

U. S. NUCLEAR REGULATORY COMMISSION

REGION V

Report Nos. 50-528/88-03, 50-529/88-03, 50-530/88-03

Docket Nos. 50-528, 50-529, 50-530

License Nos. NPF-41, NPF-51, NPF-74

Licensee: Arizona Public Service Company  
P. O. Box 21666  
Phoenix, Arizona 85836

Facility Name: Palo Verde Nuclear Generating Station - Units 1, 2 and 3

Inspection at: Wintersburg, Arizona

Inspection Conducted: January 12-15, 1988

Inspected by:	<u><i>AS Yuhas</i></u>	<u>2/19/88</u>
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	Facilities Radiological Protection Section	
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	H. S. North, Senior Radiation Specialist	Date Signed
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	G. P. Yuhas, Chief	Date Signed
	Facilities Radiological Protection Section	

Summary:

Inspection during the period of January 12-15, 1988 (Report Nos. 50-528/88-03, 50-529/88-03 and 50-530/88-03)

Areas Inspected: Routine unannounced inspection including: in-office review of licensee reports, licensee action on previous inspection findings, Unit 3 radiation protection and radwaste startup testing, tour of the facility, and review of radioactive material particle control.

Inspection procedures 30703, 83521, 83524, 83722, 84521, 90713, and 92702 were utilized.

Results: In five of the six areas addressed, no apparent violations were identified. In one area, a violation of 10 CFR 19.11 was identified (see Section 3). As a result of this inspection effort, NRC became aware of a significant radiological problem associated with deterioration of stellite wear surfaces on Unit 1 reactor coolant pump impellers. In addition, the licensee's surveys and evaluation to establish personnel dosimetry practices for radioactive waste sorting were called into question.

## DETAILS

### 1. Persons Contacted

- \*J. G. Haynes, Vice President, Nuclear Production
- \*J. M. Allen, Unit 1 Plant Manager
- \*W. E. Ide, Unit 2 Plant Manager
- \*O. J. Zeringue, Unit 3 Plant Manager
- \*R. M. Butler, Standards and Technical Support Director  
C. Rogers, Manager of Licensing
- \*W. F. Quinn, Safety and Licensing Director
- \*L. E. Brown, Radiation Protection and Chemistry Manager
- \*G. D. Perkins, Central Radiation Protection Manager
- \*T. D. Shriver, Compliance Manager
- \*T. Hillmer, Radwaste Support Manager
- \*W. E. Sneed, Unit 3 Radiation Protection Manager
- \*L. G. Papworth, Director, Quality Assurance
- \*J. R. Mann, Radiation Protection Standards Supervisor  
D. McGee, Radiation Protection Support Supervisor  
J. Scott, Unit 3 Chemistry Supervisor

\*Denotes personnel present at the exit interview held on January 15, 1988.

In addition, the inspectors met and held discussions with other licensee and contractor personnel.

### 2. Review of Licensee Reports (90713)

Licensee reports reviewed and closed without on-site followup include:

- o Semiannual Radioactive Effluent Release Report, for Units 1 and 2 for the period ending June 30, 1987.
- o Semiannual Radioactive Effluent Release Supplement, for Units 1, 2 and 3 for the period ending December 31, 1986, and June 30, 1987.

	<u>Licensee Event Reports (LERs)</u>	<u>Special Reports</u>
Unit 1	87-001-00 (87-01-L1)	1-SR-87-024 (87-24-X0)
Unit 2	2-87-015-00 (87-15-L0)	2-SR-87-020 (87-20-X0)
	2-87-015-01 (87-15-L1)	2-SR-87-021 (87-21-X0)
	87-017-00 (87-17-L0)	SR-87-023 (87-23-X0)
	2-87-018-00 (87-18-L0)	2-SR-87-024 (87-24-X0)
	2-87-020-00 (87-20-L0)	2-SR-87-025 (87-25-X0)
		2-SR-87-027 (87-27-X0)
		2-SR-87-029 (87-29-X0)
Unit 3		3-SR-87-005 (87-05-X0)

No violations or deviations were identified.

