Nuclear Reactor Laboratory
University of Wisconsin-Madison

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License R-74
Docket 50-156

August 23, 2007

U. S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, D. C. 20555

Dear Sir:

Enclosed is a copy of the 2006-2007 Annual Report for the University of Wisconsin Nuclear Reactor Laboratory as required by our Technical Specifications.

Sincerely,

Robert J. Agasie
Reactor Director

Enc. (Annual Report)

cc: Region III Administrator
Compliance Inspector, Craig Bassett
Facility Project Manager, Daniel Hughes
Reactor Safety Committee, RSC 935

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NRR

THE UNIVERSITY OF WISCONSIN
NUCLEAR REACTOR LABORATORY

FISCAL YEAR 2006-2007 ANNUAL OPERATING REPORT

Prepared to meet reporting requirements of:
U. S. Department of Energy
SPECIAL MASTER TASK RESEARCH SUBCONTRACT NO. C96-175937
and
U. S. Nuclear Regulatory Commission
(Docket 50-156, License R-74)

Prepared by:

Robert J. Agasie
Department of Engineering Physics

EXECUTIVE SUMMARY OF REACTOR UTILIZATION

Teaching: Teaching usage of the reactor during the year included:

- 113 Nuclear Engineering students in laboratory and lecture courses.
- 48 students and staff from other UW-Madison departments used the facilities for formal instruction.
- 60 students and staff from 6 additional college-level educational organizations used the facilities for formal instruction.
- 352 students and instructors from 5 non-college level educational organizations used the facilities for formal instruction as part of the UW Nuclear Reactor Outreach Program.

Research: Neutron irradiations during the year included:

- 588 samples irradiated for departments at UW-Madison.
- 228.1 hours of neutron beam time were attributed to the study of neutron radiolysis in water at supercritical pressures and temperatures.

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A. SUMMARY OF OPERATIONS

1. INSTRUCTIONAL USE -- UW-Madison Classes and Activities

Nuclear Engineering & Engineering Physics (NEEP) 231, "Survey of Nuclear Engineering" was offered in the spring semester with an enrollment of 34 students. The course is designed for freshmen students interested in nuclear engineering and consists of three lecture modules surveying fission, fusion and radiation science technologies. The fission module concludes with a reactor tour.

NEEP 427 was offered in the fall and spring semesters with a total enrollment of 48 students. Several NEEP 427 experiments use materials that are activated in the reactor. One experiment entitled "Radiation Survey" requires that students make measurements of radiation levels in and around the reactor laboratory.

Thirty-one students were enrolled in NEEP 428 which was offered in the fall and spring semesters. Three experiments in NEEP 428 require exclusive use of the reactor. These experiments ("Critical Experiment", "Control Element Calibration", and "Pulsing") required a total of 18 hours of exclusive reactor use. Other NEEP 428 laboratory sessions use material that has been irradiated in the reactor ("Fast Neutron Flux Measurements by Threshold Foil Techniques" and "Resonance Absorption").

Individual class sessions for Civil and Environmental Engineering 809 and Engineering Physics 468 were held in the Reactor Laboratory, with 35 students participating.

The Reactor Laboratory's continued commitment to its educational outreach program attracts large numbers of community organizations who visit the reactor. A listing of individual schools and educational programs who have visited is provided below in section A.2 of this report.

2. REACTOR SHARING PROGRAM

The University of Wisconsin Nuclear Reactor was again funded this year by the U.S. Department of Energy, Office of Nuclear Energy, Science and Technology to offer reactor services in accordance with the University Reactor Sharing Program. The purpose of the program is to make available university nuclear reactor facilities to non-reactor owning colleges, universities, and other educational institutions. User groups affiliated with the host institution (UW-Madison) are also eligible for assistance, up to 35% of the awarded funds. This year, the Reactor Laboratory provided $43,091 of reactor services free of charge to the user institutions under the University Reactor Sharing Program; of which, $17,200 was reimbursed by the U.S. Department of Energy. User institutions participation in this year's program are detailed below.

