UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

CONSENT CALENDAR ITEM

December 2, 1980

ADJUDICATORY

SECY-A-80-188

For: The Commissioners

From: Martin G. Malsch
Deputy General Counsel

Subject: PETITION FOR A HEARING IN THE MATTER OF THE PROPOSED DECONTAMINATION OF THE DRESDEN NUCLEAR POWER STATION

Discussion: Background

Commonwealth Edison Company (CECo) operates the Dresden Nuclear Power Station, Unit No. 1. On December 19, 1974, CECo proposed to shut down the reactor and chemically decontaminate the facility's primary cooling system. (Attachment 1) The proposed chemical cleaning program was based on extensive research which led to the formulation of a new cleaning compound and to the determination of the corrosion effects that compound would have on various reactor materials with which it would come in contact during the cleaning process. CECo also initiated a program to evaluate the effects of decontamination on primary system integrity. The NRC's regulations (10 CFR 50.59) provide that changes in the facility or operating procedures which create an unreviewed safety question cannot be made without an amendment to the operating license. Although CECo took the position that the cleaning program presented no unreviewed safety questions, CECo conceded that the return to power after cleaning was outside the scope of the original safety evaluation for the facility. Accordingly, CECo stated that if the NRC deemed a license amendment to be necessary for a return to power operation after cleaning, CECo would apply for an amendment to Dresden's Technical Specifications. On April 1, 1975, CECo informed the NRC that the development of Technical Specifications for post-cleaning operation would require additional time, and requested interim authorization to conduct the cleaning program with the return to power contingent upon the completion of several open items. (Attachment 1a)

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CONTACT:

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Previous Staff Action

On December 9, 1975 the NRC authorized CECo to initiate the proposed chemical decontamination of Dresden without requiring any license amendments. (Attachment 2) 1/ This authorization was contingent on CECo's completion of three unresolved items: (1) completion of a testing program to be reviewed and approved by NRC prior to chemical cleaning; (2) submission of a pre-service inspection program for NRC review and approval prior to the return to power operation; and (3) submission of a post-cleaning surveillance program for NRC review and approval prior to the return to power operation. A two and one-half page safety evaluation accompanied the NRC decision. In that evaluation, staff reached no conclusions about the possible existence of unreviewed safety questions but concluded that authorization of initiation of the program was warranted because staff anticipated the successful resolution of the unresolved issues.

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1/ Staff also found that the project did not involve a significant hazards consideration.

Thus, a fair reading

as is discussed below,

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Current Status

Since the staff's authorization in 1975, CECo has completed construction of the support facilities needed to carry out the project. On November 14, 1979, CECo applied for amendments to two Technical Specifications: (1) deletion of the requirement to maintain primary containment integrity during the chemical cleaning when all fuel will be removed from the reactor; and (2) exclusion of radioactive liquid storage tanks (which are inside seismically qualified structures) from the above grade storage curie limit. [Attachment 3].

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Petitions

Between late 1979 and early 1980, three petitions were filed 2/ pursuant to 10 CFR 2.206 requesting the NRC to prepare an environmental impact statement (EIS) and hold a public hearing on the proposed decontamination. On June 26, 1980, the Director, NRR granted the requests for NRC preparation of an EIS and enclosed copies of that

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2/ Petitioners were Ms. Kay Drey, Mr. Robert Goldsmith, on behalf of Citizens for a Better Environment and the Prairie Alliance, and Ms. Marilyn Shineflug, on behalf the Illinois Safe Energy statement with his replies to the petitioners. The Director denied the request for the public hearing because that request had been premised on the lack of NRC assurances that it would prepare the EIS. 3/

On July 8, 1980, several persons and groups, comprised mainly of those who had previously petitioned under 2.206, 4/ jointly petitioned the Commission to hold hearings on CECo's application for a license amendment and on the EIS related to the proposed decontamination (Attachment 4). In addition, petitioners contend that a proper determination of "no significant hazard" has not been made regarding the proposed chemical decontamination and that a proceeding to make such a determination and a hearing are required.

we consider

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3/ See SECY-A-80-101.

4/ The only new petitioner is Ms. Bridget Rorem; Ms. Drey and Ms. Shineflug are now individual petitioners and not just representing their respective organizations, and Mr. Goldsmith is no longer a petitioner but, instead, is representing them as counsel.

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Martin G. Malsch
Deputy General Counsel

Attachments:
1. CECo letter 12/19/74
1a. CECo letter 4/1/75
1b. CECo letter 4/16/75
2. NRC letter 12/9/75
2a. Staff memo 5/29/80
3. CECo letter 11/14/79
4. Petition for Public Hearings
5. CECo letter 11/14/80
6. Draft Order

Commissioners' comments or consent should be provided directly to the Office of the Secretary by c.o.b. Wednesday, December 17, 1980.

Commission Staff Office comments, if any, should be submitted to the Commissioners NLT December 10, 1980, with an information copy to the Office of the Secretary. If the paper is of such a nature that it requires additional time for analytical review and comment, the Commissioners and the Secretariat should be apprised of when comments may be expected.

This paper is tentatively scheduled for affirmation on an open meeting during the week of December 22, 1980. Please refer to the appropriate Weekly Commission Schedule, when published, for a specific date and time.

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Secretariat

release

Commonwealth Edison
One First National Plaza, Chicago, Illinois
Address Reply to: Post Office Box 767
Chicago, Illinois 60690

December 19, 1974

Mr. Edson G. Case
Acting Director
Directorate of Licensing
Office of Regulation
U.S. Atomic Energy Commission
Washington, D.C. 20545

Subject: Dresden Station Unit 1 "Chemical Cleaning Licensing Submittal", AEC Dkt. No. 50-10

Dear Mr. Case:

If deemed necessary by Onsite and Offsite review, Commonwealth Edison will request by March 1975 an amendment to DPR-2. The purpose of this amendment will be to incorporate into the Technical Specifications primary system boundary structural integrity limits which are adequate to allow power operation of the unit following the chemical cleaning discussed in the attached report "Dresden Unit 1 Chemical Cleaning Licensing Submittal".

The following areas will be considered in developing the proposed Technical Specifications change.

1. The existing metal surveillance specimens are being evaluated for usefulness in a continuing program after chemical cleaning.

2. In addition, various metal specimens will be fabricated and installed in the reactor prior to the cleaning. Some of these specimens will be removed for metallographic examination immediately after the cleaning. Others will remain in the reactor and be removed during succeeding refueling outages for metallographic examination.

   The exact materials to be included in the program cannot be specified at this time, because they may be limited by the space available for exposure in subsequent service. At the minimum, they will consist of sensitized and as-welded 304SS, 410SS, A302B, and sensitized and as-welded Inconel 600. Hopefully, other materials of interest can

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also be included and these will be chosen when it is known that space is available. As many materials of current and potential future interest will be included as is practical.

3. As part of the post-cleaning acceptance, a representative number of welds will be examined prior to the cleaning to determine as accurately as possible the characteristics of the indication. Following the chemical cleaning and during at least two subsequent refueling outages, these same welds will be reexamined to determine any change in the characteristics of the indication, which might be attributable to the chemical cleaning process.

The licensing submittal contains an evaluation of the safety considerations involved in returning the primary coolant system to service following the chemical cleaning. This evaluation will serve as the basis for the proposed Technical Specifications which are being prepared for submittal by March 1975.

One signed original and 39 copies of this licensing submittal are provided for your review.

Very truly yours,

J. S. Abel

J. S. Abel
Nuclear Licensing Administrator
Boiling Water Reactors

Attachment

DRESDEN I

CHEMICAL CLEANING

LICENSING SUBMITTAL

12-16-74

CONTENTS

I. SUMMARY

It is the purpose of this document to provide an overview of the research, development and engineering that has been carried out to insure the feasibility and safety of Dresden Unit 1 chemical cleaning.

The Dresden Station Unit 1 chemical cleaning program has been established on the basis of an extensive development program, as discussed in parts III and IV. Formulation of a new chemical cleaning solvent was found to be necessary because existing techniques were ineffective. The new solvent has been demonstrated to provide sufficient reduction in radiation levels to improve plant access significantly. It has been shown to be compatible with the materials in the Dresden Unit 1 primary system. Furthermore, a program of post chemical cleaning assessment has been established to evaluate the effects on the primary system integrity.

Possible public hazards and environment effects of the chemical cleaning program have been considered in development of the cleaning procedures and chemical cleaning system design. The procedures and design will preclude any new or adverse effect to the environment or the public.

The full-scale cleaning of Dresden Station Unit 1 primary system is scheduled for the first half of 1977.

II. INTRODUCTION TO THE DRESDEN-1 CLEANING PROGRAM

Recent studies of occupational radiation exposures at operating U.S. light water reactors show a three-fold increase in yearly average exposure per plant between 1969 and 1973 (188 man-rem in 1969 compared to 544 man-rem in 1973). Roughly 80 percent of this exposure is received in performance of plant maintenance. Certain individual plants have shown much sharper year-to-year increases due to the necessity of performing repairs in high-radiation areas. At one plant, operational exposure for example, increased from 834 man-rem in 1972 to 5160 man-rem in 1973, due largely to the repair of defective welds.

At Dresden Unit-1, radiation levels have also shown significant and consistent increases. Commonwealth Edison recognizes that access to primary components is necessary. A method of reducing occupational radiation exposures at its operating plants must, therefore, be developed. One tool to accomplish this is total plant decontamination. Dow Industrial Service was engaged to evaluate existing technology and, if necessary, develop new technology for the total decontamination of Dresden Unit-1. Existing technology was found inadequate. A new solvent was thus developed and tested on contaminated samples taken from Dresden-1, with very promising results. They are now completing a comprehensive materials-testing program encompassing all Dresden-1 pressure boundary materials. A preliminary design for facilities, systems and equipment required to implement a full scale decontamination of Dresden-1 has been developed.

In establishing this program, the following goals were identified as being of primary importance:

1. Reduce radiation levels to improve plant accessibility
2. Ensure future safe and efficient operation of Dresden-1
3. Develop and prove techniques usable on other reactors
4. Encourage broad vendor, manufacturer, and consultant participation

This project is being managed by Commonwealth Edison with Dow Industrial Service Division of Dow Chemical Company serving as Edison's prime contractor. Suntac Nuclear Corporation, a subsidiary of Catalytic Construction Company and NUS, is Dow's subcontractor for architectural, engineering and construction activities.

In addition to the above participants, Edison has contracted with the following to serve as consultants:

1. The Nuclear Energy Division of General Electric Company
2. Craig F. Cheng of Argonne National Laboratory
3. T. A. Hendrickson of Burns & Roe, Inc.
4. Roger W. Staehle of Ohio State University

III. PROCESS DEVELOPMENT PROGRAM

A. Evaluation of Alternatives

Various methods of radiation level reduction have been considered. These can be grouped into four categories:

1. Mechanical Cleaning
2. Water Flushing
3. Operational Techniques
4. Chemical Cleaning

Evaluations of each of these categories, and of numerous sub-categories were performed, and are summarized in TABLE I. Of all the techniques evaluated, chemical cleaning appears to be the only one capable of providing significant reductions in plant radiation levels.

B. Solvent Development

The ineffectiveness of the known solvents discussed in part 4.a of TABLE 1 can be attributed to the chemical differences between deposits formed in BWR and PWR primary systems, for which most of them had been developed. This led to the need of developing a new solvent for the Dresden-1 project. The greater difficulty in removing the film from BWR plants compared to PWR's is based on the greater stability of the film produced in the more oxidizing environment of the former. In general, oxides deposited from the more oxidizing solutions tend to be more insoluble, since higher valent oxides are more stable.

