

Appendix III

Summaries

of

Health Physics Support

Effluent Releases

Environmental Survey Program

Radiation and Contamination Control Program

and

Personnel Exposures

8009030353

Summary of Health Physics
Support for the Operation of
the Nuclear Science Center Reactor
1979

III-1

— Provided health physics monitoring support for processing 920 irradiations containing over 11,000 samples and 1050 curies of radioactivity.

— Certified 603 shipments of radioactive materials to off-site industry.

— Certified 254 shipments of radioactive materials to other campus laboratories.

— Provided monitoring support for processing and handling over 5500 experimental samples retained at the Nuclear Science Center laboratories.

— Conducted environmental survey program in cooperation with the Texas State Department of Health. This program consists of in-situ TLD monitors and the collection, analyses and evaluation of over 100 soil, water, vegetation, and milk samples.

— Provided personnel monitoring support for 40-50 persons on a daily basis and over 4,000 visitors as required.

— Performed radionuclide analyses and packaged approximately 300 Ft³ of dry solid radioactive waste for disposal.

— Performed radioisotope identification and determined radioactivity concentrations for 44 releases of radioactive liquid effluents totaling 910,000 gallons including fresh water diluent. Volume of fresh water diluent was 690,000 gallons required to maintain effluent releases to approximately 1% of MPC values specified in 10CFR20.

— Performed surveys of the Nuclear Science Center facilities for radiation levels and radioactive contamination including the collection, analyses, and evaluation of approximately 250 smear samples on a weekly basis.

— Conducted radiation safety training for 50 NSC employees and experimental personnel using NSC facilities.

— Conducted radiation safety training for off-site support agencies required for the implementation of emergency planning and preparedness procedures. These personnel included 15 members of St. Joseph's Hospital, 38 members of College Station Fire Department and ambulance services, and 40 members of the University Police Department.

EFFLUENT RELEASE SUMMARY

Introduction

Summaries of radioactive effluents released from the Nuclear Science Center for 1979 are included in this Appendix. These data are presented in tabular form and include atmospheric, liquid and solid waste releases.

Particulate Releases

Radioactive particulates are monitored at the base of the central exhaust stack and summarized on a monthly basis. The annual average release rate was $1.39 \text{ E-}11 \text{ } \mu\text{Ci/cc}$. Total radioactivity released for the year was $1.03 \text{ E-}03$ curies. There were no radioisotopes with > 8 day half-lives identified from isotopic analyses of the filter papers. These analyses revealed only the decay daughters of Radon-Thoron. These data are presented in Table I.

Gaseous Releases

Argon-41 is the major gaseous effluent produced and released at the Nuclear Science Center. This effluent is measured by counting the Argon-41 photopeak in the gaseous discharges of the central exhaust stack. Total Argon-41 released during 1979 was 2.44 Ci . This results in an annual average release rate of $3.23 \text{ E-}08 \text{ } \mu\text{Ci/cc}$ as measured in the central exhaust stack with no dilution factors applied. Applying the dilution factor of $5.0 \text{ E-}03$ allowed at the site boundary (as determined, SAR, pages 117-119, June 1979) results in radioactivity concentrations of $< 1\%$ of the limits specified in 10CFR20, Appendix B, Table II, Column 1. These data are summarized on a monthly basis and presented in Table II.

Liquid Waste Releases

Radioactive liquid effluents are collected in liquid waste holdup tanks prior to release from the confines of the Nuclear Science Center. Sample analyses for radioisotope identification and radioactivity concentrations were determined for each release. There were 44 liquid waste releases totaling $9.10 \text{ E } 05$ gallons including diluents from the Nuclear Science Center during 1979. The total radioactivity released for 1979 was $2.35 \text{ E-}02 \text{ Ci}$ with an average concentration of $6.83 \text{ E-}06 \text{ } \mu\text{Ci/ml}$. Radioisotopes were identified as Ir-192, Co-60, Mn-54, Co-58, Na-24, Zn-65, Cr-51, Cd-115, Ce-141, Br-82, Cd-109, Co-57, Cs-137, I-133, and Sb-122. Radioactivity concentrations for each radioisotope was below the limits specified in 10CFR20. Summaries of these data are presented in Tables 3-13.

Solid Radioactive Waste

There was a total of 29.41 Ft³ of dry solid waste materials packaged in four 55 gallon steel drums for disposal during 1979. These materials were transferred to the Radiological Safety Office, Texas License 6-448, for disposal. This material consisted of Eu-152 contaminated soil and 5 each 14 inch sections of 3 inch carbon steel pipe doped with Co-60. These materials contained 2.43 E-01 Ci of Co-60 and 1.02 E-03 Ci of Eu-152. These data are summarized in Table 14. Also, an additional volume of approximately 250 Ft³ of dry solid waste materials was assayed for radioactivity concentration and radioisotope identification. These materials were packaged in 55 gallon steel drums and stored for future disposal.

