50-288

REED COLLEGE *Portland, Oregon 97202*

REACTOR FACILITY

October 15, 2001

Document Control Desk
US Nuclear Regulatory Commission
Washington, DC 20555

Enclosed is Reed College Reactor's Annual Report for September 1, 2000 to August 31, 2001.

This has been another exciting year. We continue to make progress on many of our long term projects. Details are shown in the report.

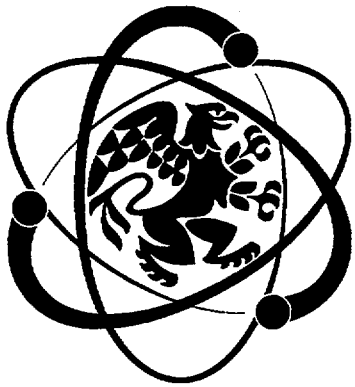
Please feel free to contact me for additional information.

Regards,

Stephen G. Frantz
Director, Reed College Reactor

A020

REED REACTOR FACILITY



ANNUAL REPORT

September 1, 2000 -- August 31, 2001

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Stephen G. Frantz
Director, Reed Reactor Facility
Program Director, Nuclear Science
Consortium of the Willamette Valley

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OVERVIEW

This report covers the period from September 1, 2000 to August 31, 2001, and is intended to fulfill the reporting requirements of the U.S. Nuclear Regulatory Commission, the U.S. Department of Energy, and the Oregon Department of Energy including:

- U. S. Nuclear Regulatory Commission, License No. R-112 (Docket 50-228)
- Oregon Office of Energy Rule No. 345-030-010
- U. S. Department of Energy Grant No. DE-PS07-00ID13865
- U. S. Department of Energy Grant No. DE-FG03-96NE38158

We wish to thank other funding sources and grants including Portland General Electric, Precision Cast Parts Corporation, Pacific Northwest National Laboratory, and John Swanson.

The reactor is a Triga Mark I reactor with zirconium hydride / uranium hydride fuel elements in a circular grid array at the bottom of a 25-foot-deep tank of water and is surrounded by a graphite reflector. The fuel is enriched to 19.9% in uranium-235.

The Reed College Reactor Facility has been a resource for research and educational projects in the Portland area since its establishment in 1968. The main uses of the Reed Reactor Facility are instruction and research, especially trace-element analysis. In addition to providing student research opportunities, the reactor staff works to educate the surrounding community on the principles of nuclear energy and radiation safety.

There were over 1,500 individual visits to the Reactor Facility during the year. Most were students in classes at Reed College or area universities, colleges, and high schools. Including tours and research conducted at the facility, the Reed Reactor Facility contributed to the educational programs of 15 colleges and universities in addition to 46 pre-college groups. Most of the reactor use by non-Reed personnel was conducted under the auspices of the Nuclear Science Consortium of the Willamette Valley, supported by a grant from the U.S. Department of Energy through the Reactor Sharing Program.

The reactor was operated 245 times on 127 days. The thermal energy produced was 34.5 megawatt-hours.

The reactor staff consisted of a Director, an Associate Director, a contract Health Physicist, and approximately 25 Reed College undergraduate students licensed by the Nuclear Regulatory Commission as reactor operators or senior reactor operators. There were no radiation exposures to individuals in excess of 1% of the limit during the year. There were

no releases of liquid radioactive material from the facility and airborne releases were well within regulatory limits.

As this report was being finished, the facility experienced a small fuel leak. Procedures are in place for this and investigations are proceeding. This is not expected to have any long term effects on the facility or its mission.

PEOPLE

Facility Staff

During the period September 1, 2000 to August 31, 2001, the facility staff consisted of:

Reactor Director:	Stephen Frantz (4/94 – Present)
Associate Director:	Juliet Brosing (1/00 – 6/00) Eric Weis (6/00 – Present)
Reactor Supervisor:	Ryan Richter (8/00 – 5/01) Rachel Barnett (5/01-9/01)
Training Supervisor:	Eric Weis (8/00 – 5/01) Rachel Barnett (5/01-Present)
Radiation Safety Officer:	Kathleen Fisher (8/00 – Present)
Contract Health Physicist:	Marshall Parrott (8/91 – Present)