3. Followup of Previous Inspection Findings (92702)

10 CFR 19.11, "Posting of notices to workers." states, in part:

"(a) Each licensee shall post current copies of the following documents..."

"...(4) Any notice of violation involving radiological working conditions,..."

"...(d) Documents, notices, or forms posted pursuant to this section shall appear in a sufficient number of places to permit individuals engaged in licensed activities to observe them on the way to or from any particular licensed activity location to which the document applies, shall be conspicuous, and shall be replaced if defaced or altered.

"(e) Commission documents posted pursuant to paragraph (a)(4) of this section shall be posted within 2 working days after receipt of the documents from the Commission; the licensee's response, if any, shall be posted within 2 working days after dispatch by the licensee. Such documents shall remain posted for a minimum of 5 working days or until action correcting the violation has been completed, whichever is later."

On January 12, 1988, the inspectors noted that no copies of a Notice of Violation accompanying Inspection Report 50-528/87-40, and involving radiological working conditions, were posted on the way to or from licensed activity locations within Unit 1, at 1345, within Unit 3 at 1500, at the Dry Active Waste Processing (DAWP) facility at 1600, nor at administration locations outside the protected area. Discussions held with the licensee at 1400 on January 12, 1988, and at 0930 and 1100 on January 13, 1988, revealed the following:

- ° Inspection Report 50-528/87-40 and the accompanying Notice of Violation were received on January 7, 1988, in the licensee's Document Control office.
- ° Licensee document ES06.05, "NRC Posting Requirements," listed the Manager, Licensing as the individual responsible for designating where and when notices are to be posted. The Manager of Licensing stated that he had not received a copy until the evening of January 8, 1988.
- ° At 0900 on January 13, 1988, the licensee's Manager of Administrative Services, designated by ES06.05 as the person directly responsible for ensuring posting of notices when received from the Manager of Licensing, stated that copies of the subject notice for posting had first been received on the afternoon of January 12, 1988.
- ° The inspectors observed copies of the Notice of Violation being posted at 1230 on January 13, 1988, at the entrance/exit to the licensee's facility, and at other licensee's designated locations.



- ° The inspectors did not confirm if there had been previous examples of failure to comply with the requirement expressed in 10 CFR 19.11(e). The root cause of this instance appears to be directly related to the licensee's procedure and its implementation.
- ° The manager of licensing suggested that it would be helpful if NRC clearly identified each document that must be posted pursuant to 10 CFR 19.11 with the transmittal. The Chief, Facilities Radiological Protection Section, stated that such action would have to be generic in nature and could be proposed by the licensee pursuant to 10 CFR 2.802.

At the exit interview, the licensee stated that the site Manager of Compliance would take direct responsibility for ensuring timely posting of Commission notices pursuant to 10 CFR 19.11, and that the licensee's internal administrative controls would be revised to reflect that action. Failure to post a Notice of Violation involving radiological working conditions within two working days is an apparent violation of 10 CFR 19.11 (50-528/88-03-01).

4. Radiation Protection - Startup Unit 3 (83521)

The following records and documents were reviewed:

Licensee Procedures -

75RP-9ZZ47, "Radiation Survey Procedure"

75PA-3ZZ01, "Biological Shield Survey"

Referenced by 75PA-3ZZ01 -

ANSI N18.9-1972, "Program for Testing Biological Shielding in Nuclear Power Plants"

ANSI/ANS 6.3.1-1980, "Program for Testing Radiation Shields in Light Water Reactors"

"Combustion Engineering Safety Systems Analysis Report" (CESSAR) Section 14

Palo Verde "Final Safety Analysis Report" (FSAR) Section 12

"Bioshield Survey Plan (Original)" (BSP)

The inspectors reviewed the licensee's test data for all surveys up to 100% reactor power. The inspectors, upon discussion of the results with some of the personnel who conducted the surveys, made the following observations:

- a. The licensee's Test Results Review Group (TRRG) had not yet reviewed and evaluated the surveys.