TABLE 1
 PARTICULATE EFFLUENT RELEASES
 ANNUAL SUMMARY
 1979

Month	Exhaust Volume cc	Concentration $\mu\text{Ci}/\text{cc}$	Total Radioactivity	
			μCi	Ci
January	6.31 E 12	4.42 E-11	278.90	2.79 E-04
February	5.71 E 12	2.64 E-11	150.74	1.51 E-04
March	6.31 E 12	1.63 E-11	102.85	1.03 E-04
April	6.12 E 12	1.02 E-11	62.42	6.24 E-05
May	6.31 E 12	9.07 E-12	57.23	5.72 E-05
June	6.12 E 12	6.53 E-12	39.96	3.40 E-05
July	6.31 E 12	1.92 E-11	121.15	1.21 E-04
August	6.31 E 12	4.67 E-12	29.46	2.95 E-05
September	6.12 E 12	6.53 E-12	39.96	4.00 E-05
October	6.31 E 12	1.10 E-11	69.41	6.94 E-05
November	6.12 E 12	8.71 E-12	53.30	5.33 E-05
December	6.31 E 12	4.72 E-12	29.78	2.98 E-05

Total Volume: 7.44 E 13 cc

Annual Average Release: 1.39 E-11 $\mu\text{Ci}/\text{cc}$

Total Radioactivity Released: 1.03 E-03 Ci

TABLE 2
 GASEOUS EFFLUENT RELEASES
 ARGON-41
 ANNUAL SUMMARY
 1979

Month	Exhaust Volume cc	Concentration* $\mu\text{Ci}/\text{cc}$	Concentration** $\mu\text{Ci}/\text{cc}$	Percent** MPC	Radioactivity* Total (Ci)
January	6.31 E 12	2.35 E-08	1.17 E-10	0.3	1.48 E-01
February	5.71 E 12	3.35 E-08	1.67 E-10	0.4	1.91 E-01
March	6.31 E 12	3.35 E-08	1.67 E-10	0.4	2.11 E-01
April	6.12 E 12	3.10 E-08	1.55 E-10	0.4	1.89 E-01
May	6.31 E 12	2.35 E-08	1.17 E-10	0.3	1.48 E-01
June	6.12 E 12	2.60 E-08	1.30 E-10	0.3	1.59 E-01
July	6.31 E 12	1.37 E-08	6.85 E-11	0.2	8.69 E-02
August	6.31 E 12	2.36 E-08	1.18 E-10	0.3	1.48 E-01
September	6.12 E 12	2.85 E-08	1.42 E-10	0.4	1.74 E-01
October	6.31 E 12	2.60 E-08	1.30 E-10	0.3	1.64 E-01
November	6.12 E 12	4.45 E-08	2.25 E-10	0.6	2.72 E-01
December	6.31 E 12	8.19 E-08	4.09 E-10	1.0	5.16 E-01

Total Volume: 7.44 E 13 cc

Annual Average Release*: 3.23 E-08 $\mu\text{Ci}/\text{cc}$

Total Radioactivity Released*: 2.41 Ci

*As Measured in the Central Exhaust Stack

**As Determined at 100 meters, approximate boundary of exclusion area,
 with 200/1 Dilution Factor; SAR, Pages 117-119, June 1979

TABLE 3
 RADIOACTIVE LIQUID EFFLUENT RELEASES
 SUMMARY
 1979

Isotope	Number Releases	Volume* Gallons	Concentration* $\mu\text{Ci}/\text{cc}$	MPC-W $\mu\text{Ci}/\text{cc}$	MPC %	Radioactivity Ci
Ir-192	39	7.96 E 05	4.45 E-06	4.0 E-05	11.1	1.34 E-02
Co-60	42	8.77 E 05	1.12 E-06	3.0 E-05	3.7	3.72 E-03
Mn-54	38	8.08 E 05	7.45 E-07	1.0 E-04	0.7	2.28 E-03
Co-58	35	7.76 E 05	3.35 E-07	9.0 E-05	0.4	9.85 E-04
Na-24	10	1.90 E-05	1.23 E-06	3.0 E-05	4.1	8.86 E-04
Zn-65	21	7.15 E 05	2.99 E-07	1.0 E-04	0.3	8.11 E-04
Cr-51	3	6.20 E 04	2.17 E-06	2.0 E-03	0.1	5.10 E-04
Cd-115	1	2.85 E 04	4.02 E-06	3.0 E-05	13.4	4.34 E-04
Ce-141	11	2.64 E 05	3.47 E-07	9.0 μ -05	0.4	3.48 E-04
Br-82	4	7.80 E 04	3.21 E-07	4.0 E-05	0.8	9.49 E-05
Cd-109	1	1.70 E 04	5.53 E-07	2.0 E-04	0.3	3.56 E-05
Co-57	5	1.55 E 05	6.00 E-08	4.0 E-04	<.1	3.52 E-05
Cs-137	2	3.4 E 04	5.04 E-08	2.0 E-05	0.3	6.50 E-06
I-133	1	1.70 E 04	4.18 E-08	1.0 E-06	4.2	2.69 E-06
Sb-122	1	1.7 E 04	2.50 E-08	3.0 E-05	<.1	1.61 E-06