The criteria for this new solvent include the following:

1. Greatest possible reduction in radiation levels
2. Complete dissolution of film
3. No reprecipitation and redeposition
4. Low corrosion rates
5. One-solution treatment

TABLE I

ALTERNATIVE METHODS FOR REDUCING
RADIATION LEVELS IN DRESDEN-1

Reduction Method	Advantages	Disadvantages	Evaluation
Mechanical Cleaning			
a. Brushing, wiping, scrubbing & scouring	Simple - No chemical waste Filtration disposal	Not highly effective Access not possible in many areas High personal exposure	Cannot be used as a solution to total problem
b. Poly-pig (pumped scouring projectile)	Waste handling eased Technique available	Applies only to piping High radiation exposure Access not possible in many areas Leaves residue	Does not meet program goals for reduction of radiation levels
c. Ultrasonic cleaning	No system modifications required Waste handling eased	High radiation exposure Access not possible in many areas Gives only localized effect	Does not meet program goals for reduction of radiation levels
d. Component replacement	Achieves minimum radiation level	Expensive High radiation exposure Partial solution only Waste disposal difficult	Cannot be used as a solution to the total problem Consider supplemental use for certain problem areas

TABLE I (Continued)

Reduction Method	Advantages	Disadvantages	Evaluation
2. Water Flushing			
a. Fill & drain	Simple - No significant additional equipment	Ineffective on scale and crud traps	Does not meet program goals for reduction of radiation levels
b. High pressure jetting	Waste handling eased	Piping access difficult or impossible without major changes Not effective without chemical addition Airborne contamination problems	Does not meet program goals for reduction of radiation levels Requires extensive Pressure boundary disturbance
3. Operational Techniques			
a. On-line chemical addition (transport deposit to cleanup system)	No or minimum outage Provides on-going solution for future	Proven or even promising method unknown at this time Licensing/safety questions difficult to answer	Not feasible at this time
b. Improve feedwater	Minimize future buildup	Long response time Does not remove scale or crud trap material Does not affect primary system generated corrosion products	Does not meet program goals for reduction of radiation levels

TABLE 1 (Continued)

Reduction Method	Advantages	Disadvantages	Evaluation
4. Chemical Cleaning			
a. Flushing with existing solvents shown below:	Techniques well known Treats total system No substantial system modification required	Extensive corrosion testing required Large waste disposal problem Low decontamination factors Lower solubility than desired	Does not meet goals for reduction of radiation levels

EVALUATION OF DECONTAMINATION SOLVENTS DESCRIBED IN THE LITERATURE WITH DRESDEN 1 SPECIMEN

Code Name	Chemical Formula	g/l	Conditions of Use	Decontamination Factor for Cobalt 60
APAC (Shippingport 1964)				
(AP)	$KMnO_4$	13	24 hrs. - 121°C	1
	NaOH	100		
(AC)	$(NH_4)_2HC_6H_5O_7$	13	28 hrs. - 121°C	1.15
AP-Citrox (PRTR 1965)				
(AP)	$KMnO_4$	30	2 hrs. - 105°C	1
	NaOH	100		
(Citrox)	$H_2C_2O_4$	25		
	$(NH_4)_2HC_6H_5O_7$	50	3 hrs. - 81°C	1.15
	$Fe_2(SO_4)_3$	2		
	diethyl thiourea	1		
60% H_4PO_4 (Dresden 1968)				
	H_3PO_4	600	4 hrs. - 121°C	2.0

EVALUATION OF "KNOWN" DECONTAMINATION SOLVENTS USING CONDITIONS DIFFERING FROM "THE LITERATURE"

Code Name	Chemical Formula	g/l	Conditions of Use	Decontamination Factor for Cobalt 60	Reason For Rejection
AP	NaOH	10	12 hrs. - 97°C	1	Low DF
	$KMNO_4$	30			
ACE	$(NH_4)_2HC_6H_5O_7$	100	pH 5	450	Insufficent removal of fission products & sloughing
	$EDTA+NH_4OH$	0.4	100 hrs. - 130°C		
	inhibitor				
Citrox	$H_2C_2O_4$	24	pH 2.4	780	Corrosion
	$(NH_4)_2HC_6H_5O_7$	50	100 hrs. - 130°C		
	$Fe(NO_3)_3 \cdot 9H_2O$	2			
	inhibitor				
AC	$(NH_4)_2HC_6H_5O_7$	100	100 hrs. - 130°C	45	Sloughing and low DF
	inhibitor				
Sulfox	H_2SO_4	30	100 hrs. - 130°C	928	Corrosion
	$H_2C_2O_4$	9			
	inhibitor				
(AP)(AC)	Each used in sequence; formulated etc, as above AP and AC			547	2-stage system and sludging
(AP)(ACE)	Each used in sequence; formulated etc, as above AP and ACE			230	2-stage system and sludging
(AP)(Citrox)	Each used in sequence; formulated etc, as above AP and Citrox			1350	2-stage system and sludging

b.	New solvent flushing (NUTEK-L106)	Techniques well known Treats total system No substantial modification required	Extensive corrosion testing required Large waste disposal problem (demin resins) Low decontamination factors Lower solubility than desired	Effectiveness questioned Test results not available Cannot consider at this time
c.	New solvent flushing Dow Solvent NS-1	Same as 4.b Single phase system Close to 100% solubility High decontamination factors Liquid waste problem reduced by factor of 2 to 3 over known solvents	Extensive corrosion Testing required Waste Processing required	Appears to be th best alternative to achieve program goal

In order to develop such a solvent for the actual film (adherent to surfaces) and sludge (non-adherent) at Dresden-1 a series of samples was obtained from the plant and tested with different solvent formulations. These samples included hand-hole covers, from the B and C Secondary Steam Generators, and pipe specimens from the cleanup loops. In addition, samples of sludge were vacuumed from the bottom of the reactor pressure vessel to determine the type of material to be found in loose deposits throughout the system.

Analysis of the corrosion products on pipe surfaces showed the material to be a spinel-type metal oxide, high in nickel and/or chromium. The final solvent, Dow Solvent NS-1, was demonstrated to give decontamination factors ranging up to 1000 on the various specimens containing the radioactive film from the reactor primary system. This range comes about from the experimental results in which the most highly radioactive specimens show the greatest percentage reduction in activity, while all samples tend toward a similar, low level of residual activity. At least three possible explanations for the residual can be offered:

1. Exchange of radioactive metal atoms with the surface of the base metal.

2. Diffusion of radioactive corrosion products into grain boundaries in the base metal.

3. Very minor activation of base metal by the neutron flux arising from (γ,n)-reactions on deuterium in the water.

Since these residuals are very low -- usually under 0.1 mr/hr on the test coupon inner surfaces -- an overall decontamination to low levels is confidently indicated.

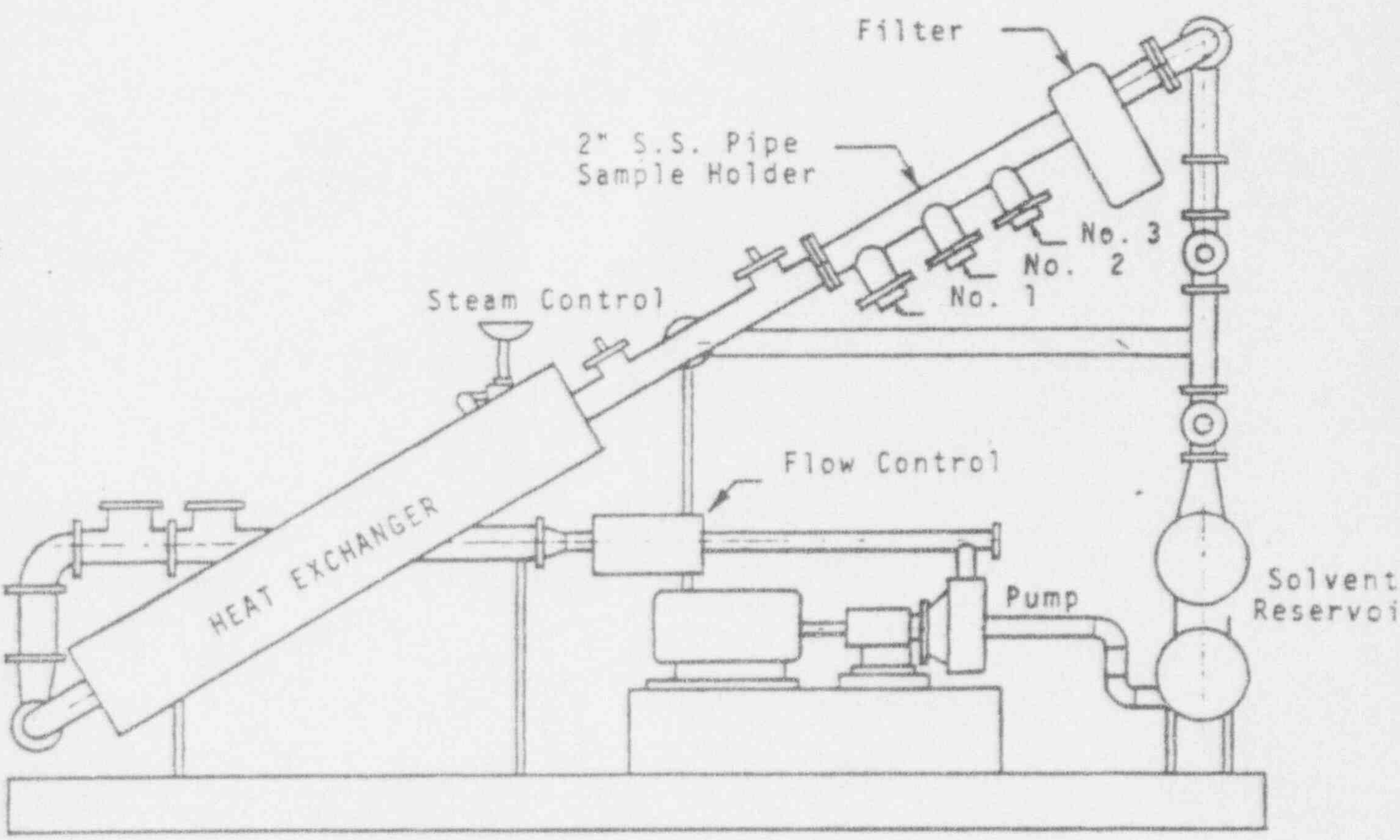
Estimates of the total quantity of film were made by consideration of the radiation levels throughout the system, based on actual measurements at the site. Various approximation methods yielded a figure of about 3000 curies ($\pm$ 1000 curies), primarily cobalt-60. Consideration of the specific activity of the sludge and film samples led to an estimated quantity of 450 to 1100 pounds of total deposit to be dissolved during the cleaning operation.

C. <u>Loop Test</u>

A special test was carried out to determine the effectiveness of the solvent under deadleg conditions. The test was designed to show any possible redeposition onto clean metallic surfaces. It was also capable of detecting undissolved sludge which might be transported to other locations within the loop. For this purpose, the Dow Industrial Service Dynamic Test Loop was employed. A special stainless steel spoolpiece containing three sample wells (deadlegs) and filters was constructed and installed within the circulating loop (see FIGURE 1).

FIGURE I

HIGH PRESSURE CIRCULATION LOOP



A total of thirteen test coupons were mounted on two different sample holders which, in turn, were placed in two deadlegs for this test. Seven coupons were contaminated metal specimens cut from the primary system of Dresden Unit-1. The remaining six specimens were material test coupons with clean surfaces representative of the materials of construction of the primary system.

The solvent was circulated at 21 GPM which represented a linear velocity of 2.0 ft./sec. in the pipe section adjacent to the deadlegs. It was heated to 250°F, the temperature of the intended cleaning of Dresden-1. Shortly after the test started, it was observed that the activity spread almost uniformly to all parts of the system, indicating rapid dissolution of the film. At the end of 75 hours, the test was interrupted and specimens were removed, rinsed, and counted for total radioactivity. They were once again returned to the loop until a total of 100 hours exposure time had elapsed. The specimens were once again counted. Decontamination factors ranging from 114 to 936 were found for these specimens, with the highest factors occurring in the case of the most contaminated coupons The lower decontamination factors were measured for specimens that had been pre-cleaned ultrasonically prior to the solvent exposure. Noticeable reprecipitation or plating of radioactive components did not occur.

The results indicated acceptable performance of the solvent under these dynamic conditions.

D. CP-5 (Argonne) Demonstration

The Dow Solvent NS-1 was recently used to clean a stainless steel heat exchanger in the CP-5 reactor at Argonne National Laboratory. This exchanger, used as the main heat sink for the reactor, has been in service for 15 years. It had experienced severe water-hardness deposit and bacteria, impeding heat transfer. The solvent was used with a microbiocide additive to remove this deposit.

The solution was circulated through the cooling water side of the exchanger for 24 hours at 120°F. This treatment resulted in a 2.5 fold increase in heat-transfer capability and a 50% reduction in pressure drop across the system. No physical examination of the exchanger was possible after the cleaning, but stressed stainless steel test coupons were installed before the start of the operation and were examined metallurgically after the cleaning. There was no evidence of any adverse effects. The heat exchanger has been in normal service since the cleaning in early September, 1974, with no evidence of deterioration.

This chemical cleaning at Argonne is not direct engineering proof of the ability of the solvent to remove BWR-corrosion product scale, nor is it complete evidence of its compatibility with stressed stainless steel. However, this operation has given experience with the solvent under field conditions and has added to our laboratory data.

E. Pilot Testing

Prior to actual full-scale cleaning at Dresden-1, if feasible and practical, a test of the solvent and cleaning process in a pilot plant model will be carried out. The EBWR reactor at Argonne National Laboratory is currently being considered as a candidate for this pilot. The intent is to perform detailed before-and-after materials examination. This will ensure that a field condition test will have been run in addition to the extensive lab testing. A section of the EBWR primary system will be isolated and the solvent circulated through that section under the actual temperature and pressure conditions expected for the Dresden-1 cleaning. It is anticipated that the isolated section will include representative piping and materials similar to those existing in the Dresden-1 plant. Prior to the pilot plant test, an intensive liquid penetrant and volumetric surface examination of the sections to be tested will be performed. The same testing will be conducted after the cleaning and flushing procedure. Any anomalies will be investigated thoroughly.