- b. The 20% reactor power and higher gamma surveys were performed with ion chamber survey instruments, whose smallest scale increment was 0.2 mr/hr. Readings in areas such as the Control Room, whose habitability design is based on a 1% fuel defect, and are limited to 0.5 mr/hr are designated as Zone 1 areas. The inspectors noted that the licensee's actual fuel defect is orders of magnitude lower than the design source term, tending to mask the criteria of 0.5 mr/hr maximum as called for by the licensee's FSAR. The CESSAR and BSP call for 0.1 mr/hr for capability of detection by gamma survey instruments.

The licensee representative at the exit interview stated that this observation will be considered by the TRRG.

- c. The 50% reactor power neutron survey instruments were recalibrated and the survey re-performed when the licensee noted anomalous data. The results of the second survey appeared to resolve the anomalies.

The evaluation by the licensee's TRRG and any consequent changes will be evaluated in a subsequent inspection.

No violations or deviations were identified.

5. Radwaste - Startup Unit 3 (84521)

a. Chemical and Radiochemical Tests

The licensee had completed testing through the 80% reactor power level but had not yet evaluated the 100% level results. Chemistry personnel stated that they had experienced higher than expected levels of silica, sulfates, and sodium in the secondary side of the plant, and higher than average conductivity (18  $\mu\text{mho/cm}$ ) in the Volume Control Tank (VCT), but that no serious water quality problems were observed.

b. Technical Specifications (TS)

The licensee's chemistry staff stated that no out-of-specification results were observed during startup or operation for either reactor coolant or effluent chemistry.

The inspectors asked the licensee's chemistry staff how lower limits of detectability (LLD) for samples and monitoring of the liquids discharged to the on-site evaporation ponds are utilized. The licensee staff stated that LLDs are used to meet the TS a priori and that any measurable and identifiable isotopes present, although at concentrations less than the TS limit, will be recorded and reported. A review of effluent and reactor coolant radiochemical data will be conducted in a subsequent inspection.

c. Effluent Monitor Readings

Preliminary effluent and process monitor reading comparisons with sample data were reviewed. The licensee's TRRG had reviewed all but



the 100% reactor power results, and one Test Exception Report (TER) had been issued due to disparities in the letdown monitor (RT-204) readings of up to about 400%. Insufficient radioactivity was available in the effluents to be detected by the monitors, at the time of the inspection. The licensee's chemistry staff attributed the disparity in RT-204 to differing capabilities and sample locations relative to the detector, and were recommending acceptance to the TRRG. The final evaluation by TRRG, waste system tests, and sampling of normally non-radioactive process and effluent streams will be examined in a subsequent inspection.

No violations or deviations were identified.

## 6. Facility Tour

The inspectors conducted a tour of Unit 3 radiologically controlled areas, outside areas of all three units, and of the Dry Active Waste Processing (DAWP) facility. Independent radiation surveys were conducted using a Model RO-2 ion chamber survey instrument, Serial #22906, calibrated November 5, 1987, and due for calibration February 5, 1988.

While touring outside areas, the inspectors made the following observations:

- o Cable armour on the controls for the Unit 1 Containment Building emergency hatch was damaged. Licensee personnel were aware of and had taken initial action to repair it. Vital area access was not affected.
- o A work area posted "Contaminated Area" had been established by the Steam Generator Blowdown Demineralizer Total Dissolved Solids (TDS) sump for Unit 1. Water was observed to be flowing across one corner of the area from the floor above the sump to the ground outside. When the observations were discussed with a Lead Radiation Protection Technician (RPT), he dispatched an RPT to conduct a survey and sample the liquid, which were later reported by the licensee's RP staff to have been uncontaminated. Postings and labels appeared to be in compliance with 10 CFR 20 and licensee procedures.

