much more serious than radiation from external sources. Again, the quantitative estimates of these hazards are hard to make because they depend critically upon the atmospheric conditions at the time of the fire.

To repeat, our recommendations are that the radioactive materials be removed from the premises immediately, that the area be decontaminated, that the fire and police departments be alerted to the hazards at the plant and that they make emergency plans with the appropriate agencies of government to monitor the radioactivity from the plant in case of a fire, to prepare to evacuate the area in case of a serious emergency, and to have plans for securing the area once the emergency is over.

On Monday, June 27, 1988, I met with Ms. Gail McFarland-Benedict, Dr. Frank Bradley of the Department of Labor, and Mr. Gordon Johnson of the Attorney-General's office to discuss many of the points covered in this letter.

Sincerely,

Carroll C. Trail
Professor

Department of Physics

June 29, 1988

To: Prof. A. Halpern, chairman

From: Prof. C. C. Trail

I am requesting $10,000 to purchase radiation detection equipment and supplies so that we may continue our work with the Environmental Conservation Committee of the New York State Assembly.

During the last year, we worked with Hon. Maurice Hinchey, chairman of the Committee and Ms. Gail McFarland-Benedict from the staff of the Committee to identify radioactive hazards left by various radiochemical businesses in the New York City area, many of which are in Brooklyn.

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We do not have at Brooklyn College the portable equipment for field studies and we have had to borrow this equipment from a colleague at a SUNY campus upstate. This arrangement will not be possible during the coming year, making it necessary to purchase our own equipment.

Your support of this request will be very much appreciated.

cc: Dr. C. Kimmich, Associate Provost

5-5.10-03

Militscher

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION II
26 FEDERAL PLAZA
NEW YORK, NEW YORK 10278

Honorable Maurice C. Hinchey
Member, State Assembly of New York
Legislative Office Building, Room 625
Albany, New York 12248

Dear Mr. Hinchey:

Thank you for your letter dated July 11, 1988, concerning the Radium Chemical Company (RRC) site located in Woodside, New York. Recently, I responded to a similar request for a CERCLA Removal Action at this site from New York State Department of Environmental Conservation's Commissioner, Mr. Thomas C. Jorling. Attached is a copy of this response. Since this reply to Commissioner Jorling, my staff has informed me that a CERCLA Removal Action in the form of 24-hour site security and other measures commenced as of July 26, 1988. Plans for the site cleanup operations and the removal, transportation, and disposal of the radioactive materials are currently underway. My staff is diligently working on a Site Specific Contract for the selection of a qualified contractor to perform the cleanup and removal work. We expect that the planning, selection, and award process will take several months to complete.

We will continue to keep your office apprised of our activities on this site and appreciate your support and concern for the environment.

Sincerely,

Christopher J. Daggett,
Regional Administrator

Attachments

cc: Thomas C. Jorling, Commissioner
N.Y.S. Dept. of Env. Conservation

RRC Task Force

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

5-5.10-04

AUG 1 1988

Mr. Thomas C. Jorling
Commissioner
New York State Department
of Environmental Conservation
50 Wolf Road
Albany, New York 12233-1010

Dear Commissioner Jorling:

Thank you for your July 1, 1988 letter requesting the U.S. Environmental Protection Agency (EPA) to conduct a Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) removal action at the Radium Chemical Company site located in Woodside, Queens, New York. As you know, EPA has been working with your staff and other State and New York City agencies for several months as part of the Radium Chemical Company (RCC) Task Force. Mr. Paul Giardina of my staff co-chairs this task force which has been providing technical support and conducting joint inspections of the facility with New York State and New York City agencies.

A removal action of this nature will also require special disposal permits to be obtained, detailed coordination of restricted transportation routes for disposal of the radioactive sources and contaminated materials, and intensive personnel safety and monitoring measures during cleanup operations. We are prepared to initiate measures under a CERCLA removal action that would allow continuation of site security and maintenance of the ventilation and electrical systems utilizing EPA's Emergency Response Cleanup Services (ERCS) contractor. However, the ERCS contractor lacks the technical expertise and specialized equipment necessary to perform a complex high-level radioactive substances cleanup and removal which this site entails.

I have directed my staff to develop a Site Specific Contract for the actual cleanup and removal operations. We are coordinating with EPA Headquarters and are now taking the initial steps for planning and preparing the specialized contract. We expect it will take several months before a specialized contractor can be selected and begin actual removal operations. During this period, we will maintain site security and other stabilization measures at the site. In addition, we will also perform routine monitoring of the radiation levels inside and outside of the facility to ensure that radiation levels do not endanger public health and safety. We will keep your office apprised through communications with the NYSDEC member of the RCC Task Force, on the progress on the selection of the specialized contractor and other activities associated with the removal operation.

The cost of this removal action could exceed $1.5 million. The Removal Program funding availability is limited. As you know, my staff has been working closely with Mr. Michael O'Toole of your staff on the prioritization of removal sites in New York State. More than half of the total Regional Advise of Allowance for fiscal year 1988 is committed to CERCLA Removal Actions that are located in New York. We regularly update and expand our list of New York sites and change priorities as necessary, based upon our interaction with Mr. O'Toole. I believe that this site deserves a high priority. We will reserve sufficient fiscal year 1989 CERCLA monies for this removal action since cleanup operations, transportation, and disposal could not be initiated before the first quarter of fiscal year 1989 when the Site Specific Contract will be in in place. I have attached a current list of New York State sites which have been prioritized and funded in coordination with your staff.

Again, we will continue to maintain close coordination with your staff through the RCC Task Force and will act upon your request for a complete cleanup of the site.

We share your concern regarding this facility and the protection of the public as well as the environment surrounding Radium Chemical Company and are aggressively pursuing an appropriate course of action for future removal activities.

Sincerely,

For

Christopher J. Daggett
Regional Administrator

Attachment

cc: Thomas F. Hartnett, Commissioner
New York State Department of Labor

Stephen Josephs, Commissioner
New York City Department of Health

Alfonse M. D'Amato, United States Senator

Ivan Lafayette, Assemblyman
New York State Assembly

Maurice Hinchey, Assemblyman
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Gordon Johnson, Assistant State Attorney
New York State Attorney General's Office

RRC Task Force Members

bcc: William Muszynski, RA
Conrad Simon, AWM
Stephen Luftig, ERRD
Douglas Blazey, ORC
Richard Salkie, ERRD-DD
Bruce Sprague, 2ERR-RP
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Shawn Googins, AWM-RAD
Lynn Wright, ORC-WTS
Charles Fitzsimmons, ERR-RP
Lisa Guarneiri, WH-548B
Joseph LaFornara, ERT

5-5.10-05

FILE COPY

AUG 9 1988

Honorable Maurice C. Hinchey
Member, State Assembly of New York
Legislative Office Building Room 625
Albany New York 12248

Dear Mr. Hinchey:

Thank you for your letter dated July 11, 1988, concerning the Radium Chemical Company (RRC) site located in Woodside, New York. Recently I responded to a similar request for a CERCLA Removal Action at this site from New York State Department of Environmental Conservation's Commissioner, Mr. Thomas C. Jorling. Attached is a copy of this response. Since this reply to Commissioner Jorling, my staff has informed me that a CERCLA Removal Action in the form of 24-hour site security and other measures commenced as of July 26, 1988. Plans for the site cleanup operations and the removal, transportation, and disposal of the radioactive materials are currently underway. My staff is diligently working on a Site Specific Contract for the selection of a qualified contractor to perform the cleanup and removal work. We expect that the planning, selection, and award process will take several months to complete.

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Sincerely,

William J. Muszynski, P.E.
Acting Regional Administrator

Attachment

cc: Thomas C. Jorling, Commissioner
New York State Department of Environmental Conservation

RRC Task Force

bcc: J. Marshall 2OEP
S. Luftig, 2ERRD
R. Salkie, 2ERR-DD
G. Zachos, 2ERR-RP
B. Sprague, 2ERR-RP
L. Wright, 2ORC

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

AUG 1 1988

Mr. Thomas C. Jorling
Commissioner
New York State Department
of Environmental Conservation
50 Wolf Road
Albany, New York 12233-1010

Dear Commissioner Jorling:

Thank you for your July 1, 1988 letter requesting the U.S. Environmental Protection Agency (EPA) to conduct a Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) removal action at the Radium Chemical Company site located in Woodside, Queens, New York. As you know, EPA has been working with your staff and other State and New York City agencies for several months as part of the Radium Chemical Company (RCC) Task Force. Mr. Paul Giardina of my staff co-chairs this task force which has been providing technical support and conducting joint inspections of the facility with New York State and New York City agencies.

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William J. Muszynski For

Christopher J. Daggett
Regional Administrator

Attachment

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Joseph LaFornara, ERT

5-5.10-05

FILE COPY

AUG 9 1988

Honorable Maurice C. Hinchey
Member, State Assembly of New York
Legislative Office Building Room 625
Albany New York 12248

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

AUG 1 1988

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Commissioner
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50 Wolf Road
Albany, New York 12233-1010

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William J. Muszynski For

Christopher J. Daggett
Regional Administrator

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Shawn Googins, AWM-RAD
Lynn Wright, ORC-WTS
Charles Fitzsimmons, ERR-RP
Lisa Guarneiri, WH-548B
Joseph LaFornara, ERT

5-5.10-06

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION II
26 FEDERAL PLAZA
NEW YORK, NEW YORK 10278

SEP 6 1988

Honorable Claire Shulman
President, Borough of Queens
City of New York
Borough Hall
Kew Gardens, New York 11424

Dear Ms. Shulman:

Thank you for your letter addressed to Christopher J. Daggett dated August 3, 1988, concerning the Radium Chemical Company (RCC) site located in Woodside, New York. The U.S. Environmental Protection Agency (EPA) initiated a CERCLA Removal Action at this site in the form of 24-hour site security and stabilization measures on July 26, 1988. This action was taken at the request of the New York State Department of Environmental Conservation.

The upcoming EPA cleanup and removal action involving radioactive sources of the type found at this site will require several months of careful preparations. Our preparations will include obtaining special disposal permits, detailing coordination of restricted transportation routes for disposal of the radioactive sources and contaminated materials, and intensive personnel safety and environmental monitoring programs during cleanup operations. Currently, site security and measures to continue with the maintenance of electrical, telephone, plumbing, and ventilation systems at the site are being provided through EPA's Emergency Response Cleanup Services (ERCS) contractor. However, the present contractor lacks sufficient technical expertise and the specialized equipment necessary to perform the complex high-level radioactive substances cleanup and removal which this site entails.

Therefore, I have directed my staff to develop a Site Specific Contract for the actual cleanup and removal operations. We are coordinating with EPA Headquarters in planning and preparing the specialized contract, but it will take several months before a specialized contractor can be selected and begin actual removal operations. During this period, we will maintain site security and other stabilization activities at the site. In addition, we will also perform routine monitoring

of the radiation levels inside and outside of the facility in coordination with New York State and City agencies to ensure that radiation levels do not endanger public health and safety.

EPA has prepared an informational fact sheet which describes some of the past and proposed actions to be taken. Attached is a copy for your information.

We will continue to keep your office apprised of our activities on this site and appreciate your support and concern for the environment.

Sincerely,

William J. Muszynski, P.E.
Acting Regional Administrator

Attachment

cc: Thomas C. Jorling, Commissioner
New York State Department of
Environmental Conservation

bcc: RCC Task Force
J. Marshall, 2DRA
C. Simon, 2AWM
S. Luftig, 2ERR
M. Randol, 2OEP
D. Blazey, 2ORC
[redacted]
B. Sprague, 2ERR-RP
G. Zachos, 2ERR-RP
R. Mueller, PM-214F
K. Weaver, PM-FSM
S. Murphy, PM-FSM
S. Googins, AWM-RAD
L. Wright, ORC-WTS
C. Fitzsimmons, 2ERR-RP
L. Guarneiri, WH-548B
J. LaFornara, 2ERT

United States
Environmental Protection Agency
Region 2: New Jersey, New York
Puerto Rico, Virgin Islands
26 Federal Plaza, NY, NY 10278

FACTS

August 1988

EPA TO TAKE SUPERFUND ACTION AT FORMER RADIUM SUPPLY FIRM IN QUEENS, NEW YORK

CURRENT ACTION

The U.S. Environmental Protection Agency (EPA) has formally agreed to a request from New York State to secure and begin preparations for the disposal of radioactive materials stored in an former radium supply firm in Queens, New York.

EPA took over site security from the firm last month to reduce risks posed by unauthorized access to the closed building at 60-06 27th Avenue, along the Brooklyn-Queens Expressway, in a largely industrial neighborhood.

On Thursday, August 11th, EPA re-entered the building to perform further assessment of its interior and contents. Before any removal of the materials inside the contaminated building, EPA will conduct additional sampling and analyses of the site where the radium sources are to be stored.

Radium is a naturally occurring radioactive element that is dangerous if handled or disposed of improperly.

Removal costs for the radium at the site will probably be in excess of $1 million and will paid for through the Federal Superfund.

PAST ACTIONS

EPA and State investigations have confirmed that the facility contains radium previously used to treat cancer and stored in thousands of sealed metal tubes and cylinders within shielded, lead containers.

The public is not at risk due to continued 24-hour security to prevent illegal access and extra shielding measures taken by the former owners to reduce the potential for unsafe public exposure.

Before the firm's license was suspended by the State in January 1983, the firm purchased and distributed needles containing radium for use in some forms of cancer therapy. most of the firm's former customers had been physicians and hospitals. Alternate treatments are presently available and used by the medical community.

The State Departments of Labor and Environmental Conservation, as well as the Attorney General's Office and the New York City Department of Health have been active participants in successful efforts to prevent adverse environmental effects from this facility. EPA will continue to coordinate with all appropriate local and State agencies during the removal of all the materials from the site.

For further information call EPA's Office of External programs at (212) 264-2515.

####

5-5.10-07

CLAIRE SHULMAN
PRESIDENT

(718) 520-3220

Muszynski
Marshall
cc: Lufting/Action
Sims
Randal
Salkie Lufting
Copy 9/22/88

Fyi
Chris Militscher

CITY OF NEW YORK
OFFICE OF THE
PRESIDENT OF THE BOROUGH OF QUEENS
120-55 QUEENS BOULEVARD
KEW GARDENS, NEW YORK 11424

September 12, 1988

Mr. William J. Muszynski, P.E.
Acting Regional Administrator
United States Environmental Protection Agency
26 Federal Plaza
New York, NY 10278

Dear Mr. Muszynski:

Thank you for your recent letter regarding the United States Environmental Protection Agency's work concerning the Radium Chemical Company site located in Woodside, New York.

I am pleased to see the clean-up of the radioactive sources located in the building is proceeding. As you know this is a densely populated area and the clean-up and removal operations should occur as quickly as possible.

Please send me future reports on EPA's activity on this site. Thanking you in advance for your cooperation.

Sincerely,

Claire Shulman

CLAIRE SHULMAN
President
Borough of Queens

CS:jls

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION II

DATE: SEP 02 1988

SUBJECT: Request for Rapid Authorization of Additional Trust Monies for CERCLA Removal Action at the Radium Chemical Company, Woodside Queens, New York.

FROM: Christopher A. Militscher, On-Scene Coordinator Bruce Sprague (for)
Response and Prevention Branch

TO: Stephen D. Luftig, Director
Emergency and Remedial Response Division

THRU: Richard Salkie, Associate Director Bruce Sprague (for)
Removal Program Office

SUMMARY

On July 1, 1988, Mr. Thomas Jorling, Commissioner, New York State Department of Environmental Conservation requested that the U.S. Environmental Protection Agency conduct a CERCLA/SARA removal action at the Radium Chemical Company (RCC) Site located at 60-06 27th Ave, Woodside, Queens, New York. Mr. Jorling requested that EPA provide security, remove radioactive material and other hazardous materials from this site.

On July 26, 1988, you verbally approved a removal action for site security. The total project ceiling was $25,000 of which $20,000 was for mitigation contracting.

Based upon my review of the financial accounting for this site and proposed actions for this site, it is anticipated that an additional $80,000 in mitigation contracting funds will be required until preparation and approval of the complete removal action funding memorandum for site stabilization occurs. This increase will raise the total project ceiling to $150,000, of which $100,000 is for mitigation contracting.

THREAT

The main threats to the public are exposure through direct human contact and the possibility of vandalism and/or theft of the radioactive substances. Direct contact with the radioactive sources could result in radiation burns, various cancers, long term disease, sterility and even death.

A fire at the facility or adjacent company could expose firefighters and other emergency response personnel to radiation contamination. Smoke from a fire could directly or indirectly expose thousands of people to radioactive particles in the smoke.

Firefighting runoff could contaminate streets, sewers and storm-drains.

Unauthorized or illegal access to the facility could expose unprotected persons to significant levels of radon gas without entering the vault area itself. If ventilation and electrical systems are not maintained or fail, a buildup of radon gas would occur in the vault and surrounding rooms of the facility.

PROPOSED ACTION

The proposed immediate actions are to continue site security, upgrade and maintain essential electrical, plumbing, and ventilation systems, initiate a personnel radiation monitoring program and supply decontamination and radiation screening equipment for current removal activities. The personnel radiation monitoring program will cover site security, cleanup contractor, EPA and TAT personnel. Baseline whole body radiation exposure monitoring will be conducted with monthly monitoring to track personnel exposure.

ENFORCEMENT

Region II's Office of Regional Counsel, Site Compliance Branch, and Radiation Branch are currently working with the New York State Attorney General's Office on the failure by RCC to comply with the State's Stipulation and Order. RCC has failed to regularly maintain the 24-hour guard services required by the order on at least two occasions. Also, the Company has failed to provide reliable radon measurements, adequate disposal plan, adequate decontamination plan, and bids for decontamination work.

In a letter dated June 30, 1988, which documented a June 28, 1987, meeting, EPA advised the Company's legal representatives that a CERCLA response action is likely because RCC had failed to comply with the October 19, 1987, Stipulation and Order. The failure to pay its obligations, in effect, resulted in "abandonment" of the radium sources.

The Stipulation and Order issued by Justice Graci for the Supreme Court of the State of New York, County of Queens, dated July 20, 1988, reconfirmed this determination of de facto abandonment by RCC.

RECOMMENDATION

Conditions at the Radium Chemical Company Site meet the criteria for a removal action under 40 CFR 300.65(b)(2) of the National Oil and Hazardous Substance Contingency Plan (NCP), in that there exists:

a) Actual or potential exposure to hazardous substances or contaminants by nearby populations, animals, or foodchain [Section 300.65(b)(2)(i)];

b) Hazardous substances, pollutants or contaminants in drums, barrels, tanks, or other bulk storage containers, that may pose a threat of release [Section 300.65(b)(2)(iii)].

As required by Section 104(a)(2) of CERCLA, this removal action will contribute to the efficient performance of any long term remedial action planned at this site.

I therefore recommend your approval of this additional CERCLA removal funding request of which the new estimated total project ceiling is $150,000, mitigation ceiling $100,000, TAT ceiling $20,000 and EPA ceiling $30,000. Please indicate your approval and funding authorization per the current delegations of authority by signing below.

