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PHILLIPS PETROLEUM COMPANY
Atomic Energy Division
Idaho Falls, Idaho

REPOSITORY INEL
COLLECTION SNAPTRAN
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TAN-SPERT HP Progress Report
FOLDER Feb 1966 Cord-21-66A

March 15, 1966

TAN-SPERT Health Physics
Progress Report for February 1966
Cord-21-66A

Mr. J. W. McCaslin
O F F I C E

The monthly report of the TAN-SPERT Health Physics Section for February 1966 is as follows:

TSF

The major activities requiring HP coverage in the TSF area during February were

1. HCA cell entries and manipulator repair work
2. Coverage of X-ray work on the PM-2A
3. ML-1 Hot Shop coverage
4. Monitoring of fuel in the pool area
5. Coverage during repair of RML manipulators
6. Increased number of radioactive shipments.

Activities associated with the PM-2A have required almost constant HP coverage in the Hot Shop. Radiation fields around the PM-2A reactor vary from 200 mR/hr at the base of the reactor to fields greater than 25 R/hr near the top. Close surveillance is necessary to control the exposure of the many personnel involved with this experiment. Numerous AED-328 forms "Request for Radiation Exposure in Excess of that Normally Permitted" have been completed for this project.

A radiation detector alarmed in the Evaporator Building during the evening shift on 2-8-66. The operator was advised by telephone to stop the job and leave the area. The next morning an inspection was made of the chart recorders and they indicated that the radiation level in the valve room had reached 50 mR/hr. However, there was no exposure to personnel as the radiation level in the control room had not increased. A spare detector is being put into service in the control room to more closely monitor personnel during the sampling procedure.

Health Physics personnel participated in the Edison Day Tour. Participation included erecting displays, answering questions, and directing the tour along the route.

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Decontamination Facilities

The major items decontaminated, chemically cleaned, or sandblasted during February include:

1. SNAPTRAN equipment
2. PM-2A equipment

3. 15 casks
4. HCA tools and equipment
5. Fork truck
6. 5 Cafeteria dollies
7. CFA dumpster
8. 3 EBOR pumps
9. G.E. Lapmaster
10. Drill press.

SPERT

The weighing of fuel-rod sections have been completed at SPERT II. The contamination controlled area has been left intact for future fuel handling.

Nuclear testing procedures continued during the month at SPERT III. A series of static nuclear tests were run at varying temperatures and pressures from a maximum 570°F and 1750 psig decreasing to lesser values during the progress of the tests.

Maintaining temperature in the system required around-the-clock attention of an engineering crew and surveillance of radiological hazards by Health Physics. Overtime was used to cover the off-shifts.

Following the static test series, the core was unloaded and void coefficient measurements were undertaken using aluminum wire to simulate a void volume. Insertion of the wires and their removal and replacement was accomplished by an engineering technician inside the vessel with an HP in constant surveillance.

Three tests were run at SPERT IV on the CDC loading on a minimum period of 5.7 msec which induced a power peak of 4.1 GW. No deformation of fuel rods resulted from these tests.

Two tests were run in a lead-rod series. A 5.7 msec period test resulted in no core damage. A 5.0 msec period test resulted in a 7-inch logitudinal rupture in one of the rods just below the aligning lower grid. Twenty-three inches of fuel rod was left void by the ejection of the oxide fuel.

Following the rupture, air contamination of about 900 aau concentration was detected in the closed building. Entry was restricted until the following morning when the nuclides had decayed to insignificant concentration.

System water was considerably contaminated with pulverized oxide fuel expelled during the rupture. System water was pumped through filters to a hold tank in an attempt to collect the dispersed fuel. The vessel and hardware were partially decontaminated to facilitate examination of all of the 1600 fuel rods and removal of the damaged rods.

The procedure for sampling the air and reactor water are being refined due to the probability of repeated ruptures during future tests.

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Eating is now prohibited in the building and some ribboned areas are entered in Anti-C clothing. Examination of fuel specimens which have been ruptured adds to the probability of contamination spread in the building.