During the tour of Unit 3 radiologically controlled areas, the inspectors noted that the unit continued to maintain very good housekeeping practices. One area, the 100' elevation letdown control valve gallery access (Room A-109), had an area around a pipe with flashing lights and high radiation area postings in accordance with TS 6.12, "High Radiation Areas." The licensee's RP staff stated that a locksmith had already been informed of the need to lock the door to the room, and that the same pipe had been observed to be the cause of the first locked area in the Auxiliary Building in each unit. The RP staff further stated that the possibility of a design problem causing a large crud trap was being evaluated and that they would be attempting to determine the nature of the radioactivity with a portable multichannel analyser. Followup on this matter will be conducted in a subsequent inspection (50-530/88-03-02). Material condition of radiation protection equipment

was good. Those licensee (Arizona Public Service) RPTs with whom hot particle control was discussed had received additional training in survey techniques after the inspection conducted October 26-30, 1987. (See Inspection Report 50-528/87-38, 50-529/87-37, 50-530/87-39). Training of contractor RPTs is discussed below.

During the tour of the DAWP, the inspectors observed work activities and waste processing in progress. The following observations were made:

- ° Although the licensee's site access training guide reported that "PVNGS Plant Policy Number 12" required safety eyewear, few personnel within or without radiologically controlled areas observed this policy. At the exit interview, the Vice President, Nuclear Production, stated that the policy was in the process of re-evaluation at the time of the inspection.
- ° The RPT at the facility stated that a particle had been found on a worker upon frisking after exiting a Hot Particle Control Area (HPCA) tent, used for hand sorting of waste material with external-to-container dose rates of 5 to 50 mr/hr. The RPT showed the particle which had been retained in accordance with licensee procedure 75RP-9ZZ78, "Decontamination," to the inspectors. Further observations and subsequent findings are discussed in the following paragraph (7).

No violations or deviations were identified.

#### 7. Hot Particle Control

10 CFR 20.101(a) states, in part:

"...no licensee shall possess, use, or transfer licensed material in such a manner as to cause any individual in a restricted area to receive in any period of one calendar quarter from radioactive material and other sources of radiation a total occupational dose in excess of..."

"...Rems per Calendar Quarter..."

"...2. Hands and forearms, feet and ankles..... 18 3/4..."

10 CFR 20.201, "Surveys." states, in part:

"(b) Each licensee shall make or cause to be made such surveys as (1) may be necessary for the licensee to comply with the regulations in this part, and (2) are reasonable under the circumstances to evaluate the extent of the radiation hazards that may be present."

10 CFR 20.202, "Personnel monitoring." states, in part:

"(a) Each licensee shall supply appropriate personnel monitoring equipment to, and shall require the use of such equipment by:

"(1) Each individual who enters a restricted area under such circumstances that he receives, or is likely to receive, a dose in excess



of 25 percent of the applicable value specified in paragraph (a) of § 20.101."