Total Releases: 44

*Total Volume: Gallons: 9.10 E 05 CC: 3.45 E 09

*Average Concentration: 6.83 E-06 $\mu\text{Ci}/\text{cc}$

Total Radioactivity: 2.35 E-02 Ci

*Includes fresh water diluent

TABLE 4
 RADIOACTIVE LIQUID EFFLUENT RELEASES
 MONTHLY SUMMARY
 January 1979

Isotope	Number of Releases	Volume* Gallons	Concentration* $\mu\text{Ci/cc}$	MPC-W $\mu\text{Ci/cc}$	MPC %	Radioactivity Ci
Co-60	2	3.40 E 04	1.25 E-06	5.0 E-05	2.5	1.61 E-04
Zn-65	2	3.40 E 04	1.02 E-06	1.0 E-04	1.0	1.32 E-04
Mn-54	1	1.70 E 04	1.14 E-06	1.0 E-04	1.1	7.35 E-05
Cr-51	1	1.70 E 04	7.83 E-07	2.0 E-03	<.1	5.05 E-05
Co-58	1	1.70 E 04	6.63 E-07	9.0 E-05	0.7	4.27 E-05
Ce-141	1	1.70 E 04	2.25 E-07	9.0 E-05	0.2	1.45 E-05

Total Release: 2

Total Volume: Gallons 3.40 E 04 cc 1.29 E 08

Average Concentration: 3.68 E-06 $\mu\text{Ci/cc}$

Total Radioactivity: 4.75 E-04 Ci

*Includes fresh water diluent

TABLE 5
 RADIOACTIVE LIQUID EFFLUENT RELEASES
 MONTHLY SUMMARY
 March 1979

Isotope	Number of Releases	Volume* Gallons	Concentration* $\mu\text{Ci/cc}$	MPC-W $\mu\text{Ci/cc}$	MPC %	Radioactivity Ci
Co-60	2	3.40 E 04	9.07 E-07	5.0 E-05	1.8	1.17 E-04
Zn-65	2	3.40 E 04	5.33 E-07	1.0 E-04	0.5	6.88 E-05
Co-58	2	3.40 E 04	1.53 E-07	1.0 E-04	0.2	1.98 E-05
Ir-192	2	3.40 E 04	6.23 E-08	4.0 E-05	0.2	8.04 E-06
Sb-122	1	1.70 E 04	2.50 E-08	3.0 E-05	<0.1	1.61 E-06

Total Release: 2

Total Volume: Gallons 3.40 E 04 cc 1.29 E 08

Average Concentration: 1.67 E-06 $\mu\text{Ci/cc}$

Total Radioactivity: 2.15 E-04 Ci

*Includes fresh water diluent

TABLE 6
 RADIOACTIVE LIQUID EFFLUENT RELEASES
 MONTHLY SUMMARY
 April 1979

Isotope	Number of Releases	Volume* Gallons	Concentration* $\mu\text{Ci}/\text{cc}$	MPC-W $\mu\text{Ci}/\text{cc}$	MPC %	Radioactivity Ci
Co-60	3	5.10 E 04	1.94 E-06	3.0 E-05	6.5	3.76 E-04
Zn-65	3	5.10 E 04	1.08 E-06	1.0 E-04	1.1	2.10 E-04
Mn-54	2	3.4 E 04	1.96 E-06	1.0 E-04	2.0	1.26 E-04
Co-58	3	5.10 E 04	2.76 E-07	9.0 E-05	0.3	5.34 E-05
Cd-109	1	1.70 E 04	5.52 E-07	2.0 E-04	0.3	3.56 E-05
Ce-141	2	3.4 E 04	4.13 E-07	9.0 E-05	0.5	2.66 E-05
Ir-192	2	3.4 E 04	3.98 E-07	4.0 E-05	1.0	2.56 E-05
Co-57	1	1.70 E 04	4.48 E-08	4.0 E-04	<0.1	2.89 E-06
I-133	1	1.70 E 04	4.17 E-08	1.0 E-06	4.2	2.69 E-06