F. Full Scale Cleaning

The actual full-scale chemical cleaning of Dresden-1 is expected to be accomplished within a two-week time span. Written procedures will be developed to control the administration, operation, and emergency responses during the cleaning. Prior to using chemicals in the system, a full-scale trial run with demineralized water is planned with the fuel removed. Following a successful trial run, the chemical cleaning process will begin. The entire procedure will consist of seven steps:

1. Preparation of the primary system and water trial
2. Addition of chemicals
3. Chemical cleaning
4. First water flush and rinse
5. Subsequent flushes and rinses as needed
6. Recommissioning of plant
7. Treatment of waste

The first five steps describe the actual chemical cycle of the process. Following removal of the fuel, the primary system (See FIGURE II) will be filled to operation level with demineralized water. Auxiliary heating equipment and the reactor recirculating pumps will be operated to heat the metal surfaces to 160-200°F. Premixed chemicals will then be injected into the circulating system through an auxiliary piping system. The same heating methods will be used to raise the temperature of the system and maintain it at 250°F for an expected 100 hours. Various circulating schemes will be utilized to insure good solvent/system contact. Extensive radiochemistry, wet-chemistry and radiation monitoring techniques will be employed to follow the cleaning process. Emergency procedures will be developed to handle leakage or equipment failures. Equipment and piping of the chemical cleaning system has been designed so that any leakage or failures will be contained and processed in controlled areas. At any time during the chemical phase, the major equipment pieces (RPV, Steam Drum, SSG's, etc.) and connecting piping in the system can be rapidly drained to minimize the consequences of unforeseen events. When indicated by analytical results and agreed upon by the controlling parties, the solvent will be drained to holding tanks. The system will then be flushed through strategic points. A complete water fill, recirculation, and heating cycle will follow to rinse the system. The rinse and drain procedures can be repeated as indicated by chemical analysis to assure removal of solvent from the system. Following the chemical cleaning, the plant will be available for extensive inspections and maintenance of components. Radioactive waste will be stored, concentrated, and solidified for disposal.

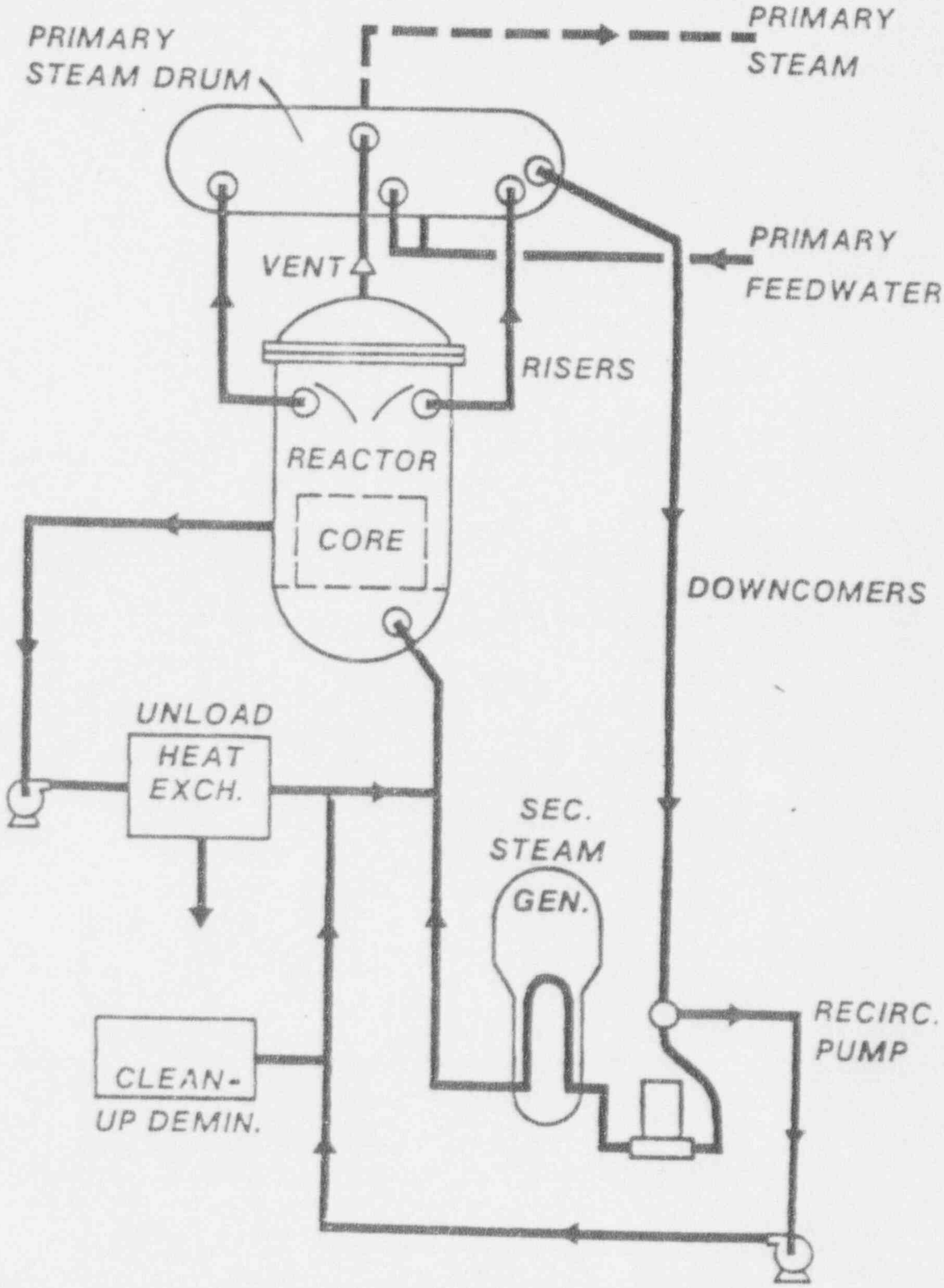
G. Solvent Quality Control

Material compatibility testing, as defined in Section IV, will be utilized to define an envelope of operating conditions within which the chemical cleaning will be conducted. The envelope will define limits in the following areas:

1. Operating temperature range
2. Maximum solvent contact time
3. Maximum-minimum solvent component concentrations
4. Maximum-minimum corrosion-inhibitor concentration
5. Maximum allowable solvent-impurity concentrations (e.g. Cl^-, F^-, Pb^{++}, S^{--}, etc.)
6. pH limitations
7. Oxygen concentrations

Figure II

PRIMARY SYSTEM



DOW INDUSTRIAL SERVICE DIV.
THE DOW CHEMICAL COMPANY

Solvent analyses will be conducted in order to monitor cleaning and decontamination progress. These solvent analyses will include the following:

1. Fe
2. Ni
3. pH
4. Residual solvent capacity
5. Gamma ray counting (primarily for cobalt 60)
6. Cu
7. Oxygen
8. Redox potential
9. Temperature

This series of tests will be used as input to determine the effective end point of the process.

IV. MATERIAL COMPATIBILITY

Since the solvent is active and has been shown to provide an effective means for removing the Dresden 1 film, we have also considered adverse effects of the solvent on materials of construction. A program has been organized to evaluate the following:

1. The effect of the solvent on the materials of construction during the cleaning process

2. The possible residual effect of the solvent on the materials during subsequent operation of the plant

Work to evaluate these concerns has been conducted primarily by Dow Industrial Service but confirmatory work has been at General Electric Company, Argonne, and Ohio State University.

A. Materials Identification

In order to evaluate the compatibility of materials of construction with the solvent, it was necessary first to identify such materials. This matter demanded particular attention because of the age of the plant. A major effort was, therefore, organized to identify the following:

1. Materials which will be exposed to the solvents

2. Heat treatment and fabrication conditions of these materials

3. Crevices and similar geometric configurations where solvent might sequester or where crevice corrosion attack might occur

4. Locations where two metals are connected and where galvanic corrosion processes might occur

5. Existence of other materials such as gaskets or bearings which might dissolve, slough, leach or absorb chemicals during the cleaning or subsequent operation

In order to obtain this information, Dow engineers thoroughly analyzed the system by conducting:

1. A search and study of the available drawings and records

2. An inspection and study of the Dresden-1 primary system

3. A review of original records from vendors and suppliers

From these efforts, it was possible to establish an inventory of materials and conditions.

The materials identified are listed in TABLE II. TABLE III summarizes the various bi-metallic coupled and crevice configurations. The information in TABLES II and III was used to organize the materials testing program. All of the materials and conditions identified in these tables were incorporated into the materials test program. In certain cases it was necessary to substitute similar materials for lack of availability of the exact alloys. All of these substitutions were reviewed and approved by Commonwealth Edison and the consultants.

B. Materials Test Program

A major effort was made to evaluate the compatibility of materials of construction with the cleaning solution.

The test program was designed to evaluate the following:

1. Alloy chemistry

2. Alloy heat treatments including sensitization of stainless steel and temper embrittlement of low-alloy steels

3. Environmental conditions, including the effects of impurities such as oxygen, halides, sulfur species, as well as dissolved corrosion products

4. Effects of crevices, bi-metallic junctions, surface conditions, welding and applied stresses

5. Effects of prior irradiation of the structural materials

TABLE II

Materials Found in Dresden-1 That Will Contact Chemical Cleaning Solution

WETTED MATERIALS:

AISI

302
303
304
316
347
410
416
B16
B113
C1040
C1045
C1213

SAE

SAE 40 (Brass)
SAE 64
SAE 660 (Bronze
SAE 1112

ASTM

A53-B
A105-2
A106-B
A155-KC70
A167-3
A182-F304, 304 ELC, 316, F22
A193-B8, 416
A194-8, 1
A212-A, B
A213-304
A216-WCB
A240-304, 304L, 405
A249-304L
A264-304L
A268-405, 410
A269-321
A276-304, 410, 410H, 420
A296-CA15
A298-304L, 308, 309
A302-B
A312-304, 316
A335-F1, P22
A336-F1
A371-309
A376-304
A479
A516-70
A582
B371

ASME

SA48-25,30
SA53
SA105-2, 1
SA107-1137, 1141
SA108-1035
SA113
SA120
SA132-304
SA155-2-1/4, CL1
SA182-F11, F6, F304
SA194-C12H
SA216-WCB, WCA
SA217-WCL, WC9
SA234-WP22, WP22W, WPB, WPE
SA266-2
SA269-304
SA278-25
SA285-C
SA298-308L, 209
SA335-P11
SA336-F8
SA351-CF8
SA358-S
SA403-WPW 304, WPW 326
SA511-MT321
SB30
SB62
SB143-A2
SB145-4A
P-3442B

OTHERS

Asbestos
Carpenter Mirromold
Cast Iron C130
Co-Cr-W Alloy (AWS-5.13)
Copper
Copper and Neoprene
Everdur
Flexrock 401
Garlock 24
Graphitar 14
Hastelloy C
Haynes - 25, 21
Inconel
Monel
Nitrile
Si-Bronze
Stellite 6
TP 17-4PH

TABLE III

BIMETALLIC JUNCTIONS OF WETTED MATERIALS IN DRESDEN-1

Junction Material	Equipment Piece
303-304*	G-17
304-304L*	C-2, C-3
304-316*	G-17, Pipe: C-1, Valves: SP115M2, 108M2, SP213-M2
304-347*	G-17, Valve: 108M2
304-405*	F-4, F-16
304-410*	C-2
304-410H*	F-16
304(ANN)-410	G-125
304(ANN)-420 (H.T)*	G-125, G-39
304-1020*	C-2, E-2, E-4, E-7, G-39
304-1112	C-2
304-H25 Alloy*	Valve: 208M2
304-TP17-4PH*	G-4, G-17
304-Copper*	G-17
304-Chrome*	G-17
304-Graphitar*	G-17
304-Flexatallic 304*	Valves: SP115M2, Sp213M2
304-Inconel*	G-4, G-17
304-Stellite#6*	G-39, Valve: A208M2
304-Monel	Valve: A208M2
304L-405*	C-2
304L-410*	C-2
304L-1020*	C-2, C-8, E-2, E-3, E-4
308L-1020*	F-4, C-2
309-1020*	F-4, C-2
316-347*	Valve: 108M2
316-17-4P4*	Valve: Sp115M2
347-Copper*	G-17
347-2 1/4 Cr 1 Moly*	Valves: 198M1, 110
347-Stellite #6*	G-17, Valves: 108M1, 110
347-Hastelloy C*	Valves: 108M1, 110
405-410*	C-2
405-410H*	C-2, F-16
405-416	C-2
410-410H	G-125
410-230	G-125
410-1020*	Valves: MV10, MV6 SPA116, 223
410-Carpenter Mirromold*	VAlve: MV10
410-Stellite #6*	G-39
410-Flexatallic 304*	Valve: MV6 SPA116
410-Tungsten, Cobolt, Chrome Alloy	Valves: 223, 401