a. Hot Particle Detection

The inspectors discussed discrete radioactive particle control with two contractor RPTs assigned to the Dry Active Waste Processing (DAWP) facility. The inspectors had observed that the Radiation Exposure Permit (REP), number 0-88-0009, did not note whether personnel extremity dosimetry was required. Under the section titled "Special Instructions," the REP stated, in part: "Contamination and/or hot particle survey, as applicable, recommended at end of job." Hot particle monitoring on personnel is required at 30 minute intervals in licensee procedure 75RP-9ZZ83, "Hot Particle Control." A modified Eberline RO-2 ion chamber survey instrument is used by the licensee for these surveys (monitoring). The RPTs stated that they did perform such monitoring at the required intervals. The RPTs further stated that they had found a hot particle and had removed it from the personal modesty garments of a worker who had exited the Hot Particle Control Area (HPCA) earlier in the day. The HPCA tent was set up for hand sorting of waste from containers (polyethylene bags) which, when surveyed externally, read 5 mr/hr to 50 mr/hr. The particle was discovered when the worker performed a whole body frisk at the exit to the radiologically controlled area (RCA) at the DAWP facility. The inspectors inquired as to survey methods used. The RPTs expressed a lack of familiarity with the function of the modified RO-2 (or RO-2M), and stated that the only training in detection or hazards of hot particles they had received was a general memorandum to all workers, posted at the entrance to the RCA, and a reading of 75RP-9ZZ83, which they had certified having read by signature. One RPT stated he had used an unmodified RO-2, Serial #3947, on the particle and had not observed any response. The particle had read 400,000 disintegrations per minute (dpm) on a pancake G-M tube detector, as recorded on the contamination report for the worker.

The inspectors surveyed the particle and observed an open window uncorrected reading on NRC RO-2 #22906 of 1.8 mr/hr. The inspectors observed a source check of RO-2 #3947, NRC RO-2 #22906, and of another RO-2 #3933 and an RO-2M #3919, both of which were removed from the HPCA tent entrance. An unidentified RO-2M remained inside the tent. One RPT stated that RO-2M #3919 had failed a battery check during use. The batteries were replaced and the results of the source checks and other data obtained are summarized below:



Source: Sr-90/Y-90 No. RP-188  
 Date/Time of Checks: January 12, 1988/1600

	Instruments			
	NRC RO-2 #22906	RO-2 #3947	RO-2 #3933	RO-2M #3919
Calibration Due	2-5-88	3-8-88	3-30-88	6-10-88
Date Last Marked as Source Checked	N/A	1-11-88	1-6-88	1-11-88
Reading on Particle in mr/hr	1.8	0	2	5
Acceptable Source Response in mr/hr				
1.92-2.88	2.2	0	3.1	*
14-21	17	0	19	Off-Scale High
140-210	160	170	180	*
1520-2280	1900	1600	2200	*

\*The RPTs stated that the calibration facility personnel had informed them that any response on any except the lowest scale was acceptable for this source. That statement was later verified by discussion with those personnel.



The inspectors expressed their concerns regarding the RO-2M instrument calibration and use with the RP Support Supervisor. He stated that one of his engineers had performed the modifications. From discussions with the engineer, the Central RP Manager, the RP and Chemistry Manager, and with personnel assigned to radiation survey instrument calibration and use, the inspectors made the following observations concerning the licensee's modified RO-2s:

- ° Most of the modifications were similar to those described in "Health Physics," P. 485, dated April 1987. The purpose of the modifications, as described in Health Physics, was to reduce angular dependence of incident beta radiation.
- ° A licensee's memorandum, dated September 8, 1987, described the changes to the electronics, described extrapolation chamber intercomparison with a modified RO-2, and contained the following statements:
 

"The modified RO-2 field applications are restricted to the same conditions as a standard RO-2 survey (with the exception of a beta correction factor of 1.0)."

"The extrapolation chamber does not respond well at dose rates <100 mrad/hr due to the low current values involved. Therefore, beta readings on the 5 mr/hr and 50 mr/hr scales could not be checked. However, since meter response is linear, and a 1:1 beta and gamma response was obtained on the 500 mr/hr and 5000 mr/hr scales, it would follow that a 1:1 gamma response on the 5 mr/hr and 50 mr/hr ranges would indicate a 1:1 beta ratio as well."
- ° The extrapolation chamber intercomparison, which as noted above was not performed on the two lowest scales, had been performed on only one RO-2M at the time of the inspection, and was performed without use of the slotted aluminum window which was added later to aid in particle isolation.
- ° No periodic beta calibration was performed on any of the RO-2Ms in use. The licensee performs gamma calibrations on the upper three scales. Licensee representatives stated that the instrument is not used for surveys for record, only for monitoring of HPCAs and personnel therein. The instruments are marked, in part: "BCF=1" and "do not use 0-5 mr/hr scale."
- ° Other contractor RP technicians contacted stated that they had received no training in use of the modified RO-2 except receipt of a copy of the general memorandum discussed above and having read 75RP-9ZZ83.