APPROVED: Edgar D. Goffe DATE: 9/2/88

DISAPPROVED: _____ DATE: _____

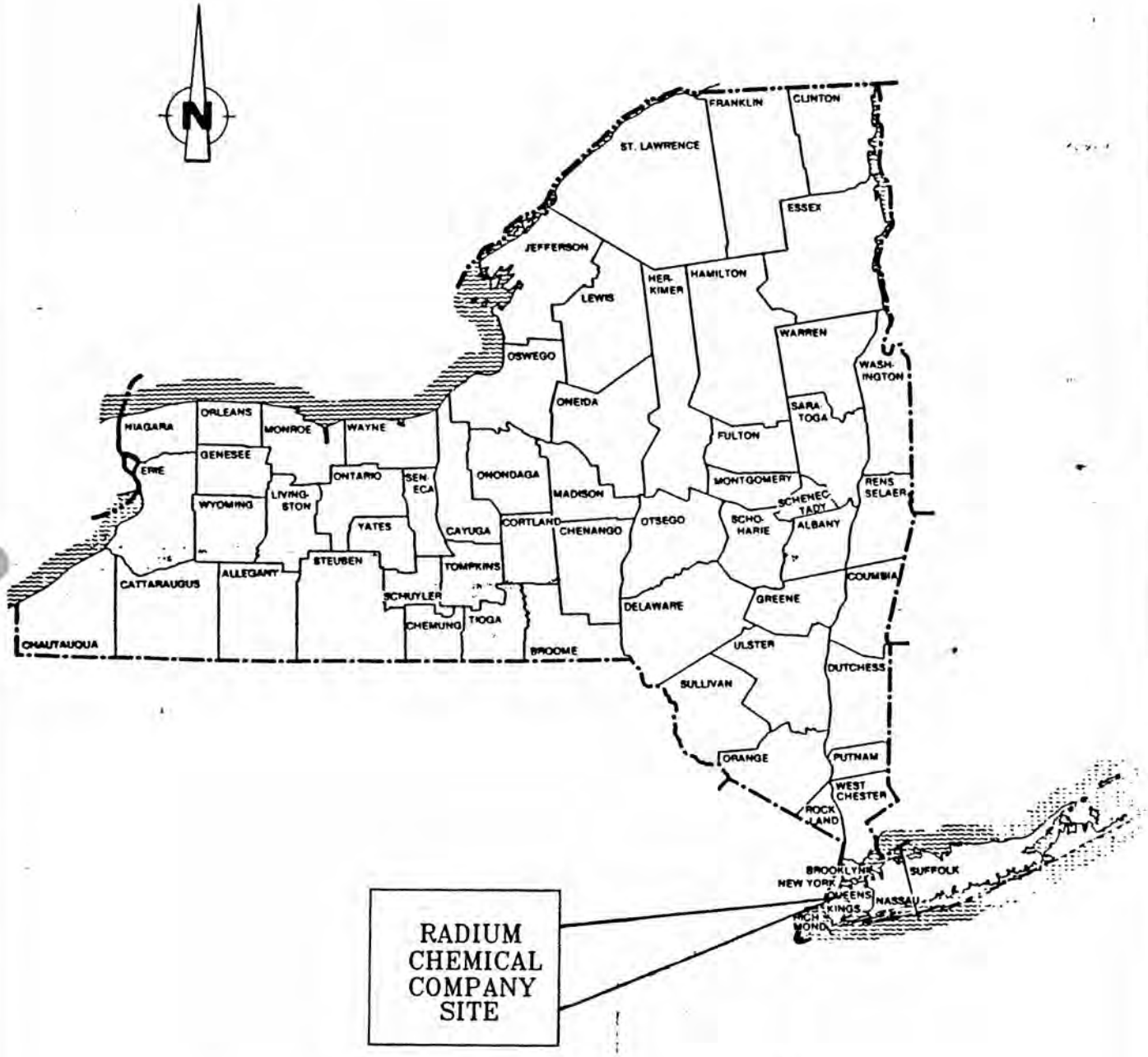
cc: (after approval is obtained)

W. Muszynski, 2RA
J. Marshall, 2DRA
C. Simon, 2AWM
K. Callahan, 2ERR-DD
R. Salkie, 2RPO
G. Zachos, 2ERR-RP
B. Sprague, 2ERR-RP
J. Czapor, 2ERR-SC
G. Pavlou, 2ERR-NYCRA
M. Randol, 2OEP
E. Schaaf, 2ORC-NYCSUP
R. Gherardi, 2OPM-FIN
K. Weaver, 2OPM-FIN
P. Giardina, 2AWM-RAD
S. Anderson, PM-214F (EXPRESS MAIL)
T. Fields, WH-548B
H. Longest, WH-548B
T. Jorling, NYSDEC
M. O'Toole, NYSDEC

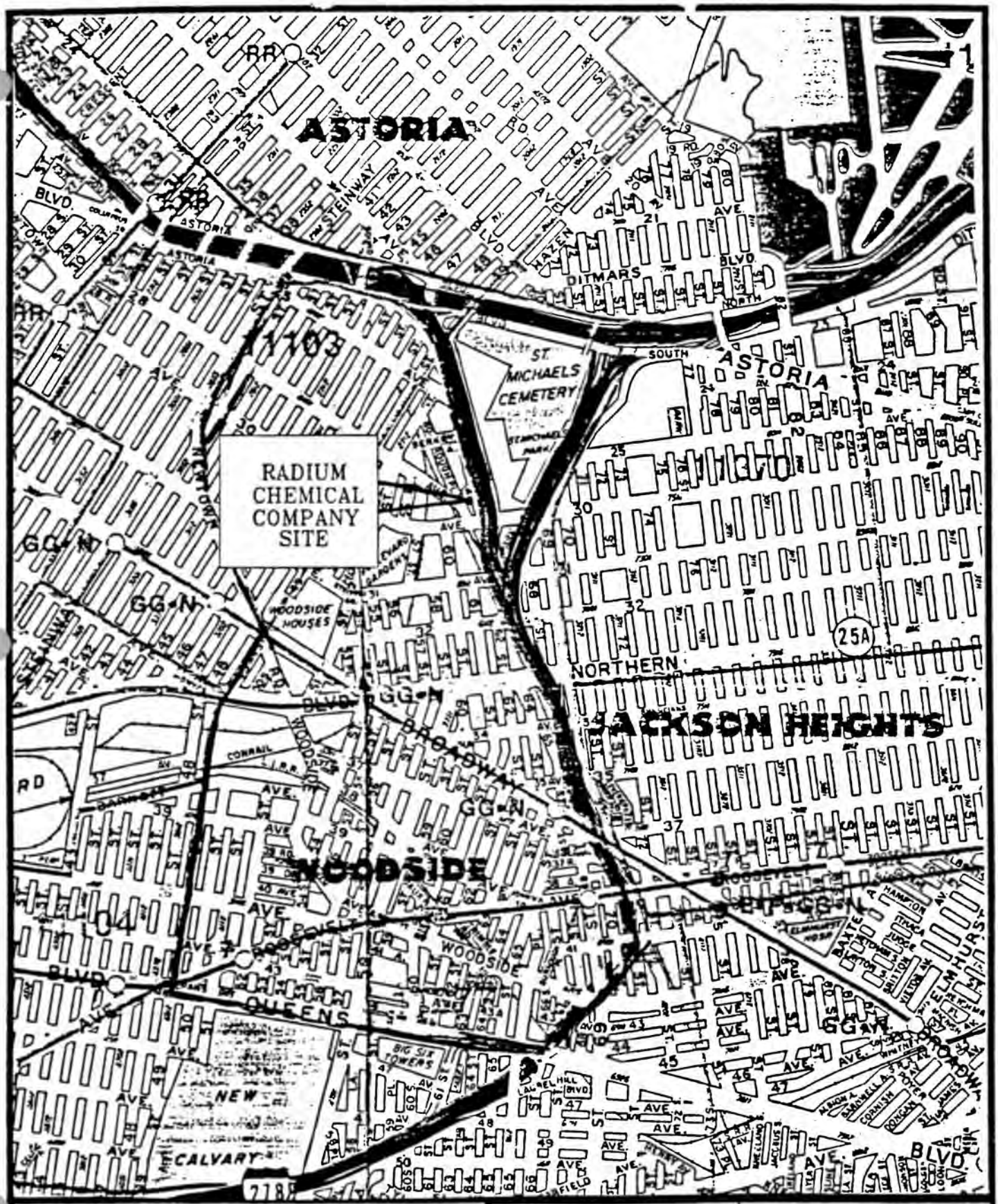
bcc: S. Googins, 2AWM-RAD
C. Fitzsimmons, 2ERR-RP
K. Moyik, 2ERR-TSB
L. Guarneiri, WH-548B

RADIUM CHEMICAL COMPANY

WOODSIDE, QUEENS, NEW YORK

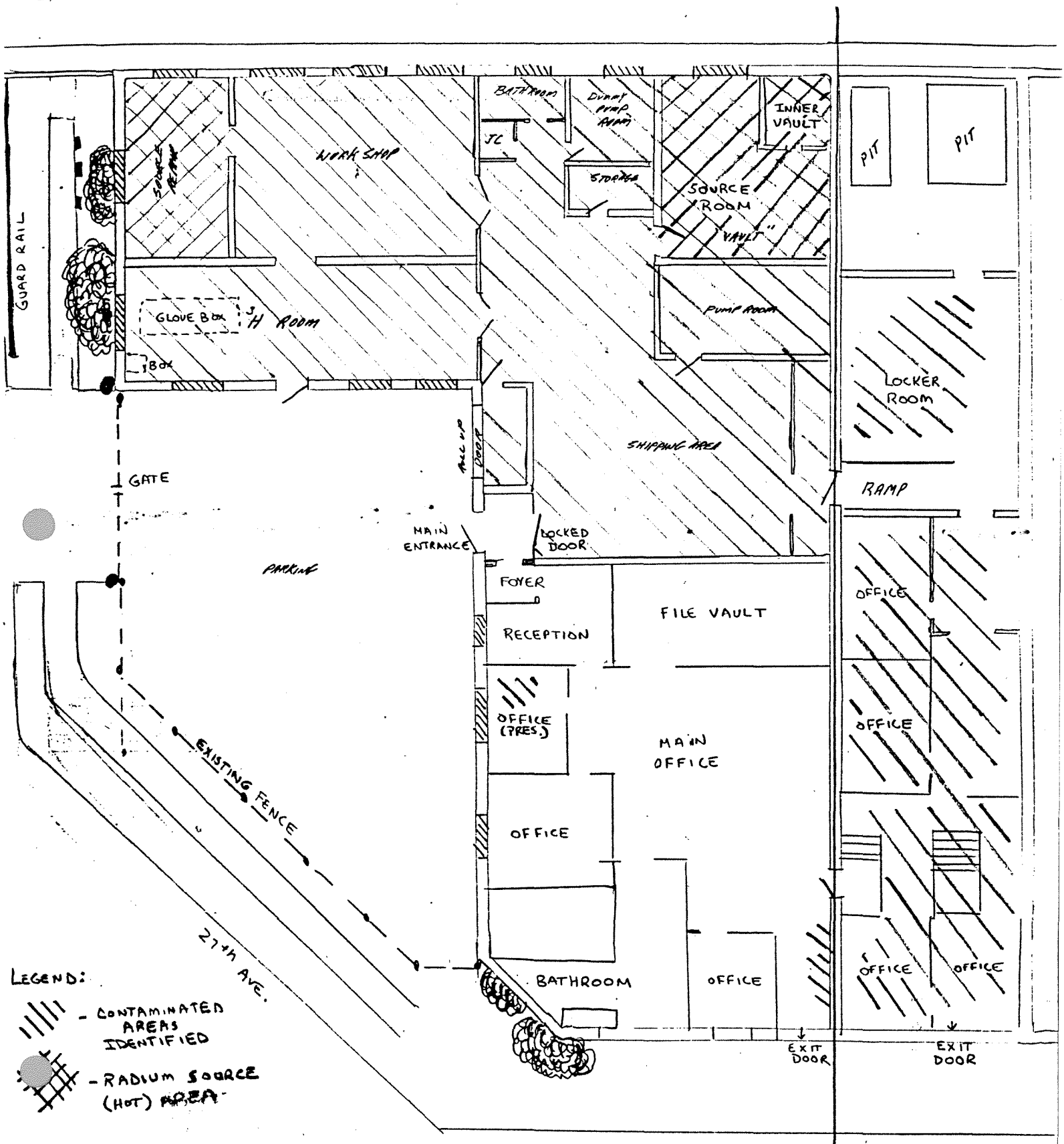


WESTON — SPILL PREVENTION & EMERGENCY RESPONSE DIVISION		EPA PM Militscher	Site Location Map
In Association with ICF Technology Inc., C.C. Johnson & Associates, Inc., Resource Applications, Inc., Geo/Resource Consultants, Inc., and Environmental Toxicology International, Inc.		TAT PM Long	Radium Chemical Co.



WESTON — SPILL PREVENTION & EMERGENCY RESPONSE DIVISION	EPA PM Militscher	Site Location Map
In Association with ICF Technology Inc., C.C. Johnson & Associates, Inc., Resource Applications, Inc., Geo/Resource Consultants, Inc., and Environmental Toxicology International, Inc.	TAT PM Long	Radium Chemical Co.

BQE



RADIUM CHEMICAL COMPANY SITE
Facility Drawing
Woodside, New York

ATTACHMENT NO. 1

Uranium Series (4n + 2)*

Nuclide	Historical name	Half-life	Major radiation energies (MeV) and intensities†		
			α	β	γ
$^{238}_{92}U$	Uranium I	4.51×10^{9}y	4.15 (25%) 4.20 (75%)	---	---
$^{234}_{90}Th$	Uranium X_1	24.1d	---	0.103 (21%) 0.193 (79%)	0.063c‡ (3.5%) 0.093c (4%)
$^{234}_{91}Pa^{m}$	Uranium X_2	1.17m	---	2.29 (98%)	0.765 (0.30%) 1.001 (0.60%)
99.87% | 0.13%					
$^{234}_{91}Pa$	Uranium Z	6.75h	---	0.53 (66%) 1.13 (13%)	0.100 (50%) 0.70 (24%) 0.90 (70%)
$^{234}_{92}U$	Uranium II	2.47×10^{5}y	4.72 (28%) 4.77 (72%)	---	0.053 (0.2%)
$^{230}_{90}Th$	Ionium	8.0×10^{4}y	4.62 (24%) 4.68 (76%)	---	0.068 (0.6%) 0.142 (0.07%)
$^{226}_{88}Ra$	Radium	1602y	4.60 (6%) 4.78 (95%)	---	0.186 (4%)
$^{222}_{86}Rn$	Emanation Radon (Rn)	3.823d	5.49 (100%)	---	0.510 (0.07%)
$^{218}_{84}Po$	Radium A	3.05m	6.00 (~100%)	0.33 (~0.019%)	---
99.98% | 0.02%					
$^{214}_{82}Pb$	Radium B	26.8m	---	0.65 (50%) 0.71 (40%) 0.98 (6%)	0.295 (19%) 0.352 (36%)
$^{218}_{85}At$	Astatine	~2s	6.65 (6%) 6.70 (94%)	? (~0.1%)	---
$^{214}_{83}Bi$	Radium C	19.7m	5.45 (0.012%) 5.51 (0.008%)	1.0 (23%) 1.51 (40%) 3.26 (19%)	0.609 (47%) 1.120 (17%) 1.764 (17%)
99.98% | 0.02%					
$^{214}_{84}Po$	Radium C'	164μs	7.69 (100%)	---	0.799 (0.014%)
$^{210}_{81}Tl$	Radium C''	1.3m	---	1.3 (25%) 1.9 (56%) 2.3 (19%)	0.296 (80%) 0.795 (100%) 1.31 (21%)
$^{210}_{82}Pb$	Radium D	21y	3.72 (.000002%)	0.016 (85%) 0.061 (15%)	0.047 (4%)
$^{210}_{83}Bi$	Radium E	5.01d	4.65 (.00007%) 4.69 (.00005%)	1.161 (~100%)	---
~100% | .00013%					
$^{210}_{84}Po$	Radium F	138.4d	5.305 (100%)	---	0.803 (0.0011%)
$^{206}_{81}Tl$	Radium E''	4.19m	---	1.571 (100%)	---
$^{206}_{82}Pb$	Radium G	Stable	---	---	---

*This expression describes the mass number of any member in this series, where n is an integer.
Example: $^{206}_{82}Pb$ (4n + 2).....4(51) + 2 = 206

†Intensities refer to percentage of disintegrations of the nuclide itself, not to original parent of series.

‡Complex energy peak which would be incompletely resolved by instruments of moderately low resolving power such as scintillators.

Data taken from: Table of Isotopes and USNRDL-TR-802. Chart taken from: Radiological Health Handbook, H.E.W.,

DRAFT

Preliminary Assessment and Request for CERCLA Removal Funding;
Radium Chemical Company, Woodside Queens, N.Y. - ACTION MEMORANDUM

Christopher A. Militscher, On-Scene Coordinator
Response and Prevention Branch

Redact

William J. Muszynski, P.E.
Acting Regional Administrator

THRU: Stephen D. Luftig, Director
Emergency and Remedial Response Division

I. EXECUTIVE SUMMARY

The New York State Department of Environmental Conservation (NYSDEC) and other agencies have requested the U.S. Environmental Protection Agency's (EPA) assistance in stabilizing and cleaning up a site involving the improper storage of high level radioactive substances. Radium Chemical Company (RCC) handles radium "needles" or sealed sources sparingly used for cancer therapy and medical research. A Stipulation and Order was issued on October 19, 1987, by New York State against the company for specific security and stabilization measures for the site, to secure leaking materials, to remove the materials for proper disposal, and to decontaminate the building. The Stipulation and Order was not complied with by RCC. Thus, a second Stipulation and Order was obtained on July 20, 1988, determining that the facility could not be maintained and that was de facto abandoned.

On-scene site security ceased by RRC as of July 26, 1988, at which time EPA began to provide 24 hour site security. This action was taken as per Mr. Stephen D. Luftig's verbal approval for a Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), as amended by the Superfund Amendments and Reauthorization Act (SARA) of 1986, removal action. This action in the form of site security and eventual site stabilization measures for the radioactive materials includes a total project ceiling of $25,000, which includes $20,000 for mitigation contracting.

This Action Memorandum serves to document this action and provides for a complete removal of the radioactive materials at the site. The removal action's project ceiling would be for an additional $1,960,400, of which $1,524,400 is for mitigation contracting. This brings the totals to $1,985,000 and $1,544,400, respectively.

The proposed project includes the provision for the preparation of a Site Specific Contract to perform the actual removal work due to the highly complex nature and technical requirements for the cleanup of the radioactive materials.

FILE:W/Radium Chemical Company
2ERR-RP:MILITSCHER:340-6647:8/17/88:Sue:Disk Action Memos #1:Rev.8/31/88

II. BACKGROUND

A. Historical Information

The Radium Chemical Company (RCC) was founded in New York in 1913. Radium, a naturally occurring element isolated from uranium by Marie and Pierre Curie in 1898, was used primarily for luminous paint. Radium Chemical Company's more recent use for radium was for cancer therapy whereby the radiation emitted from tiny needles filled with radon gas killed cancerous cells. Radium Chemical either leased or sold the needles to hospitals and research laboratories. The needles were also used in the oil industry to chart geological strata.

Over the last 20 years, however, safer techniques involving cobalt and cesium were developed and the medical use of radium dropped significantly. Thus, the Company at this time is storing relatively large quantities of needles and other sealed sources compared to the materials which can be practically and safely utilized.

The New York State Department of Labor (NYSDOL) denied Radium Chemical Company's application for relicensing several years ago. More recently, seperate and district basis for determining that Radium Chemical should not be granted a license to sell or lease sealed radium sources related to the manner of operations of using radioactive materials in Athens, Georgia and Ottawa, Illinois by Luminous Process, Inc. This Deleware Corporation of which Joseph A. Kelly, Jr., Radium Chemical's current President, is also President. Consent judgements entered in the U.S. District Court for the Middle District of Georgia and the 13th Judicial Circuit Court of LaSalle County, Illinois, determined that the two facilities were contaminated with radiation levels which violated the limits set by the applicable statutes and regulations of Georgia and Illinois, respectively. As part of the settlement for incurred costs for the EPA cleanup, the Federal Government obtained options on the corporate property of RRC, including stock, physical property, and other tangible assets.

B. Site Setting/Description

The Radium Chemical Company is located at 60-06 27th Avenue in Woodside, Queens, New York. The one-story brick building abuts the Brooklyn Queens Expressway on one side and 27th Avenue on another. (See Location Maps No. 1 and 2).

The Radium Chemical Company is located in a commercial and residential area which is heavily populated. A commercial facility also shares a common wall and part of the overall building with

the Radium Chemical Company facility (i.e., Solux Co.). A health club is located within 100 feet to the facility. During preliminary assessment activities, it was observed that numerous pedestrians walk past a portion of the fence line of the facility. Furthermore, vehicular traffic is very active along 27th Avenue. The Brooklyn - Queens Expressway has almost constant traffic and is a main thoroughfare for New York City commuter traffic. Traffic congestion and tie ups are commonplace. The Brooklyn - Queens Expressway's right lane is located less than 12 feet from the wall to the facility.

C. Quantity of Types of Substances Present

According to the NYSDEC, 82.6 curies of radium are stored at the facility in the form of "needles" and "seeds". These sources are encased in platinum-iridium or other metals and were formerly used in the medical treatment procedures for cancer therapy. There are 7.8 curies of radium-beryllium neutron sources and 16.9 curies of other radium sources used in radiography applications. In total, there are 107.3 curies of radium sources. (In SI Units, this is equivalent to 397.01 X 10^{10} Becquerels).

Radium (Atomic No. 88) is a radioactive alkaline earth metal. Radium is a product of disintegration of uranium and is present in all ores containing uranium. The atomic mass number of the most stable radium isotope is 226. Radium undergoes spontaneous disintegration with the formation of radon gas (i.e., 226 Ra88 > 222 Rn84 + 4 Hez). One gram of radium produces approximately .0001 milliliters of radon per day at normal temperatures and pressure.

Attachment No. 1 shows the natural decay of radium 226 into its radioactive daugthers and the associated type of radiation (i.e., alpha, beta, and gamma). Radionucleides, such as radium 226, are listed EPA Hazardous Substances under 40 CFR Parts 117 and 302.