Total Releases: 3

Total Volume: Gallons 5.10 E 04 cc 1.93 E 08

Average Concentration: 4.44 E-06 $\mu\text{Ci}/\text{cc}$

Total Radioactivity: 8.58 E-08 Ci

*Includes fresh water diluent

TABLE 7
 RADIOACTIVE LIQUID EFFLUENT RELEASES
 MONTHLY SUMMARY
 May 1979

Isotope	Number of Releases	Volume* Gallons	Concentration* $\mu\text{Ci/cc}$	MPC-W $\mu\text{Ci/cc}$	MPC %	Radioactivity Ci
Na-24	2	3.25 E 04	2.46 E-06	3.0 E-05	8.2	3.03 E-04
Co-60	3	4.95 E 04	7.29 E-07	3.0 E-05	2.4	1.37 E-04
Br-82	3	4.95 E 04	4.03 E-07	4.0 E-05	1.2	9.08 E-05
Ir-192	3	4.95 E 04	2.33 E-07	4.0 E-05	0.6	4.39 E-05
Mn-54	2	3.25 E 04	2.20 E-07	1.0 E-04	0.2	2.71 E-05
Zn-65	2	3.25 E 04	2.06 E-07	1.0 E-04	0.2	2.54 E-05
Co-58	2	3.25 E 04	6.20 E-08	9.0 E-05	<0.1	7.63 E-06
Ce-141	1	1.55 E 04	2.40 E-08	9.0 E-05	<0.1	1.41 E-06

Total Releases: 3

Total Volume: Gallons 4.95 E 04 cc 1.88 E 08

Average Concentration: 3.38 E-06 $\mu\text{Ci/cc}$

Total Radioactivity: 6.36 E-04 Ci

*Includes fresh water diluent

TABLE 8
 RADIOACTIVE LIQUID EFFLUENT RELEASES
 MONTHLY SUMMARY
 June 1979

Isotope	Number of Releases	Volume* Gallons	Concentration $\mu\text{Ci/cc}$	MPC-W $\mu\text{Ci/cc}$	MPC %	Radioactivity Ci
Co-60	5	1.20 E 05	1.62 E-06	3.0 E-05	5.4	7.42 E-04
Mn-54	5	1.20 E 05	8.69 E-07	1.0 E-04	0.9	3.96 E-04
Zn-65	4	9.15 E 04	8.31 E-07	1.0 E-04	0.8	2.88 E-04
Co-58	5	1.20 E 05	2.14 E-07	9.0 E-05	0.2	9.78 E-05
Ir-192	5	1.20 E 05	1.95 E-07	4.0 E-05	0.5	8.91 E-05
Ce-141	2	4.57 E 04	5.18 E-08	9.0 E-05	<0.1	8.99 E-06
Br-82	1	2.85 E 04	3.87 E-08	4.0 E-05	<0.1	4.19 E-06

Total Releases: 5

Total Volume: Gallons 1.20 E 05 cc 4.56 E 08

Average Concentration: 3.56 E-06 $\mu\text{Ci/cc}$

Total Radioactivity: 1.63 E-03 Ci

*Includes fresh water diluent

TABLE 9
 RADIOACTIVE LIQUID EFFLUENT RELEASES
 MONTHLY SUMMARY
 July 1979

Isotope	Number of Releases	Volume* Gallons	Concentration* $\mu\text{Ci/cc}$	MPC-W $\mu\text{Ci/cc}$	MPC %	Radioactivity Ci
Cd-115	2	2.85 E 04	4.02 E-06	4.0 E-05	10.0	4.34 E-04
Cr-51	2	2.85 E 04	3.76 E-06	2.0 E-03	0.2	4.07 E-04
Co-60	4	7.87 E 04	1.05 E-06	3.0 E-05	3.5	3.14 E-04
Mn-54	4	7.87 E 04	9.93 E-07	1.0 E-04	1.0	2.96 E-04
Na-24	2	2.85 E 04	2.66 E-06	3.0 E-05	8.9	2.87 E-04
Zn-65	3	6.23 E 04	8.48 E-07	1.0 E-04	0.8	2.00 E-04
Co-58	3	6.23 E 04	4.39 E-07	9.0 E-05	0.5	1.04 E-04
Ir-192	4	7.87 E 04	3.41 E-07	4.0 E-05	0.9	1.02 E-04
Co-57	1	1.70 E 04	4.48 E-08	4.0 E-04	0.1	2.89 E-06

Total Releases: 4

Total Volume: Gallons 7.87 E 04 cc 2.98 E 08

Average Concentration: 7.72 E-06 $\mu\text{Ci/cc}$

Total Radioactivity: 2.15 E-03 Ci

*Includes fresh water diluent

TABLE 10
 RADIOACTIVE LIQUID EFFLUENT RELEASES
 MONTHLY SUMMARY
 August 1979

Isotope	Number of Releases	Volume* Gallons	Concentration* $\mu\text{Ci/cc}$	MPC-W $\mu\text{Ci/cc}$	MPC %	Radioactivity Ci
Co-60	5	1.13 E 05	9.80 E-07	3.0 E-05	3.3	4.18 E-04
Mn-54	6	1.29 E 05	6.63 E-07	1.0 E-04	0.7	3.24 E-04
Na-24	2	6.23 E 04	6.12 E-07	3.0 E-05	2.0	1.44 E-04
Zn-65	4	9.58 E 04	3.84 E-07	1.0 E-04	0.4	1.39 E-04
Co-58	6	1.29 E 05	2.19 E-07	9.0 E-05	0.2	1.08 E-04
Cr-51	1	1.65 E 04	8.47 E-07	2.0 E-03	0.4	5.30 E-05
Ir-192	4	6.55 E 04	1.78 E-07	4.0 E-05	0.4	4.42 E-05
Co-57	1	1.53 E 04	2.70 E-08	4.0 E-04	<0.1	1.56 E-06