The licensee stated that the modified RO-2 is used only for monitoring, that if a hot particle is detected on an individual by the instrument then other means than the modified RO-2 reading would be used to assess dose. The licensee, in a telephone conversation conducted on January 26, 1988, stated that four modified RO-2s were

rechecked open window on a gamma calibrator, and that all four had responded within tolerance to each other, and a factor of 2 to 2.5 times the normal response of an unmodified R0-2. The inspectors concluded that the reproducibility and calibration validity for beta-emitting particles was in serious question.

b. Hot Particle Dose

The inspectors made several observations concerning the potential and likely doses to an individual sorting radioactive material by hand, when the method used to control exposure is the gamma dose rate limitation on the exterior of the containers and periodic surveys.

The exposure of most interest, if the exterior of the bag is limited to 50 mr/hr, and the presence of particles is probable, would be to the hands and forearms, due to the potential for particle adherence to the extremities.

A hot particle, if a gamma emitter such as Co-60, reading about 7 mr/hr on the exterior of the container, but no closer than 15 cm from the outside of the bag, would, if it adhered to the extremity of a worker hand sorting the material, deliver a gamma radiation dose to the hand at .4 cm distance within 30 minutes, of at least 4.7 rem. The same Co-60 particle would read only about 1.6 mr/hr outside a 30" x 48" full bag, if centered in the bag (12 inch radius), and would be approximately 112  $\mu$ Ci. If the particle were primarily a beta-emitter, such as a fission product particle, detection of the particle would be correspondingly more difficult on the outside of a bag, and the beta dose rate would be even higher, due to the higher energies involved.

The inspectors concluded from the above, that screening of containers of material and monitoring with modified R0-2s, as instituted by the licensee, would not provide assurance that occupational doses to the extremities of individuals performing hand sorting of solid wastes contaminated with particles, would be 25% or less of the applicable dose limitations of 10 CFR 20.101.

c. Hot Particle Production

During the Unit 1 refueling (October 1987 - January 1988), the RCP impellers were removed for antimony decontamination prior to shaft removal because of the shaft cracking problem. Concurrent with the opening of the primary system, the licensee found a significant increase in the number of Co-60 particles identified during surveys. Some of the particles contained millicurie quantities of Co-60.

Examination of the impellers disclosed significant damage to the stellite wear rings or surfaces. The licensee reported that the stellite had been plasma-arc deposited on the impeller base metal in a layer approximately 0.012 inches thick. The upper surface was 12 inches in diameter and 4 inches wide. The lower surface was 28

inches in diameter and about 4 inches wide. The licensee described the damage as follows:

- ° The complete loss of the upper wear surface on one pump.
- ° The loss of 3 or 4, 1-inch diameter blisters in another area.
- ° The loss of a 4-inch strip, 3/4 to 1 inch wide.
- ° The loss of small chunks or chips from one of the lower surfaces.

Seven of the eight impellers in service in Units 1 and 2 were coated with stellite by the RCP manufacturer. One of the Unit 1 and all the Unit 3 pumps were coated with stellite by another contractor. The Unit 1 impeller which lost all of the upper stellite surface was the unit coated by the manufacturer while the one coated by the contractor showed blisters.

The stellite material was estimated to contain 55% cobalt. This would mean that one complete upper wear surface of one pump would result in about 148 grams of cobalt entering the primary coolant. Depending on residence time and neutron flux, one year of operation could result in the production of several hundred curies of Co-60 activity in particle or flake form.