Junction Material	Equipment Piece
416-AISI C1213*	G-54
410-18Cr8Ni: StStl*	Valve: 401
416-Cast Iron #30*	G-54
416-SAE 660*	G-54
410-420*	G-39
1020-1137/1141*	E-7
1020-1112	G-125
1020-Nitrile (O-rings)*	G-39
1020-Flexatallic*	G-125, Valve: MV6-SPA116
1020-70/30 Cu/Ni*	E-7
1020-2 1/4 Cr 1 Moly*	Pipe: C-1, C-2, C-3, C-4, Valves: 108M1, 110, 108M2
1020-Cast Iron C130	G-125
1020-Asbestos*	Valve: 223
1020-Carpenter Mirromold*	Valve: MV10
1020-Stellite*	Valves: MV10, MV6SPA116, 110, 108M2
1112-Cast Iron C130*	G-125
2 1/4 Cr 1 Moly-Tungsten Cobalt Cromium Alloy	Valve: 401
2 1/4 Cr 1 Moly-18Cr 8 Ni StnStl	Valve: 401
2 1/4 Cr 1 Moly-Stellite #6*	Valves: 108M1, 108M2
H25 Alloy-Stellite #6*	Valves: 108M1
Graphitar 14-Stellite #6*	G-17
#40 Brass-B1113*	G-54
B-62-Everdur*	G-125
B-30*	G-125
B-30 - B-62*	G-125
Cast Iron #30-SAE660*	G-54

* Crevice Conditions

Equipment Piece Number Identification:

C-2	Reactor Pressure Vessel
C-3	Drum, Primary Steam
C-8	Tank, Reactor Clean-up Demineralizer
E-2	Secondary Steam Generator
E-3	Heat Exchanger, Regenerative, Clean-up Demineralizer
E-4	Heat Exchanger, Regenerative, Clean-up Demineralizer
E-7	Heat Exchanger, Reactor Unloading
E-111	Cooler, Reactor Enclosure Drain Tank
F-4	Turning Vane, Reactor Pressure Vessel
F-6	Vessel Thimble
F-15	Diffuser Basket with Poison Sparger
F-16	Guide, Grid
F-17	Plate, Core Support
F-21	Control Rod Drive Tube Assembly
G-4	Pump, Clean-up Demineralizer Recirc.
G-17	Pump, Reactor Recirculating
G-39	Pump, Unloading Recirculating
G-54	Pump, Reactor Enclosure Drain Tank
G-125	Pump, Reactor Area Sump

TABLE IV

SUMMARY OF CORROSION DATA

AISI TYPE ALLOY	GENERAL CORROSION*	CREVICE CORROSION	GALVANIC CORROSION*	STRESS CORROSION
1020	017740			
304	0.0096	none	304L (0.0001) to 1020 (0.35)	none
304 Sen.	0.1061	none	304L (0.0027) to 1020 (0.824)(1:10)**	none
304L	0.0089	none	304L (0.0011) 1020 (1.406)(10:1)	none
304L Sen.	0.0890	none	304L (0.0009) to 1020 (2.8396)(1:30)	none
347	0.0233	none	347 (0.0011) to 1020 (0.3385)	none
405	0.1233	none	405 (0.4759) to 1020 (C.0802) 405 (0.0046) to 304 (0.0010)	none
446	0.0086	none	446 (0.0013) to 1020 (0.2032)	none
Inconel 600	0.0116	none		none
17.4 PH	0.0377	none	17-4 (0.0009) to 304 (0.0013)	
Hastelloy B	0.03356	none		none
Copper 122 and 715	0.05136	none		none
Aluminum	5 - 10		Al (0.2706) to 304(0.0009)	none

*Corrosion numbers represent total mils penetration during test (1 mil=10^{-3} inches). Penetration assumed to be uniform over the surface of the specimen.

**Numbers in parenthesis refers to area ratio of active to noble metal.

--All corrosion tests were without added impurities.

COMMENTS

General Corrosion - Each number represents an average weight loss from at least 5 specimens converted to penetration (mils)/300 hour test time. All testing done under air saturated conditions, with test temperature set at 275°F.

Crevice Corrosion - Each alloy has been tested with artificial Teflon crevices and in a double U-bend configuration (stressed crevice). (No crevice initiation occurs on stainless alloys, copper alloys, or nickel based alloys.)

Aluminum alloys have not been tested. Tests were run at 275°F from 100 to 300 hours.

Galvanic Corrosion - Each alloy couple has a (1:1) area ratio except where noted. Couples were made by rubber banding coupons together (long-term welded couples are under test at present. The galvanic tests were made in air saturated conditions at 250°F for 16 hours.

Stress Corrosion - Each alloy was tested in a series of double U-bend tests. In addition, the 304 stainless alloys were sensitized before U-bend (heated to 1200°F for 50 hrs with a furnace cool). The 405 and 446 stainless alloys were tested after temper embrittling (at 885°F for 100 hours with a furnace cool). The stress tests were under static conditions for 112 hrs at 275°F.

Special attention has been given to assure that the solvent chemistry, as defined in section 3-G, used in material testing is the same as that to be used in the full scale process.

The experimental portion of the test program found that there were no metallurgical or environmental conditions which are expected to be encountered during the chemical cleaning which would adversely affect the integrity of the materials of construction.

The detailed materials testing program consists of the following six parts:

1. General Corrosion Testing

Specimens representative of the materials in TABLE II (as determined and agreed on by a panel of metallurgical and corrosion testing consultants) were exposed to the solvent to evaluate the rate of general corrosion. These specimens were exposed for 100 to 300 hours and evaluated to determine the loss of weight and occurrence of localized pitting or intergranular attack. TABLE IV summarize the results of this work in the second column.

Examination of the specimens after terials testing showed no evidence of pitting or intergranu attack. Results of visual examination were confirmed t optical metallography.

2. Crevice Corrosion Testing

Crevice corrosion tests were conducted. The results are summarized in Column 3 of TABLE IV. No acceleration of attack was observed over that of the general corrosion attack in the first column. No localized attack was observed on surfaces exposed inside the crevices.

3. Galvanic Corrosion Testing

The fourth column of TABLE IV shows the results from Galvanic Corrosion tests. These results show that the corrosion of the more active materials in each couple is accelerated in each case. However, these increased rates are still small and are not considered significant.

4. Stress Corrosion Testing

Stress corrosion testing was conducted on all materials using U-Bend specimens which were exposed for 112 hours. Table IV, Column 5 shows that no cracking was observed for the alloys exposed to the cleaning environment.

5. Electrochemical Studies

Electrochemical studies of sensitized 304 stainless steel conducted in the Corrosion Laboratory at Ohio State University have shown that the protective character of the film is stable and shows no tendency to pitting or other forms of breakdown.

6. Boundary Conditions

A series of reasonably "worst-case" experiments were organized wherein several of the above conditions were tested simultaneously. The most significant of these experiments involved specimens which incorporate stresses, sensitization, crevices and cold work. These specimens did not crack under the environmental conditions specified for the cleaning operation

When these "worst specimens" were exposed to conditions of increased oxidizing potential achieved by adding oxygen or ferric ion, stress corrosion cracking was observed. However, subsequent tests with the same specimens in deionized water showed that the solvent was no more aggressive than the water. A review of the results by General Electric concluded that the manner and rate of cracking in the solvent was identical to that observed in their previous tests in oxygenated deionized water.

C. Irradiated Material Testing

The effects of chemical cleaning on highly-irradiated stainless steel is a subject on which little is known and little has been published. Since some of the critical reactor components have been in high neutron fields for a long time, it is necessary that experiments be designed and carried out to determine any such effects. Tests conducted with actual irradiated metal are difficult and expensive due to the high radiation fields associated with them. For this reason, a test has been designed which should yield a maximum amount of data.

1. Materials

The material to be tested has been acquired from 304SS cans that had been used to contain surveillance coupons in the reactor core. Coupons of approximately 1/2" x 4" x 1/16" will be prepared from these cans. In addition, non-irradiated coupons of the same size will be prepared for comparision.

2. Test Method

The coupons, 6 irradiated and 6 nonirradiated, will be mounted in tensile fixtures, strained 1% and stressed to yield. These fixtures will be mounted in a circulating loop along with several other tests such as "wedge open loading" precracked specimens and crevice corrosion coupons, both nonirradiated.

3. Test Conditions

The environmental conditions for the test will be as follows:

a. Temperature 255 ± 5°F

b. Contact time 200 hrs.

c. Normal solvent concentration, oxygen saturated at ambient temperature

d. Deposit components and solvent impurities such as iron, nickel, halogens, and copper at concentration levels expected during the cleaning process.

4. Evaluation

A visual examination of the specimens will be made to check for cracks or other surface attack. Weight loss will be evaluated and compared to the nonirradiated coupons.

D. <u>Residual Solvent Effects</u>

Additional tests will be performed to determine any residual solvent effects on the primary system materials. These tests will determine the effects on 304SS during cleaning and subsequent service at operating temperature and pressure. The planned test will comprise: (1) Intergranular Stress-Corrosion Cracking (IGSCC) Tests Under Simulated Cleaning Conditions, (2) IGSCC Tests in Simulated BWR Environment, and (3) Tests for Chemistry and Corrosiveness of Decomposed Solvent. The following is a description of these tests.

1. <u>IGSCC Tests Under Simulated Cleaning Conditions</u>

These tests will consist of exposure of simple rectangular bent-beam samples -- roughly 3" x 1/2" x 1/16" -- strained 1%-2% by bending over a radius block, with both ends anchored to maintain residual stresses. The exposure conditions would be the time and temperature anticipated for the cleaning operation in fresh solvent and in solvent containing Fe^{+3} and Ni^{+2}. Data will be obtained by optical and metallographic examinations for IGSCC.

2. IGSCC Tests In Simulated BWR Environment

These experiments will consist of exposure of unstressed samples to solvent containing Fe, Fe^{+3}, and Ni^{+2} for the time and temperature anticipated for the cleaning operation. The samples will then be rinsed with water and exposed to oxygenated 550 F water as both bent-beam and constant-load uniaxial tensile specimens. Data will be obtained from a statistical analysis of the IGSCC behavior of the samples exposed to the solvent in comparison to control samples which had not seen prior exposure to the solvent.

It is planned to perform both of the above tests using a heat of 304SS known to be susceptible to IGSCC. All samples will be made from the same heat of material.

3. Test for Chemistry and Corrosiveness of Decomposed Solvent

This test was accomplished by connecting two short pieces of 304SS tubing with a 304SS Swagelok® fitting. The fitting was filled with solvent during assembly. The assemblies were then tested in solvent for 300 hours at 250°F under static conditions. Following this exposure, the assemblies were placed in deionized water at 575°F for 100 hours. When disassembled, the internal surfaces of the fittings which had formed the crevices showed no crevice attack or stress corrosion.

V. FACILITY SAFETY EVALUATION AND DESIGN BASIS

A. Summary

Although substantial amounts of radioactive material (3000 Ci as Co-60) will be removed from the Dresden-1 Primary System, the cleaning process is not considered to impose any unreviewed safety questions. However, returning to power operation following the chemical cleaning falls outside of scope of previous safety evaluation for Dresden Unit 1. This Licensing Submittal contains an evaluation of the safety considerations involved in the primary coolant system return-to-service following the chemical cleaning. Based on this evaluation, it was concluded that the proposed post chemical cleaning inservice inspection requirements proposed in the License Amendment are adequate to ensure that there will be no reduction in the safety margin of the structural integrity of the primary coolant boundary. This conclusion is based on consideration of the source terms, the design basis selected for the facility, and the planning and procedural aspects provided. In addition, since the cleaning system will actually be in use for a short period of time, the probability of adverse site conditions occurring during the cleaning is considered low.

B. Source Terms

During the cleaning, the radioactive source will consist of activated corrosion and wear products removed from reactor plant surfaces by the solvent. Fission product concentrations will be negligible. The specific activity of the solvent, after the cleaning, is estimated to be 10 μCi/cc (as Co-60) based on the analysis of samples taken from the primary system. The total activity which will be removed is estimated to be 3000 Ci. The solvent will be concentrated in the liquid waste processing portion of the cleaning facility, and the concentrated portion will be solidified for off-site burial.

C. System Design and Performance

The major components of the cleaning facility are tanks, pumps, heat exchangers, connecting piping and valves. Storage tanks V201, V202 (See plot plan A-101 included at the end of this report) are used to collect the used solvent and initial rinses which comprise the bulk of the radioactive materials. The tanks will be constructed of reinforced concrete, with stainless steel liners, and will have a total capacity of 300,000 gallons. Each tank will be classified as Seismic Category I, and will meet the structural design basis used for Dresden 2-3, Class I structures. The tanks will also meet requirements for withstanding the design-basis tornado for Region I as defined in Regulatory Guide 1.76. Tanks V201 and V202 are equipped with vents and overflows which are directed to the interior of the radwaste building. Any leakage from these tanks will be contained in the building.

