



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

MAR 17 1988

MEMORANDUM FOR: J. Philip Stohr, Acting Director
Division of Radiation Protection
and Emergency Preparedness
Office of Nuclear Reactor Regulation

FROM: LeMoine J. Cunningham, Chief
Radiation Protection Branch
Division of Radiation Protection
and Emergency Preparedness
Office of Nuclear Reactor Regulation

SUBJECT: SUMMARY OF A MEETING ON THE NEED FOR REVISED REGULATORY
GUIDANCE ON HOT PARTICLE EXPOSURES OF SKIN

In a response to a request from the Nuclear Management and Resources Council (NUMARC), NRC staff met with representatives of NUMARC and other industry groups on March 10, 1988. The purpose of the meeting was for the NRC staff to hear industry concerns regarding adverse impacts of the current regulatory position regarding exposure of skin to hot particles and the need for a revised regulatory position, in interim guidance, that would be less restrictive. Industry groups represented at the meeting in addition to NUMARC were the Edison Electric Institute (EEI), Institute for Nuclear Power Operations (INPO) and several nuclear utilities. Senior NRC staff members present at the meeting were T. T. Martin, NRR, and B. M. Morris, RES. A list of attendees is enclosed.

Industry representatives expressed a concern that, as a result of the current regulatory position, a high level of attention and emphasis is currently being given to hot particles and hot particle doses at nuclear power plants. This attention and emphasis is causing unnecessary fear and concern among nuclear power plant workers and is creating a potential for unjustified litigation. Other concerns are multi-million dollar costs and additional worker radiation exposures, inconsistent with ALARA principles, that could be substantially reduced by a change in the NRC position on the hot particle exposures. Industry representatives emphasized that a change in the NRC position would not result in any decrease in protection of workers or the general public nor in the controls that have been established to prevent hot particles from being transported offsite. Copies of the viewgraphs used in the industry presentation are enclosed.

NRC representatives indicated that this issue is being considered by the staff, which is now gathering information on the issue. The staff requested additional information on the estimates of costs and other impacts presented by

MH45-3
Radiation

MAR 17 1988

industry representatives. Mr. Tipton, NUMARC, promised to provide the requested information to Mr. Martin, NRR. Mr. Tipton also will provide a copy of NUMARC comments on the draft NCRP recommendations on hot particle exposure limits when these comments are available.

Original signed by LeMoine J. Cunningham


LeMoine J. Cunningham, Chief
Radiation Protection Branch
Division of Radiation Protection
and Emergency Preparedness
Office of Nuclear Reactor Regulation


Enclosures:


1. Attendees - NRC/NUMARC/EEI Meeting
2. Viewgraphs used in industry presentation

Distribution:

JPStohr, NRR
LJCunningham, NRR
JEWigginton, NRR
ODLynch, NRR
JDBuchanan, NRR
DBMatthews, NRR
RJBarrett, NRR
JHSniezek, NRR
TTMartin, NRR
REAlexander, RES
BMMorris, RES
JWNHickey, NMSS
GLSjoblom, NMSS
RRBellamy, RI
DMCollins, RII
WDSafer, RIII
LAYandell, RIV
FAAnslawski, RV
PD
Central Files
RPE R/F


RFB:DREP
JDBuchanan:bt
03/14/88


SC:RFB:DREP
JEWigginton
03/14/88


RFB:DREP
LJCunningham
03/17/88

ATTENDEES - NRC/NUMARC/EEI MEETING
March 10, 1988

NAMEORGANIZATION

T. T. Martin
Tom Tipton
Lynne Fairbent
Dick Warnock
E. Scott Medling
Lionel Lewis
Dave Harward
Mike Williams
Eugene Rollins
R. E. Alexander
Bill Morris
Ed Flack
Al Roecklein
Oliver D. T. Lynch
John D. Buchanan
James D. Jamison
Alan Nelson
Kenneth Travis
Bill Kindley
L. J. Cunningham

NRC/NRR
NUMARC
NUMARC
NUMARC/So. Calif. Ed.
NUMARC/So. Calif. Ed.
Duke Power Co.
NUMARC
Union Electric Co.
S. C. Elec. & Gas
NRC/RES
NRC/RES
NRC/OE
NRC/RES
NRC/NRR
NRC/NRR
Battelle - PNL
NUMARC
EEI
INPO
NRC/NRR