Participating Institution	Principal Investigator	Number of Faculty/ Students Involved
Academy of Certified Hazardous Materials Managers	R. North	12/0
Reactor tour with a discussion on radioactive materials handling at a university research and test reactor.		
Beloit College	S. Ballou	1/0
Analyzed swipe tests to leak check radioactive sources and performed detector calibration.		
Institute of Electrical and Electronics Engineers	T. Allen	29/0
Engineering professional development program. Reactor tour with a discussion on applications of nuclear energy and uses of the UW nuclear reactor.		
Notre Dame Radiation Laboratory	D. Bartels	3/5
Neutron beam irradiation in supercritical water test loop to measure neutron and beta/gamma radiolysis rates in supercritical water.		

Participating Institution	Principal Investigator	Number of Faculty/ Students Involved

University of Illinois - Champaign-Urbana
B. Meline 0/5
Day long reactor operations demonstration and reactor physics measurements laboratory. Included real time demonstration of NAA capabilities.

University of Wisconsin - Madison
Department of Anthropology
R. Law 1/0
NAA to characterize fragments of steatite manufacturing debris excavated from the archaeological site of Harappa, Pakistan.

University of Wisconsin - Madison
Department of Engineering Physics
M. Swandby ½3
Reactor tour and demonstration of supercritical water test loop in support of graduate research recruitment program.

University of Wisconsin - Madison
Department of Engineering Physics
T. Allen 2/31
Production of various activation foils as gamma emitting sources for the Instrumentation Laboratory.

University of Wisconsin - Madison
Department of Engineering Physics
J. Blanchard 1/6
Safety training lecture provided to an introduction to engineering research seminar.

University of Wisconsin - Madison
Department of Engineering Physics
P. Wilson 1/1
Irradiation of activation foils for measuring the spacial flux distribution of beam ports number 1 and 2.

University of Wisconsin - Madison
Department of Engineering Professional Development
D. Woolston 1/10
Reactor tour with a discussion on applications of nuclear energy, uses of the UW nuclear reactor and opportunities in nuclear science and engineering.

Participating Institution	Principal Investigator	Number of Faculty/ Students Involved

University of Wisconsin - Madison
Ion Beam Laboratory
D. Whyte 1/1
Calibration equipment services provided to the Ion Beam Laboratory.

University of Wisconsin - Madison
Department of Anthropology
I. Druc 1/0
NAA to characterize fragments of ceramic pottery.

University of Wisconsin - Madison
Department of Civil & Environmental Engineering
R. Shaten 1/11
Reactor tour and energy discussion as part of CEE 809, Energy, Society and the Environment.

University of Wisconsin - Madison
Department of Engineering Physics
M. Swandby 1/11
Reactor tour and demonstration of supercritical water test loop in support of graduate research recruitment program.

University of Wisconsin - Madison
Department of Engineering Physics
T. Allen 4/77
Production of various activation foils as gamma emitting sources for the Instrumentation Laboratory.

University of Wisconsin - Madison
Department of Engineering Physics
J. Blanchard ¼
Safety training lecture provided to an introduction to engineering research seminar.

University of Wisconsin - Madison
Department of Engineering Physics
G. Kulcinski 1/8
Analyzed swipe tests to leak check radioactive sources.

Participating Institution	Principal Investigator	Number of Faculty/ Students Involved

University of Wisconsin - Madison
Department of Engineering Physics
M. Anderson 1/1
Developed dosimetry technique to measure gamma dose in a mixed spectrum containing neutron radiation using methyl viologen.

University of Wisconsin - Madison
Department of Engineering Physics
J. Murphy 1/34
Reactor tour and lecture as part of the Introduction to Nuclear Engineering course.

University of Wisconsin - Madison
Department of Engineering Physics
C. Dickerson 1/1
Analysis of proton activated ceramics at the Ion Beam Laboratory using reactor high purity germanium detectors.