III. THREAT

A. Threat of Public Exposure

The main threats to the public are exposure through direct human contact and the possibility of vandalism and/or theft of the radioactive sources. It has been a well publicized fact that these radioactive sources are present at the facility and could encourage acts of theft and possibly, although not extremely likely, terrorism. However, should site security at the facility cease, the potential for direct exposure is greatly increased. Direct contact with the radioactive sources could result in severe radiation burns, different cancers, and other long term diseases, sterility, and even death.

A fire at the facility or the adjacent company could expose firefighters and other emergency response personnel to radiation contamination. The smoke from the fire could directly or indirectly expose thousands of people to radioactive particles in the smoke or from the fallout. Similarily, the runoff from firefighting efforts would contaminate streets, sewer and storm drains and pipes, and equipment to significant levels of radiation.

Unauthorized or illegal access could expose unprotected persons to significant levels of radon gas without entering the vault area itself. If ventilation and electrical systems are not maintained or fail, a buildup of radon gas will naturally occur in the vault and surrounding rooms of the facility. Although some site security measures existed (e.g., fences, signs), the cessation of 24-hour security guards would allow for unauthorized and unrestricted access to the facility, thus, EPA began site security on July 26, 1988.

B. Evidence of Extent of Release

EPA performed an outside survey of the facility on September 17, 1987, with NYSDOL and detected no radionucleide contamination outside of the facility. Measurements of gamma and X-ray exposure rates were taken outside the facility and nearby businesses in the area. Measurements taken by EPA essentially confirmed previous measurements taken outside the building by NYSDOL and NYSDEC. Exposure rates ranged from background to approximately 1.5 to 4.0 MR (milliRoentgens) per hour. The maximum readings were observed at direct contact with the outside of the buildings. On the sidewalk, immediately outside a facility wall, the exposure rate ranged from 300 to 450 MR (microRoentgens) per hour. Across the street from this location, the exposure rate ranged from 50 to 100 MR per hour. Based upon comparable results from the NYSDOL, measurements in the far right lane of the BQE was no greater than 500 MR per hour. On contact with the building at this location exposure rates were approximately 0.2 MR per hour. The roof of the building above the vault area was found to have exposure rates as high as 5.0 MR per hour.

C. Previous Actions to Abate Threat

EPA has provided technical assistance to EPA, the State, and City Agencies through the Radium Chemical Company (RRC) Task Force. Mr. Paul Giardina, Chief of EPA's Radiation Branch co-chairs this task force. The NYSDEC's Stipulation and Order required that the RRC provide for a number of mitigation actions to be taken at the facility until complete removal and disposal of the unpermitted radioactive sources could be made. These actions included activities by RRC which provided additional reduction of external gamma

radiation levels (i.e., shielding at windows), the installation of additional fencing, the posting of signs, and the use of 24-hour guard services. Although, the guard services were not always reliable and were not paid full by RRC.

D. Current Action to Abate Threat

Besides legal actions sought by the State of New York and meetings held with RRC legal representatives, EPA's current actions to abate the threat include the following:

1. Initiation of 24-hour site security at the facility.
2. Provisions for paying for electrical and telephone services.
3. Installation of a TV monitor and outside surveillance camera and spotlight.
4. Installation of a backup electrical generating system.
5. Purchase of replacement motors for vault ventilation fans.

IV. ENFORCEMENT

Region II's Office of Regional Counsel, Site Compliance Branch, and Radiation Branch are currently working with the New York State Attorney General's Office on the failure by RCC to comply with the State's Stipulation and Order. RCC has failed to regularly maintain the 24-hour guard service and the Company has failed to make payments to the Contractor for guard services on at least two occasions. The Company has failed to provide reliable radon measurements, an adequate disposal plan, an adequate decontamination plan, and bids for decontamination work.

The only removal activities carried out to date by the Company are the removal of four containers with four grams of radium (representing four curies) and the receipt of four more containers which have not yet been put to use. According to NYSDEC, the Company has not met the requirements for removal of all of the radioactive materials by January 1, 1988, and decontamination of the facility.

In a letter dated June 30, 1988, which documented a June 28, 1987, meeting, EPA advised the Company's legal representatives that a CERCLA response action is likely because RRC had failed to comply with the October 19, 1987, Stipulation and Order. This letter addressed the inability by RRC to pay for guard services to protect the building, to pay its employees, or to properly dispose of the radioactive materials. Furthermore, the failure to pay its obligations, in effect, resulted in "abandonment" of the radium sources.

The Stipulation and Order dated July 20, 1988, reconfirmed this determination of de facto abandonment by RCC. The Stipulation and Order allows RCC to properly sell the radium sources, if an appropriate buyer can be found, with proceeds from the sale to be used to satisfy any expenses incurred by the Government including previous unsatisfied judgements with EPA Region IV.

Radium 226 is a listed Hazardous Substance under ~~with~~ 40 CFR Parts 117 and 302. Thus, the National Oil and Hazardous Substance Pollution Contingency Plan (NCP), 40 CFR Part 300.65(b)(2), criteria for a removal action are met through the actual or potential exposure to hazardous substances, pollutant, or contaminants by nearby populations, animals, or food chain and the hazardous substances, pollutants, or contaminants in drums, barrels, tanks, or other bulk storage containers that may pose a threat of release.

V. PROPOSED PROJECT AND COSTS

A. Objective of the Project

The overall objective of this removal action is to continue with site security measures, to initiate site stabilization measures for the radioactive materials, and to properly remove and dispose of the materials at a licensed disposal facility. Initially, the removal action will include measures to reduce the potential for disturbing dusts and particles which are contaminated with radioactive substances and to upgrade and improve the ventilation system in the vault area. Also, EPA will initially segregate radioactive sources from flammable and combustible materials in the vault and other storeroom areas to reduce the threat of fire involving radiation sources.

At this time, it is not certain what level of decontamination of the building will be necessary until the radioactive sources are removed and until a complete radiation survey can be performed. For purposes of planning, this project only includes the removal of approximately 30 cubic yards of obviously contaminated materials (e.g., Tools, benches, loose site debris, etc.). Removal or full decontamination of the floors, walls, ceiling, and other permanent portions of the building are not within the scope of work for this removal action.

This removal action includes the provision for the preparation, issuance, and award of a Site Specific Contract for the actual cleanup and removal operations. The ERCS contractor lacks the technical expertise and specialized equipment necessary for a high-level radioactive materials removal action. The ERCS contractor will provide site security and other support activities under the proposed project.

The development and implementation of the Site Specific Contract will be coordinated with the Facilities Administration and Management Branch within EPA Region II to facilitate its preparation and issuance. The Site Specific Contract will address the type of contract required to perform the specialized work.

Estimated project costs and the proposed schedule are included in this Action Memorandum but could be subject to significant change depending upon the ability to provide a Site Specific Contractor. The activities and actions under this removal include the following items:

1. Continue with 24 hour site security, TV monitor camera surveillance, backup generating systems, backup motors for ventilation systems, and providing electrical and telephone services.

2. Implementation of a full radiological medical monitoring program, including whole mass body surveys, periodic dosimeter recording and analysis, installation of radiation detection devices, and regular perimeter monitoring.

3. Setting up command post and decontamination areas and floor installation of radon dust and radioactive particle control devices, including shielding and ventilation equipment.

4. Installation of remote handling devices to containerize and resecure radioactive sources.

5. Package, label, and placement of radioactive sources in specialized radioactive waste casks for transportation. Obtain special permits for disposal and preparation of manifests and placards, where appropriate.

6. Coordinate and make arrangements for restricted transport routes to disposal facility.

7. Remove loose debris, benches, and other non-fixed items which are contaminated for transportation to appropriate disposal facility.

8. Wipe surfaces clean and remove dust and particles in vault and other storeroom areas for decontamination purposes.

9. Provide full radiological survey and sample and analyses of surface areas to determine extent of contamination to fixed portions of the building after all sources have been removed. Provide results to remedial program office and New York State agencies. Demobilize equipment and personnel and safety facility.

It is not proposed in the scope of work of this Action Memorandum to decontaminate the fixed portions of the building, including floors, walls, ceiling, etc.

B. Project Estimated Costs

Mitigation Contracting	
ERCS Cleanup Contractor (Labor: Response Manager, Field Clerk, Electrician, Guards for 24-hour site security, Equipment: backup generator, surveillance camera, etc.)	$ 75,000
Site Specific Contractor (Labor, Equipment, Expendable Materials, Transportation, Disposal, and Radiological Monitoring, Sampling and Analyses)	$ 1,250,000
Contingency Factor of 15%	$ 168,750
Rounded Mitigation Contracting Total	$ 1,294,000
TAT Extramural Costs	$ 110,000
Subtotal Extramural Costs	$ 1,404,000
Contingency Factor for Extramural Costs of 10%	$ 140,000
Total Extramural Costs	$ 1,544,400
Intramural Costs	
EPA Regional and Headquarters Direct Costs	$ 126,000
ERT Direct Costs	$ 9,000
Intramural Indirect Costs	$ 306,000
Total Intramural Costs	$ 441,000
Total Project Ceiling	$ 1,985,400
Rounded to Nearest Thousand	$ 1,985,000

C. Project Schedule

The preparation and issuance of the Site Specific Contract for the removal activities is expected to take several months to complete. Upon award of a contract, it is expected that following

medical monitoring of personnel for radiation and other site safety measures, actual removal activities can commence in one to two weeks. Depending upon the extent of exposure to on-site workers to above standard levels of radiation, it is expected that the cleanup, transportation and disposal activities will take two to three months to complete. Final decontamination and radiation surveys following the removal of the sources is expected to take one to two months to complete. In total, it is expected that the removal action can be completed in the late summer of 1989.

Disposal activities will be conducted in accordance with State regulations and Federal regulations, where applicable. The radioactive materials in the facility are not strictly regulated by the Resource, Conservation and Recovery Act of 1980, as amended. However, every effort will be made to ensure that comparable standards for transportation and disposal are applied in the spirit of EPA's CERCLA Off-Site Treatment, Storage, and Disposal Policy.

VI. RECOMMENDATIONS

Conditions at the Radium Chemical Company site warranted the action to provide site security and stabilization measures until such time as a complete removal of the radioactive sources could be implemented in accordance with the criteria under 40 CFR Part 300.65 (b)(2) of the National Oil and Hazardous Substance Pollution Contingency Plan. That is, the actual or potential exposure to hazardous substances or pollutants or contaminants by nearby human pollutions, animals, or food chain and hazardous substances, pollutants, or contaminants in drums, barrels, tanks, or other bulk storage containers that may pose a threat of release, existed and immediate measures to mitigate the actual threat of release.

This removal action is expected to contribute to the efficient performance of long-term remedial measures by removing the leaking radioactive sources and minimizing the continued release from the facility to the environment.

The responsible party was found through State and Federal actions to be incapable of providing a timely response to mitigate the threat from the radioactive sources.

It is, therefore, recommended that a continued removal action under CERCLA, as amended by SARA be approved for funding an increase above the current project ceiling of $25,000, of which $20,000, is for mitigation contracting.

Your authority to authorize the additional project funds to total $1,985,000, of which $1,544,400 is for mitigation contracting, including previously authorized funds, is pursuant to Administrator's September 21, 1987 Delegation 14-2-B.

Approval: _____ Date: _____

Disapproval: _____ Date: _____

cc: (after approval is obtained)

J. Marshall, Acting 2DRA
S. Luftig, 2ERRD
K. Callahan, 2ERRD-DD
R. Salkie, 2RPO
G. Zachos, 2ERR-RP
B. Sprague, 2ERR-RP
J. Czapor, 2ERR-SC
G. Pavlou, 2ERR-NYCRA
M. Randol, 20EP
D. Blazey, 20RC
E. Schaaf, 20RC-NYCSUP
H. Barrack, 20PM
R. Gherardi, 20PM-FIN
K. Weaver, 20PM-FIN
P. Giardina, 2AWM-RAD
S. Anderson, PM-214F (EXPRESS MAIL)
T. Fields, WH-548B
H. Longest, WH-548B
P. McKechnie, OIG
T. Jorling, NYSDEC

bcc: L. Wright, 20RC-NYSUP
S. Googins, 2AWM-RAD
C. Fitzsimmons, 2ERR-RP
K. Moyik, 2ERR-TSB
L. Guarneiri, WH-548B

C. MILITSCHER

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION II

5-5.30-01

DATE: SEP 6 1988

SUBJECT: Removal Action Memorandum for Radium Chemical Company, Woodside Queens, New York

FROM: Christopher A. Militscher, On-Scene Coordinator
Response and Prevention Branch

TO: See Below:

Attached for your review and comment is the proposed action memorandum for Radium Chemical Company, Woodside Avenue, Queens, N.Y.

If you have any comments please provide them to me as soon as possible, but no later than September 16, 1988. If comments are not received from you by that date, I will assume your concurrence on the attached draft. We will be reluctant to take comments on the final version that were not made on this draft. If you have further questions, feel free to contact me at FTS 340-6647.

Attachment

Addresses:

Stephen D. Luftig, 2ERR
Richard Salkie, 2ERR-RPO
Bruce Sprague, 2ERR-RP
John Czapor, 2ERRD-SC
Margaret Randol, 20EP
Eric Schaaf, 20RC-NYCSUP

Request for Ceiling Increase and Exemption from $2,000,000 Funding Limitation for the Radium Chemical Company Removal Action, Woodside, Queens, New York; Site No. 3H

William J. Muszynski, P.E.
Acting Regional Administrator

J. Winston Porter, Assistant Administrator
Office of Solid Waste and Emergency Response

THRU: Henry L. Longest II, Director
Office of Emergency and Remedial Response

Timothy Fields, Jr., Director
Emergency Response Division

I. ISSUE

Funds are necessary to continue stabilization measures, initiate cleanup, transportation, and disposal activities of leaking uncontrolled radioactive materials and other hazardous substances at the Radium Chemical Company (RCC) site in Woodside, Queens, New York. Continued response actions are estimated to exceed the $2 million statutory limit and further removal actions cannot be undertaken unless an exemption to this limit and a ceiling increase are approved. It is estimated that an additional $2,872,000 over the existing $250,000 project ceiling will be required to complete this project, of which $2,524,000 are extramural cleanup contractor costs.

II. BACKGROUND

Initial removal activities began on July 26, 1988, at which time the U.S. Environmental Protection Agency (EPA) began by providing 24-hour site security at RCC. This action was taken per Mr. Stephen D. Luftig's verbal approval of the removal action pursuant to the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), as amended by the Superfund Amendments and Reauthorization Act (SARA) of 1986.

This action was documented and amended in a request for rapid authorization of additional Superfund monies and Action Memorandum dated September 2, 1988 (Attachment A). The amended action provided for a total project ceiling of $150,000, of which $100,000 was for mitigation contracting. On November 17, 1988, an additional $100,000 was verbally authorized by Mr. Luftig for mitigation costs raising the total project ceiling to $250,000.

FILE:Radium Chemical Co.
2ERR:RP:MILITSCHER:340-6647:TT/SI:Action Memo#1:Rev.11/15/88:11/19/88
11/21/88:11/25/88:11/28/88

The New York State Department of Environmental Conservation (NYSDEC) and other agencies had requested that EPA remove the large quantity (greater than 107.3 curies) of radioactive materials and decontaminate this facility. RCC handled radium "needles", "seeds", or sealed sources currently used sparingly for cancer therapy and medical research in the United States (See Attachment B). RCC is financially incapable of providing for proper storage of the radioactive materials and has been unable to comply with New York State orders to cleanup and remove the radioactive materials at the facility.

New York State issued its first Stipulation and Order against RCC on October 17, 1987, for specific security and stabilization measures at the facility, to secure leaking materials, to remove the radioactive materials for proper disposal, and to decontaminate the building. A second Stipulation and Order was obtained on July 20, 1988, after the first Stipulation and Order provisions were not complied with by RCC. Thus, the second Stipulation and Order made the determination that the facility could not be maintained and that it was de facto abandoned by RCC. RCC has been found to be financially insolvent although bankruptcy proceedings have not been initiated by its President.

RCC is located at 60-06 27th Avenue in Woodside, Queens, New York. The one-story brick building abuts the Brooklyn Queens Expressway (BQE) on one side and 27th Avenue on the other (See Location Maps Attachments No. 1, 2 and 3). RCC is located in a commercial and residential area which is heavily populated. A commercial facility which constructs light fixtures also shares a common wall and part of the overall building with the RCC facility (i.e., Solux Company). The BQE Health Club is located within 100 feet from the RCC facility. Numerous pedestrians walk past a portion of the fence line of the facility. Vehicular traffic is very active along 27th Avenue as it is a main artery in Queens to access the BQE.

The BQE has heavy vehicular traffic on it during most hours of the day and is a main thoroughfare for New York City commuter traffic. Traffic congestion and tie ups are commonplace. The westbound lane of the BQE is located less than 6 feet from the south wall of the facility. Attachment C contains additional historic and background information of RCC and more detailed radiological information pertaining to this site.

III. ACTIONS TAKEN TO DATE

Actions taken to date by EPA include the initiation of 24-hour site security and site stabilization measures. These measures include provisions to provide telephone service, electrical service, gas

and oil deliveries for heating, and water and sewer service for this building. Other activities conducted to date include measures for a security surveillance system, installation of a backup electrical generating system, purchase of backup ventilation fan motors to reduce the buildup of radon gas levels, purchase of decontamination materials, establishment of a decontamination area, initiation of a dosimeter badge program with radiation exposure monitoring, segregation of flammables and toxic chemicals from the vault area (radium storage area), monitoring radiation levels and radon gas sampling.

At the time this Action Memorandum was being prepared, other stabilization measures taken were increased fencing, posting of signs around the facility, increased screening in the front of windows, and mobilizing an office trailer for security guards and other on-site personnel. A videotape of the facility was made by EPA during one of the preliminary assessment visits.

The On-Scene Coordinator and other Regional management personnel have requested that NYSDEC and EPA staff begin evaluations of the site for proposed ranking on the National Priorities List (NPL). It is expected that significant residual contamination may exist after the removal action is completed to warrant continued remedial actions at this site.

In addition, contingency planning and development of an extensive site safety plan are being developed in coordination with the NY/NJ Regional Response Team and all appropriate New York City officials, part of the Local Emergency Planning Committee.

IV. CRITERIA FOR EXEMPTION FROM THE STATUTORY LIMIT

The Radium Chemical Company site continues to meet the following criteria prescribed in CERCLA Section 104(C), as amended by SARA, necessary for an exemption from the two million dollar limitations for removals. Also, the site continues to meet the criteria for a removal action under 40 CFR 300.65(b)(2) of the National Oil and Hazardous Substance Contingency Plan (NCP).

1. Continued response actions are immediately required to mitigate and emergency.

A continued response action will eliminate the threat of fire and explosion posed by the improperly stored containers of hazardous materials including flammable liquids, corrosives, poisons, and oxidizers. Some of the hazardous substances identified include acetone, hydrochloric acid, sulfuric acid, nitric acid, formaldehyde, elemental mercury, barium acetate, sodium hydroxide, solvent

naptha, and numerous metal oxides and oxysalts. An anomymous bomb threat was received on October 3, 1988, by EPA's site security force. Primarily, the threat of a fire or explosion at this facility could cause untold radioactive contamination in and around the facility, and potentially, in the community of Woodside and beyond. On two occasions the RCC building has been struck by vehicles. The wall struck by these vehicles was the vault room (where the radium sources are located) which is adjacent to the roadway. Luckily, no fires occurred. A fire in this room possibly emitting radioactive particles would potentially affect thousands of people including responding firefighters, local residents and commuters on the roadway.

2. <u>There is an immediate risk to public health, welfare, or the environment</u>.

According to the RCC records obtained by EPA, 82.6 curies of radium are stored at RCC in the form of "needles" or "seeds". These sources are encased in platinum-iridium and other metals and were formerly used in the medical treatment procedures for cancer therapy. There are 7.8 curies of radium-beryllium neutron sources and 16.9 curies of other radium used in radiography applications. In total, there are 107.3 curies of known radium sources. (In SI units, this is equivalent to 397.01×10^{10} Becquerels). In addition, there is an unknown quantity of loose tritium (H^3) and radium also located at RCC. Attachment No. 4 shows the natural decay of Radium 226 into its radioactive daughters and the associated type of radiation (i.e., alpha, beta, and gamma and other radiological information). Radionuclides, such as Radium 226, are listed EPA Hazardous Substances under 40 CFR Parts 117 and 302.

The immediate risk to the public is the threat of exposure through direct human contact as a result of fire or explosion at this site.