Storage tanks V203 and V204 will contain low-activity rinse water and processed liquid wastes. These tanks will be freestanding coated (Carbolene 300) carbon-steel tanks and will be surrounded by reinforced concrete dikes of sufficient size to contain any leakage from the tanks. The tanks will be designed to meet API standards. The radioactivity content of tanks V203 and V204 will be limited to that allowed under the existing Dresden Unit 1 Technical Specifications.

The system piping from the reactor containment building to storage tanks V201 and V202 will be compatible with the commercial standards of ANSI b.31.1.0. This piping will be contained in a buried concrete vault of sufficient design to contain any leakage and provide necessary radiation shielding. The remaining cleaning system components will be provided in accordance with commercial standards and specifications. There are no mechnical modifications required for the reactor-coolant pressure boundary. After completion of the cleaning, the temporary piping tie-ins will be removed and the original flanged connections will be replaced.

The cleaning and liquid radwaste processing equipment will be located in a Seismic Category I building. The building will be designed to withstand the design basis tornado for Region I as defined in Regulatory Guide 1.76. All equipment will meet the requirements of Quality Group D Components per Regulatory Guide 1.26, since their failure would not result in dose rates exceeding 0.17 Rem at the site boundary.

The expected 3000 curies of radioactivity, contained in approximately 200,000 gallons of liquid, will be concentrated into approximately twenty 1000 gallon batches. The concentrated waste will be solidified in approximately 800 drums (55 gallons each) or other approved containers for off-site shipment in shielded casks. The remaining 180,000 gallons of decontaminated water will be further polished and recycled into the plant makeup system.

D. Safety Evaluation

1. Cleaning Facility

Prior to performing the Dresden-1 cleaning, the reactor plant will be shutdown, the fuel assemblies removed, and the reactor coolant system drained. There will be, therefore, only a negligible inventory of fission products or other volatile radionuclides. The radioactive materials encountered will consist of nonvolatile activated corrosion and wear products. During the cleaning and subsequent waste processing, the radioactivity will be dissolved in the solvent.

For these reasons it is expected that off-site doses from the releases of gaseous waste will be negligible. The lack of fission product activity, especially radioiodine, eliminates the potential for exposure via inhalation or ingestion, since there is no potential for airborne release or later deposition off-site. Specific dose calculations, as presented in Regulatory Guide 1.42, are thus not required for the cleaning operations.

Storage tanks, V201 and V202 will contain the radioactivity removed from the reactor primary system until the waste is processed. These tanks will be designed and fabricated per Seismic Category I, and will be designed to withstand the design basis tornado for Region I as defined in Regulatory Guide 1.76. The tanks will form one wall of a Seismic Category I building also designed to the requirements of Regulatory Guide 1.76. In addition, the tanks and buildings will be designed to withstand site flooding. With these design considerations, even under safe shutdown earthquake (SSE) or tornado conditions, failure of the tanks or building is considered very unlikely. The solvent and radioactivity will remain contained and the release of radioactivity to the discharge canal or to the Illinois river will be prevented.

2. Cleaning Operations

Prior to the cleaning, a preoperational test of all equipment, instrumentation and controls to be utilized during the cleaning will be performed. All procedures and operations (as specified in Section III F.) will be performed to ensure that the process can be conducted safely, prior to the addition of cleaning chemicals.

During the actual cleaning, process controls and instrumentation will provide necessary information to reduce the possibility of spreading contamination within the reactor containment. In the event of adverse site conditions, most of the Dresden primary system volume can be pumped out to the waste storage tanks in approximately fifteen minutes. The ability to isolate and drain various sections of the reactor primary system and associated system will be provided to reduce the effects of any leakage which may occur. Since the cleaning will be performed at 35 psig and 250°F (a small fraction of normal operating conditions) and auxiliary heat removal equipment will be provided, potential radiological problems associated with high temperature (above 250°F) operations and/or leaks are eliminated. Process equipment and controls will be provided to ensure that the storage tanks will not be exposed to temperatures which could cause excessive expansion, or freezing, of the liner or damage concrete.

Operation of the radwaste processing system will be in accordance with existing Dresden Unit 1 Technical Specifications. As low as practicable release levels will be maintained, and effluent monitoring practices followed. It is planned to reuse processed water, thereby reducing the total radioactivity released in liquid effluents.

VI. POST CHEMICAL CLEANING

A. Continuing Materials Surveillance

The chemical control program for Dresden Unit 1 will comply with the technical specifications when the plant is put back into service after the chemical cleaning. The existing metal surveillance specimens are being evaluated for usefulness in a continuing program after chemical cleaning.

In addition, various metal specimens will be fabricated and installed in the reactor prior to the cleaning. Some of these specimens will be removed for metallographic examination immediately after the cleaning. Others will remain in the reactor and be removed during succeeding refueling outages for metallographic examination.

The exact materials to be included in the program cannot be specified at this time, because they may be limited by the space available for exposure in subsequent service. At the minimum, they will consist of sensitized and as-welded 304SS, 410SS, A302B, and sensitized and as-welded Inconel 600. Hopefully other materials of interest can also be included and these will be chosen when it is known that space is available. As many materials of current and potential future interest will be included as is practical.

As part of the post-cleaning acceptance, a representative number of welds will be examined prior to the cleaning to determine as accurately as possible the characteristics of the indication. Following the chemical cleaning and during at least two subsequent refueling outages, these same welds will be reexamined to determine any change in the characteristics of the indication, which might be attributable to chemical cleaning process.

B. In-Service Inspection

Following chemical cleaning of the Dresden Unit 1 Primary System an in-service inspection program will be performed, as complete as plant physical accessibility permits. It will be based upon the requirements of Section XI of the ASME Boiler and Pressure Vessel Codes.

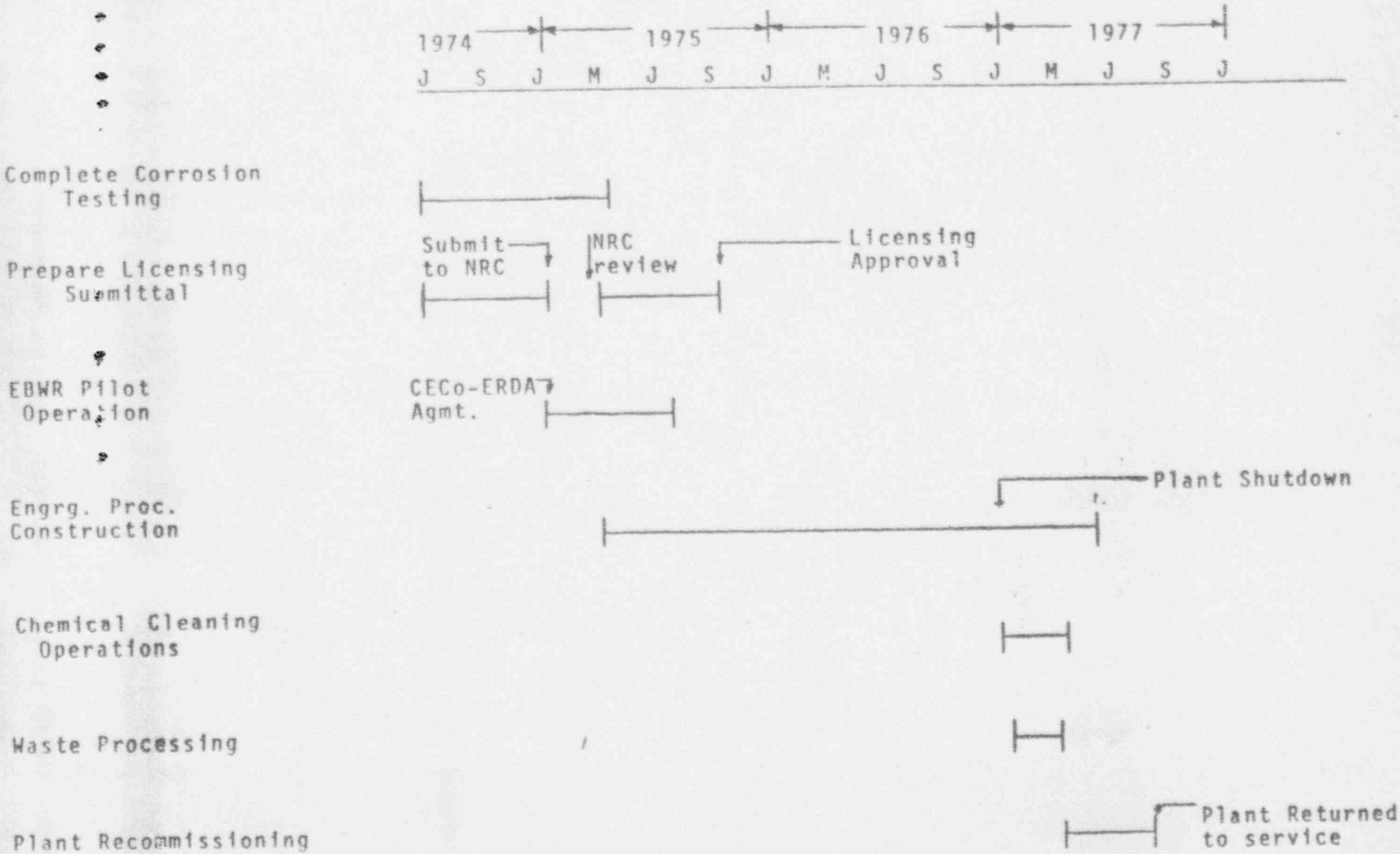
If necessary, this inspection will also meet the requirements in the Interim Acceptance Criteria for Emergency Core Cooling Systems for Light Water Power Reactors.

Inspection points which were deleted from the in-service inspection program due to high radiation levels since the 1971 in-service inspection will be included as a part of this inspection.

VII. SCHEDULE

The attached chart presents our current schedule for the cleaning of Dresden-1. We expect to complete corrosion testing by March, 1975. Detailed engineering and construction of the chemical cleaning systems are scheduled to start March 1, 1975. The actual chemical cleaning operations including waste processing would start in January, 1977 and run for 2 or 3 months. This will be followed by an extensive recommissioning effort which will include in-service inspection and equipment overhaul. The plant would be returned to service in mid-1977.

DRESDEN - 1 CHEMICAL CLEANING
SCHEDULE



Commonwealth Edison
One First National Plaza, Chicago, Illinois
Address Reply to: Post Office Box 767
Chicago, Illinois 60690

April 1, 1975

Mr. Edson G. Case
Acting Director
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Subject: Dresden Station Unit 1
Chemical Cleaning Licensing Submittal
NRC Docket No. 50-10

Dear Mr. Case:

In a letter to you dated December 19, 1974 concerning this subject, it was indicated that related proposed Technical Specification changes would be submitted by March, 1975. The intent was to develop Technical Specifications adequate to allow power operation of the Unit 1 reactor following the chemical cleaning. The general scope of these Technical Specifications was outlined in the December 19, 1974 letter.

After further review, it is our conclusion that these "post chemical cleaning" Technical Specifications can not be developed fully prior to January, 1976. Additional information needed to develop detailed specifications will be obtained from certain ongoing testing programs and from plant inspections during the Fall, 1975 refueling outage.

It is requested that your review of the December 19, 1974 licensing submittal continue toward issuance of an authorization of the chemical cleaning program by June, 1975. Since it is expected that some testing work and the detailed Technical Specifications will not be completed by June, 1975, it is suggested that the authorization be contingent on completion of a specific list of "open items" prior to return to power operation following the chemical cleaning. This list of open items would include the following:

1. In addition to the existing metal surveillance specimens, various metal coupons will be fabricated and installed in the reactor prior to the cleaning. Some of these specimens will be removed for metallographic examination immediately

after the cleaning. Others will remain in the reactor and be removed during succeeding refueling outages for metallographic examination.

2. The new metal specimens will consist of sensitized and as-welded 304SS, 410SS, and sensitized and as-welded Inconel 600. Hopefully, other materials of interst can also be included. As many materials of interest will be included as practical.

3. As part of the post cleaning acceptance, a representative number of welds with known minor indications will be examined prior to the cleaning to determine as accurately as possible the characteristics of the indications. Following the chemical cleaning and during two subsequent refueling outages, these same welds will be re-examined to determine any change in the characteristics of the indication which might be attributable to the chemical cleaning process.

4. The materials test program, as detailed on the attached test matrix, will be completed by September 1, 1975. Conclusions and a summary from these materials test program will be made available to the staff. The successful completion of this test program will be documented by Dow Chemical or General Electric Company depending on the party performing the test work. Test results will be audited and approved by one of our independent consultants as well as by Commonwealth Edison Company personnel.

5. Performance of a pilot plant test operation is scheduled. Details are not yet firm. When this is arranged, the staff will be kept informed. A report summarizing the operation will be made available to the staff on completion of the test.

Proceeding in the manner requested will allow the chemical cleaning program to proceed to the equipment procurement stage on a schedule consistent with performing the cleaning in late 1976 or early 1977. The program would proceed on the basis of the requested NRC preliminary approval, and resolution of the "open items" could proceed in parallel without delaying the schedule of the chemical cleaning project.