University of Wisconsin - Madison
Department of Environmental Health & Safety
A. Ben-Zikri 1/0
Performed detector calibration services.

University of Wisconsin - Madison
Police Department
J. Jansen 1/0
Performed detector calibrations for 16 Canberra Radiacs.

University of Wisconsin - Whitewater
S. Sayhun 1/0
Analyzed swipe tests to leak check radioactive sources and performed detector calibration.

Wisconsin National Guard's
54th Weapons of Mass Destruction Civil Support Team
T. Donovan 12/0
Facility orientation and demonstration in emergency response techniques.

Non-College Groups:

Participating Institution	Number Instructor/Students Involved

Boy Scouts of America 3/299

Reactor tour with a discussion on applications of nuclear energy and uses of the UW nuclear reactor. Program included hands on demonstrations of radiation detection and shielding.

Capitol Science & Engineering Fair 1/13

Reactor tour with a discussion on applications of nuclear energy and uses of the UW nuclear reactor.

LaFollette High School 2/19

Advanced Science and Engineering Class. Reactor tour with a discussion on applications of nuclear energy and uses of the UW nuclear reactor. Provided real time gamma spectroscopy activation analysis laboratory demonstration.

McFarland High School 1/5

Advanced Science and Engineering Class. Reactor tour with a discussion on applications of nuclear energy and uses of the UW nuclear reactor. Provided real time gamma spectroscopy activation analysis laboratory demonstration.

Montessori Middle School 1/8

Advanced Science and Engineering Class. Reactor tour with a discussion on applications of nuclear energy and uses of the UW nuclear reactor. Provided real time gamma spectroscopy activation analysis laboratory demonstration.

USER SUMMARY:

Educational Institutions:	13
Students:	593
Faculty/Instructors:	88

3. SAMPLE IRRADIATIONS AND NEUTRON ACTIVATION ANALYSIS SERVICES

There were 588 individual samples irradiated during the year. Of these samples, 207 were irradiated for 15 minutes or less. Samples accumulated 128.5 irradiation space hours and 398.0 sample hours. Many samples were irradiated and then counted at the Reactor Laboratory as part of our neutron activation analysis program. In the listing below the notation (NAA) indicates that the samples were processed by our neutron activation analysis program.

Engineering Physics Department, UW-Madison
UW Nuclear Reactor Laboratory
19 samples, 6.95 sample hours
Production of calibration sources for required reactor measurements and development of methods for instrumental neutron activation analysis.

Engineering Physics Department, UW-Madison
Graduate Research Project
74 samples, 17.0 sample hours
Irradiation of methyl viologen (MV+2) mixed with sodium formate (NaCOOH) for measuring neutron/gamma mixed spectrum dosimetry.

Engineering Physics Department, UW-Madison
Instrumentation Laboratory
131 samples, 122 sample hours
Irradiation of foil sources for radiation detector experiments, including absolute counting for neutron flux measurements and activation of samples for neutron activation analysis experiment.

Engineering Physics Department, UW-Madison
NE 428
52 samples, 54.9 sample hours
Irradiation of foils for resonance absorption measurements and fast neutron flux measurements.

Department of Medical Physics, UW-Madison
5 samples, 4.15 sample hours
Irradiation of copper containing microspheres for PET tracers in medical physics applications.

Department of Soil Sciences, UW-Madison (NAA)

235 samples, 117.5 sample hours

Professor P. Helmke used NAA to determine Fe, K/Na ratios, and trace element concentrations of samples from a soil-stoneline-ironstone complex in Uganda. This information determines the degree and type of weathering, geochemistry and hydrology which control formation of these types of complexes throughout much of the tropics.

Department of Anthropology, UW-Madison (NAA)

72 samples, 75.6 sample hours

Dr. I. Druc used NAA to characterize fragments of pottery manufacturing debris excavated from archaeological sites.