Senior Reactor Operators (SRO):	Jack Barnett	Stephen Frantz
	Rachel Barnett	Ryan Gaffney
	Jay Bodzin	Rudy Gilmore
	Mat Brener	Chris Hoefler
	Reid Burkland	Kater Murch
	Tim Cassidy	Ryan Richter
	Cilicia Dorn-Lopez	David Rosoff
	Joshua Filner	Eric Weis
	Nicki Ford	

Reactor Operators (RO):	Alexander Austin	Michael Perry
	Lily Cool	Joaquin Ramsey
	Ann Erickson	David Rubin
	Erin Freed	Seth Samuel
	Jesse Helm	Dan Spoth
	David Jordan	Benjamin Tombaugh
	Eric Lawrence	Nancy VanProoyen
	Kristina Lestik	Jon Young
	Megan Othus	

The list of operators includes everyone who held a license during the reporting period. ROs who upgrade their licenses to SRO during the reporting period are listed under SRO. All staff members were Reed College undergraduates except Mr. Frantz, Mr. Gaffney, Mr. Filner, Ms. Fisher, and Dr. Parrott.

Oversight Committees

The Reed Reactor Facility has two oversight committees: the Radiation Safety Committee and the Reactor Operations Committee. The Radiation Safety Committee is concerned with emergency preparedness, health physics, radiation safety, physical security, environmental impact, and the interface between the Reed Reactor Facility and the Reed College and the surrounding community. The Reactor Operations Committee deals with the day-to-day operations of the reactor, reactor maintenance, reactor safety, operator training, and requalification. The membership of the committees during the reporting period is shown below:

Radiation Safety Committee

Voting Members:

John Frewing (Chair) *(Oregon Independent College Foundation)*
Wayne Lei *(Environmental Director, Portland General Electric)*
Jack Mahoney *(Neighborhood Resident)*
Tom Meek *(Radiation Protection Manager, Trojan Nuclear Power Plant)*
Steve Reese *(Reactor Director, Oregon State University)*
Kathleen Fisher *(Reed Environmental and Safety Director)*

Ex Officio(without vote):

Peter Steinberger *(Dean of the Faculty, Reed College)*
Stephen Frantz *(Director, Reed Reactor Facility)*
Juliet Brosing *(Associate Director, Reed Reactor Facility)*
Marshall Parrott *(Contract Health Physicist)*
Ryan Richter *(Reactor Supervisor)*
Eric Weis *(Reactor Training Supervisor)*

Reactor Operations Committee

Voting Members:

Robert Reynolds (Chair) *(Physics Faculty, Reed College)*
Juliet Brosing *(Physics Faculty, Pacific University)*
Hyong Rhew *(Chinese Faculty, Reed College)*
Raymond Mayer *(Mathematics Faculty, Reed College)*
Josh Filner *(Medical Student, Oregon Health Science University)*

Ex Officio(without vote):