Mr. Edson G. Case
Page 3
April 1, 1975

One (1) signed original and 39 copies of this request for preliminary approval of the Dresden Station Unit 1 chemical cleaning are submitted for your review.

Very truly yours,

J. S. Abel
Nuclear Licensing Administrator
Boiling Water Reactors

releas

Commonwealth Edison
One First National Plaza, Chicago, Illinois
Address Reply to: Post Office Box 767
Chicago, Illinois 60690

April 16, 1975

OFFICE OF THE SECRETARY
D.C.

Mr. Benard C. Rusche, Director
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Subject: Dresden Station Unit 1
Chemical Cleaning Licensing Submittal
Supplement 1
NRC Docket No. 50-10

Dear Mr. Rusche:

Attached is the subject supplement to the original licensing submittal dated December 19, 1974. This supplement contains additional information specifically requested by your staff and contains Appendix I which describes in detail the extensive corrosion studies performed to demonstrate compatibility of the cleaning solvent and the Dresden Unit 1 primary system material.

As indicated in our letter to Mr. E. G. Case dated April 1, 1975 concerning this subject, it is intended that this supplement provides sufficient information to allow your preliminary approval of the chemical cleaning program by June 1975. If you have any further questions or comments, please contact me.

One signed original and 39 copies of this submittal are provided for your review.

Very truly yours,

J. S. Abel
Nuclear Licensing Administrator
Boiling Water Reactors

3,

4456

[Attachment 1b]

004088

- RWU Connor ~~Nelson~~

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

December 9, 1975

Docket No. 50-10

Commonwealth Edison Company
ATTN: Mr. R. L. Bolger
Assistant Vice President
Post Office Box 767
Chicago, Illinois 60690

Gentlemen:

The NRC staff has c pleted its review of your requests dated December 16, 1974, April 1, 1975, and April 14, 1975, for authorization to carry out a chemical decontamination of the interior surfaces of the Dresden 1 Primary Coolant System. Based on our review of the decontamination program, we have concluded that the program can be conducted with reasonable assurance that the health and safety of the public will not be endangered.

During our review three items were identified as unresolved. It is our understanding that they will be resolved as follows:

1. The testing program will be completed and the results submitted for the review and approval of the NRC staff prior to performing the proposed chemical cleaning.

2. A pre-service inspection program for the primary coolant boundary will be formulated and submitted for our review and approval prior to returning the reactor to service.

3. A post-cleaning surveillance program which includes additional surveillance specimens and a specimen withdrawal and examination schedule will be submitted for our review and approval prior to returning the reactor to service.

On this basis the Commonwealth Edison Company is authorized to initiate its proposed chemical decontamination of Dresden Station Unit 1.

The staff's review is summarized in the attached Safety Evaluation.

Sincerely,

Karl R. Goller

Karl R. Goller, Assistant Director
for Operating Reactors
Division of Reactor Licensing

Enclosure:
Safety Evaluation

[Attachment 2]

cc w/enclosure:
John W. Rowe, Esquire
Isham, Lincoln & Beale
Counselors at Law
One First National Plaza
Chicago, Illinois 60670

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

SUPPORTING AUTHORIZATION TO CHEMICALLY DECONTAMINATE THE PRIMARY COOLING SYSTEM AT DRESDEN UNIT 1

COMMONWEALTH EDISON COMPANY

DRESDEN NUCLEAR POWER STATION UNIT 1

DOCKET NO. 50-10

INTRODUCTION

By letters dated December 16, 1974, April 1, 1975 and April 14, 1975, the Commonwealth Edison Company (CECo) requested authorization to carry out a chemical decontamination of the interior surfaces of the Dresden Unit 1 primary coolant system.

The purpose of the decontamination is to remove a deposition of activated corrosion products which is tightly bonded to the primary coolant system piping and components. The presence of the corrosion products in the system results in high levels of radiation in adjacent areas and limits access to these areas for the purpose of in-service inspection, routine maintenance and plant modifications.

CECo has tentatively scheduled the chemical cleaning project to begin in January 1977 with an anticipated return to service scheduled for July 1977.

EVALUATION

The staff's review of CECo's proposed chemical decontamination of the interior surfaces of the Dresden Unit 1 primary coolant system has been completed. The results of this review are as follows:

1. Environmental Impact

   The chemical decontamination of the Dresden 1 primary coolant system will be performed entirely within a closed decontamination system. The system has been designed so that no chemical or radiological wastes will be released to the environment from the decontamination process. All wastes generated in the process will be either solidified for offsite burial at a licensed burial ground or reprocessed for reuse onsite. The solid wastes produced are similar in type and quantity to those handled routinely at the site. Therefore, no adverse environmental impacts are anticipated due to the decontamination.

2. Materials Compatibility

The staff has reviewed the results of the material testing program that has been carried out in support of the proposed Dresden 1 decontamination program. The test program was organized to look at corrosive effects during the decontamination process and possible residual effects during subsequent reactor operation.

Based upon our review of the results of the testing program completed to date, we have concluded that the test program adequately evaluated those aspects of the materials compatibility that we consider to be important. As a result of our discussions with CECo's consultant, Dr. Craig Cheng of Argonne National Laboratory, we find that the remaining program will be conducted in a manner that will answer our presently unresolved concerns and the test results will be adequately interpreted and reported.

We conclude that upon the successful completion of the testing program described in the submittals and with an adequate surveillance and inspection program, the Dresden Nuclear Power Station Unit 1 can be subjected to the described chemical cleaning process without undue corrosion or other deleterious materials compatibility effects that would adversely effect the integrity of the primary coolant system and connected systems.

A small number of items of concern have not been resolved to the staff's full satisfaction at this time. However, we conclude that authorization to carry out the chemical decontamination should be granted in anticipation of the successful resolution of these open items in the near future. The following open items are identified at this time as requiring resolution to the staff's satisfaction:

(a) The materials test program will be completed and the test results will be analyzed and reviewed prior to the beginning of the cleaning process.

(b) Surveillance specimens in addition to those now planned will be determined by mutual agreement with the applicant and a schedule for specimen withdrawal will be stated.

(c) A pre-service inspection program for the primary coolant boundary and safety related systems will be formulated and performed prior to return to power.

3. Effluent Treatment Systems

We have determined that the effluent treatment system, if constructed as described in the CECo submittals, is capable of handling the types and quantities of effluents expected to be generated by the decontamination program. Our review was limited to the use of the system for chemical decontamination only, and use of the system for any other purpose subsequent to that program must be reviewed prior to such use.

4. Radiological Safety

We have further concluded that the radiological safety program described in the submittals is adequate to assure that the health and safety of the public and the onsite personnel will not be endangered by the Dresden 1 decontamination project.

CONCLUSION

We have concluded, based on the considerations discussed above, that: (1) because the chemical cleaning does not involve a significant increase in the probability or consequences of accidents previously considered and does not involve a significant decrease in a safety margin, the cleaning project does not involve a significant hazards consideration, (2) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, and (3) such activities will be conducted in compliance with the Commission's regulations and the issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public.

Date: December 9, 1975

Sheldon Trubatch H-1035

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EGCase

Docket No. 50-10

MAY 2 9 1980

MEMORANDUM FOR: Chairman Ahearne

THRU: William J. Dircks (Signed) T. A. Rehm
Acting Executive Director for Operations

FROM: Harold R. Denton, Director
Office of Nuclear Reactor Regulation

SUBJECT: DRESDEN DECONTAMINATION

Enclosed is our response to your memorandum dated February 27, 1980 which asked three specific questions:

1. What is being done at Dresden?
2. What type of approval did NRC give (license amendment?)?
3. Did we do a negative declaration or environmental assessment?

As indicated in the enclosure, we have completed our review of the safety and environmental aspects of the proposed chemical decontamination at Dresden and expect to issue a draft environmental statement for comment by the end of the month.

Original Signed by
H. R. Denton
Harold R. Denton, Director
Office of Nuclear Reactor Regulation

Enclosure:
As stated

cc w/enclosure:
Commissioner Gilinsky
Commissioner Kennedy
Commissioner Hendrie
Commissioner Bradford
SECY
OPE
OGC

NRR
HDenton
5/ /80

*See previous yellow for concurrences

[Attachment 2a]

OFFICE	DL: ORB #5	DL: ORB #5*	DOR: AD/SEP*	OELD*	DOR*	NRR*
SURNAME	PO'Connor:cc	DLZiemann	RHVollmer		DGEisenhut	EGCase
DATE	5/27/80	4/7/80	4/7/80	4/16/80	5/12/80	5/19/80

DRESDEN DECONTAMINATION

(1) What is being done at Dresden?

Since our 1975 authorization to initiate preparations for the Dresden Unit 1 decontamination, Commonwealth Edison Company (CECo) has completed construction of the support facilities necessary to carry out the decontamination in a safe and environmentally acceptable manner. CECo has also submitted all of the information required by the staff to satisfy the three conditions that were part of our earlier approval. We have prepared a safety evaluation and environmental evaluation for the decontamination project and are prepared to issue an approval to proceed with the decontamination.

We have received numerous requests from the public to prepare an Environmental Impact Statement (EIS) and to hold a public hearing on the decontamination project. Two of these requests have been accepted as petitions under section 2.206 of our regulations for action by the Commission. One of these by Ms. Kay Drey requests that we prepare an EIS and one by the Illinois Safe Energy Alliance (ISEA) asks for a public hearing. We have carefully reviewed the allegations made by these petitioners and have reassessed the environmental impact of the project and have concluded, as we concluded in 1975, that the decontamination will not adversely impact the environment. Based upon the recent Commission decision requiring that an EIS be prepared for the Surry steam generator replacement action, we have decided to convert our environmental appraisal into draft enviromental statement.

A significant amount of the public's interest in the decontamination has been focused on the waste shipment and disposal aspects of this activity. We have contracted with Brookhaven National Laboratory through NMSS to evaluate the effect of decontamination chemicals on the integrity of the shipping containers that will be used to transport and bury the Dresden decontamination wastes. The preliminary results of the Brookhaven study support our previous determination that these wastes can be safely shipped off site for burial. NRC has notified the public (43 FR 49811) that an Environmental Impact Statement supporting our Proposed Rule 10 CFR 61 which will implement a specific regulatory program for the management of low-level radioactive waste. This statement offers the public an opportunity to comment on the generic aspects of the disposal of decontamination wastes.

In light of the proposed changes to Part 51 which will require that we consider occupational exposures when determining whether to prepare Environmental Impact Appraisals, we have also evaluated the occupational exposure that will be associated with the decontamination. Commonwealth Edison Company (CECo) submitted a detailed Man-Rem estimate for the project in compliance with the ALARA requirements of 10 CFR 20. In this estimate CECo concluded that approximately 500 Man-Rem would be received by its employees and contractors. We reviewed CECo's estimates and concluded that they were well based and conservatively bounded the expected occupational exposures that would be received.

CECo has recently reported that the occupational exposures experienced have been even lower than the earlier estimates because of careful planning. CECo now projects a total Man-Rem exposure of about 300 Man-Rem for the entire project.

From 1973 through 1977 the occupational exposure at Dresden station has averaged 627 Man-Rem per year per reactor. The annual exposures ranged from 313 to 1141 Man-Rem per year per plant. These annual exposures show that the occupational exposures exhibit a range around the average of minus 314 Man-Rem per plant per year to plus 514 Man-Rem per year per plant. It is readily seen that the anticipated occupational exposure of 250 to 500 Man-Rem from the Dresden decontamination falls well within the range of variations that has been historically found at Dresden Station and other operating reactors. Therefore, the occupational exposure anticipated due to the decontamination project does not differ significantly from the normal range of exposures at the station from year to year.

All aspects of our reassessment, including preliminary reports from Brookhaven, support our previous finding that this decontamination does not adversely impact the environment.

Because this issue has been the subject of significant public inquiry, we are also considering holding a public meeting in the Dresden vicinity to explain our action and inform the public of the results of our evaluation.

We met with staff members of the Council on Environmental Quality on February 14, 1980. We provided them with the background and status of this action and discussed our proposed approach to this issue.

The completion of our review of this action involves not only the decontamination but also the review of the inspections prior to return to operation. We will be determining whether or not to impose license limitations or conditions on the actual conduct of the decontamination work or in connection with the resumption of operation thereafter.

(2) What type of approval did NRC give (license amendment?)?

Commonwealth Edison had originally planned to carry out the decontamination under the provisions of 10 CFR 50.59 which allow the licensee to make changes in the facility if the changes do not involve a change in the Technical Specifications or an unreviewed safety question. The staff, identified neither technical specification changes needed nor unreviewed safety questions. However, because of ACRS and staff concerns related to the potential for causing pipe cracks and some previous decontamination project misfortunes, we informed CECo that we wished to be kept closely informed about the progress of the decontamination program.