SNAPTRAN

Additional analyses of the data from the SNAPTRAN-2 reactor destructive test have provided the following information:

1. nuclear power release of 7.8×10^{10} watts
2. energy release of 57 mw-sec
3. a mechanical energy release of 0.3 to 0.5 pounds of TNT equivalent
4. time of the start of axial and radial motion of reactor components in disassembly was approximately 125 microseconds before and 110 microseconds after time of peak power, respectively
5. rates of displacement were measured to be 900 ft/sec axially and 400 ft/sec radially.

Figure 1 shows the approximate distribution of fuel in the IET area. Health Physics surveys conducted in this area indicated a very heavy concentration of fuel pieces and particles out to the 10 meter arc. Between the 10 meter and 50 meter arcs fuel particles and pieces were somewhat less densely concentrated. Fuel particles located between the 50 meter and 100 meter arcs were sparsely scattered and only a few relatively small pieces were located beyond the 100 meter arc.

Radiological-survey and clean-up crews have successfully cleared the radioactive debris outside the 100 meter arc. The clean-up involved surveying each square foot of ground with a portable Geiger-Mueller survey instrument. The radioactive material was then carefully scooped up and stored in cadmium lined polyethylene containers. There were no significant exposures received by personnel working on this detail.

Several High Volume air samples were collected in the working area during this period. No significant airborne beryllium or radioactive contamination was observed on these samples.

Clean-up of the reactor structure and dolly were completed, and this unit was transferred to the TAN RPSSA for storage. Several days were spent decontaminating the test cell floor which was pitted by burning fuel particles. In general, the contamination level on the floor is less than 100 d/m/100 cm^2. Clean-up of the IET area is continuing and will not be completed until all areas are within permissible radioactive contamination limits.

Samples of fuel recovered from the SNAPTRAN-2 test were sent to CPP for fission product analysis. The data from this source were correlated with the calculated available fission products in the 57 megawatt power excursion. Preliminary data indicate an appreciable amount of fission products retained in the fuel lattice. A complete fission product balance cannot be made until downwind air sampler data is available. The MTR Radiation Physics Group is still continuing the data reduction of these samples.

A special attempt was made to sort through the recovered SNAPTRAN-2 fuel and rubbish to recover activated gold samples which had been placed inside of the core to determine the total energy release of the destructive test. The attempt was successful, resulting in the recovery of six of the original ten gold samples.

Special Problems

Assistance was given to STEP Instrument Development personnel in checking a 20 Ci thulium-170 source for contamination. The low energy ^{170}Tm source (84 KeV) is being used for LOFT blowdown studies. Several contaminants (~1.1 MeV) caused intolerable interference in the studies. Various checks indicated that a large percent of the contamination existed on the surface of the ^{170}Tm source and in the aluminum holding capsule. The contamination appeared to have been reduced to a tolerable level after being washed and re-incapsulated.

Several items of counting equipment were obtained from surplus GCRE equipment. The acquired equipment will help in the organization of a counting room for support of the safety test program.

Radiological Engineering

The general procedures used in reactor hazards analysis were critically reviewed. The CURIE and RSAC codes are being re-evaluated and updated to coincide with the most accurate available data. One member of the group attended a Public Health Service training course entitled "Atmospheric Diffusion of Air Pollution--Theory and Application." A summary of the training course appears in the trip report Ruht-4-66A. Some work was done to calculate MPCs for isotopes not listed in the Report of the ICRP Committee II by the Federal Radiation Council.

Summary of Routine Work

Smears	4920
Direct reading dosimeters	69
Body Fluid sampled	
Routine	12
Special	0
Liquid samples	
Waste water	4
Radioactive Shipments	
Off-site	6
On-site	66
Burial Ground	8
Laundry	6
Safe Work Permits	55
Beryllium analysis	3
Safety Meetings	3
Excess exposure request	2
Whole body analysis	8
Green tags	345

MAN HOUR TABULATION

Exempt	Non-Exempt	Total		Exempt	Non-Exempt	Total
	Scheduled Hours				Actual Hours Worked	
1280	1760	3040		1216	1854	3070
	Overtime				Absences	
0	230	230	S -	0	36	36
			SF -	0	4	4
			H -	64	88	152
			V -	0	8	8
			DF -	0	0	0
	Total	3270			Total	3270

OLCordes:dcm/JRF

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