Based upon preliminary contingency plan modelling by Lawrence Livermore National Laboratory, a worst case senario of a gasoline tanker from the BQE crashing and burning at RCC, could have radiological implications and deposition of radium at distances in excess of 5 miles. Actual discrete radium sources would be thrown hundreds of feet and if touched, would result in severe radiation burns and direct contamination of the area in which they fell.

Additional actions that could cause direct human contact are from vandalism or theft of the radioactive sources. Unfortunately, this site is in a area of heavy illegal drug trafficking and has been well publicized as containing radioactive sources encased in platinum, iridium and gold. This makes this site very appealing and encourages acts of theft and possibly terrorism. Direct contact

with the radioactive sources could result in severe radiation burns, increased lifetime risk for a variety of cancers and other long-term diseases, sterility and even death. Some of the sources of radium are known to be currently leaking or have previously leaked during RCC's operations.

Radon gas is currently being released from the vents in the roof at levels which exceed New York State and Federal guidelines at concentrations in excess of 200 pCi/l. Actual radium could also be emitted from the facility via the same ventilation system. A new

Wash drains and sinks located inside several of the rooms also show contamination and could be another pathway for the migration of radioactive materials.

Measurements of direct radiation exposure exceed EPA's trigger value (i.e., 1mR/hr) for emergency response personnel at the vault. The vault area has measurements which are greater than 2,000 milliRoentgens/hour (2,000 mR/ hr.) or 2 R/hr. At 2R/hr., an intruder in the vault would exceed the non-occupational Federal standard of 500 millirems per year in 15 minutes. In addition, radon gas levels in the vault, shipping area, and other portions of the facility exceed the New York State Department of Labor Standards for restricted access of 30 picocuries/liter (pCi/l). Radon gas levels have been sampled and been measured in excess of 300 pCi/l. An individual exposed to 300 pCi/l for an occuptional year (2,000 hours) would receive a dose equivalent the lungs of approximately 250 rem. This equates to an estimated increased risk of lung cancer per year of approximately 9×10^{-4}/year. Outside the wall of the shielded vault and other contaminated rooms, direct radiation exposure measurements are greater than 10 times normal background levels found typically in urban areas. For this reason, prolonged exposure to radiation at unacceptable levels would result in an immediate risk to persons in close proximity to the radium sources and contaminated areas.

A continued response action would reduce the immediate risk to public health and welfare by removing and properly disposing of the radioactive sources, other known grossly contaminated materials, and laboratory chemicals located at RCC. Tools, furniture, and other radium contaminated debris need to be removed because of the threat of exposure and direct contact, and in the event of a fire, actual radium could be released to the environment with similar effects as for the radium source materials.

As proposed, this phase of the Removal Action does not include removing the residual contamination from the walls, floors, or ceilings, after the source materials are removed. At this time,

it cannot be determined what additional decontamination measures will be required until after sources are removed, properly disposed of, and a subsequent radiation survey can be performed.

3. Assistance will not otherwise be provided on a timely basis.

RCC has been determined to be financially incapable of providing an effective response. New York State has obtained a court order confirming the de facto abandonment of the facility by its owner. Several other third party potentially responsible parties (PRP) have been identified, including Solux, Inc., which rented a portion of office space to RCC, the American Cancer Society, and Mamonides Medical Center. In the case of the American Cancer Society and Mamonides Medical Center, both parties own small quantities of radium sources, which were being stored by RCC. However, RCC for years was unable to identify and return their respective sources based upon poor record keeping and inventory controls. These sources represent a fraction of the total radium sources at RCC.

No other PRP's are known to exist. New York City and State agencies have declined to take response and removal actions at RCC.

V. ENFORCEMENT STATUS

As previously mentioned, no PRP has been found to be financially viable or willing to undertake a cleanup. The only removal activities carried out to date by RCC are the removal of four containers with four grams of radium (representing four curies) and the receipt of four more containers which have not yet been put to use. According to New York State, RCC did not pay the contractor for disposal services on these sources.

The Stipulation and Order dated July 20, 1988, reconfirmed this determination of de facto abandonment by RCC. The Stipulation and Order allows RCC to properly sell its radium sources, if an appropriate buyer can be found. The proceeds from these sales would be used to satisfy any expenses incurred by the government, including previous unsatisfied judgements with EPA. However, the sale of radium sources will not be permitted by EPA if it jeopardizes this removal effort. At this time, it is highly unlikely that RCC will be able to arrange for a proper sale of its sources. To date, RCC has been unsuccessful for over a year in making such arrangements. In addition, EPA has incurred costs resulting from the removal action at another RCC facility, Luminous Processes, Inc., a site located in Athens, Georgia. RCC also has numerous other creditors, including the Internal Revenue Service for tax debts, utility companies, previous guard services, the State of Illinois, Solux, Inc., and the City of New York.

EPA is currently seeking an Administrative Order to limit access of the facility from its President and two remaining employees. Their presence at the facility and its office is disruptive to EPA's proposed removal action and has been determined to be unsafe. Furthermore, their access to the office areas, which have been found to be contaminated in certain portions, poses a threat of the spreading of contamination from the facility through direct contact. EPA is also currently considering the issuance of Notice Letters to the other PRPs, although none of these parties appear capable of providing removal and disposal of the radioactive sources and hazardous substances.

VI. PROPOSED ACTION AND COSTS

The overall objective of this removal action is to continue with site security measures to initiate site stabilization measures for the radioactive materials and hazardous substances, and to properly remove and dispose of the materials at licensed and permitted disposal facilities. Initially, the actual cleanup activities will include measures to reduce the potential for disturbing dust and particles which are contaminated with radioactive substances and to upgrade and improve the ventilation system and decontamination areas in the facility. A new ventilation system will be installed to eliminate the emission of radon gas into the environment. This system will also reduce the level of radon gas in the building to allow the removal cleanup contractor personnel to work at lower concentrations of radon gas required under the site safety plan.

At this time, it is not certain what level of decontamination of the building will be necessary until the radioactive sources are removed and until a complete radiation survey can be performed. Based upon preliminary surveys, this proposed action will include the removal of up to 60 cubic yards of uncompacted materials that are grossly or obviously contaminated (e.g., tools, benches, loose site debris, cabinets, chairs, decon materials, etc.), and which cannot be cost effectively decontaminated. Removal or full decontamination of the floors, walls, ceiling, and other permanent portions of the building are not within the scope of work for this removal action due to uncertainties of residual contamination at this time and until all radium sources are removed.

This removal action includes the provision for the approval of a Support Agreement (i.e., Interagency Agreement) for technical assistance between the U.S. Army and its radiological cleanup contractor and the EPA. The OSC also considered the preparation, issuance, and award of a Site Specific Contract for the actual cleanup and removal operations. (However, unacceptable delays in implementating this type of contract could forestall cleanup opera-

tions for an undetermined number of months). The Emergency Response Cleanup Contractor Services (ERCS) contractor lacks the technical expertise and specialized equipment necessary for such a radioactive materials removal action. The ERCS contractor will continue to provide site security and other support activities under the proposed project.

The development and implementation of a Support Agreement with the U.S. Army's Rock Island Arsenal for technical assistance will be coordinated with the U.S. Army's Comptroller and Financial Management Group, and EPA Region II's Facilities Administration and Management Branch and other program support offices.

Estimated project costs and the proposed schedule are included in this Action Memorandum but could be subject to significant change depending upon the ability to obtain a Support Agreement with the U.S. Army, the ability to obtain a disposal facility variance to reduce the number of loads and transportation requirements, and the ability to decontaminate grossly contaminated materials.

Furthermore, if the OSC is unable to obtain U.S. Army assistance, it is planned to subcontract the cleanup and removal operations through the ERCS contractor at an increased cost. A site specific contract for disposal would also be attempted if this latter alternative is pursued.

The response actions to be taken in this removal action are consistent with any long-term remedial actions to be taken at the site.

The activities and actions under this removal include the following items:

1. Continue with 24-hour site security, TV monitor camera surveillance, backup generating systems, backup motors for ventilation systems, and providing electrical and telephone services.

2. Implementation of a full radiological medical monitoring program, including whole body counting, regular dosimeter recording and analysis, installation of radiation detection devices, and regular perimeter environmental monitoring.

3. Setting up command post and decontamination areas and floor installation of radium particulate and radioactive materials particle control devices which will reduce radon gas levels emitted through vents which go outside and ventilation equipment and floor covering.

4. Installation of remote handling devices to inventory, containerize, and resecure radioactive sources for disposal.

5. Package, label, and placement of radioactive sources in specialized radioactive waste casks for transportation. Obtain special permits for disposal and preparation of manifests and placards, where appropriate.

6. Coordinate and make arrangements for potentially restricted transport routes to disposal facility.

7. Remove loose debris, benches, and other non-fixed items which are contaminated for transportation to appropriate disposal facility. Potential decontamination of such items for unrestricted use will be based on Nuclear Regulatory Commission Regulatory Guidance 8.23 and/or appropriate N.Y. State regulations.

8. Wipe surfaces clean and remove dust and particles in vault and other storeroom areas where removal activities require reduced radiation levels under the site safety plan.

9. Remove and properly dispose of contaminated laboratory chemicals, where practical, in compliance with the CERCLA Off-Site Disposal Policy.

10. Demobilize equipment and personnel and secure facility.

It is not proposed in the scope of work of this Action Memorandum to decontaminate the fixed portions of the building, including floors, walls, ceilings, etc., due to the technical reasons previously cited.

The project schedule is expected to take up to one year to complete for the activities previously mentioned. Upon approval of the Support Agreement, it is expected that it will take one month for medical monitoring of personnel and mobilization of safety equipment to be completed. Actual cleanup and removal activities can commence following preparatory tasks. Depending upon the magnitude of radiation exposure to on-site workers, it is expected that the cleanup, transportation and disposal activities will take four to six months to complete. Decontamination of equipment, demobilization, and radiation surveys are expected to take two to three months to complete. Upon approval of this memorandum, a 12 month exemption will be processed for regional approval.

Disposal activities for the radioactive materials and hazardous substances will be conducted in accordance with State and Federal regulations, where applicable. The radioactive materials are not regulated under RCRA, however, EPA will use appropriate State and

Nuclear Regulatory Commission guidelines for cleanup and disposal standards. For the removal of the laboratory chemicals, the requirements of the CERCLA Off-Site Treatment, Storage, and Disposal Policy will be met.

Below are the estimated removal project ceiling costs.

Removal Project Ceiling Costs

Extramural Costs

ERCS Cleanup Contractor (Site security, stabilization measures, decon supplies, etc.)	$ 250,000
U.S. Army Radiological Cleanup Contractor	$ 1,650,000
10% Contingency Factor	$ 185,000
Mitigation Contracting Ceiling	$ 2,035,000
TAT Costs	$ 110,000
Subtotal Extramural Costs	$ 2,195,000
15% Contingency of Extramural Costs	$ 329,250
Extramural Costs: Rounded Total	$ 2,524,000

Intramural Costs

Intramural Direct Costs (ERT, HQ Region)	$ 136,000
Intramural Indirect Costs	$ 212,160
Total Intramural Costs	$ 348,160
Total Removal Project Ceiling Increase Estimate Rounded to Nearest Thousand	$ 2,872,000
Current Total Project Ceiling	$ 250,000
PROPOSED TOTAL CEILING	$ 3,122,000

VII. RECOMMENDATIONS

Trust fund monies allocated for this proposed action are under our Regional Advice of Allowance for FY-1989. The proposed allocations of mitigation funds in FY-89 will be $2,500,000 in first quarter.

I recommend that you approve this $2 million exemption request for this site because conditions at RCC continue to meet the CERCLA Section 104(C) criteria for exceeding financial limits to a removal actions. In addition, I recommend your approval of a ceiling increase of $2,872,000. This increase will raise the total project from $250,000 to $3,122,000, of which $2,524,000 is for increased extramural cleanup contractor costs. Please indicate your approval or disapproval by signing below.

Approval: _____ Date: _____

Disapproval: _____ Date: _____

cc: (after approval is obtained)

S. Luftig, 2ERR
R. Salkie, 2ERR-AD
R. Basso, 2ERR-SC
G. Zachos, 2ERR-RP
B. Sprague, 2ERR-RP
G. Pavlou, 2ERR-NYRA
M. Randol, 2OEP
D. Blazey, 2ORC
E. Schaaf, 2ORC-NYSUP
H. Barrack, 2OPM
R. Gherardi, 2OPM-FIN
P. Giardina, 2AWM-RAD
C. Hart, PM-214F (EXPRESS MAIL)
T. Fields, OS-210
H. Longest, OS-200
T. Jorling, NYSDEC
T. Hartnett, NYSDOL
J. Tritz, U.S. Army

bcc: T. Lieber, 2ORC-NYSUP
S. Googins, 2AWM-RAD
C. Fitzsimmons, 2ERR-RP
K. Moyik, 2ERR-TSB
L. Guarneiri, OS-210
J. Rosianski, 2OEP
R. Cahill, 2OEP
C. Visnic, 2ERR-SC
J. LaFornara, ERT
S. Murphy, 2OPM-FIN
E. Savage, ERT

ATTACHMENT C

A. History and Background of Radium Chemical Company

The Radium Chemical Company (RCC) was founded in New York in 1913. Its original corporate offices were located in Manhattan. In the late 1950's it is believed that RCC moved its radium lease source operations to its present location in Woodside, New York.

Radium is a naturally occurring element isolated from uranium by Marie and Pierre Curie on 1898, and was used primarily for luminous paints and radiographic sources prior to the full development of more sophisticated x-raying technology. RCC's more recent use for radium was for cancer therapy, whereby, the radiation emitted from the radium sources and "seeds" filled with radon gas killed cancerous cells. RCC either leased or sold the implant needles to hospitals, medical centers, and research laboratories. Needles of this type also had limited use in the oil industry to chart geological strata.

Over the last 20 years, however, safer techniques involving cobalt and cesium were developed and the medical use of radium dropped significantly. Thus, RCC at this time is storing relatively large quantities of needles and other sealed sources, some of which are leaking, compared to the materials which can be pratically and safely utilized.

The New York State Department of Labor (NYSDOL), which regulated facilities in New York handling naturally occurring isotopes not used in nuclear weapons or reactors, denied RCC's application for relicensing in 1983. RCC appealed this denial and obtained continuance under its licensing for ongoing operations. However, numerous health and safety violations had been documented at RCC and on two separate occasions, the building was struck and damaged by vehicles on the 27th Avenue side of the facility.

These incidents highlighted the concerns by New York State agencies of having such a large source of radioactive materials in a densely populated area of New York City. More recently, a separate and distinct basis for determining that RCC should not be granted a license to sell, lease, or reuse returned shipments of sealed radium sources related to the manner of operations of using radioactive materials in Athens, Georgia and Ottawa, Illinios by Luminous Process, Inc. | This Delaware Corporation of which Joseph A. Kelly, Jr., RCC's current President and owner, is also President. Consent judgement entered the 13th Judicial Circuit Court of LaSalle County, Illinois, determined that the two facilities were contaminated with radioactivity at levels which violated the limits set by applicable statutes and regulations of Georgia and Illinios, respectively. 1 2

The Athens, Georgia site was also known for the actual radiological health impact to former employees (including cancer) as a result of workers wetting paint brush bristles with their tongues while applying radium-based luminous paints to watch dials. As part of the settlement for incurred costs for the EPA cleanup there, the Federal Government obtained pledged options on the corporate property of RCC, including its corporate stock, physical property and other tangible assets. The outstanding EPA costs owed by RCC for the Athens cleanup total hundreds of thousands of dollars.

According to an employee of RCC, the company was also involved in an incident with the theft of some 50 ounces of contaminated gold, which was one metal used to make gold "seeds" containing radon. A former disgruntled employee apparently stole the gold and sold it to jewerly stores on route to Florida. This contaminated gold was later melted down with other gold ores and was later believed to have resulted in a recall of thousands of articles of jewelry. Additional skin cancer risks to the general public resulted from this incident.

B. Radiological Information

EPA has performed numerous radiation surveys inside of RCC to determine the extent of radiation exposure levels and radiological contamination from RCC's operations. It is clear that strict health and safety procedures were not followed. Radiation monitoring instruments do not appear to have regularly calibrated or repaired and there were no decontamination procedures. Furthermore, rooms with elevated radon gas levels were not regularly sampled for working levels and there was no apparent respiratory protection provided to anyone entering these areas. Listed below are some of the radiation surveying measurements and radon gas levels obtained during the preliminary assessment:

1. Solux Office Space Area Rented By RCC

Instrument: Ludlum with Alpha Scinitillator
Normal Background: 1-2 Counts per mintue (cpm)
Office Areas, including chairs, books, vents, light switches, etc.
Range of readings: 250-500 cpm
Hot Spots, including equipment, empty vials, etc.
Range of readings: 2,000 - 3,000 cpm
Floors, Range of readings: 10 - 200 cpm

Instrument: Bicron 2,000 Surveyor
Normal Background: 10 micro Roent gens/hour (uR/hr)
Hot Spots: contaminated chairs, equipment, etc.
2 milliRoentgens/ hour

Radon Gas Sample: Normal Background Indoor: 1-2 picoCuries/liter (pCi/l.)
Sample taken: 117 pCi/l

2. Roof Exhaust Vents Above Vault, And Glove Box Room

Instrument: Bicron 2,000 Surveyor
Normal Background Outdoors: 10-25 uR/hr (0.01 to 0.025 mR/hr)
Roof Surface: 15-50 mR/hr

Radon Gas Sample:
Normal Background Outdoors: 0.2 to 0.5 pCi/l
Sample taken at Exhaust Vent: >200 pCi/l

3. Vault Area (Background levels as previously noted)

Instrument: Bicron 2000 Surveyer
Within 2 ft. of Sources: 2R/hr

Radon Gas Samples
Inside Vault: Range from 60 to >200 pCi/l

4. Shipping Area (Background levels as previously noted).
Instrument: Bicron 2000 Surveyer and LUDLUM MicroR meter
Depending upon Location; Readings Range from 100 mR/hr to up to 800 mR/hr

5. Outside Of Facility Near Brick Wall (background as previously noted)
Instrument: Bicron 2000 Surveyer, Ludlum MicroR meter
Two to three inches from Wall Surface: 4 to 5 mR/hr

In addition to these measurements, furniture, files, articles of clothing, books, floors, etc., are contaminated with radium in Mr. Kelly's (President) and Mr. Kaufman's offices (RCC Health and Safety Officer and Vice President). Readings of thousands of counts per minute were obtained using an alpha scintillator on these items. Based upon these facts and the poor practices of decontamination, it is expected that the homes and personal items of Mr. Kelly and Mr. Kaufman are also radiologically contaminated. Mr. Kaufman is believed to have skin cancer of the hands. Radiation surveys of their homes is proposed for the near future to determine if this situation is true.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION II
26 FEDERAL PLAZA
NEW YORK, NEW YORK 10278

OCT 4 1988

Commander
AMC-COM
Attention: AMSMC-PCW-HA (C/O James C. Tritz)
Rock Island, Illinois 61299-6000

Dear Commander,

The purpose of this letter is to request Army assistance for the removal and disposal of radioactive materials at the Radium Chemical Company (RCC) site, 60-06 27 th Avenue, Woodside, New York. This request is made pursuant to Title 40 Code of Federal Regulations Part 300.23 (b)(3) of the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) by the On Scene Coordinator of this site.

According to records obtained from the files of RCC, the facility contains approximately 110 curies of radium-226 in the form of sealed sources (many of which are believed to be leaking) previously used for cancer therapy, well logging, and radiography applications. The radium activity is divided into three categories of sources; 1) 83.549 Ci of medical cancer therapy sources, 2) 16.680 Ci of radiography sources, and 3) 7.8 Ci of radium-beryllium neutron sources. In addition, it is anticipated that approximately 60 cubic yards of radium contaminated debris (glove boxes, HEPA filters, furniture, and materials generated during the source removal) will also require packaging and disposal.

RCC is located in a densely populated area of Queens, New York, immediately adjacent to the Brooklyn-Queens Expressway (BQE), a major highway through the New York Metropolitan area. A copy of a map of the immediate area indicating the facility's location is included with this request. An incident at the facility involving a major fire/explosion or a release of radium would contaminate the surrounding environment and present severe public health and safety consequences.

On July 1, 1988 the New York State Department of Environmental Conservation requested that the U.S. Environmental Protection Agency (EPA) conduct a removal action at the site (copy attached). Since that time the EPA has provided for security, conducted site stabilization and radiological monitoring activities (24 hour guard service, installation of backup electical generator, floodlighting, and CCTV observation system). On September 2, 1988 the project ceiling for interim support was approved up to $150,000 prior to actual site remediation (see attached memorandum of September 2, 1988). The Agency has been preparing to issue a site specific

contract for the source and debris removal due to the lack of radiological expertise of our emergency response contractor, OH Materials Inc. It is anticitpated that the invitation for bid process and the award of a contract may delay actual site removal activities by six months or more. Unfortunately, EPA has recently received threats of violence (bomb threats) directed against the facility, and wishes to take the most expedient and cost effective path to enact the removal of the radium sources.