Total Releases: 6

Total Volume: Gallons 1.29 E 05 cc 4.89 E 08

Average Concentration: 2.52 E-06 $\mu\text{Ci/cc}$

Total Radioactivity: 1.23 E-03 Ci

*Includes fresh water diluent

TABLE 11
 RADIOACTIVE LIQUID EFFLUENT RELEASES
 MONTHLY SUMMARY
 September 1979

Isotope	Number of Releases	Volume* Gallons	Concentration* $\mu\text{Ci/cc}$	MPC-W $\mu\text{Ci/cc}$	MPC %	Radioactivity Ci
Ir-192	8	1.58 E 05	2.03 E-06	4.0 E-05	5.1	1.21 E-03
Co-60	7	1.41 E 05	9.69 E-07	3.0 E-05	3.2	5.16 E-04
Mn-54	7	1.41 E 05	6.37 E-07	1.0 E-04	0.6	3.39 E-04
Zn-65	6	1.24 E 05	4.78 E-07	1.0 E-04	0.5	2.25 E-04
Co-58	6	1.24 E 05	3.44 E-07	9.0 E-05	0.4	1.62 E-04
Na-24	4	6.65 E 04	6.01 E-07	3.0 E-05	2.0	1.51 E-04
Ce-141	2	2.85 E 04	1.59 E-07	9.0 E-05	0.2	1.72 E-05
Co-57	2	2.90 E 04	1.82 E-08	4.0 E-04	<0.1	2.0 E-06

Total Releases: 8

Total Volume: Gallons 1.58 E 05 cc 5.97 E 08

Average Concentration: 4.40 E-06 $\mu\text{Ci/cc}$

Total Radioactivity: 2.63 E-03 Ci

*Includes fresh water diluent

TABLE 12
 RADIOACTIVE LIQUID EFFLUENT RELEASES
 MONTHLY SUMMARY
 October 1979

Isotope	Number of Releases	Volume* Gallons	Concentration* $\mu\text{Ci/cc}$	MPC-W $\mu\text{Ci/cc}$	MPC %	Radioactivity Ci
Ir-192	7	1.89 E 05	1.58 E-05	4.0 E-05	39.5	1.13 E-02
Co-60	7	1.89 E 05	1.16 E-06	3.0 E-05	3.8	8.33 E-04
Mn-54	7	1.89 E 05	9.35 E-07	1.0 E-05	9.3	6.69 E-04
Co-58	5	1.56 E 05	5.94 E-07	9.0 E-05	0.6	3.49 E-04
Ce-141	4	1.22 E 05	6.02 E-07	9.0 E-05	1.5	2.79 E-04
Cn-65	4	1.40 E 05	4.71 E-07	1.0 E-05	4.7	2.51 E-04
Co-57	1	7.70 E 04	8.87 E-08	4.0 E-05	0.2	2.59 E-03
Cs-137	2	3.40 E 04	5.04 E-08	4.0 E-05	0.1	6.50 E-06

Total Releases: 7

Total Volume: Gallons 1.89 E 04 cc 7.16 E 08

Average Concentration: 1.92 E-05 $\mu\text{Ci/cc}$

Total Radioactivity: 1.38 E-02 Ci

*Includes fresh water diluent

TABLE 13
 RADIOACTIVE LIQUID EFFLUENT RELEASES
 MONTHLY SUMMARY
 November 1979

Isotope	Number of Releases	Volume* Gallons	Concentration* $\mu\text{Ci/cc}$	MPC-W $\mu\text{Ci/cc}$	MPC %	Radioactivity Ci
Ir-192	4	6.70 E 04	2.12 E-06	4.0 E-05	5.3	5.38 E-04
Co-60	4	6.70 E 04	4.20 E-07	3.0 E-05	1.4	1.07 E-04
Zn-65	3	5.00 E 04	2.23 E-07	1.0 E-05	2.2	4.24 E-05
Mn-54	4	6.70 E 04	1.14 E-07	1.0 E-05	1.1	2.90 E-05
Co-58	3	5.00 E 04	7.82 E-08	9.0 E-05	<.1	1.49 E-05

Total Releases: 4

Total Volume: Gallons 6.70 E 04 cc 2.54 E 08

Average Concentration: 2.88 E-06 $\mu\text{Ci/cc}$

Total Radioactivity: 7.32 E-04 Ci

*Includes fresh water diluent

TABLE 14
SOLID RADIOACTIVE WASTE DISPOSAL
ANNUAL SUMMARY
1979

Radioisotope	Radioactivity (Ci)
Co-60	2.43 E-01
Eu-152	1.02 E-03

Total Volume: 29.41 Ft³ contained in four 55 gallon steel drums

Total Radioactivity: 2.44 E-01 Ci

ENVIRONMENTAL SURVEY PROGRAM

Introduction

The environmental survey samples were collected in accordance with the schedules of the cooperative surveillance program between the Texas State Department of Health and Texas A&M University. These samples were analyzed for gross gamma and beta activities and isotope identification. Data from these samples remained basically unchanged from 1978 and reflect the continued use of retention facilities and sample analysis for laboratory effluents prior to their release. Sample analyses indicate that the activities are remaining at normal background levels in the unrestricted environment.