HOT PARTICLES

- o MICROSCOPIC ----- < 100 μ M
- o PARTICULATE ----- INSOLUBLE
- o HIGHLY CHARGED
- o SIGNIFICANT ACTIVITY (SEVERAL μ CI)
 - FUEL/FISSION FRAGMENTS (Cs, Ce, Ru)
(FAILED FUEL)
 - ACTIVATION PRODUCTS (Co, Cr, Mn, Zr, Hf, Ta, Sb)
(MACHINING OPERATIONS AND WEAR)
- o HOT PARTICLES ARE NOT NEW
- o RECENT DISCOVERY DUE TO MORE SENSITIVE MONITORING EQUIPMENT
- o APPROXIMATELY 75% OF PLANTS HAVE IDENTIFIED HOT PARTICLES

EXTENT OF HOT PARTICLES IN INDUSTRY

BASED ON AN EPRI SURVEY OF 61 PLANTS:

18 PLANTS -- FUEL PARTICLE INCIDENT ONLY*

42 PLANTS -- INCIDENCE OF ACTIVATION PARTICLES*

17 PLANTS -- NO INCIDENTS OF PARTICLES

* SOME PLANTS HAD BOTH TYPES

SUMMARY

INDUSTRY CONCERNS

1. ALARA CONSIDERATIONS
2. DOSE ASSIGNMENT AND EVALUATION
3. REGULATORY COMPLIANCE
4. IMPACT ON WORKERS
5. IMPACT ON RADWASTE VOLUME
6. CREDIBILITY

ALARA CONSIDERATIONS

- o UNNECESSARY WHOLE BODY DOSE INCURRED
- o MISDIRECTED RESOURCES
- o RISK PERSPECTIVE
- o REDUCED EFFICIENCY

DOSE ASSIGNMENT AND EVALUATION

- o METHOD OF DOSE ASSIGNMENT
- o APPROPRIATE DOSE LIMIT
- o IMPLIED RISK

REGULATORY COMPLIANCE

- o TECHNICAL "OVEREXPOSURES"
- o ENFORCEMENT
- o LOWER SALP RATINGS
- o IMPACT ON INSPECTION FREQUENCY
- o ANI PREMIUMS

IMPACT ON WORKERS

- o PHYSICAL IMPACT
- o PSYCHOLOGICAL IMPACT
- o IMPROPER RISK PERCEPTION

IMPACT ON RADWASTE VOLUME

- o PROTECTIVE CLOTHING

- o SOLID WASTE

- o LIQUID WASTE

CREDIBILITY

- o EXPOSURE RECORDS
- o EXPOSURE LIMITS
- o HEALTH PHYSICS PROGRAMS
- o UTILITY AND INDUSTRY PUBLIC IMAGE
 - WORKERS
 - PUBLIC
- o NRC IMAGE
 - WORKERS
 - PUBLIC

IMPLEMENTATION OF INTERMIN GUIDANCE

ASSUME: A_B $\mu\text{Ci-HRS}$

ALTERNATIVE 1: SIMILAR APPROACH TO
CURRENT USE OF MPC-HRS.

o IF $A_B > \text{LIMIT}$

- INDICATES A PROGRAMMATIC REVIEW
MAY BE NECESSARY
- REGULATORY ACTION
- MEDICAL FOLLOW-UP
(TIME PERIOD BASED ON
MOIST DESQUAMATION)

o $A_B < \text{LIMIT}$

- INDUSTRY ADMINISTRATIVE LIMITS
AND CONTROLS

o RECORDS

- RECORD $\mu\text{Ci-HRS}$. EXPOSURE IN SAME
MANNER AS MPC-HRS.

IMPLEMENT EXPOSURE CONTROLS BASED ON
 $\mu\text{CI-HRS}$ CONCEPT.