The Region II Office of the U.S. EPA understands that the Army has the capability and/or available resources to conduct such a removal and disposal operation. The Region is prepared to enter into an Inter-Agency Agreement with the Army to quickly remove the threat to public health and safety presented by the radium sources. The Agency is also prepared to reimburse the Army for the cost of the removal action through the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) fund. The details of this funding can be coordinated through each organization's respective finance offices.

We would be pleased to provide additional information regarding the RCC facility and conduct an on-site tour for Army personnel who will be involved in the operation. Attached for your information are pollution reports (POLREPS) concerning the facility. If you have any questions regarding this request for assistance, or the site itself, please contact either Christopher Militscher (201-321-6647) or Shawn Googins (212-264-6459).

Sincerely,

Douglas R. Mahama FOR

Christopher A. Militscher, On Scene Coordinator, Emergency and Remedial Response Division, Response and Prevention Branch.

Shawn W. Googins, Radiation Safety Officer, Air and Waste Management Division, Radiation Branch.

Attachments

cc: B. Sprague EERD-RP
P. Giardina AWM-RAD

(3)

The original letter and all attachments will be Express Mailed to you today, 10/19/88.

Doug Adams

Dekle


BRONX CO.
QUEENS CO.
MANHATTAN
CON-EDISON
BERRIANS ISL.
MANHATTAN PSYCHIATRIC CENTER
TRIBOROUGH BRIDGE
WARDS ISLAND PARK
HELL GATE
ASTORIA
STEIN
ST. MICH
CEMETE
Radium Chemical Company
LONG ISLAND CITY
ROOSEVELT ISLAND
(WELFARE ISLAND)
WEST CHANNEL
EAST CHANNEL
QUEENSBORO BRIDGE
QUEENSBRIDGE HOUSES
RAVENSWOOD HOUSES
BROADWAY
NORTHERN BOULEVARD
CONRAIL
WOODSIDE
SKILLMAN
QUEENS BLVD
NEW CALVARY CEMETERY
CALVARY CEMETERY
MT. ZION CEMETERY
QUEENS EXPRESSWAY
BORDEN AV
WHITE AUTO CAR PLZ.
LONG ISLAND CITY STA.
GREENPOINT
SEWAGE TREATMENT PLANT
PENNY BRIDGE STA.
MANHATTAN AV
MC GUINNESS BLVD
LONG ISLAND
29
35
5
2
44
6
1
4
25
25A
278
495
77
78

U.S. ENVIRONMENTAL PROTECTION AGENCY

POLLUTION REPORT

DATE: October 13, 1987

Region II
Response and Prevention Branch
Edison, New Jersey 08837

201-548-8730 - Commercial & FTS
24-Hour Emergency

TO: C. Daggett, EPA
W, Muszynski, EPA
S. Luftig, EPA
R. Salkie, EPA
F. Rubel, EPA
J. Marshall, EPA
ERD, Washington (E Mail)
TAT
NRC
J. Czapor, EPA
P. Giardina, EPA
S. Googins, EPA
M. O'Toole, NYSDEC
B. Sprague, EPA

POLREP NO.: ONE (1)
INCIDENT/SITE NO.: Radium Chemical Company
POLLUTANT: Radium 226 and decay products
CLASSIFICATION: Major
SOURCE: Active facility
LOCATION: Woodside, New York
AMOUNT: Approximately 110 to 140 curies
WATER BODY: None

1. SITUATION:

A. On September 15, 1987, Response and Prevention Branch received notification from the New York State Department of Environmental Conservation (NYSDEC) regarding a potential source of a radiation release at the Radium Chemical Company located in Woodside, New York.

B. EPA coordinated extensively with NYSDEC, the New York State Department of Labor (i.e lead agency), and the New York City Department of Environmental Protection regarding the radiation being emitted from this commercial facility.

C. Approximately 110 out of 140 curies are currently stored at this facility. EPA's Radiation Branch is familiar with the past problems/concerns regarding NYSDOL's enforcement actions to correct worker safety and storage violations.

D. On September 17, 1987, EPA conducted an outside radiation survey with NYSDOL personnel. A detailed report was prepared by Radiation Branch and forwarded to appropriate EPA offices.

E. A meeting was held in September of 1987, which included representatives from ERRD, Radiation Branch, and SCB and NYSDEC, NYSDOL, NYCDEP and others to discuss future agency actions/roles for this facility.

DATA BASE CODES FOR CAUSE OF RELEASES

A - Transportation Accident

B - Structural Failure

C - Runaway Chemical Reaction

D - Fire

E - Human Error

F - Failure of Indicator/Detection Instruments

G - Lack of Indicator/Detection Instruments

H - Severe Weather

I - Lack of Equipment Maintenance

J - Accident in Handling Material (not Transportation)

K - Overfilling of Container

L - Pipe or Pipeline Failure

M - Tank Failure

N - Vandalism

O - Other

(Note, multiple codes may be used for any one incident)

PREVENTION CODE: Enter the appropriate code, in Section 3 of the POLREP:

CODE	EQUIVALENCE
1	IMPROVE MAINTENANCE
2	IMPROVE OR INCREASE INSPECTION
3	INSTITUTE FURTHER OPERATOR TRAINING
4	ADD MORE CONTROLS OR ACCIDENT PREVENTATIVE EQUIPMENT
N	N/A

CAUSE CODE (S):

G - Lack of Indicator/Detection Instruments and O - Improper Storage.

2. ACTION TAKEN:

A. On October 13, 1987, RPB with the Radiation Branch and NYSDOL, performed a preliminary assessment inside of the facility to ascertain the indoor levels of radiation and the conditions under which materials were being stored. Level C personal protective equipment and dosimeters with radiation detection instruments including an alpha scintallator and Bicron 2000 meter were employed.

B. Radiation levels just outside of the vault range from 25 to 50 milliroentgens per hour (MR/hr), depending upon the instruments employed. Two adjacent rooms are believed to be contaminated, but NYSDOL & EPA were not permitted access to them. Other areas within the facility were relatively free of contamination. Radiation readings in the offices were above background but were in the microroentgen/hour (uR/hr) range (Approx. 25 to 150 (uR/hr).

C. A part-time employee for the company was present during the assessment and security appeared to be adequate. The vault room is located behind two locked doors. Detection instruments and fire extinguishers were also present and believed to be in working order.

D. Photographs and wipe samples of the floors were taken during the assessment. The wipe samples are expected to be sent to Montgomery, Alabama for analysis.

E. EPA's OEP (H. Philips) was present during the inspection and spoke with N.Y.S. Assemblyman I. Lafayette. A N.Y.C. policeman was posted across the street from the facility.

3. MEASURES WHICH COULD AVOID RELEASES OF SIMILAR NATURE:

A. (4) Add more controls and prevention equipment including additional shielding around sources.

(1) Improve maintenance and clean-up of contaminted areas inside of the vault and other two adjacent rooms believed to be contaminted.

4. FUTURE PLANS AND RECOMMENDATIONS:

A. A detailed report of the preliminary assessment is expected to be prepared by Radiation Branch for interested parties.

B. OSC will continue to coordinate local and state agencies and other EPA Region II offices as requested.

FINAL POLREP_____ FURTHER POLREPS FORTHCOMING X SUBMITTED BY Christopher A. Whitcher

On-Scene Coordinator
Response & Prevention Branch

DATE OSC RELEASED: 10/28/87

U.S. ENVIRONMENTAL PROTECTION AGENCY

5-5.60-02

POLLUTION REPORT

DATE: August 4, 1988

Region II
Response and Prevention Branch
Edison, New Jersey 08837

201-548-8730 - Commercial & FTS
24-Hour Emergency

TO: W. Muszynski, EPA
J. Marshall, EPA
R. Salkie, EPA
M. Randol, EPA
ERD, Washington, (E-Mail)
TAT
W. Mugdan, EPA
J. Czapor, EPA
G. Pavlou, EPA
B. Sprague, EPA
RCC Task Force
M. O'Toole, NYSDEC
J. Sevinsky, NYS
Regional NYSDEC Office II
M. Barer, NYCDEP
C. Fitzsimmons, EPA
L. Wright, EPA

POLREP NO.: Two (2)
INCIDENT/SITE NO.: Radium Chemical Co./3H
POLLUTANT: Radium 226, Radon gas, etc.
CLASSIFICATION: Potential Major
SOURCE: Bankrupt facility
LOCATION: Woodside, Queens, New York
AMOUNT: 108 grams
WATER BODY: None.

1. SITUATION:

A. A New York State Stipulation and Order was obtained on July 20, 1988, determining that the Radium Chemical Company (RCC) could not meet its financial obligations, could not comply with an earlier order to cleanup and remove the radioactive sources from the facility, and was de facto abandoned - The Order addressed problems with RCC providing 24-hour site security.

CAUSE CODE (S): Improper storage - O (Other).

2. ACTION TAKEN:

A. On July 25, 1988, following-up on requests by the New York State Department of Environmental Conservation (NYSDEC) and other agencies, EPA's OSC performed an on-site inspection of the facility to determine the need for site security and stabilization measures.

B. Based upon EPA's site assessment and information gathered from RCC's lone regular employee at the facility, it was determined that 24-hour site security and other measures would be required in the near future.

C. Based upon a verbal approval from the ERRD Director, Mr. Stephen D. Luftig, the OSC issued a Delivery Order to begin site security and other stabilization measures on July 26, 1988. Other measures included the transfer of accounts for electrical and telephone service to the ERCS contractor in order to maintain ventilation systems and communications with the guard service, the provision for a backup generator system and spare motors for ventilation fans,

and a TV system for outside areas. OSC performed radiation measurements outside the facility and found radiation levels near the brick wall to be .4 to .5 MR/hr. above background, during the July 26, 1988, site inspection.

D. On August 2, 1988, EPA's OSCs, Radiation Branch representative, and Regional Contracting Officers met to discuss the need, preparation, and details for a Site Specific Contractor to perform the highly complex and technically demanding work for the actual cleanup, removal, transportation, and disposal activities required for this site.

3. MEASURES WHICH COULD AVOID RELEASES OF SIMILAR NATURES:

A. The measures which could avoid similar situations associated with this particular facility are complex, and because this site is unique within Region II, there are no recommendations provided in this POLREP.

4. FINANCIAL ACCOUNTING:

A.	Total Project Ceiling Authorized	$ 25,000
B.	Total Funds Authorized for Mitigation Contracts as of 7/26/88	$ 20,000
C.	Expenditures for Mitigation Contracts	
	1.a. Amount obligated to DCN KE1080 as of 7/26/88	$ 20,000
	1.b. Estimated Expenditures as of 8/4/88	$ 1,500
	1.c. Balance Remaining	$ 18,500
D.	Unobligated Balance Remaining	$ -0-
E.	Estimate of Total Expenditures to Date for all Mitigation Contracts	$ 1,500
F.	Other Extramurals Costs	
	1.a. TAT salary/travel as of 8/4/88	$ -0-
G.	Intramural Removal Costs	
	1.a. EPA travel and salaries as of 8/4/88	$ 500
H.	Total Expenditures	$ 2,000
	% of $2 Million	0.1 %
I.	Percentage of Total Project Ceiling	8 %

4. FUTURE PLANS AND RECOMMENDATIONS:

A. OSC will begin preparation of detailed Action Memorandum and statement of work for the Site Specific Contract for the removal activities.

B. OSC will continue to follow up with ERCS Contractor on providing stabilization measures as directed in the D.O. and Daily Work Order.

C. OSC will continue to coordinate with ORC, SCB, Radiation Branch, and State and local agencies on future Removal Action plans.

D. OSC will perform video taping of inside of facility for future use and will perform on-site inspections and radiation surveys as needed.

FINAL POLREP_____ FURTHER POLREPS FORTHCOMING X SUBMITTED BY Douglas R. Rhodama For

Christopher A. Militscher
On-Scene Coordinator
Response & Prevention Branch

DATE OSC RELEASED: Aug. 16, 1988

U.S. ENVIRONMENTAL PROTECTION AGENCY 5-5.60-03

POLLUTION REPORT

DATE: August 29, 1988

Region II
Response and Prevention Branch
Edison, New Jersey 08837

201-548-8730 - Commercial & FTS
24-Hour Emergency

TO: W. Muszynski, EPA
S. Luftig,EPA
R. Salkie, EPA
M. Randol, EPA
ERD, Washington
TAT
W. Mugdan, EPA
J. Czapor, EPA
G. Pavlou, EPA
B. Sprague, EPA
RCC Task Force
M. O'Toole, NYSDEC
Regional NYSDEC Office II
M. Barer, NYCDEP
C. Fitzsimmons, EPA
C. Visnic, EPA

POLREP NO.: Three (3)
INCIDENT/SITE NO.: Radium Chemical Co./3H
POLLUTANT: Radium 226, Radon Gas, and Contaminants
CLASSIFICATION: Potential Major
SOURCE: Bankrupt Facility
LOCATION: Woodside, Queens, New York
AMOUNT: Approximately 110 Grams
WATER BODY: None

1. SITUATION:

A. See previous POLREP.

CAUSE CODE(S): Other - O - (Bankrupt Facility).

2. ACTION TAKEN:

A. On August 11, 1988, a meeting was held with representatives from NYSDOL, NYSDEC, NYCDOH, EPA's ORC, and Radiation Branch to discuss the proposed Removal Action's scope of work. Also on 8/11/88, EPA performed a continued preliminary assessment at the facility and videotaped the inside and outside of the building. In addition to extensive radioactive contamination throughout the facility, approximately two (2) hundred labpack containers were also discovered in several portions of the facility. The containers included improperly stored acids, flammables, oxidizers, and poisons. The surfaces of the containers were found to be contaminated with radioactive particulates. Level C personnel protective gear was utilized during the assessment.

B. On 8/19/88, OHM's electrician discovered and corrected a problem with the ventilation system's timer, which was not operating on a regular 24-hour basis. Plans to provide a backup generating system, TV monitor and surveillance camera, and spotlight are currently underway. Revised D.W.O. provided to ERCS contractor on 8/12/88.

C. On August 26, 1988, another radiation survey was performed, including side rooms and offices to the main office. Contamination was also found in these rooms as well. OHM field clerk visited site to get list of expendables needed at the facility.

3. MEASURES WHICH COULD AVOID RELEASES OF SIMILAR NATURES:

A. See previous POLREP.

4. FUTURE PLANS AND RECOMMENDATIONS:

A. At the request of the Radiation Branch, OSC will visit Montgomery, Alabama facility to calibrate radiation equipment, learn procedures for radon gas detection, and begin specifiactions of equipment needed in the statement of work for the site specific contract.

5. FINANCIAL ACCOUNTING:

A.	Total Project Ceiling Authorized	$ 25,000
B.	Total Funds Authorized for Mitigation Contracts as of 7/26/88	$ 20,000
C.	Expenditures for Mitigation Contracts	
	1.a. Amount obligated to DCN KE 1080 as of 7/26/88	$ 20,000
	1.b. Estimated Expenditures as of 8/29/88	$ 5,000
	1.c. Balance Remaining	$ 15,000
D.	Unobligated Balance Remaining	$ -0-
E.	Estimate of Total Expenditures to Date for all Mitigation Contracts	$ 5,000
F.	Other Extramurals Costs	
	1.a. TAT salary/travel, as of 8/29/88	$ -0-
G.	Intramural Removal Costs	
	1.a. EPA travel and salaries as of 8/29/88	$ 3,000
H.	Total Expenditures % of $2 Million	$ 8,000 .4%
I.	Percentage of Total Project Ceiling	32%

FINAL POLREP_____ FURTHER POLREPS FORTHCOMING X SUBMITTED BY C. E. Fitzsimmons (for)

Christopher A. Militscher
On-Scene Coordinator
Response & Prevention Branch

DATE OSC RELEASED: 8-31-88

ENVIRONMENTAL PROTECTION AGENCY

POLLUTION REPORT

DATE: September 23, 1988

Region II
Response and Prevention Branch
Edison, New Jersey 08837

201-548-8730 - Commercial & FTS
24-Hour Emergency

TO: W. Muszynski, EPA
S. Luftig,EPA
R. Salkie, EPA
M. Randol, EPA
ERD, Washington
TAT
W. Mugdan, EPA
J. Czapor, EPA
G. Pavlou, EPA
B. Sprague, EPA
RCC Task Force
M. O'Toole, NYSDEC
Regional NYSDEC Office II
M. Barer, NYCDEP
C. Fitzsimmons, EPA
C. Visnic, EPA

POLREP NO.: Four (4)
INCIDENT/SITE NO.: Radium Chemical Co./3H
POLLUTANT: Radium 226, Radon Gas, and Contaminants
CLASSIFICATION: Potential Major
SOURCE: Bankrupt Facility
LOCATION: Woodside, Queens, New York
AMOUNT: Approximately 110 Grams
WATER BODY: None

1. SITUATION:

A. See previous POLREP.

CAUSE CODE(S): Other - O - (Bankrupt Facility).

2. ACTION TAKEN:

A. From 8/29/88 to 9/1/88, OSC visited Eastern Environmental Response Facility in Montgomery, Alabama to calibrate radiation equipment, learn procedures for radon gas detection, and begin specifications of equipment needed for Site Specific Contract's statement of work.

B. Expedited Action Memo covering site security and stabilization measures issued an approval on 9/2/88. Comprehensive draft Action Memo for cleanup and removal issued for comments on 9/6/88.

C. On 9/15/88, site visit made with Googins and TAT to confirm radon levels in office and to check on items requested under Daily Work Orders (DWO). TAT assigned task of preparing draft community relations plan. OSC requested written response of status for items on DWO's not yet completed.

D. OSC had meetings and telephone discussions with DPO and OHM regarding lack of follow-up on subcontracted items and failure to provide 1900-55 forms in a timely manner. OSC had requested action by OHM to resolve delays in providing electronic surveillance, backup generating system, and purchase of backup ventilation motors.

E. OSC forwarded copies of letters to Googins (for distribution to NYSDOL) and ORC and SCB on Gift Letters of leased sources and on radium source materials stored at RCC by PRPs. Two (2) PRP's identified include Maimonides Medical Center and the American Cancer Society, both of which own radium sources at RCC.

3. MEASURES WHICH COULD AVOID RELEASES OF SIMILAR NATURES:

A. See previous POLREP.

4. FUTURE PLANS AND RECOMMENDATIONS:

A. OSC will continue to work on preparation of statements of work for Site Specific Contracts (One for disposal - sole source and the other for cleanup and transportation - open competition).

B. OSC will finalize draft Action Memo and will coordinate with ORC and SCB on follow-up issues regarding enforcement and PRP's.

C. OSC and Googins plan site inspection on 9/26/88.

5. FINANCIAL ACCOUNTING:

A.	Total Project Ceiling Authorized	$ 150,000
B.	Total Funds Authorized for Mitigation Contracts as of 9/2/88	$ 100,000
C.	Expenditures for Mitigation Contracts	
	1.a. Amount obligated to DCN KE 1080 and KE 0127	$ 100,000
	1.b. Estimated Expenditures as of 9/19/88	$ 20,745
	1.c. Balance Remaining	$ 79,255
D.	Unobligated Balance Remaining	$ -0-
E.	Estimate of Total Expenditures to Date for all Mitigation Contracts	$ 20,745
F.	Other Extramurals Costs	
	1.a. TAT salary/travel, as of 9/23/88	$ 500

G. Intramural Removal Costs

1.a. EPA travel and salaries as of 9/23/88	$ 3,500	
H. Total Expenditures	$ 24,745	
% of $2 Million		1.2%
I. Percentage of Total Project Ceiling		16.5%

FINAL POLREP_____ FURTHER POLREPS FORTHCOMING__X__ SUBMITTED BY: Christopher A. Militscher

Christopher A. Militscher
On-Scene Coordinator
Response & Prevention Branch

DATE OSC RELEASED: 9/29/88

U.S. ENVIRONMENTAL PROTECTION AGENCY

POLLUTION REPORT

DATE: October 12, 1988

Region II
Response and Prevention Branch
Edison, New Jersey 08837

201-548-8730 - Commercial & FTS
24-Hour Emergency

TO: W. Muszynski, EPA
S. Luftig,EPA
R. Salkie, EPA
M. Randol, EPA
ERD, Washington
TAT
W. Mugdan, EPA
J. Czapor, EPA
G. Pavlou, EPA
B. Sprague, EPA
RCC Task Force
M. O'Toole, NYSDEC
Regional NYSDEC Office II
M. Barer, NYCDEP
C. Fitzsimmons, EPA
C. Visnic, EPA

POLREP NO.: Five (5)
INCIDENT/SITE NO.: Radium Chemical Co./3H
POLLUTANT: Radium 226, Radon Gas, and Contaminants
CLASSIFICATION: Potential Major
SOURCE: Bankrupt Facility
LOCATION: Woodside, Queens, New York
AMOUNT: Approximately 110 Grams
WATER BODY: None

1. SITUATION:

A. On October 3, 1988, at approximately 5:10 a.m., a bomb threat was received by Gleason Security from an unidentified caller. Gleason Security notified the N.Y.C. Police Department and EPA of the incident.