The environmental survey program was expanded in 1977 to include the in-situ measurement of integrated radiation exposures at the site boundaries. These measurements are made for a period of approximately 90 days using commercially available thermoluminescent dosimeters (TLD's) of lithium fluoride chips in glass encapsulated bulbs. These dosimeters are provided and processed by Texas Department of Health, Division of Occupational Health and Radiation Control. Ambient background for these measurements is determined from a control dosimeter located southeast of Easterwood Airport approximately 800 meters east of the Nuclear Science Center site. This location is at a right angle to the prevailing southeasterly winds which occur a large majority of the time on an annual basis.

Table 19 lists the average exposure rate above ambient background for a number of locations at the site boundary. The highest exposure points at the north and west location of the site boundary. Additionally, a dosimeter is located adjacent to the radioactive waste storage building and the instrument calibration range. Exposure data from this dosimeter is not considered as a result of reactor operations but does reflect the maximum site boundary exposure of 51.3 micro R/hr. This site boundary location is further protected from free access to the general public for an additional 100 meters of fenced Texas A&M University property. A dosimeter at this location reveals only background radiations.

Summaries of the environmental survey program for 1979 are presented in Tables 15-19.

TABLE 15
 ENVIRONMENTAL SURVEY PROGRAM
 FIRST QUARTER SUMMARY
 1979
 W A T E R

Radioactivity (Pci/L)

Location	Number Samples	Average	Maximum	Minimum
TAMU Sanitary Outflow	3	12.0 ± 5.0	14.1 ± 5.0	9.2 ± 4.5
NSC Creek	1	340.0 ± 20.0		
White Creek	1	13.0 ± 5.0		

V E G E T A T I O N

Radioactivity (Pci/gm, ASHED)

Location	Number Samples	Average	Maximum	Minimum
NSC Site (Outside Fence)	1	28 ± 2.7		
NSC Site (Inside Fence)	1	33 ± 2.2		
NSC Creek	1	19 ± 2.1		
Cyclotron	1	45 ± 3.0		
White Creek	1	14 ± 3.0		

M I L K

Radioactivity (Pci/L)

Location	Number Samples	Isotope	Average	Maximum	Minimum
TAMU Dairy	3	K-40	1190 ± 53	1330 ± 53	1100 ± 55
		H-3	<500	<500	<500

TABLE 16
 ENVIRONMENTAL SURVEY PROGRAM
 SECOND QUARTER SUMMARY

1979

W A T E R

Radioactivity (Pci/L)

Location	Number Samples	Average	Maximum	Minimum
NSC Creek	4	13.1 ± 5.1	25	7 ± 1.4
White Creek	3	9.9 ± 5.4	21	2.4
Sanitary Outflow	3	7.5 ± 1.6	12 ± 7.6	3.2 ± 1.4
Upper Brazos	2	5.8 ± 1.3	7.2 ± 1.0	4.4 ± 1.0
Lower Brazos	2	15.5 ± 3.7	26 ± 6.5	5.0 ± 1.0

V E G E T A T I O N

Radioactivity (Pci/gm, Dry. wt.)

Location	Number Samples	Average	Maximum	Min' num
NSC Site (Inside Fence)	3	37.6 ± .7	50.0 ± 3.6	24.0 ± 1.7
NSC Site (Outside Fence)	3	37.1 ± 2.9	50.0 ± 4.9	16.0 ± 1.1
White Creek	4	33.7 ± 2.6	58.0 ± 3.9	24.0 ± 2.2
NSC Creek	3	31.6 ± 2.3	43.0 ± 3.2	20.0 ± 1.7

M I L K

Radioactivity (Pci/L)

Location	Number Samples	Isotope	Average	Maximum	Minimum
TAMU Dairy	3	Cs-137	7.2 ± 4.5	8.9 ± 5.5	5.6 ± 3.6
		H-3	<500	<500	<500
		K-40	1216 ± 71	1220 ± 85	1210 ± 61

TABLE 17

ENVIRONMENTAL SURVEY PROGRAM
THIRD QUARTER SUMMARY

1979

W A T E R

Radioactivity (Pci/L)

Location	Number Samples	Average	Maximum	Minimum
NSC Creek	3	46.9 ± 8	88.0 ± 12	6.8 ± 4
White Creek	2	13.0 ± 5	14.0 ± 5.3	12 ± 4.7
Upper Brazos River	1	7.6 ± 4		
Lower Brazos River	1	13.0 ± 7		
Sanitary Outflow	3	9.6 ± 5	14.0 ± 5.5	6.6 ± 4

V E G E T A T I O N

Radioactivity (Pci/gm, Dr wt.)