Because of the 36 million dollar cost associated with the decontamination project CECo agreed to provide NRC with a licensing request for our approval. CECo felt that the request would be a prudent action to assure that the staff have an early opportunity to express any licensing concerns that might impact the viability of the project.

On December 9, 1975 we issued a letter which conditionally authorized the initiation of the decontamination program at Dresden. The authorization indicated that our review to that point had concluded that the decontamination could be conducted with reasonable assurance that the health and safety of the public would not be endangered.

(3) Did we do a negative declaration or environmental assessment?

Our 1975 authorization to initiate the chemical decontamination did not involve a license amendment or other federal action subject to NEPA review. We did assess the environmental impact of the proposed decontamination and concluded that there would be no adverse environmental impact. Accordingly, we did not prepare a Negative Declaration and Environmental Impact Appraisal. Our December 9, 1975 letter copy enclosed, only authorized preparation for the proposed chemical decontamination. Our environmental assessment of the program was summarized in Section 1 of the related Safety Evaluation. As stated earlier we are preparing a draft Environmental Statement for this action and expect to issue it by the end of May.

release

Commonwealth Edison
One First National Plaza, Chicago, Illinois
Address Reply to: Post Office Box 767
Chicago, Illinois 60690

November 14, 1979

Director of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Subject: Dresden Station Unit 1
Proposed Amendment to Appendix A, Technical Specification, to Facility Operating License DPR-2 Required to Perform Primary System Chemical Cleaning
NRC Docket No. 50-10

Dear Sir:

Pursuant to 10 CFR 50.59, Commonwealth Edison proposes to amend Appendix A, Technical Specifications, to Facility Operating License DPR-2 to support the chemical cleaning of the Dresden Unit 1 primary system.

The changes to the Technical Specifications concern (1) deletion of the requirement to maintain primary containment integrity during the chemical cleaning outage when all fuel is removed from the reactor and containment, and (2) exclusion of radioactive liquid storage tanks which are inside seismically qualifjed structures from the above grade storage curie limitation.

The change to the primary containment integrity requirement is necessary to allow the chemical cleaning to be performed at the required temperature of 250°F. Special procedures will be implemented to provide for the rapid removal of the cleaning solution to receiving tanks should a significant leak from the primary system occur. This will ensure that any leakage will be small in volume and contained within the sphere. Since the contamination species being removed are non-volatile and no fuel will be inside the containment, release of volatile activities due to a leak would be minimal. Normal ventilation flow is adequate to ensure that any airborne activity will be conveyed to the stack and monitored.

The clarification of the radioactive waste above grade storage requirement is necessary to allow transfer and storage of the spent cleaning solution prior to processing in the Chemical Cleaning Building storage tanks, which are physically above grade. The current curie limit is based upon postulated rupture of above grade tanks, due to a seismic event, allowing their contents to be released in an uncontrolled manner. Since the tanks in the Chemical Cleaning Building are located in a seismically qualified structure sized to contain the contents of all the tanks inside that structure, the curie limit does not apply.

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w/check: $4000.00

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Director of Nuclear Reactor Regulation
November 14, 1979
Page 2

Pursuant to 10 CFR 170, Commonwealth Edison has determined the proposed amendment to be Class III. As such, we have enclosed a fee remittance in the amount of $4,000.00.

Please address any questions you may have concerning this matter to this office.

Three (3) signed originals and thirty-seven (37) copies of this transmittal are provided for your use.

Very truly yours,

D. L. Peoples
Director of Nuclear Licensing

RFJ:mae
enclosures

SUBSCRIBED and SWORN to
before me this 14th day
of November, 1979.
Mary A. Evans
Notary Public

ENCLOSURE I

Dresden Unit 1 Revised Technical Specification Pages

Revised Pages

87
91
98
102

New Page

91a

7911270 340

4.7 LIMITING CONDITION FOR OPERATION

4.7 SURVEILLANCE REQUIREMENT

NOTE: During the outage beginning November, 1978, to decontaminate the primary system, the requirement of 3.7.A.1 is not applicable when all fuel is removed from the reactor and the containment.

d. The test duration shall not be less than 24 hours for integrated leak rate measurements, but shall be extended to a sufficient period of time to verify, by measuring the quantity of air required to return to the starting point (or other methods of equivalent sensitivity), the validity and accuracy of the leak rate results.

e. Acceptance Criteria for IPCLT

(1) The maximum allowable leak rate L_p, shall not exceed 0.4 weight percent of the contained air per 24 hours at a pressure of 20 psig.

(2) The allowable operational leak rate, $L_{to}(20)$, which shall be met prior to resumption of power operation following a test (either as measured or following repairs and retest) shall not exceed $0.75\ L_p$.

f. Corrective Action for IPCLT

If leak repairs are necessary to meet the allowable operational leak rate, the integrated leak rate test need not be repeated provided local leakage measurements are conducted and the leak rate differences prior to and after repairs, when correc ted to the test pressure and

Bases:

3.7

A. Primary Containment - The integrity of the primary containment and operation of the emergency core spray system in combination, limit the off-site doses to values less than those in 10 CFR 100 in the event of a break in the primary system piping. Thus, containment integrity is specified whenever the potential for violation of the primary reactor system integrity exists. Concern about such a violation exists whenever the reactor is critical and above atmospheric pressure. In addition, even during periods when the reactor is shutdown, primary containment integrity is required to ensure fission products would be contained in the event of a refueling accident or large spill of radioactive water from the primary system. If no work is being done in the primary containment which has the potential for release of radioactivity, containment integrity is not required.

With all fuel removed from the reactor, any volatile activities which could be released during the chemical cleaning outage beginning in November, 1978, would be minimal. Normal sphere ventilation flow would ensure that airborne activity would be conveyed to the stack, and the stack gas monitor will be in service. Chemical cleaning procedures will be established for dumping the cleaning solution to receiving tanks in case of significant leakage from the primary system and to ensure that any leakage of liquids to the sphere will be contained within the sphere. Therefore, based on the above, primary containment integrity is not required for the November, 1978 chemical cleaning outage when no fuel is in the containment.

B. Primary Containment Isolating Valves
Isolation valves are provided on lines penetrating the primary containment and open to free space of the containment. Closure of one of the valves in each line would be sufficient to maintain containmant integrity. Automatic initiation is required to minimize the potential leakage paths from the containment in the event of a loss of coolant accident.

The primary containment has a design temperature and pressure of 325°F and 29.5 psig, respectively. In addition, the containment was designed for a maximum leakage of 0.5% (by weight) per day at 37 psi. For the largest break, the maximum containment pressure is approximately 20 psig which is less than design pressure and containment leakage should be less than 0.4%/day, which is specified at 20 psig.

The allowable leakage rate at 20 psig is calculated from the containment design leakage rate of 0.5% (by weight) per day at 37 psig by using the following equation:

$$L_T + La\ ({}^{P}t/pa)1/2$$

3.8 LIMITING CONDITION FOR OPERATION

3. Two independent samples from a tank shall be taken and analyzed and the valve line-up checked prior to discharge of liquid effluents from that tank.

4. If the limits of 3.8.C cannot be met, radioactive liquid effluents shall not be released.

D. Radioactive Waste Storage

The maximum amount of radioactivity in liquid storage in all Dresden Stations above grade tanks shall not exceed 90 curies. If these conditions cannot be met the stored liquid shall be recycled within 24 hours to below grade tanks. All tanks located within the seismic portion of the Chemical Cleaning Building are not considered above grade storage.

E. General

It is expected that releases of radioactive material in effluents will be kept at small fractions of the limits specified in Section 20.106 of 10 CFR Part 20. At the same time the licensee is permitted the flexibility of operation, compatible with considerations of health and safety, to assure that the public is provided a dependable source of power even under unusual operating conditions which may temporarily result in releases higher than such small fractions, but still

4.8 SURVEILLANCE REQUIREMENT

3. The performance and results of independent samples and valve checks shall be logged.

D. Radioactive Waste Storage

A sample from each of the above-grade liquid waste tanks shall be taken, analyzed, and recorded every 72 hours. If no additions to a tank have been made since the last sample, the tank need not be sampled until the next addition.

E. General

1. Operating procedures shall be developed and used, and equipment which has been installed to maintain control over radioactive materials in gaseous and liquid effluents produced during normal reactor operations, including expected operational occurrences, shall be maintained and used, to keep levels of radioactive material in effluents released to unrestricted areas as low as is reasonably achievable. The environmental monitoring program given in Table 4.8.1 shall be conducted.

DOCKETED
USNRC
JUL 11 1980
Office of the Secretary
Docketing & Service
Branch

UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

COMMONWEALTH EDISON Dresden Nuclear Power Station Unit 1	))))))	Docket No. 50-10

PETITION FOR PUBLIC HEARINGS

NOW COME Petitioners, CITIZENS FOR A BETTER ENVIRONMENT, PRAIRIE ALLIANCE, KAY DREY, BRIDGET ROREM, ILLINOIS SAFE ENERGY ALLIANCE AND MARILYN SHINEFLUG, by their attorney Robert Goldsmith, and hereby petition the United States Nuclear Regulatory Commission as follows:

1. Pursuant to 42 U.S.C. §2239 and 10 C.F.R. 2.206, Petitioners request the Nuclear Regulatory Commission (NRC) to hold hearings on the Environmental Impact Statement (EIS) related to the decontamination at Dresden Nuclear Power Station Unit 1 (Dresden 1) and on the application for amendment to Commonwealth Edison Company's (CECo) operating license for Dresden 1, necessary for the said decontamination.

2. Petitioner Citizens for a Better Environment (CBE) is an Illinois not-for-profit corporation with approximately 3,000 members residing in Illinois and a nationwide membership of approximately 12,000 persons. CBE files this petition on

behalf of its members who reside near the Dresden Nuclear Power Station, Unit 1 and whose health, safety and property may be adversely affected by any environmental impact of the chemical decontamination, as well as for its members who reside near nuclear stations which may be decontaminated in the future.

3. Petitioner Prairie Alliance (PA) is an Illinois not-for-profit corporation with approximately 350 members residing in Illinois. PA files this petition on behalf of its members who reside near the Dresden Nuclear Power Station, Unit 1 and whose health, safety and property may be adversely affected by any environmental impact of the chemical decontamination.

4. Petitioner Kay Drey is a citizen of the State of Missouri. Her health, safety and property and that of her family and descendants will be adversely affected by any negative environmental impact resulting from the decontamination at other nuclear stations.

5. Bridget Rorem is a citizen of the State of Illinois and resides in Essex, Illinois, which is within 15 miles of Dresden 1. Her health, safety and property and that of her family and descendants will be adversely affected by any negative environemtnal impact resulting from the decontamination of Dresden 1.

6. Illinois Safe Energy Alliance is a coalition of 19 affiliate organizations located in the State of Illinois totaling over 300 members. It files this petition on behalf

of its members who may be adversely affected by any negative environmental impact resulting from the decontamination of Dresden 1.

7. Marilyn Shineflug is a citizen of the State of Illinois. Her health, safety and property and that of her family and descendants will be adversely affected by any negative environmental impact resulting from the decontamination of Dresden 1.

8. Petitioners have a substantial interest in the proposed chemical decontamination at Dresden Unit 1 in that:

(a) The Dresden station is located in the State of Illinois and is within 50 miles of several of the state's most populated areas including the Chicago Metropolitan area, Aurora and Joliet, in which a large portion of Petitioners reside.

(b) Any mishap or accident occuring during the proposed decontamination releasing radionuclides into the environment will adversely affect Petitioners in the vicinity.

(c) The Dresden station is located near the confluence of three major water resources, the Illinois, Kankakee and Desplaines Rivers; any release of radiation contaminating these waterways will adversely affect Petitioners.

(d) The Petitioners desire to preserve the future environment of the area surrounding the Dresden station for themselves, their families and descendants.

(e) The chemical decontamination at Dresden 1 is a prototype for the development of large scale chemical decontaminations at nuclear stations across the nation.

9. Dated May 1980, the NRC issued a draft EIS related to "Primary Cooling System Chemical Decontamination at Dresden Nuclear Power Station Unit No. 1."

10. Pursuant to 10 C.F.R. 51.52, the NRC has authority to hold public hearings on an EIS.

11. Pursuant to the Council on Environmental Quality Regulations, 40 C.F.R. 1506.6(c)(1), where there is a substantial interest in holding a hearing, the lead agency shall hold a public hearing.

12. In this case, there are both a substantial interest in holding a hearing and a substantial environmental controversy, to wit, the decontamination of Dresden 1.

13. Pursuant to 10 C.F.R. 50.59 and 50.90, CECo has requested a license amendment in order to decontaminate Dresden 1.

14. Under 42 U.S.C. §2239(a), the NRC shall grant a hearing upon request of any person whose interest may be affected by the proceeding.

15. Petitioners' interests will be affected by this proceeding and hence a full hearing, under 42 U.S.C. §2239(a), with Petitioners accorded full party status and given the right to cross examine witnesses and present testimony of their own, should be granted.