CAUSE CODE(S): Other - O - (Bankrupt Facility).

2. ACTION TAKEN:

A. On October 3, 1988, EPA noitified key agencies of the RRT to inform them of the bomb threat and to make them aware of the situation at the site and the status of the CERCLA Removal Action. EPA also intensified security measures as a result of the incident.

B. On October 7, 1988, a field visit was made with a representative from NYSDEC. Traffic congestion caused extreme delays of EPA's arrival on-site. ERCS contractor (Response Manager and field clerk) were on site to work with OSC on the location and specifications of a new fence, screening at windows, installation of an office trailer, and other items specified in a Daily Work Order. S. Googins performed radiation surveys and took radon gas samples to determine working levels. The radon gas instrument donated to RCC appears to be misreading actutal radon gas levels and needs re-calibration.

C. Also, on October 7th, OSC and S. Googins with assistance from the NYSDEC representative set up a decontamination/dress down area in LEVEL C. Later, OSC and S. Googins segregated chemicals and combustible materials away from vault area and near front room to allow easier access by firefighters in the event of a fire at RCC. This activity was performed in LEVEL B.

D. A notice of auction and sale from N.Y.C. for a past creditor and leasehold gift letters and replies were received from RCC employee and are being forwarded to ORC and SCB for follow-up actions.

3. MEASURES WHICH COULD AVOID RELEASES OF SIMILAR NATURES:

A. See previous POLREP.

4. FUTURE PLANS AND RECOMMENDATIONS:

A. OSC will continue to request more timely submission of 1900-55 forms from ERCS contractor.

B. OSC will follow-up on fence and other stabilization measures with ERCS contractor.

C. OSC is requesting meeting with ORC on issuance of a Federal Order to restrict RCC access to the facility.

D. OSC will continue to work on contingency plan, community relations plan, site safety plan, action memo, etc.

E. OSC and S. Googins will continue to pursue request for U.S. Army assistance on cleanup in lieu of site specific contracts.

5. FINANCIAL ACCOUNTING:

A.	Total Project Ceiling Authorized	$ 150,000
B.	Total Funds Authorized for Mitigation Contracts as of 9/2/88	$ 100,000
C.	Expenditures for Mitigation Contracts	
	1.a. Amount obligated to DCN KE 1080 and KE 0127	$ 100,000
	1.b. Estimated Expenditures as of 9/19/88	$ 20,745
	1.c. Balance Remaining	$ 79,255
D.	Unobligated Balance Remaining	$ -0-
E.	Estimate of Total Expenditures to Date for all Mitigation Contracts	$ 50,000
F.	Other Extramurals Costs	
	1.a. TAT salary/travel, as of 10/12/88	$ 1,500

G. Intramural Removal Costs

1.a. EPA travel and salaries as of 10/12/88	$ 4,500	
H. Total Expenditures	$ 56,000	
% of $2 Million		3%
I. Percentage of Total Project Ceiling		37%

FINAL POLREP_____ FURTHER POLREPS FORTHCOMING X SUBMITTED BY Doug Hudson for

Christopher A. Militscher
On-Scene Coordinator
Response & Prevention Branch

DATE OSC RELEASED: Oct. 19, 1988

U.S. ENVIRONMENTAL PROTECTION AGENCY

POLLUTION REPORT

DATE: November 9, 1988

Region II
Response and Prevention Branch
Edison, New Jersey 08837

201-548-8730 - Commercial & FTS
24-Hour Emergency

TO: W. Muszynski, EPA
S. Luftig,EPA
R. Salkie, EPA
M. Randol, EPA
ERD, Washington
TAT
W. Mugdan, EPA
R. Basso, EPA
G. Pavlou, EPA
B. Sprague, EPA
RCC Task Force
M. O'Toole, NYSDEC
Regional NYSDEC Office II
M. Barer, NYCDEP
C. Fitzsimmons, EPA
C. Visnic, EPA
T. Lieber, EPA

POLREP NO.: Six (6)
INCIDENT/SITE NO.: Radium Chemical Co./3H
POLLUTANT: Radium 226, Radon Gas, and Contaminants
CLASSIFICATION: Potential Major
SOURCE: Bankrupt Facility
LOCATION: Woodside, Queens, New York
AMOUNT: Approximately 110 Grams
WATER BODY: None

1. SITUATION:

A. See previous POLREP.

CAUSE CODE(S): Other - O - (Bankrupt Facility).

2. ACTION TAKEN:

A. On 10/25/88, EPA performed an on-site inspection and performed additional radiation surveying and radon gas sampling. OSC and S. Googins spoke to Solux Corporation representatives on proposed EPA actions and status of contamination in rented portion of RCC. The fence installation has begun and is 2 - 3 days from being completed.

B. A meeting was held in N.Y.C. with the Acting RA, ORC, Radiation Branch and RPO to discuss legal enforcement issues. The updated inventory of the lease-holders of radium was provided by the OSC to ORC. A restricted access order is proposed to be developed by ORC to assist in site control activities.

C. Fence installation and the securing of the windows was completed by sub-contractor on 10/28/88.

D. A site inspection was performed on 10/30/88, by the OSC and S. Googins to survey office areas and to take radon gas samples at the roof exhaust vents from the hot areas. Sample measurements exceeded 200 picoCuries/liter.

E. Site security during the past month has been very good. Weekly submittals of site entry/entry logs provided to OSC. ERCS contractor provided locks on doors to contaminated areas and gates on 10/27/88.

F. OSC has been working with RCC employee to gain information on status of leaseholders. OSC and S. Googins have been working with U.S. Army on Support Agreement and Lawrence Livermore National Laboratory, ERT, and TAT on Contingency Planning models.

3. MEASURES WHICH COULD AVOID RELEASES OF SIMILAR NATURES:

A. See previous POLREP.

4. FUTURE PLANS AND RECOMMENDATIONS:

A. A site visit is scheduled for 11/10/88, to continue surveying of office areas, inspect ERCS and subcontractor work, and contact Police and Fire Department Officials.

B. OSC will continue to work on Action Memo, Contingency Plans, Support Agreement, etc.

C. OSC recommends that S. Googins be assigned full-time to assist OSC on technical issues and finalization of Site Safety Plan.

D. OSC will follow-up with ORC on status of restricted access order.

5. FINANCIAL ACCOUNTING:

A.	Total Project Ceiling Authorized	$ 150,000
B.	Total Funds Authorized for Mitigation Contracts as of 9/2/88	$ 100,000
C.	Expenditures for Mitigation Contracts	
	1.a. Amount obligated to DCN KE 1080 and KE 0127	$ 100,000
	1.b. Estimated Expenditures as of 10/25/88	$ 50,170
	1.c. Balance Remaining	$ 49,830
D.	Unobligated Balance Remaining	$ -0-
E.	Estimate of Total Expenditures to Date for all Mitigation Contracts	$ 55,000
F.	Other Extramurals Costs	
	1.a. TAT salary/travel, as of 10/31/88	$ 3,000

G. Intramural Removal Costs

1.a. EPA travel and salaries as of 10/31/88	$ 5,500	
H. Total Expenditures	$ 63,500	
% of $2 Million		3%
I. Percentage of Total Project Ceiling		42%

FINAL POLREP_____ FURTHER POLREPS FORTHCOMING X SUBMITTED BY Christopher A. Militscher

Christopher A. Militscher
On-Scene Coordinator
Response & Prevention Branch

DATE OSC RELEASED: 11/17/88

C.M.

U.S. ENVIRONMENTAL PROTECTION AGENCY

POLLUTION REPORT

DATE: November 16, 1988

Region II
Response and Prevention Branch
Edison, New Jersey 08837

201-548-8730 - Commercial & FTS
24-Hour Emergency

TO: W. Muszynski, EPA
S. Luftig, EPA
R. Salkie, EPA
M. Randol, EPA
ERD, Washington
TAT
W. Mugdan, EPA
R. Basso, EPA
G. Pavlou, EPA
B. Sprague, EPA
RCC Task Force
M. O'Toole, NYSDEC
Regional NYSDEC Office II
M. Barer, NYCDEP
C. Fitzsimmons, EPA
C. Visnic, EPA
T. Lieber, EPA

POLREP NO.: Seven (7)
INCIDENT/SITE NO.: Radium Chemical Co./3H
POLLUTANT: Radium 226, Radon Gas, and Contaminants
CLASSIFICATION: Potential Major
SOURCE: Bankrupt Facility
LOCATION: Woodside, Queens, New York
AMOUNT: Approximately 110 Grams
WATER BODY: None

1. SITUATION:

A. See previous POLREP.

CAUSE CODE(S): Other - O - (Bankrupt Facility).

2. ACTION TAKEN:

A. On 11/10/88, OSC performed site inspection at RCC to coordinate ERCS set up of trailer for guards and make arrangements for installation of hot zone monitoring cameras, additional telephone lines, removal of uncontaminated site debris (i.e. tree) and other D.W.O. items.

B. On 11/14/88, OSC worked with S. Googins on continued coordination with U.S. Army, Lawrence Livermore National Laboratory (LLNL), OEP on Reno Gazzette inquiry, etc. OSC still has not received confirmation from ORC on consent order for limited access or site compliance on issuance of PRP letters (RCC, Solux, et al.).

C. Early indications on contingency planning model run by LLNL are very alarming. Radiation risks of exposure resulting from a fire on-site would affect hundreds of thousands of persons in Queens and beyond and could include a plume several miles in length. Additional work with LLNL on final modeling needs to be coordinated.

D. OSC has been having problems with denying access to RCC President to contaminated areas and file materials and has threatened him with "arrest tactics" until consent order is prepared by ORC. RCC President has previously requested EPA to allow a paper shredder on site so he can remove files from cabinets and sell the cabinets for income. OSC has denied requested at this time.

E. On 11/10/88, OSC made decsion to subcontract RCC employee to work on leaseheld radium sources inventory and other clerical support activities. Memo to file prepared after discussing issue with IG.

F. Radon levels in Solux area of RCC exceed State standard of 3 pCi/l (i.e. 117 pCi/l). Access to this area should be denied to Solux representatives. OSC has prepared letter to Solux informing them of EPA's radiation survey results on contamination in this portion of the facility.

G. On 11/15/88, RCC employee provided OSC with file information on past cleanups at Luminous Process, Inc. (LPI), sites in Athens, Georgia and Ottawa, Illinois. Past legal actions against LPI were extensive and this information will be forwarded to OGC, ORC, and SCB. No entry into hot zone was made on this date.

H. On 11/16/88, OSC and S. Googins made entry into hot zone to move leaking sources from outside of the vault into the vault (approx. 8 feet) and cleared room in vault for ERCS electricans to install video camera. Radiation explosure levels in excess of 1R/hr in vault. Radon gas level in shipping room area approximately 300 pCi/liter. L. Guarneiri provided office tour and worked on Action Memo in trailer. J. Kelly (Pres. of RCC) on-site and provided with mail and files requested after EPA surveyed materials for contamination. ERCS electrician worked on electrical connections for office trailer. N.Y.C.D.O.H. inspector provided site tour by S. Googins.

I. On 11/17/88, OSC requested additional assistance for Removal Action from ERT, TAT, and EPA offices. OSC is concerned that the site is being perceived as "typical hazardous waste site cleanup", which OSC does not believe is the case. OSC will not have ERCS install hot zone cameras until additional technical support is obtained. Decontamination area needs to be expanded and Site Safety Plan needs to be finalized. Additional funding is also required to continue with site stabilization measures and contingency planning activities.

J. S. Luftig verbally approved total project ceiling increase to $250,000 as of 11/17/88, to address additional interim funding increase request by OSC.

3. MEASURES WHICH COULD AVOID RELEASES OF SIMILAR NATURES:

A. See previous POLREP.

4. FUTURE PLANS AND RECOMMENDATIONS:

A. OSC will continue to work on Contingency Plan, Community Relations Plan, Site Safety Plan, $2 Million Exemption Action Memo, IAG with Lawerence Livermore National Laboratory, Administrative Record, cost accounting and other related items.

B. OSC will continue to press for support from ORC and SCB on Consent Assessment for Restricted Access, PRP Notice letters, and lease hold source letters.

C. OSC will continue followup with U.S. Army on Support Agreement for clean-up contractor. IAG will also have to be prepared in concert with Support Agreement.

D. OSC will followup on request for additional technical support from TAT, ERT, and others.

E. OSC is planning to hold RRT meeting including local N.Y.C. Police and Fire Department officials on or about 12/14/88.

5. FINANCIAL ACCOUNTING:

A.	Total Project Ceiling Authorized	$ 250,000
B.	Total Funds Authorized for Mitigation Contracts as of 9/2/88	$ 100,000
C.	Expenditures for Mitigation Contracts	
	1.a. Amount obligated to DCN KE 1080 and KE 0127	$ 100,000
	1.b. Estimated Expenditures as of 11/18/88	$ 65,000
	1.c. Balance Remaining	$ 35,000
D.	Unobligated Balance Remaining	$ 100,000
E.	Estimate of Total Expenditures to Date for all Mitigation Contracts	$ 70,000

F.	Other Extramurals Costs		
	1.a. TAT salary/travel, as of 11/18/88	$ 3,000	
G.	Intramural Removal Costs		
	1.a. EPA travel and salaries as of 11/18/88	$ 7,000	
H.	Total Expenditures % of $2 Million	$ 80,000	4%
I.	Percentage of Total Project Ceiling		32%

FINAL POLREP_____ FURTHER POLREPS FORTHCOMING__X__ SUBMITTED BY Christopher A. Militscher

Christopher A. Militscher
On-Scene Coordinator
Response & Prevention Branch

DATE OSC RELEASED: 12/28/88

U.S. ENVIRONMENTAL PROTECTION AGENCY

POLLUTION REPORT

DATE: November 28, 1988

Region II
Response and Prevention Branch
Edison, New Jersey 08837

(201) 548-8730 - Commercial and FTS
24 Hour Emergency

TO: W. Muszynski, EPA
S. Luftig, EPA
R. Salkie, EPA
M. Randol, EPA
ERD Washington
(E-Mail)
W. Mugdan, EPA
R. Basso, EPA
G. Pavlou, EPA
B. Sprague, EPA
RCC Task Force
M. O'Toole, NYSDEC
Regional NYSDEC Office II
M. Barer, NYCDEP
C. Fitzsimmons, EPA
C. Visnic, EPA
T. Lieber, EPA
TAT

POLREP NO.:	Eight (8)
INCIDENT NAME:	Radium Chemical Co.
SITE/SPILL NO.:	3H
POLLUTANT:	Radium 226, Radon Gas, and Contaminants
CLASSIFICATION:	Potential Major
SOURCE:	Bankrupt Facility
LOCATION:	Woodside, Queens, New York
AMOUNT:	Approximately 110 Grams
WATER BODY:	None

1. SITUATION:

A. See previous POLREP.

CAUSE CODE(S): Other - O - (Bankrupt Facility).

2. ACTION TAKEN:

A. On Monday, November 21, 1988, a meeting was held. Attendees included: Weston TAT, EPA and Weston REAC. Topics discussed were as follows:

a) Briefing on site, current status, preliminary planning etc.

b) Verbal request for assistance was given to TAT to provide;

* 2 trained technicians for purposes of field sampling, site monitoring, wipe sampling, detailed site assessment etc.

* 1 trained technician to assist with decontamination of the above technicians, sample preparation, and report generation, site safety plans etc.

* Supply to EPA one Certified Health Physicist (CHP) to assist with site risk evaluation and contingency planning.

* TAT to provide cost estimate for supplying above personnel.

* TAT to provide CAMEO modeling capability.

B. On Wednesday, November 23, 1988, a meeting was held at the command post in Edison, N.J. Attendees included EPA, ERT, TAT and REAC.

Topics discussed included the following:

1) C. Militscher discussed the current site status.

2) C. Militscher discussed individual personnel responsibilities as to the following tasks:

* Site Safety Plan

* Local Contingency Plan

* Fire Suppression

* Development of Administrative Record

* Community Relations Plan

* Development of FACT SHEETS

* Site blowup map indicating evacuation radii.

3) C. Militscher stated that all files are to be kept in the Command Post trailer, and stated that the trailer phone # is (201) 906-6931

3. COMPLETED TASKS:

A. November 29, 1988, setup of Command Post trailer at Edison, N.J. has been completed.

4. FUTURE PLANS AND RECOMMENDATIONS:

A. OSC will continue to work on Contingency Plan, Community Relations Plan, Site Safety Plan, $2 Million Exemption Action Memo, IAG with Lawerence Livermore National Laboratory, Administrative Record, cost accounting and other related items.

B. OSC will continue to press for support from ORC and SCB on Consent Assessment for Restricted Access, PRP Notice letters, and lease hold source letters.

C. OSC will continue followup with U.S. Army on Support Agreement for clean-up contractor. IAG will also have to be prepared in concert with Support Agreement.

D. OSC will followup on request for additional technical support from TAT, ERT and others.

E. Meeting with New York City OEM to be held on or about December 1st at the offices of New York City EPA; to be attended by OEM representatives and EPA.

F. OSC is planning to hold RRT meeting including local N.Y.C. Police and Fire Departments officials on or about December 14, 1988.

3. FINANCIAL ACCOUNTING:

A.	Total Project Ceiling Authorized	$ 250,000
B.	Total Funds Authorized for Mitigation Contracts as of 9/2/88	$ 100,000
C.	Expenditures for Mitigation Contracts	
1.a.	Amount obligated to DCN KE 1080 and KE 0127	$ 100,000
1.b.	Estimated Expenditures as of 11/28/88	$ 65,000
1.c.	Balance Remaining	$ 35,000
D.	Unobligated Balance Remaining	$ 100,000

E.	Estimated of Total Expenditures to Date for all Mitigation Contracts	$ 70,000
F.	Other Extramural Cost	
	1.a. TAT salary/travel as of 11/28/88	$ 3,000
G.	Intramural Removal Costs	
	1.a. EPA travel and salaries as of 11/28/88	$ 8,500
H.	Total Expenditures	$ 81,500
	% of $2 Million	4.1%
I.	Percentage of Total Project Ceiling	32.6%

FINAL POLREP_____ FURTHER POLREPS FORTHCOMING ✓ SUBMITTED BY C.E. Fitzsimmons (for)

Chris Militscher, OSC
Response and
Prevention Branch

DATE OF RELEASE: 12/5/88

Radium Chemical Company Removal Action, Woodside, Queens, New York

William Muszynski, P.E.
Acting Regional Administrator

Winston J. Porter, Associate Administrator
Office of Solid Waste and Emergency Response

On July 1, 1988, Mr. Thomas Jorling, Commissioner, New York State Department of Environmental Conservation, requested our assistance in the removal of approximately 110 curies of radium and other hazardous materials from Radium Chemical Company, Woodside, Queens, New York. Preliminary assessment activities performed by our Regional On-Scene Coordinator and Regional Health Physicist have determined the site to contain a large quantity of radioactive material in both leaking and unleaking containers. In addition, the building has been found to be extensively contaminated in most areas by the radiological sources used by the Radium Chemical Company. Because this situation exists in a heavily populated area, we believe that the On-Scene Coordinator must have radiological experience to deal in an effective manner with this removal action. The OSC must be confident in dealing with radiological clean-up contractors, worker safety and public health concerns as they relate to radiological matters. The Region does not have such an individual in its staff of OSCs.

We are aware that the Environmental Response Team (ERT) has individuals who have both radiological and OSC experience. As such, I request that Headquarters,through the ERT, assume the role as OSC on the Radium Chemical removal action.

The Region would support this effort through funding of this removal removal action with its FY-89 Advice of Allowance for the Removal Program. We have estimated that $2.5 million in FY89 funds will be required to complete the removal action. In addition, the Region would support the ERT OSC by providing assistance from our Emergency and Remedial Response Division, Office of Policy and Management, Office of Regional Counsel, Office of External Programs and Air and Waste Management Division to handle appropriate tasks.

The Radium Chemical site has been discussed in Headquarters with representatives of your Emeregency Response Division and the Office of Radiation Programs. The $2 Million Dollar Exemption Request Action Memorandum was submitted in mid December and is presently under review by the appropriate Headquarters approval offices.