4. OTHER MAJOR EDUCATIONAL AND RESEARCH USE

The reactor laboratory is continuing collaboration with Argonne National Laboratory and the Notre Dame Radiation Laboratory on the study of neutron radiolysis in water at supercritical pressures and temperatures. The supercritical water loop experiment has been used to determine radiolytic yields as a function of temperature and pressure. Aqueous electron yields have been measured at 248 bar from 25° to 400° C and at 380° and 400° C as a function of pressure. The hydrogen radical has been measured at 248 bar from 25° to 350° C. Critical hydrogen concentration behavior could not be investigated because of a lack of oxygen signals at the outlet of the apparatus. Future experiments are planned to determine the total radical yield as a function of pressure at 380° C and 400° C.

The Reactor Laboratory embarked on a novel research project to conduct neutron/gamma mixed spectrum dosimetry using low temperature radiolysis. A new simple inexpensive optical means to accurately measure neutron and gamma dose was developed and used as an instructional tool. The basis of the system makes use of radiolysis of distilled deoxygenated water at low temperature. The dosimetry technique makes use of a mixture of methyl viologen (MV+2) mixed with sodium formate (NaCOOH) and distilled deoxygenated 18 MΩ/cm water. When this non-toxic sample (mainly water) solution is subjected to a radiation field, aqueous electrons are formed that react with the small quantity of clear MV+2 to form a stable solution of blue MV+. In other words, this technique results in turning a clear solution blue when placed in a radiation field. To obtain quantitative information on the dose received, the absorption spectrum of the solution is

measured with a spectrophotometer. This determines the concentration of MV+ by a standard optical absorption technique. (The optical density or the amount of blue light absorbed is proportional to the dose received by the solution). It is possible to separate the neutron dose contribution from the gamma contribution using the activation of the Na atoms in the sodium formate. This activation is counted to infer the neutron absorbed dose. Once the neutron contribution is measured it can be subtracted from the total to give the gamma dose.

During July 2006, the Reactor Laboratory again participated in the Nuclear Science Summer Seminar high school enrichment program which is a joint effort between the University of Wisconsin Nuclear Reactor and Evansville, WI, High School. The program was two, week long seminars on nuclear science. Twelve junior and senior, high school advance physics and chemistry, students and 5 high school teachers visited the Reactor. Each seminar runs five days with lectures and laboratory sessions. Topics included review of atomic and nuclear structure, radioactivity, and shielding. Laboratory sessions included use of Geiger-Müeller and scintillation counters to experimentally investigate lectured topics. The final day was dedicated to lecture and demonstration of nuclear reactor physics utilizing the UW Nuclear Reactor.

In the fall of 2006, the Reactor Laboratory hosted a series of day long workshops entitled "Nuclear Physics in the Science Curriculum: A Primer for Middle and High School Teachers". The workshops were attended by 65 middle and high school math and science teachers. Each workshop consisted of three major sessions. One session was a demonstration of the reactor which included teachers getting "hands on" experience operating the reactor. Another session presented applications of nuclear energy and discussed career opportunities in these field. The third session presented information on radiation including a "hands on" demonstration and laboratory exercise on the use of Geiger Mueller counters in detecting ionizing radiation and demonstrating material shielding properties.

5. CHANGES IN PERSONNEL, FACILITY AND PROCEDURES

Any changes reportable under 10 CFR 50.59 are indicated in section E of this report. No other changes to the facility were completed during the year.

Personnel changes during the year were as follows:

The following reactor operators were removed from licensed status upon graduating or retiring and resigning their position with the university:

Scott A. Luchau	OP-70419	Effective 07/18/06
Benjamin J. Schmitt	OP-70420	Effective 09/27/06
Richard J. Cashwell	SOP-301-15	Effective 09/27/06
Eric J. Edwards	OP-70304	Effective 06/11/07

Steven Oliva was appointed to the Reactor Safety Committee upon the resignation of Paul Probert from the Reactor Safety Committee effective July 18, 2006.