Location	Number Samples	Average	Maximum	Minimum
NSC Site (Inside Fence)	3	20.0 ± 1.5	23.0 ± 1.8	15.0 ± 1.2
NSC Site (Outside Fence)	4	17.4 ± 1.3	20.0 ± 1.4	15.0 ± 1.2
White Creek	1	24.0 ± 1.2		
NSC Creek	3	26.3 ± 2.8	35 ± 2.7	17 ± 2.8

M I L K

Radioactivity (Pci/L)

Location	Number Samples	Isotope	Average	Maximum	Minimum
TAMU Dairy	3	K-40	1353 ± 76	1430 ± 86	1200 ± 72
		H-3	<500	<500	<500

TABLE 18
 ENVIRONMENTAL SURVEY PROGRAM
 FOURTH QUARTER SUMMARY

1979

W A T E R

Radioactivity (Pci/L)

Location	Number Samples	Average	Maximum	Minimum
White Creek	1	5.3 ± 4.5		
Sanitary Outflow	2	3.7		
NSC Creek	2	109 ± 11.5	124 ± 12	94 ± 11
Lower Brazos	2	5.2 ± 2.4	8.4 ± 4.8	2.0
Upper Brazos	2	10.3 ± 6.5	14.0 ± 8.7	6.7 ± 4.6

V E G E T A T I O N

Radioactivity (Pci/gm, Dry. wt.)

Location	Number Samples	Average	Maximum	Minimum
NSC Site (Inside Fence)	1	14.0 ± 1.9		
NSC Site (Outside Fence)	1	17.0 ± 1.2		
NSC Creek	1	18.0 ± 2.5		

M I L K

Radioactivity (Pci/L)

Location	Number Samples	Isotope	Average	Maximum	Minimum
TAMU Dairy	2	K-40	1180 ± 104	1240 ± 74	1120 ± 134
		I-131	54 13.5		
		H-3	<500	<500	<500

TABLE 19
 ENVIRONMENTAL RADIATION MONITORING PROGRAM
 INTEGRATED RADIATION EXPOSURE
 December 27, 1978 - January 17, 1980

Station Number	Location	Exposure (Gross MR)	Exposure (Net MR)	Exposure Rate (Micro R/hr)
1	Background	59	59	-
2	NSC Fence Northwest	88	29	3.1
3	NSC Fence West	103	44	4.7
4	NSC Fence North	107	48	5.1
5	NSC Fence East	86	27	2.9
6	Radioactive Waste Storage Building	535	476	51.3
7	100 Meters East of NSC Boundary	63	4	0.4
*8	NSC Fence South in Line With Hyperbaric Lab	38	7	1.4
*9	NSC Fence South in Line With Living Quarters	35	4	0.8

*Measurements begun on July 5, 1979 with the establishment of temporary living quarters for the hyperbaric lab night watchman located approximately 25 meters south of the NSC south boundary fence.

RADIATION AND CONTAMINATION CONTROL PROGRAM

Introduction

The detection and elimination of radiation hazards is an integral part of the Radiation Safety Program at the Nuclear Science Center. The radiation and smear survey programs contribute to the control and elimination of these health hazards. This program is effective in preventing the spread of radioactive contamination, improper storage of radioactive materials, and unwarranted exposures to radiation.

Radiation Survey

The Nuclear Science Center uses an area radiation monitoring system consisting of nine (9) detector channels located throughout the Reactor and Laboratory Buildings. This system is equipped with alarm settings and remote readouts in the control and reception rooms. Radiation levels and operational checks are recorded on a daily basis. This system functions as a radiation safety monitor for the early detection of impending radiation hazards. The Nuclear Science Center Facilities and site boundaries are surveyed monthly with beta-gamma sensitive instruments. These measurements are taken to determine proper storage and identification of radioactive materials and that visitor and routine work areas are free of radiation hazards. Additionally, radiation monitoring support is provided for the reactor operations and experimenter groups to insure the safe handling of radioactive materials and control of personnel exposures. There were no unexpected radiation levels or improper storage of radioactive materials detected during 1979. These surveys revealed only background radiations at the site perimeter fence.

Contamination Survey

The Nuclear Science Center is routinely surveyed for radioactive contamination every week. This program includes the collection, analysis and evaluation of approximately 250 smear samples and the decontamination of areas and stored materials with removable beta-gamma radioactivities of greater than 300 dpm/100 cm². This program was effective in the elimination of contaminated areas and ascertaining that visitor and personnel traffic patterns were free of radioactive contamination.