During the Unit 1 outage, it was determined that the upper stellite wear ring/surface was not required and it was removed from all the Unit 1 impellers. In addition, the width of the lower wear ring/surface was reduced to approximately 3 inches.

When the presence of stellite on the impellers first became known to the licensee's radiation protection staff, they requested but did not press for prompt corrective action in the belief that the stellite would adhere to the base metal and not contribute a significant source of cobalt target material. Experience has shown that the stellite is a significant source for the production of Co-60. One particle, recovered from a reactor coolant pump, was 9 millicuries. This one particle exhibited a dose rate at 10 cm of 1.77 rad/hr. Another particle about 6 times larger was found on opening a steam generator. This particle could produce skin exposure rates on the order of 200,000 rad/hr due to beta and 2 R/hr from gamma radiation. General trending of particles by the licensee revealed the following regarding those particles discovered in Unit 1 during implementation of the licensee's hot particle control program from October 15, 1987 to December 27, 1987:

Total particles less than 1 $\mu$ Ci discovered.....	175		
Estimated intensity:	<u>&gt;100 <math>\mu</math>Ci</u>	<u>20-100 <math>\mu</math>Ci</u>	<u>1-20 <math>\mu</math>Ci</u>
Total particles of suspected Co-60	5	4	56



The inspectors observed:

- Unit 1 currently produces large numbers of particles of Co-60.
- These particles could reasonably be expected to be collected in waste generated from maintenance activities. The licensee each day generates several hundred pounds of waste which is sorted by hand. This sorting was performed in the DAWP facility HPCA beginning in December 1987.
- Particles in the range of 100  $\mu$ Ci are not easily detected as being particles, unless particle surveys are conducted on each piece of waste.
- Each piece of waste removed from the bags is not surveyed prior to hand contact.
- Particles in the range of 100  $\mu$ Ci can produce doses greater than 25% of the extremity dose limitations of 10 CFR 20.101 in short periods of time (minutes).
- The licensee's personnel monitoring instrumentation and waste monitoring methods will not assure that particles generated will result in detection prior to individuals receiving significant levels of exposure.

Based on these observations, Region V will address this issue with licensee management representatives following feedback of their evaluation of the observations (50-528/88-03-03).

#### 8. Exit Interview

The inspectors met with those individuals denoted in paragraph 1 at the conclusion of the inspection. The scope and findings of the inspection were summarized. The licensee was informed of the apparent violation discussed in paragraph 3, above. The licensee acknowledged the apparent violation and stated that corrective action to prevent recurrence was being and had been taken. With respect to providing extremity dosimetry to personnel hand sorting particle-contaminated waste, the licensee stated that they did not deem occupational extremity exposures of greater than 25% of the applicable limits of 10 CFR 20.101 likely, but would perform further evaluations and advise Region V of their conclusion.

On January 29, 1988, the Radiation Protection and Chemistry Manager advised Region V that as a result of their evaluation of the extremity monitoring issue, they have concluded that although extremity exposures in excess of the 10 CFR 20 limits are possible, based on past extremity dosimeter results for more than 3700 workers, exposure to the individuals sorting trash are "not likely." In addition, they believe that there is no currently available appropriate personnel monitoring device capable of measuring the dose received from particle sources.



The NRC regional staff expressed the position that good practice required the use of extremity dosimetry in addition to the surveys that were being performed to assure that personnel were appropriately monitored. Senior NRC regional management expressed this view in a telephone conversation with senior licensee management. Senior licensee management responded to the NRC position by telephone on February 18, 1988. The licensee plans to revise the procedure, applicable to the use of extremity monitoring devices, by requiring such dosimetry when extremity exposures are expected to exceed whole body exposures by a factor of four or when whole body exposures of  $\geq 1000$  mrem are expected. The procedure presently requires such use when a factor of five is expected. In addition, the licensee plans to stop sorting waste originating in hot particle control areas and transfer such waste directly to the waste compactor without sorting.