Cynthia Stiles was appointed to the Reactor Safety Committee upon the retirement of Reactor Safety Committee Member Philip Helmke effective December 18, 2006

6. RESULTS OF SURVEILLANCE TESTS AND INSPECTIONS

The program of inspection and testing of reactor components continues, satisfactorily meeting procedural acceptance criteria. Inspection of underwater components during the annual maintenance showed no deterioration or wear.

The pool leak surveillance program continues to monitor the pool evaporation rate, the pool make-up volume, and pool water radioactivity. The pool leak surveillance program continues to show that no water effluent has been released to the environment.

B. OPERATING STATISTICS AND FUEL EXPOSURE

Operating Period	Critical Hrs	MW Hrs	Runs	Pulses
Fiscal Year 2006-2007	362.54	242.96	89	48
FLIP Core	17,596.47	14,601.82	5,116	1,098
TRIGA	24,861.46	19,590.00	7,106	2,409

Core I23-R10 was operated throughout the year. The excess reactivity of this core was determined to be 4.225%ρ.

C. EMERGENCY SHUTDOWNS AND INADVERTENT SCRAMS

There were three automatic scrams or unintentional shutdowns during the year. Each is described below in chronological sequence.

October 21, 2006; SCRAM from picoammeter number 1. Following a rod bump rising period control element calibration sequence the operator was reducing power to approximately 1 W to repeat the procedure. The operator inadvertently down ranged the picoammeter too soon. As a result, a reactor scram from a neutron high flux trip at 125% on the lower range occurred.

November 2, 2006; SCRAM from picoammeter number 1. Following a rod bump rising period control element calibration sequence, an other operator was reducing power to approximately 1 W to repeat the procedure. This operator inadvertently down ranged the picoammeter too soon. As a result, a reactor scram from a neutron high flux trip at 125% on the lower range occurred.

March 1, 2007; During full power operations a reactor SCRAM occurred with no apparent initiating trip condition. The investigation of the SCRAM relay circuit revealed that one of the two redundant SCRAM relays had failed open. The relay was replaced with an identical spare.

D. MAINTENANCE

The Preventive Maintenance Program continues to maintain equipment and systems in good condition.

Corrective maintenance was performed on the following systems:

The area radiation monitoring (ARM) system experienced several malfunctions as a result of aging equipment. In July 2006, relay 5K2, an open air contact relay, was replaced with an enclosed KRP-11A relay. The ARMs provide the latching current to the relay which actuates the annunciator and external alarm panel. Troubleshooting of earlier spurious alarms determined 5K2 was failing. In December 2006, Beam Port #2 ARM GM tube went into continuous discharge, thereby reading upscale high. The GM tube was replaced. In June 2007, Beam Port #1 ARM experienced spurious alarms as a result of short in the internal OEM K2 relay. The relay was replaced with an Omron 12VDC relay.

On October 19, 2006, the Mechanical Engineering Building suffered from a loss of building air. As a result the air operated valves for the reactor water clean-up system failed closed and isolated the reactor water clean-up system pump. The pump ran dead-head for approximately 4 hours until the water temperature heated the inlet PVC pipe to the point of melting. The inlet pipe failed and drained approximately 500 gallons of reactor pool water to the reactor water clean-up system sump. The inlet piping was repaired and the system returned to service.

In February 2007, the nitrogen-16 suppression system pump motor experienced spurious circuit breaker trips. As a result, the motor starter heater element was adjusted for 3.2 amperes. The rated motor current is 3.4 amperes.

E. CHANGES IN THE FACILITY OR PROCEDURES REPORTABLE UNDER 10 CFR 50.59

There were no changes in the facility or procedures reportable pursuant to 10 CFR 50.59 completed during the year.

F. RADIOACTIVE WASTE DISPOSAL

1. SOLID WASTE

No solid waste was transferred from the facility during the year.