16. A proper determination of "no significant hazard" has not been made in regard to the proposed chemical decontamination and a proceeding to make such a determination and a hearing are required.

17. Because this decontamination is a prototype for future decontaminations nationwide and because this may be the only opportunity for the public to directly question this program, a public hearing, with full party status to the petitioners, (as opposed to a public meeting without party status) should be granted.

WHEREFORE, Petitioners pray that the Nuclear Regulatory Commission institute a proceeding and conduct hearings concerning the proposed chemical decontamination of CECo's Dresden 1.

Respectfully submitted,

Date: [illegible]

BY: [signature]
ROBERT GOLDSMITH
Attorney for Petitioners

Robert Goldsmith
59 E. Van Buren Street
Suite 1600
Chicago, Illinois 60605
(312) 939-1530

nlow

ISHAM, LINCOLN & BEALE
COUNSELORS AT LAW

ONE FIRST NATIONAL PLAZA FORTY-SECOND FLOOR
CHICAGO, ILLINOIS 60603

TELEPHONE 312-558-7500 TELEX: 2-5288

WASHINGTON OFFICE
1120 CONNECTICUT AVENUE, N. W.
SUITE 325
WASHINGTON, D. C. 20036
202-833-9730

November 14, 1980

Secretary of the Commission
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

Re: Dresden Station Unit 1
Chemical Cleaning of
Primary Coolant System
NRC Docket No. 50-10

Dear Mr. Chilk:

These comments are submitted on behalf of Commonwealth Edison Company, which has been informed that a petition for public hearings has been filed by Citizens for a Better Environment and various other citizens groups in opposition to the proposed chemical cleaning by Commonwealth Edison of its Dresden Unit 1 reactor located in Morris, Illinois. Apparently the decision whether to hold such hearings prior to authorizing the chemical cleaning has been referred to the Commission itself, rather than to the Director of Nuclear Reactor Regulation pursuant to 10 C.F.R. §2.206. In light of the fact that the NRC Staff has already found, three times, that the proposed action will have no significant impact on the human environment, and further found at least once and perhaps twice that there are no significant hazards considerations, the Commission ought to allow the chemical cleaning to go forward without further delay.

Commonwealth Edison and the chemical cleaning project have already suffered due to the postponement caused by the NRC's last-minute decision earlier this year to prepare an environmental impact statement, notwithstanding the NRC Staff's express conclusion that the chemical cleaning "will not cause any adverse environmental impacts." See Commonwealth Edison Company (Dresden Nuclear Power Station Unit No. 1), Director's Decision DD-80-24, 11 NRC 951 (1980). The Director's decision to prepare an environmental impact statement was because of the "significant interest and concern" expressed by many of the same members of the public who now request public hearings. The delay associated

[Attachment 5]

with preparing the environmental impact statement has cost Commonwealth Edison and its customers more than $420,000 as of October 20, 1980, and those costs are continuing to accrue. Commonwealth Edison is extremely concerned that further economic waste and possible prejudice to the project itself will result if the NRC now determines, again at the eleventh hour, that adjudicatory hearings must be held prior to carrying out the chemical cleaning. In Commonwealth Edison's view the goal of public participation in regulatory decision-making has been satisfied by the public meeting held by the NRC in respect of the Draft Environmental Statement in Morris, Illinois on August 14, 1980.

A brief history of the chemical cleaning project seems in order. Dresden Nuclear Station, Unit 1 is the first privately built nuclear reactor in the United States. It began operating in August 1960, but since 1978 has been shut down for installation of various safety backfits. Over the years Dresden Unit 1 was operating, a thin layer (less than 2 mils) of corrosion deposits (crud) developed on the interior surfaces of the primary system, increasing radiation fields which made certain maintenance and inspection activities much harder to perform. The purpose of the chemical cleaning project is to reduce occupational exposure to its employees in keeping with the ALARA requirements of 10 CFR Part 20 and to allow certain inservice inspection activities to be carried out as economically as possible.

In December 1974 Commonwealth Edison Company submitted its proposal to the NRC for its review. On December 9, 1975 the NRC authorized Commonwealth Edison to proceed with the chemical cleaning, subject to resolution of three open items. At that time the NRC found the project would have no significant impact on the human environment. In addition the NRC Staff's December 9, 1975 safety evaluation specifically concluded:

> "[B]ecause the chemical cleaning does not involve a significant increase in the probability or consequences of accidents previously considered and does not involve a significant decrease in a safety margin, the cleaning project does not involve a significant hazards consideration."

In subsequent years, relying on the initial Staff approval, Commonwealth Edison built extensive chemical cleaning facilities and mobilized a large task force of architects, engineers and workers. By early 1980, Commonwealth Edison had satisfied the Staff with respect to the three open items and was ready to carry out the chemical cleaning. It had expended a majority of its $37.5 million budget, and incurred 290 man-rem occupational exposure,[1/] as compared to its original estimate of 250 to 500 man rem for the entire project. To complete the project today would cost only $1.3 million dollars and about 50 man-rem.

In 1979 and early 1980 the NRC received a flurry of petitions from interested citizens and groups requesting that an environmental impact statement be prepared, and in one case, requesting public hearings. In May of 1980 Commonwealth Edison announced that it was deferring the restart of Dresden Unit 1 until June 1986 due to existing corporate short term cash flow deficiencies and uncertainty regarding regulatory requirements arising out of the Systematic Evaluation Program and the lessons learned from the Three Mile Island accident. At the same time, Commonwealth Edison stopped work on all major engineering projects at the facility, with the exception of the chemical cleaning project, for which special facilities had been completed, chemicals purchased, and personnel trained to a high degree of readiness. Shortly after Commonwealth Edison announced it was deferring restart of the unit, the Director of Nuclear Reactor Regulation decided to require preparation of an environmental impact statement "because of significant interest and concern expressed by members of the public relating to decontamination of Dresden Unit No. 1," even though the Staff's own reevaluation of the project again led them to conclude that it would not significantly affect the human environment. This decision was subsequently formalized as "Director's Decision Under 10 CFR §2.206," DD-80-24, 11 NRC 951 (June 26, 1980). However, at the same time as his decision to prepare an environmental impact statement, the Director denied the request for public hearings, on the basis that the request was predicated on the lack of assurance that the NRC would issue an environmental

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1/ This figure of 290 man-rem includes 84 man-rem incurred for projects not within the original 250-500 man rem estimate. Thus in building the chemical cleaning facility, Commonwealth Edison has done a good job in implementing ALARA.

impact statement. Therefore, throughout this summer Commonwealth Edison maintained its facilities in readiness for chemical cleaning to take place in the fall.

On August 14, 1980, the NRC sponsored a public meeting in Morris, Illinois to discuss the draft environmental statement. Thirteen NRC personnel attended, including management, technical reviewers, consultants and lawyers. Most of those who had requested that the NRC prepare an environmental impact statement or who had commented critically on the draft environmental statement were also there. The NRC experts addressed every question asked, and the comments of those who attended the meeting were reflected in the final environmental statement.

When the final environmental statement, NUREG-0686, was published on October 17, 1980, it again reaffirmed the Staff's conclusion that the chemical cleaning will have no significant impact on the human environment (Section 6). And it also concluded that:

> [T]he decontamination process and the associated facilities built to solidify the radioactive waste will not be subject to any accidents more severe than those previously considered for the Dresden site and will not result in any hazards not previously considered.

(Section 4.3). This statement closely resembles the definition of "No significant hazards consideration" contained in proposed 10 CFR §50.91(b), 45 Fed. Reg. 20491 (March 28, 1980).

Commonwealth Edison is concerned to learn that the NRC is now contemplating holding adjudicatory hearings in respect of the chemical cleaning. We are at a loss to understand the basis for such a decision.

There is no legal requirement for the NRC to hold adjudicatory hearings under the National Environmental Policy Act of 1969. _Vermont Yankee Nuclear Power Corp._ v. _NRDC_, 435 U.S. 519, 548 (1978). The NRC has now expressed, three times, its view that there will be no significant environmental impact associated with the chemical cleaning.

Under Section 189a of the Atomic Energy Act of 1954, a hearing must be held in respect of any license amendment "upon the request of any person whose interest may be affected by the proceeding." However, if the NRC determines that the license amendment involves "no significant hazards consideration," the NRC can issue the license amendment, effective immediately. In such cases, the request for hearing does not, by itself, require the licensing process to grind to a halt while hearings are held. The NRC has recently reaffirmed that this is the law in briefs filed by the Office of the General Counsel in the United States Court of Appeals for the District of Columbia. The NRC Staff has determined twice -- in 1975 and again, apparently, in the final environmental statement -- that no significant hazards exist. In fact, Dresden Unit 1 is currently shutdown, and there is no nuclear fuel in the reactor core or within the spherical containment. The Petition for Public Hearings filed by Citizens for a Better Environment on July 8, 1980 fails to raise any specific safety issues, and the somewhat more detailed comments filed by CBE and others in respect of the draft environmental statement have not altered the best judgment of the NRC Staff's own technical reviewers as expressed at the August 14, 1980 public meeting in Morris, Illinois. that there are no serious unresolved environmental or safety concerns. The only conceivable safety issue with any substance seems to Commonwealth Edison to be whether the chemical cleaning will harm the reactor primary coolant system boundary. Commonwealth Edison's and the Staff's grounds for confidence on that issue, based on the extensive corrosion testing program already carried out and the surveillance program which will follow the chemical cleaning, can safely be addressed, if necessary, in adjudicatory hearings after the chemical cleaning, but prior to start-up in 1986.

Of course, the Commission has authority to require public hearings when it finds them to be "in the public interest." 10 CFR §2.105. But in Commonwealth Edison's view, the public interest is not well served by devoting substantial Staff and licensee resources to hearings which do not involve significant environmental or safety issues. As Chairman Ahearne stated in criticizing the decision to prepare environmental impact statements in this case:

> If the NRC had a surfeit of people and funds and if EIS's did not add any time to the regulatory process, then perhaps doing EIS's when they are not needed might be acceptable (although not a responsible use of taxpayers' funds -- but since neither condition is the case, EIS's should not be done when they are not required.

(FES, Appendix A). These remarks are even more compelling when applied to the NRC hearing process.

The broader public interest requires that the NRC weigh the costs of delaying the Dresden chemical cleaning project pending completion of adjudicatory hearings:

1) An extended delay at this time would cause the loss of key personnel from the project. These people, some of whom have been with the project since its inception in 1973-74, have considerable expertise in the design, engineering, construction and operation of the chemical cleaning system, as well as related research studies. These people cannot be expected to put their professional careers "on hold" indefinitely. The loss of these personnel will result in the loss of extensive knowledge and skills necessary for a successful completion of the project.

   New personnel will be required and it will take them considerable time to review the chemical cleaning system to obtain a full understanding of its functions and operations.

2) Additional expense would be incurred to lay up the installed equipment for proper long-term storage. An estimated $50,000 would be necessary to perform the actual chemical cleaning system lay-up. Another $25,000 would be required to perform the necessary maintenance and inspections for a one year lay-up period. (Total estimate $75,000)

3) A delay would require a complete repetition of preoperational testing of all equipment and systems taking a total of approximately eight (8) weeks at a cost of $300,000.

Additional factors to be considered in a delay of the chemical cleaning project due to the granting of a public hearing are as follows:

4) Any delay in the chemical cleaning will require personnel, as they perform routine activities, to receive additional radiation dosage. The following lists activities as a minimum that will be performed:

Activity	Dosage
a) Re-hydro test of the reactor pressure vessel system.	1 man-rem
b) Retraining of new personnel.	15 man-rem
c) Detensioning of RPV head and later retensioning.	6 man-rem
d) Leak detection system maintenance.	1 man-rem
Total additional dosage not previously estimated	23 man-rem

This total of 23 man-rem does not include dosage which would be incurred as a result of any in service inspections required during the lay-up period. Activities related to the Dresden 1 lay-up could increase this number significantly. A delay in the chemical cleaning could possibly prohibit potential lay-up alternatives from being performed, due to excessive dosage.

5) Any delay in the chemical cleaning reduces or eliminates the company's flexibility to adjust the unit's return to service if load demand or financial considerations change. The chemical cleaning must be completed before many of the required plant modifications are made. Early completion of the cleaning allows efficient use of manpower and financial resources.

In the absence of any significant new information calling into question the safety or environmental impact of the proposed chemical cleaning, Commonwealth Edison respectfully requests that the Commission allow it to proceed. Mere controversy, without technical foundation, does not justify paralysis of the licensing process. While we appreciate the many other demands upon the Commission's time, we hope that the Commission, having accepted referral of this matter from the Director of Nuclear Reactor Regulation, will make its decision promptly. In our view, the decision of whether or not to hold a hearing is clearly not an appropriate subject for further delegation or delay.

Very truly yours,

One of the Attorneys for
Commonwealth Edison Company

PPS/kb

CC: NRC Commissioners
Messrs. Bickwit
Denton
Trubach
Goddard
O'Connor
Goldsmith (CBE)