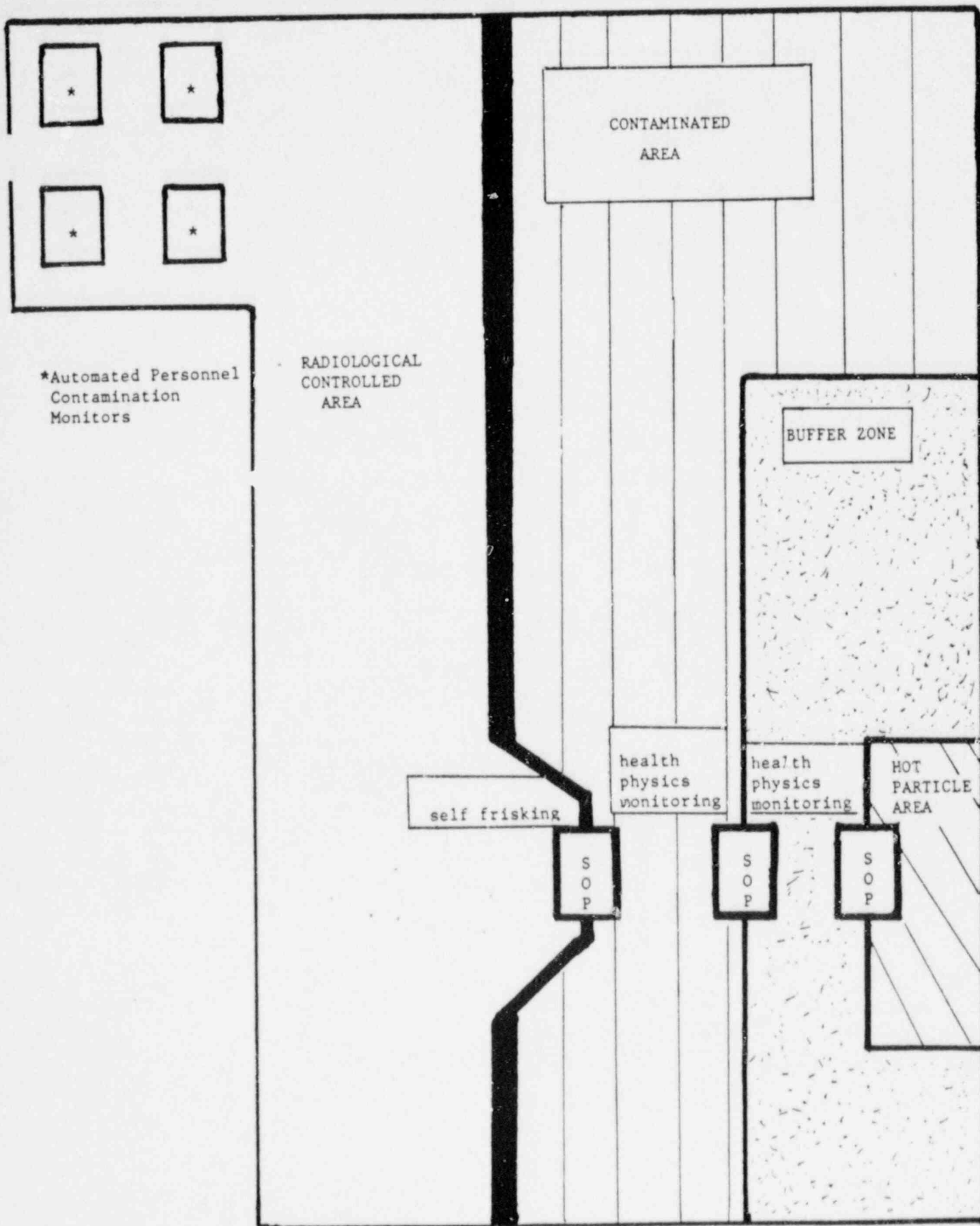
FOR EXAMPLE:

<u>MPC-HRS</u>	<u>ACTION</u>	<u>$\mu\text{CI-HR}$</u>
< 2 MPC-HRS	NOT REQUIRED TO BE RECORDED	< 5% A_B
2-40 MPC-HRS	RECORD EXPOSURE AS $\mu\text{CI-HR}$ OR MPC-HR	5% < A_B < 100%
> 40 MPC-HRS	INVESTIGATE, TAKE CORRECTIVE ACTION RECORD EXPOSURE REGULATORY ACTION	> 100% A_B
> 520 MPC-HRS	ESCALATED ENFORCEMENT ACTION	ULCERATION

NOTE: $A_B = \mu\text{CI-HR}$ LIMIT ADOPTED

ALTERNATE 2: CONVERT A_B TO DOSE

- o DETERMINE ABSORBED DOSE TO 0.1 CM^2 (D_B)
- o RELATE TO RISK
 - 2,000 RAD AVERAGED OVER 0.1 CM^2 AT SKIN DEPTH OF $100 \mu\text{M}$
RISK = 1×10^{-6}
 - 1 REM TO SKIN OF WHOLE BODY
RISK = 1×10^{-6}
 - BASED ON EQUIVALENT RISKS
 $2,000 \text{ RAD} = 1 \text{ REM}$
- o $D_B = (A_B) \left(\frac{1 \text{ REM}}{2,000 \text{ RAD}} \right) = \text{REM}$
- o ASSIGN AS HOT PARTICLES SKIN DOSE IN RECORDS
- o $D_B > \text{EXISTING LIMIT}$ (7.5 REM/QTR)
 - REGULATORY ACTION
 - MEDICAL FOLLOWUP
(PROPER TIME PERIOD)
- o ULCERATION
 - ESCALATED ENFORCEMENT ACTION



*Automated Personnel
Contamination
Monitors

RADIOLOGICAL
CONTROLLED
AREA

CONTAMINATED
AREA

BUFFER ZONE

self frisking

health
physics
monitoring

health
physics
monitoring

HOT
PARTICLE
AREA

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