2. LIQUID WASTE RELEASED TO THE SANITARY SEWER

Liquid waste discharges from the facility during the year are detailed in Table 1.

3. PARTICULATE AND GASEOUS ACTIVITY RELEASED TO THE ATMOSPHERE

Table 2 presents information on stack discharges during the year.

4. LIQUID ACTIVITY RELEASED TO THE ENVIRONMENT

No liquid activity was released to the environment during the year.

G. SUMMARY OF RADIATION EXPOSURE OF PERSONNEL (01/01/06 - 12/31/06)

The personnel radiation monitoring program at the University of Wisconsin for the past calendar year used Global Dosimetry brand TLD monitors for whole body exposure while extremity dose was monitored using TLD ring badges processed by the University of Wisconsin Radiation Calibration Laboratory. No personnel received any significant radiation exposure for the above period. The highest annual doses recorded were 61 mrem to the whole body and 294 mrem to the extremities.

The highest dose received by a member of the public visiting the reactor lab was 2.1 mrem, as measured by Siemens brand Electronic Personal Dosimeters.

Monthly radiation surveys continue to demonstrate acceptable radiation dose rates within the reactor laboratory and no contamination.

H. RESULTS OF ENVIRONMENTAL SURVEYS (01/15/06 - 01/14/07)

The environmental monitoring program at the University of Wisconsin uses Landauer Luxel brand area monitors located in areas surrounding the reactor laboratory. Table 3 indicates the dose a person would have received if continuously present in the indicated area for the entire 2006 calendar year.

I. PUBLICATIONS

The following are theses, publications and presentations based on reactor use:

Anderson, M. (February 2007). Nuclear systems Research at the University of Wisconsin. Pennsylvania State University, State College, PA.

Anderson, M. (March 2007). SCW Research at the University of Wisconsin. The 3rd International Symposium on Supercritical Water Cooled reactor design and Technology, Shanghai Jiao Tong University.

Edwards, E.J., Wilson, P.P.H., Anderson, M., Bartels, D. (2006). Radiation chemistry results from the supercritical water loop at UW-Madison. *Transactions of the American Nuclear Society*, v 95, pp 939-940.

Edwards, E.J., Wilson, P.P.H., Anderson, M.H., Mezyk, S.P., Bartels, D., Pimblottt S. (2007). An apparatus for the study of high temperature water radiolysis in a nuclear reactor: Calibration of dose in a mixed neutron/gamma field. *Radiation Science*, (Submitted)

Edwards, E.J. (2007). Determination of Pure Neutron Radiolysis Yields for use in Chemical Modeling of Supercritical Water. University of Wisconsin Thesis (Ph.D.), Madison, WI.

Schmitt, B.J. (2006). Accounting for core burnup in reactor analysis of the University of Wisconsin nuclear reactor. University of Wisconsin Thesis (M.S.), Madison WI.

Selwyn, R.G. (2007). Image-based Dosimetry for Selective Internal Radiation Therapy (SIRT) using Y-90 Microspheres. University of Wisconsin Thesis (M.S.), Madison WI.

Setter, T., Anderson, M., Wilson, P.P.H., Bartels, D. (2007). Development of a gamma dosimeter for mixed-field radiation using radiolysis. *Transactions of the American Nuclear Socity*, v 96.

Setter, T., Anderson, M., Wilson, P.P.H., Bartels, D. (2007). Development of a Gamma Dosimeter for Mixed-Field Radiation Using Radiolysis. American Nuclear Society Annual meeting, Boston, MA.

Staum, C.J. (2006). Characterization of gamma radiation fields at the University of Wisconsin nuclear reactor. University of Wisconsin Thesis (M.S.), Madison WI.

Humrickhouse, P.W., Wilson, P.P.H. (2006). Validating a Monte Carlo Model of the University of Wisconsin Nuclear Reactor with Operational Data. *Nuclear Technology*, v. 155 (2) p 166.