FILE:W/Radium Chemical Co.
2ERR-RP:SPRAGUE:340-6656:1/3/89:Sue:Disk Sue#7

I would appreciate your concurrence with this request as soon as possible. Mr. Stephen Luftig and his staff are prepared to coordinate a smooth transition.

If you have any questions, please do not hesitate to contact me. Thank you for your prompt response.

cc: T. Fields, OS-210

bcc: J. LaFornara, ERT

7-7.10-01

DRAFT

Radiat.

COMMUNITY RELATIONS PLAN
RADIUM CHEMICAL COMPANY SITE
WOODSIDE, BOROUGH OF QUEENS, NEW YORK

Issued: December 5, 1988

Prepared by:

George Beckey
William Kowalski
Technical Assistance Team
Weston/SPER Division
Edison, New Jersey 08837

Prepared for:

Christopher Militscher
Emergency and Remedial Response Division
Response and Prevention Branch, U.S. EPA
Edison, New Jersey 08837

I. SITE BACKGROUND

A. Site Description

The Radium Chemical Company (RCC is) located at 60-06 27th Avenue in Woodside, Queens, New York. The one-story brick building abuts the Brooklyn-Queens Expressway on one side and 27th Avenue on another. (See Site Location Maps).

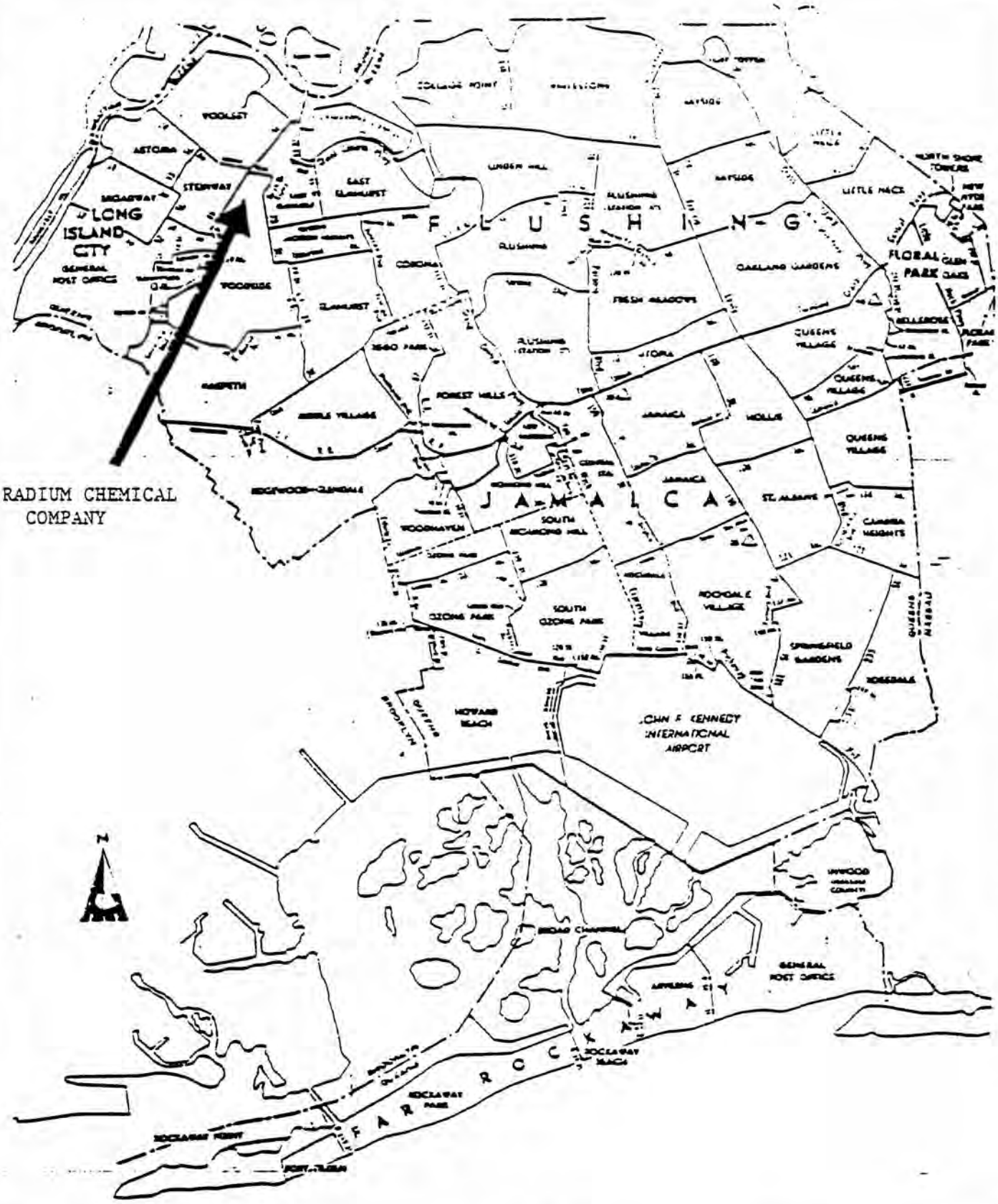
The Radium Chemical Company is located in a commercial and light industrial area. A manufacturer of industrial lighting fixtures (Solux Co.), shares a common wall and part of the overall building with the Radium Chemical Company facility. The total square footage of the building is 9,720 $ft.^2$ of which 7,220 $ft.^2$ is occupied by Radium Chemical Company. The BQE Health Club is located within 200 feet of the facility. During preliminary assessment activities, it was observed that numerous pedestrians walk past a portion of the fence line of the facility. Furthermore, vehicular traffic is very active along 27th Avenue. The Brooklyn-Queens Expressway has almost constant traffic and is a main thoroughfare for New York City commuter traffic. Traffic congestion and tie-ups are commonplace. The Brooklyn-Queens Expressway's right lane is located approximately 12 feet from the wall of the facility.

According to the New York State Department of Environmental Conservation (NYSDEC) and records obtained from RCC, approximately 110 curies of radium are stored at the facility in the form of "needles", "seeds", and radiography sources. These sources are encased in platinum-iridium or other metals and were formerly used in the medical treatment procedures for cancer therapy.

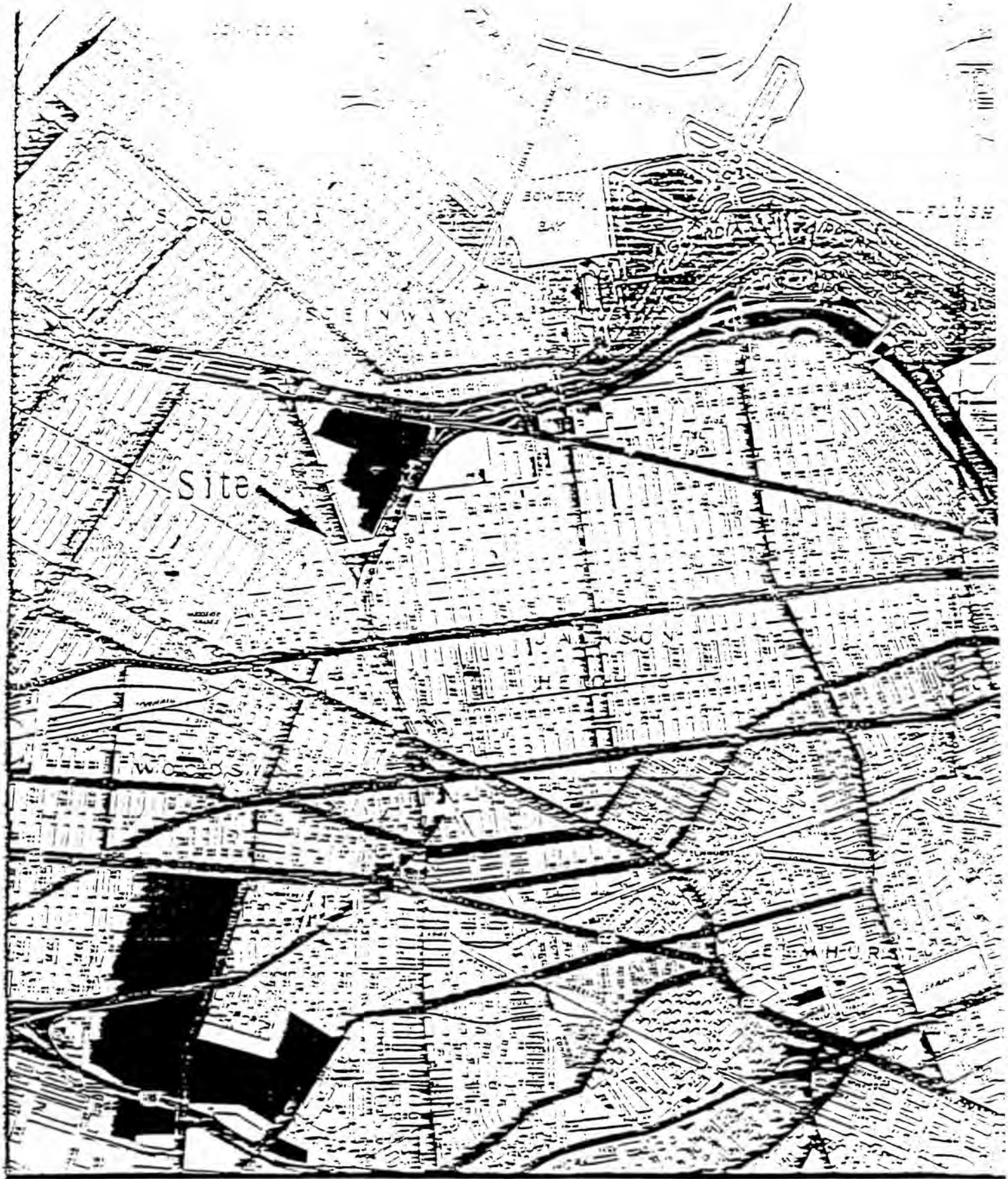
B. Site History

The Radium Chemical Company (RCC) was founded in New York in 1913. Radium is a naturally occurring element. It was first isolated from uranium by Marie and Pierre Curie in 1898 and was originally used for luminous paint for watch and instrument dials. Radium Chemical Company's more recent use for radium was for cancer therapy. In therapy, radiation emitted from tiny needles of radium, is used to kill cancer cells. Radium Chemical Company either leased or sold these needles to hospitals and research laboratories.

Over the last twenty years, however, safer techniques involving cobalt and cesium were developed and the medical use of radium dropped significantly. Thus, RCC at this time is storing relatively large quantities of needles and other sealed sources as compared to the materials which can be practically and safely utilized.



WESTON	SPILL PREVENTION & EMERGENCY RESPONSE DIVISION	EPA PM C. Militscher	Site Location Map
In Association with ICF Technology Inc., C.C. Johnson & Associates, Inc., Resource Applications, Inc., Geo/Resource Consultants, Inc., and Environmental Toxicology International, Inc.		TAT PM G. Beckey	Radium Chemical Co.



WESTON — SPILL PREVENTION & EMERGENCY RESPONSE DIVISION	EPA PM: C. Militscher	Detail Site Map
In Association with ICF Technology Inc., Edmonson & Associates, Inc., Resource Applications, Inc., Geo/Resource Consultants, Inc., and Environmental Toxicology International, Inc.	TAT PM: L. Beckett	Radium Chemicals Inc.

The New York State Department of Labor (NYSDOL) suspended RCC's operating license in January 1983, because of a series of operating violations and contamination. NYSDOL denied RCC's application for relicensing in 1986. NYSDOL ordered RCC to remove radioactive materials and decontaminate its building in August 1987.

A survey of the RCC building in May 1986 by State and City agencies determined that no significant radiation exposure was occurring outside the facility. Subsequently, EPA performed an outside survey of the facility in September 1987 which essentially confirmed previous measurements taken outside the building by NYSDOL and NYSDEC. EPA determined that there was no immediate threat or endangerment to the public health outside the RCC building.

A Stipulation and Order was issued on October 19, 1987, by New York State against the RCC for specific security and stabilization measures for the site. In the order RCC was required to secure leaking materials, to remove the materials for proper disposal, and to decontaminate the building. The Stipulation and Order was not complied with by RCC. Thus, a second Stipulation and Order was obtained on July 20, 1988, determining that the facility could not be maintained and that it was de facto abandoned. On July 1, 1988, Mr. Thomas Jorling, Commissioner, New York State Department of Environmental Conservation requested that the U.S. Environmental Protection Agency conduct a CERCLA/SARA removal action at the Radium Chemical Company Site.

RCC's inability to pay for security or cleanup of the site, and the determination by the Court that it is abandoned, resulted in EPA's involvement at the site. Under the NCP and CERCLA; EPA has the authority to respond to and cleanup abandoned, contaminated facilities where there is a potential or documented release of hazardous substances. On July 26, 1988, Stephen D. Luftig, Director, Emergency and Remedial Response Division verbally approved a removal action for site security. This verbal approval was followed by an approved Action Memorandum which was issued September 2, 1988. This original Action memorandum was intended to provide for continued site security, upgrade and maintain essential electrical, plumbing and ventilation systems, initate a personnel radiation monitoring program, and supply decontamination and radiation screening equipment for current removal activities.

The overall objective of EPA's removal action is to continue with site security measures, to initiate site stabilization measures for the radioactive materials, and to properly remove and dispose of the materials at a licensed disposal

facility. EPA will perform the initial characterization of the contaminants, assessment of contamination both inside and outside of the facility, and perform real time radon gas sampling/monitoring at the facility. The removal action will include measures to reduce the potential for disturbing dusts and particles which are contaminated with radioactive substances, and to upgrade and improve the ventilation system in the vault area. Also, EPA will initially segregate radioactive sources from flammable and combustible materials in the vault and other storeroom areas to reduce the threat of fire involving radiation sources.

At this time, it is not certain what level of decontamination of the building will be necessary until the radioactive sources are removed and a complete radiation survey can be performed. For purposes of planning, this project only includes the removal of approximately 60 cubic yards of obviously contaminated materials (e.g., tools, benches, loose site debris, etc.). Removal or full decontamination of the floors, walls, ceiling, and other permanent portions of the building are not within the original scope of work for this removal action.

II. COMMUNITY INFORMATION

A. Community Profile

Woodside is located in the northeast section of the Borough of Queens, New York City. The Borough of Queens has an area of 112.83 square miles. The community is composed of mixed light industrial, commercial, and residential properties. According to the 1980 census, the total population of Woodside is 41,056, with a total area of approximately 1.5 sq.miles. The majority of residents are senior citizens, although influxes of new residents continually alters the multi-ethnic character of the area.

Woodside is part of the Borough of Queens, which is governed by the New York City Council. One council member represents Woodside. Council members are elected every 4 years by the community at large.

B. Community Concerns

This community concerns section is based on interviews with local officials, area business leaders, and community leaders. Currently, overall concern about the RCC site has been reduced. Concerns peaked in September 1987, when the public became aware of the contamination through newspaper articles and radio and television reports. Media interest was generated by inspections, investigations, and New York State's legal actions against RCC.

Community concerns are described and summarized below:

1. Human Health Resources

Those interviewed for this plan were most concerned about potential health effects from exposure to contaminants at RCC. One community leader expressed concerns about potential health effects to people who come into daily contact with RCC. According to local officials, members and employees of the BQE Health Club were concerned about contamination in their drinking and bathing water. An employee of the health club explained that health concerns decreased when EPA determined that there was no immediate threat or danger to the public health outside of the RCC building.

2. Contingency Planning

Several local officials expressed concerns about reducing the possibility of the spread of contamination from RCC by catastrophic events. They are concerned about preventing catastrophic events which could cause a release. To alleviate this concern, 24 hour security was employed and a contingency plan is being developed.

3. Length of Time of Site Mitigation

Several public officials and community leaders expressed concerns about the length of time involved in mitigating contamination at the RCC site. One local official requested that EPA address the length of time involved in site mitigation.

4. Information on Site Activities

One community leader requested that EPA distribute a fact sheet regarding site activities. Two area organizations would like to publish information supplied by EPA in their newsletters.

5. Clean-up Procedures

One local official expressed concern regarding the possibility of the Removal Action disrupting daily life within the community. This official is concerned about the clean-up equipment obstructing pedestrian and vehicular traffic.

OBJECTIVES OF THE COMMUNITY RELATIONS PLAN AT THE RADIUM CHEMICAL COMPANY SITE

The objectives of EPA's community relations plan for the RCC site are specifically designed to meet the needs and concerns of public officials, and community and business leaders expressed during community interviews. The primary objective of EPA's community relations plan will be to provide information about the progress of the cleanup and the safety measures taken at the site to reduce health risks. The recommended objectives for EPA's community relations are discussed below.

- o Provide Status Reports of EPA Clean-up Activities

  EPA will provide local officials and business and community leaders with frequent, accurate, and easily understandable status updates of clean-up activities. Status updates of EPA's clean-up activities will communicate to the community a clear picture of measures being taken to ensure public health and safety. Providing community members with periodic updates of safety measures will help communicate to them that EPA is actively seeking to clean-up the site and implement safety measures.

PREPARE AND DISTRIBUTE UPDATES ON SITE ACTIVITIES

Purpose: To inform residents about site safety activities.

Technique: Clean-up efforts and safety measures taken by EPA at RCC will be prepared and distributed by EPA and provided to interested public officials, business leaders, community leaders, and area residents. A special effort should be made to distribute updates to state elected officials and also the local publication, " Woodside on the Move".

PROVIDE ADEQUATE WARNING OF DANGERS ASSOCIATED WITH ENTERING THE RCC BUILDING

Purpose: To warn the community and keep trespassers off the site.

Technique: EPA has placed large visible warning signs on the RCC building. The signs clearly indicate the dangers associated with entering the site. Also, additional fencing has been installed to prevent unauthorized access to radiation areas. EPA will maintain 24-hour security to help limit unauthorized access to the building. An alarm system is also being maintained to warn security services of unauthorized access.

PREPARE AND DISTRIBUTE PRESS RELEASES ON SITE ACTIVITIES

Purpose: To inform residents about the Superfund clean-up process, site activities, and safety measures implemented during the clean-up.

Technique: Press releases will be prepared and distributed to local media and will be issued as EPA completes site clean-up stages and implements safety measures.

ESTABLISH AND MAINTAIN A CENTRAL EPA COMMUNITY INTERGOVERNMENTAL AND MEDIA RELATIONS CONTACT PERSON

Purpose: To ensure that timely, understandable, and consistent responses are provided to questions raised by local officials, community leaders, business leaders, residents, and media representatives, concerning the RCC site.

Technique: An EPA Office of External Programs staff person will be designated to respond directly to public inquiries regarding site activities. In contacts with media personnel, the EPA contact person will coordinate with local officials. This EPA contact person will also monitor community concerns and activities during the removal action and make any necessary changes in community relations activities.

PREPARE AND DISTRIBUTE THE DISPOSAL TRANSPORTERS ROUTE TO LOCAL OFFICIALS

Purpose: To inform local officials about the disposal transporters route to ensure security and safety of transportation.

Technique: Provide map and description of the disposal transporters route to local and state officials and coordinate with them on logistical support.