PERSONNEL EXPOSURES

Radiation exposures to personnel at the Nuclear Science Center for 1979 were within the limits of 10CFR20. The maximum exposure received by an individual for the year was 1060 mrem. It is expected that this value will be reduced to less than 500 mrem for the next reporting period by revising certain procedures. A total of 5.610 MANREM was received for 1979. More important, the exposures reflect an extended effort by all personnel to minimize and eliminate radiation exposures whenever practicable. These exposure data becomes more significant when one considers that in addition to routine reactor operations, over 11,000 samples containing 1050 curies of radioactivity were produced and processed at the Nuclear Science Center in 1979.

The whole-body exposure data for NSC employees and experimental personnel are presented in Table 20. These data are presented in graded divisions as required under 10CFR20.202(a).

The access control procedures for visiting personnel were effective in preventing exposure to radiation. There were 4,029 visitors to the Nuclear Science Center during 1979. The maximum exposure to any visitor was less than the minimum measurable quantities. These values are 10 millirems for X or gamma, 40 millirems for hard Beta, 20 millirems for fast neutrons and 10 millirems for thermal neutron radiations.

TABLE 20
PERSONNEL WHOLE-BODY EXPOSURES
1979

Annual Whole-Body Dose Ranges (Rems)	Number of Individuals in Each Range
No Measurable Exposure	9
Less than 0.100	30
0.100 - 0.249	4
0.250 - 0.499	2
0.500 - 0.749	4
0.750 - 1.990	0
1.000 - 2.000	1
Greater than 2.000	0

Total Number of Individuals Reported: 50

If you applied prior to 1980 (i.e. for admission to the entering class of 1979 or earlier) your file has been permanently inactivated. This means that you will need to solicit new evaluations from your instructors.

In summary, evaluations can be used only for two consecutive application years.

C. Having Evaluations Sent

Since you won't be applying until after June 1st at the earliest it is strongly suggested that you follow the procedures described below:

1. Apply to all the dental schools as soon as they will accept applications (See Section III).
2. Send the completed yellow REQUEST TO SEND EVALUATIONS form (attached) to the Premedical-Predental Advisory Committee listing all the schools to which you have applied and to which evaluations are to be sent.

NOTE

You should make every effort to have all your evaluations submitted and on file before the end of summer and mailed off to the dental schools before the end of September. Most dental schools will not invite applicants for interviews until they have received the evaluations. Late mailings of evaluations, like applications, do not work in your favor!

Do not send the form to the committee until AFTER you are certain all evaluations have been received and you have filed all your applications. You may check to see whether all your evaluations are in by visiting, telephoning or writing the Premedical-Predental Advisory Committee office (the telephone number and address are on the front page of this handout). Any "Request to send Evaluation" forms received by the office before all evaluations are on file will be returned to the applicant.

VII. TRANSCRIPTS

A. Where to Send Them

Transcripts should be ordered from the Registrar of EACH college or university you have attended. Official transcripts (i.e., with the Registrar's signature or the seal of the school affixed) are required by:

- UT-System Medical and Dental Application Center
- Baylor College of Dentistry
- Out-of-State dental schools not participating in AADSAS

AADSAS will accept unofficial transcripts, but the individual schools will require an official transcript at some time prior to final acceptance. Check AADSAS application for instructions. Some schools require official transcripts to be sent to them directly at the time of application.

B. Supplemental Transcripts

At the end of the SUMMER, if you attended summer school, request the Registrar to send an official transcript to:

- UT-System Medical and Dental Application Center
- Baylor College of Dentistry
- Out-of-State dental schools not participating in AADSAS
- AADSAS-participating schools which have requested an official transcript

At the end of the FALL semester, request the registrar to send an official transcript showing your fall course work to ALL OF THE ABOVE if your application is still being considered.

C. How GPAs are computed

Your GPA must be calculated according to each school's instructions, which may differ. In general, your GPA is computed on the basis of work done at all colleges and universities attended in the following ways: cumulative (overall), science, and by semester.

VIII. PERSONAL NARRATIVE

In considering applications for admissions to dental schools admissions committees use a wide variety of information. An important component is related to such factors as motivation, attitudes, interest and values. Each application has a blank space which has simple instructions such as "This space may be used in any way you wish." In addition to the above-mentioned factors the dental schools would like to know whether or not the applicant has explored the realities of dentistry as well as some indication of the amount of health or service related experiences that indicate interest and knowledge of dentistry and an ability to work and communicate with others.

This narrative should be written in a logical, coherent manner indicative of a mature individual with appropriate judgement. A narrative that is personal, has substance and reveals the author as sincere and realistic is much more impressive to admissions committees than one which is poorly written with loose, inappropriate or repetitious and trite statements. In this regard applicants would be well advised to neatly type their responses when filling out their applications. By all means don't leave this space blank - write something!

IX. INTERVIEWS

Both the UT Dental Branch at Houston and the UT Dental School at San Antonio interview competitive applicants as part of the admissions process.

Baylor College of Dentistry interviews all students who are accepted. Only the most competitive students are interviewed.

Out-of-state schools' policies to interviews vary widely, with some schools requiring a personal interview, some making it an option for either the applicant of the admissions committee, and others granting no interviews at all.