TABLE 1
LIQUID RADIOACTIVE WASTE DISCHARGED TO SEWER

Release Date:	11/02/2006	01/11/2007	02/27/2007	05/22/2007	
Gallons Released:	1340	1000	950	800	
Total µCi:	4.77	31.66	85.07	43.22	
Sum of Fraction of MPC w/o dilution:	0.0188	0.1273	0.2885	0.1654	
Sum of Fraction of MPC w/ daily dilution:	0.0010	0.0052	0.0111	0.0054	
Isotope	MPC (µCi/ml)	Released	Released	Released	Released	
Co-58	2.00E-4	-	-	9.420	4.850	µCi
		-	-	2.62E-6	1.60E-6	µCi/ml
		-	-	0.0131	0.0080	Fraction of MPC
Co-60	3.00E-05	-	0.9539	2.416	1.753	µCi
		-	2.52E-7	6.72E-7	5.79E-7	µCi/ml
		-	0.0084	0.0224	0.0193	Fraction of MPC
Cr-51	5.00E-3	-	11.52	15.80	10.02	µCi
		-	3.04E-6	4.40E-6	3.31E-6	µCi/ml
		-	0.0006	0.0009	0.0006	Fraction of MPC
Mn-54	3.00E-4	-	-	14.52	-	µCi
		-	-	4.04E-6	-	µCi/ml
		-	-	0.0135	-	Fraction of MPC
Ru-106	3.00E-05	-	4.785	-	-	µCi
		-	1.26E-6	-	-	µCi/ml
		-	0.0421	-	-	Fraction of MPC
Zn-65	5.00E-05	4.773	14.41	42.91	19.64	µCi
		9.41E-7	3.81E-6	1.19E-5	6.49E-6	µCi/ml
		0.0188	0.0761	0.2387	0.1297	Fraction of MPC

Total volume of water released to the sanitary sewer (gallons)	=	4090
Total quantity of radioactive material released to the sanitary sewer (µCi)	=	164.7
Average daily sewage flow for dilution (gallons)	=	2.37E+04
Maximum fraction of MONTHLY release limit with DAILY dilution	=	0.0111
Maximum fraction of MONTHLY release limit with MONTHLY dilution	=	0.0007

TABLE 2
EFFLUENT FROM STACK

1. Particulate Activity

There was no discharge of particulate activity above background levels.

2. Gaseous Activity - All Argon-41

Month	Activity Discharged (Curies)	Maximum Concentration µCi/ml x 1E-6	Average Concentration µCi/ml x 1E-6
July 2006	0.001	0.47	0.0006
August	0	0	0
September	0	0	0
October	0.200	0.50	0.0160
November	0.440	0.56	0.0260
December	0.430	0.47	0.0250
January 2007	0.014	0.39	0.0008
February	0.470	0.50	0.0300
March	0.290	0.62	0.0170
April	0.170	0.53	0.0100
May	0.413	0.48	0.0240
June	0	0	0
	Total	Maximum	Average
	2.428	0.62	0.0124

Using Gifford's model, as described in the appendix to the "Safety Analysis Report for the University of Wisconsin Nuclear Reactor", a concentration of 8E-6 µCi/ml at the stack discharge would result in a maximum air concentration of 1E-8 µCi/ml at any point downwind.

TABLE 3
ANNUAL DOSE DATA -- Environmental Monitors
(01/15/06 - 01/14/07)

Location	Annual Dose mrem
Highest Dose Inside Reactor Laboratory	225.0
Dose Inside Reactor Laboratory Stack	9.0
Highest Dose Outside Reactor Laboratory (Fume hood exhaust located in Reactor auxiliary support space)	101.0
Highest Dose in Occupied* Non-restricted Area (4th floor south hallway of Mechanical Engineering Building)	18.0
Average Dose in all Non-restricted Areas (28 Monitor Points)	14.3

*Occupied areas include classrooms, offices, and lobbies/meeting areas where an individual might reasonably spend in excess of 2 hours per day.