APPENDIX A

LIST OF KEY CONTACTS AND INTERESTED PARTIES

A. Federal Elected Officials

Senator Alphonse D'Amato (202) 224-6542
520 Senate Hart Office Building
Washington, DC 20510

State Office

Suite 1635 (212) 947-7390
One Penn Plaza
New York, NY 10001

Senator Daniel Patrick Moynihan (202) 224-4451
464 Russell Senate Office Building
Washington, DC 20510

State Office

733 Third Avenue (212) 661-5150
New York, NY 10017

Congressman Thomas J. Manton (718) 706-1400
46-12 Queens Blvd.
Sunnyside, NY 11104

B. U.S. EPA Officials (See Appendix B for Heirachy)

Paul Giardina, RCC-Task Force-Co-Chairman (212) 264-4418
Air and Waste Management Division
Radiation Representatives
26 Federal Plaza, Room 905A
New York, NY 10278

Lt. Shawn Googins, PHS, Technical
Coordinator (212) 264-6459
Air and Waste Management Division
Radiation Representative's Office
26 Federal Plaza, Room 3137
New York, NY 10278

Christopher Militscher (201) 321-6647
Emergency and Remedial Response Division
On-Scene Coordinator
Woodbridge Ave. Bldg 209 MS-211
U.S. EPA Edison
Edison, NJ 08837

B. U.S. EPA Officials (Con't)

Charles Fitzsimmons (201) 321-6608
Emergency & Remedial Response Division
On-Scene Coordinator (alternate)
Woodbridge Ave. Bldg. 209, ms-211
U.S.EPA, Edison
Edison, NJ 08837

Richard Cahill
Office of External Programs
26 Federal Pl. Room 2341
New York, New York 10278

Christine Visnic (212) 264-6323
Emergency and Remedial Response Division
Site Compliance Branch
26 Federal Plaza, Room 737
New York, New York 10278

Thomas Lieser
Office of Regional Counsel
26 Federal Plaza, Room 437M
New York, New York 10238

C. State Elected Officials

Senator George Onorato (718) 545-9706
28-11 Astoria Blvd
Long Island City, NY 11102

Assemblyman Ivan C. Lafayette (718) 457-0384
74-09 37th Avenue
Jackson Heights, NY 11372

D. Other Interested Parties

Assemblyman Maurice D. Hinchey (518) 455-4436
270 Broadway
Route 1506
New York, NY 10007

E. State Officials

Dr. Frank Bradley (718) 797-7642
N.Y.S. Department of Labor
Division of Safety and Health
1 Main Street
Brooklyn, NY 11201
(Alt. George L. Kasyk)

E. State Officials (Con't)

Dr. Paul Mergis (518) 457-5915
NYSDEC
50 Wolf Road
Albany, NY 12233
(Att. Steve Zobel)

Ms Joyce Jiudice (518) 457-6695
NYSDEC
50 Wolf Road, Room 608
Albany, NY 12233

Karim Rimawi, Director (518) 473-3613
Bureau of Environmental Radiation Protection
NYS Department of Health, Room 421
Albany, NY 12203

Gordon Johnson (212) 341-2457
Assistant State Attorney
NYS Department of Law
120 Broadway
New York, NY 10271

F. City Elected Officials

Councilman Walter McCaffery (718) 482-1200
46-12 Queens Blvd.
Sunnyside, NY 11104

Borough President Claire Shulman (718) 520-3220
Borough of Queens
120-55 Queens Blvd.
Kew Gardens, NY 11424

G. City Officials

Dr. Leonard Solin (718) 643-7874
NYC Department of Health
Bureau for Radiation Control
111 Livingston Street
20th Floor
Brooklyn, NY 11201
(Att. Bob Kulikowski)

Lt. Steven Kennedy (212) 374-5500
NYC Police Dept.
Office of Emergency Management
1 Police Plaza Room 804
New York, NY 10038

Captain Kupiec (718) 476-6207
NYC Fire Dept. Engine Co #307
81-17 Northern Blvd.
Jackson Hights, NY 11372

Captain John Fanning (718) 476-6288
NYC Fire Dept. Hazardous Material Co. #1
56-29 68th
Queens, NY 11378

Captain Lawrence Hagerty (718) 626-9311
NYC Police Dept.
114th Precinct
34-16 Astoria Blvd.
Astoria, NY 11103

H. Local Organizations and Businesses

Woodside on the Move (718) 476-8449
Jane Ransom, Executive Director
58-14 Roosevelt Ave.
Woodside, NY 11377

BQE Health Club (718) 726-4343
Tom C., Manager
26-50 BQE Service Road
Woodside, NY 11377

Solux Corporation (718) 726-1300
Barbara Scott, Vice President
58-17 28th Ave.
Woodside, NY 11377

Humiseal Division (718) 932-0800
Columbia Chase Corporation
26-60 BQE West
Woodside, NY 11377

Hunter Mills Corporation (718) 932-4546
60-01 27th Ave
Woodside, NY 11377

I. Newspapers

Daily News (212)210-2100
News Department
220 E. 42nd St.
New York, NY 10017

New York Post (212) 815-8000
News Department
210 South St.
New York, NY 10002

New York Times (212) 556-1234
Science Department
229 W. 43rd St.
New York, NY 10036

J. Television and Radio Stations

WABC TV and Radio (212) 887-7777
News Department
7 Lincoln Place
New York, NY 10023

WCBS TV and Radio (212) 975-4321
News Department
524 W. 57th St.
New York, NY 10019

WNBC TV and Radio (212) 664-4444
News Department
36 Rockefeller Plaza
New York, NY 10112

WNYC FM (212) 669-7800
1 Centre St.
New York, NY 10007

WPIX-TV (212) 949-1100
News Department
220 E. 42nd St.
New York, NY 1001

K. EPA Contractors

Roy F. Weston, Inc. (TAT) (201) 225-6116
1090 King George's Post Rd., Suite 201
Edison, NJ 08837

Roy F. Weston, Inc. (REAC) (201) 632-9200
GSA Raritan Depot
Woodbridge Ave.
Bldg. 209 Annex
Edison, NJ 08837

O.H. Materials (419) 423-3526
16406 U.S. Route 224 East
Findlay, Ohio 45839 (Princeton Ofc.) (609) 987-0010

L. Other Federal Agencies

Mr. James Intz (309) 782-4947
U.S. Army Rock Island Arsenal
AMC-COM
Rock Island, Illinois 61299-6000
Attn: AMSMC-PCW-HA

M. EPA Command Post Trailer (201) 906-6931
Edison NJ Offices of EPA

APPENDIX B

RADIUM CHEMICAL COMPANY - EPA REMOVAL ACTION - HIERARCHY

Radium Chemical Command Post, Edison, NJ 201-906-6931

Federal On-Scene Coordinator (OSC)

Christopher Militscher - Lead	201-321-6647
Charles Fitzsimmons - Alternate	201-321-6608

The OSC will direct contractors in Federal operations to stabilize/cleanup the site. Will coordinate operational activities of local and state entities relative to the project. Is responsible for the overall site safety of all personnel entering the premises. Will coordinate all contingency plans, safety plans and technical removal plans.

Federal Technical Advisor

Shawn W. Googins - Certified Health Physicist - 212-264-6459

The technical advisor will provide, to the OSC, the expertise in radiological health. He will assist in the development of all plans which include the Site Safety Plan, Contingency Plans, Community Relations Plan and all necessary planning activities surrounding the removal of the sources.

Radium Chemical Company Task Force (RCC Task Force)

Paul Giardina - Co-Chairman	212-264-4418

The task force is comprised of health physicists from the City and State Agency's Departments of Labor, Health, Environmental Conservation and Law. This task force will provide expertise and other logistical support to the Technical Advisor and the OSC.

Federal Regional Response Team (RRT)

Dick Salkie - Chairman	201-321-6654
Bruce Sprague - Alternate	201-321-6654

The Regional Response Team comprised of Federal Agencies such as the Department of Defense, the Interior, Coast Guard, FEMA and OSHA will provide logistical support to the OSC.

Health and Hospitals Coordinator

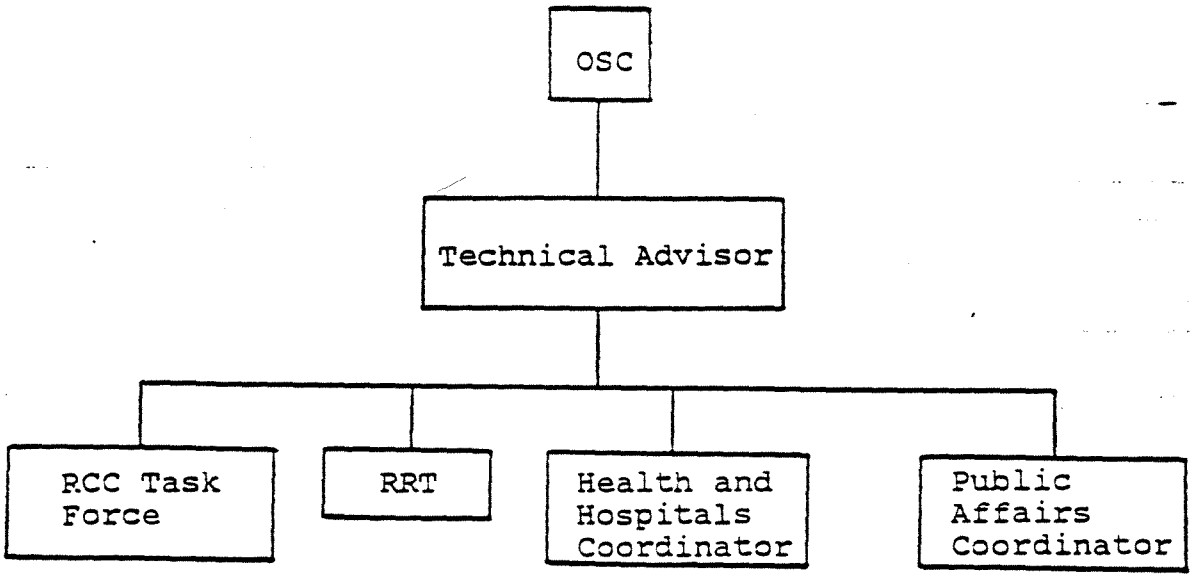
Denise Johnson - ATSDR 212-264-7662

Will assist the OSC in coordinating matters pertaining to hospital services and health assessments, as requested by the OSC.

Press/Public Affairs Coordination

Rich Cahill 212-264-2515

Will serve as the focus and coordinator with state, local and other agencies regarding any information for the press and assist the OSC in generally managing interaction with the public relative to EPA's actions. All media interaction will channel through this office.



7-7.20-01

FOR IMMEDIATE RELEASE: [redacted]

FEDERAL ENVIRONMENTAL AGENCY ASKED TO REMOVE RADIOACTIVE MATERIALS FROM QUEENS RADIUM PLANT

Attorney General Robert Abrams, Commissioner Thomas C. Jorling of the State Department of Environmental Conservation and Commissioner Thomas F. Hartnett of the State Department of Labor announced today [redacted] that the State has asked the U.S. Environmental Protection Agency to secure and dispose of potentially dangerous radioactive materials at the Radium Chemical Company in Woodside, Queens.

The facility houses approximately 108 grams of radium, the largest known stockpile in the world. Radium is a naturally occurring radioactive element that is dangerous if handled improperly.

Queens Supreme Court Justice Angelo Graci signed an order today which declares the facility effectively abandoned. The company was also ordered to grant authorities access to the plant and to cooperate with efforts to clean up the site and remove all radium and radioactive materials.

The Attorney General sought [illegible] declaring the plant abandoned as a means of facilitating a takeover of the site by the EPA. The agency has been requested to exercise its authority under the federal Superfund law and take over the facility, remove the radium and implement a cleanup.

A previous court order, signed last October, set a January 1, 1988 deadline for the company to remove all radioactive materials from the site. That order also required the company to take steps to protect the public from radiation emanating from the facility.

According to the order signed today, the plant is being declared abandoned because Radium Chemical cannot comply with the October order. The company faces expenses, including the costs of safeguarding and transporting the radioactive materials, which are far in excess of its income. Radium Chemical owes more than $600,000 to creditors, requires

(more)

$10,000 monthly to meet rental and mortgage fees, guard service and radiation safety officer's fees, and employees' wages, and would need to pay approximately $5,000 per gram to remove the 100 grams of radium from the site. The company's only income, however, comes from the less than $8,300 per month it earns by leasing radium sources to hospitals.

The officials said that the company is continuing efforts to sell the radium, which can be used for medical purposes. They said that any proceeds from such a sale will be used to help pay for cleanup and closure of the facility.

In court papers filed last October on behalf of the Departments of Labor and Environmental Conservation, the Attorney General argued that radium should not be stored in the middle of Queens and warned that serious contamination could result in the event of fire, an explosion, or improper disposal of radium. Radiation levels of 40 times the permitted safe maximum were recorded outside the facility, according to these papers.

While radiation outside the facility has been reduced to safe levels, continued storage of radium at the Queens facility remains a significant threat to safety and the environment.

Attorney General Abrams stated:

"From the beginning, our objective has been to clean up the site and remove radioactive materials that could threaten health and the environment. Originally we sought to compel the company to implement a cleanup. Now that it is evident that the company cannot comply with the original order, we have cleared the way for the EPA to step in and protect the public from contamination at the site."

Commissioner Jorling stated:

"Our focus has been to prevent adverse environmental effects from this facility. To date we have been successful. This recent decision properly shifts the next steps for cleanup to the federal EPA."

Commissioner Hartnett stated:

"This is an important step in guaranteeing the proper cleanup of this site, and ensuring the safety of the public, which is our prime concern. The action of the Attorney General's office today enables the state to bring together all agencies involved to protect the public and the workers of Radium Chemical."

(more)

The matter was handled for the Attorney General by Assistant Attorneys General Nancy Stearns, Stuart Miller and Gordon J. Johnson, under the supervision of James A. Sevinsky, chief of the Environmental Protection Bureau, with the assistance of the Department of Environmental Conservation and the Department of Labor.

-30-

United States
Environmental Protection Agency
Region 2: New Jersey, New York
Puerto Rico, Virgin Islands
26 Federal Plaza, NY, NY 10278

FACTS

August 1988

EPA TO TAKE SUPERFUND ACTION AT FORMER RADIUM SUPPLY FIRM IN QUEENS, NEW YORK

CURRENT ACTION

The U.S. Environmental Protection Agency (EPA) has formally agreed to a request from New York State to secure and begin preparations for the disposal of radioactive materials stored in an former radium supply firm in Queens, New York.

EPA took over site security from the firm last month to reduce risks posed by unauthorized access to the closed building at 60-06 27th Avenue, along the Brooklyn-Queens Expressway, in a largely industrial neighborhood.

On Thursday, August 11th, EPA re-entered the building to perform further assessment of its interior and contents. Before any removal of the materials inside the contaminated building, EPA will conduct additional sampling and analyses of the site where the radium sources are to be stored.

Radium is a naturally occurring radioactive element that is dangerous if handled or disposed of improperly.

Removal costs for the radium at the site will probably be in excess of $1 million and will paid for through the Federal Superfund.

PAST ACTIONS

EPA and State investigations have confirmed that the facility contains radium previously used to treat cancer and stored in thousands of sealed metal tubes and cylinders within shielded, lead containers.

The public is not at risk due to continued 24-hour security to prevent illegal access and extra shielding measures taken by the former owners to reduce the potential for unsafe public exposure.

Before the firm's license was suspended by the State in January 1983, the firm purchased and distributed needles containing radium for use in some forms of cancer therapy. most of the firm's former customers had been physicians and hospitals. Alternate treatments are presently available and used by the medical community.

The State Departments of Labor and Environmental Conservation, as well as the Attorney General's Office and the New York City Department of Health have been active participants in successful efforts to prevent adverse environmental effects from this facility. EPA will continue to coordinate with all appropriate local and State agencies during the removal of all the materials from the site.

For further information call EPA's Office of External programs at (212) 264-2515.

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NOTICE OF PUBLIC AVAILABILITY

THE UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION II
ANNOUNCES THE AVAILABILITY OF THE
ADMINISTRATIVE RECORD
RADIUM CHEMICAL COMPANY, WOODSIDE, QUEENS, NEW YORK

The U.S. Environmental Protection Agency (EPA) announces the availability for public review of files comprising the administrative record for the selection of the removal action at the Radium Chemical Company site, Woodside, Queens, New York. EPA seeks to inform the public of the availability of the record at this repository and to encourage the public to comment on documents comprising this administrative record.

The administrative record includes documents which form the basis for the selection of a removal action at this site. Documents now in the record include site identification, removal response, contingency planning, enforcement, health assessments, community relations and references. Other documents may be added to the record as site work progresses. These additional documents may include, but are not limited to, sampling data, comments and new data submitted by interested persons, and EPA responses to significant comments.

The administrative record is available for review during normal business hours at:

Queens Borough Public Library and
Woodside, Queens Branch
54-22 Skillman Ave.
Woodside, NY 11377

U.S. EPA - Region II
Removal Program Office
Woodbridge Ave.
Edison, NJ 08837

Additional information is available at the following locations:

Guidance documents and technical literature - Central library
U.S. EPA Region II
Removal Program Office
Woodbridge Ave.
Edison, NJ 08837

Written Comments on the Administrative record should be sent to:

Mr. Richard Salkie,
Associate Director
Removal Program Office
USEPA Region II
Woodbridge Ave.
Edison, NJ 08837

ADMINISTRATIVE RECORD REFERENCES-GUIDANCE DOCUMENTS

1. CERCLA
2. SARA
3. National Oil Hazardous Substances Contingency Plan
4. HQ and Regional Delegations of Authority
5. FSOP'S 4-Site Entry, 6-Work Zone, 7-Decon, 8-Air Surveilance, 9-Safety Plan,SOSG 7/8
6. RQ Lists
7. Hazardous Waste Evaluation and Disposal Criteria Operations Manual
8. EPA Region II OSC Operations Guidance Manual Vol. 1 and Vol.2
9. Emergency Response Cleanup Services (ERCS), USERS' MANUAL 6/86, OSWER, DIRECTIVE 9242.2-1A
10. Removal Cost Management Manual 4/88
11. Technical Assistance Team Contracts Users' Manual 9/87 OSWER Directive 9242.4-01A
12. Glossary of EPA Acronyms
13. Superfund Removal Procedures, Revision #3 OSWER Directive 9360.0-03B 2/88
14. Revised Procedures for Inplementing Off-site Response Actions OSWER Directive 9834.11 11/13/87
15. The Contract Laboratory Program
16. Radium Specific Fema Fed. Radiological Emergency Response Plan

REFERENCE MATERIAL AVAILABLE IN THE ADMINISTRATIVE RECORDS AREA

- Glossary of EPA acronyms.

- Superfund Removal Procedures - Revision #3
  OSWER Directive 9360.0-03B February 1988.

- Hazardous Waste Operations and Emergency Response; Notice of Proposed Rulemaking and Public Hearings.
  29 CFR Part 1910 Monday, August 10, 1987.

- Guidance on Implementation of the Revised Satutory Limits on Removal Action.
  OSWER Directive 9260.0-12 April 6, 1987.

- Redelegation of Authority under CERCLA and SARA
  OSWER Directive 9012.10 May 25, 1988.

- Removal Cost Management Manual
  OSWER Directive 9360.0-02B April 1988.

- Emergency Response Cleanup Services Contracts Users Manual
  OSWER Directive 9242.2-01B October 1987.

- Field Standard Operating Procedures (FSOP).
  #4 Site Enty
  #6 Work Zones
  #8 Air Surveillance
  #9 Site Safety Plan

- Standard Operating Safety Guides - US EPA Office of Emergency and Remedial Response, July 5, 1988.

- CERCLA Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (Superfund).

- SARA: Superfund Amendment and Reauthorization Act 1986.

- NCP: National Oil and Hazardous Substances Pollution Contingency Plan

AVAILABLE IN EPA LIBRARY

TECHNICAL LITERATURE

- NIOSH Pocket Guide to Chemical Hazards
- 49 CFR Part 171-179 DOT Hazardous Materials Guide
- 40 CFR Part 260-280 EPA Hazardous Waste Regs.
- NIOSH/OSHA Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities.
- Handbook of Toxic and Hazardous Chemical & Carcinogens (Marshall Sittig). (R-RA1193-558-1985)
- The Condensed Chemical Dictionary -(Hawley). (R-QD5-C5-1981)
- 40 CFR Parts 117 & 302

- TLV and Biological Exposure Indices, American Conference of Governmental Industrial Hygienists

GUIDANCE DOCUMENTS

- CERCLA (Environmental Federal Laws Reporter Volume 2)
- SARA (Librarian has copy by her desk)
- NCP (Fed. Reg. Vol. 53 No. 245 Wed. 12/21/88)
- RQLIST=40 CFR PARTS 117&302
- TAT Contracts Users Manual (Oswer Dir. 9242.4-01A)
- Superfund Removal Procedures, (OSWER DIR. 9360.0-03B)
- Revised Procedures for Implementing Off-Site Response Actions (OSWER DIR. 9834.11)
- FEMA Fed. Radiological Emergency Response Plan (Fem 1.2 R11)
- The Contract Laboratory Program Users Manual (CA 1.2, RCED 88-109FS)

ADMINISTRATIVE RECORDS REFERENCES

PUBLICLY AVAILABLE TECHNICAL LITERATURE

1. NIOSH Pocket Guide to Chemical Hazards
2. 49 CFR Part 171-179. Dot Hazardous Materials Guide
3. Threshold Limit Values and Biological Exposure Indices for 1987 - 1988 American Conference of Government Industrial Hygienists
4. 40 CFR Part 260-280. EPA Hazardous Waste Regulations
5. NIOSH/OSHA/USCG/EPA Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities. 10/85
6. Sittig, Marshall. Handbook of Toxic and Hazardous Chemicals and Carcinogens, 1985
7. Hawley, Gessner G., The Condensed Chemical Dictionary
8. 40 CFR Parts 117 & 302 (cited in Radium Action Memo)

ADMINISTRATIVE RECORD FILE AVAILABLE AT THE FOLLOWING LOCATIONS:

Queens Borough Public Library
Woodside, Queens Branch
54-22 Skillman Ave.
Woodside, NY 11377

U.S. EPA - Region II
Removal Program Office
Woodbridge Ave.
Edison, NJ 08837

U.S. EPA - Community Relations Trailer
Woodside, Queens, NY