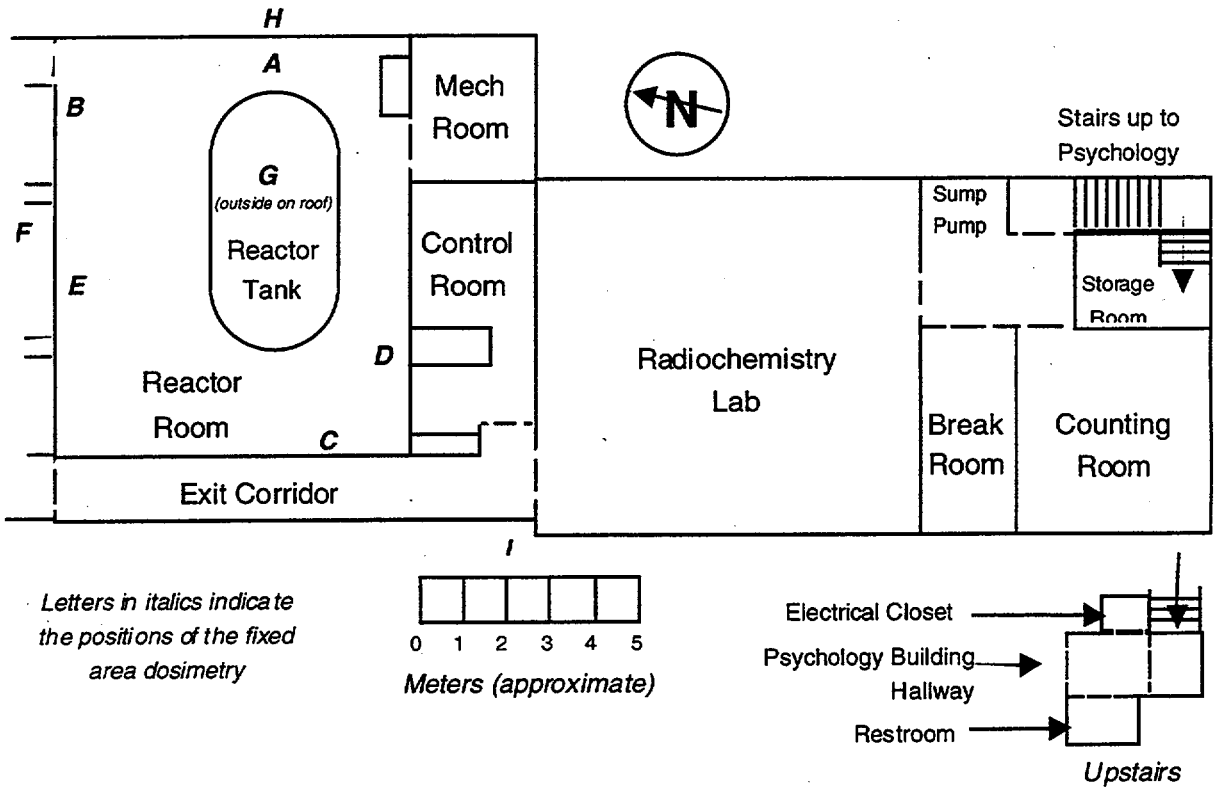
Peter Steinberger *(Dean of the Faculty, Reed College)*
Stephen Frantz *(Director, Reed Reactor Facility)*
Juliet Brosing *(Associate Director, Reed Reactor Facility)*
Marshall Parrott *(Contract Health Physicist)*
Ryan Richter *(Reactor Supervisor)*
Eric Weis *(Reactor Training Supervisor)*

FACILITIES

Reactor Facility Floor Plan

In addition to the reactor, the Reed Reactor Facility has associated space for a radiochemistry lab. A floor plan appears as Figure 1.

Figure 1 - Reed Reactor Facility Floor Plan



The equipment available at the reactor facility includes high purity germanium gamma spectrometers, X-ray florescence detector, surface barrier detectors, alpha spectrometers, silicon lithium X-ray detectors, a whole body counter, gas flow proportional counters, ion chambers, beta counters, geiger-müller tubes, neutron detectors, alpha detectors, and thermoluminescent dosimeter readers. The instruments are used for experiments and training in nuclear science and radiation detection. Two hand and shoe monitors are in the reactor bay. A liquid scintillation detector serves the campus radioisotope committee. The reactor facility has several systems for performing irradiations, described below.

Rotating Specimen Rack Facility

The rotating specimen rack ("lazy susan") is located in a well on top of the graphite reflector surrounding core. The rack consists of a circular array of 40 tubular receptacles; each of which can accommodate two irradiation tubes. Vials holding up to 17 ml (four drams) are used in this system. Samples are loaded in the specimen rack prior to the start-up of the reactor. The rack automatically rotates during irradiation to ensure each sample receives the same neutron flux. Typically, the rotating rack is used by researchers when

longer irradiation times (generally greater than five minutes) are required. The average thermal neutron flux in the rotating rack position at full power is approximately 1.7×10^{12} n/cm^{2}s with a cadmium ratio of 6. The specimen rack can be used for gamma irradiations (approximately 8 rad/min) when the reactor is shutdown.

Pneumatic Transfer System

The pneumatic transfer system ("rabbit") consists of an irradiation chamber in the outer E-ring of the core with its associated pump and piping. This allows samples to be transferred in and out of the reactor core very rapidly, while the reactor is at power.

Routine use of the pneumatic transfer system involves placing samples into vials, which in turn are placed in special capsules known as "rabbits." The capsule is loaded into the system in the laboratory next to the reactor and is then transferred pneumatically into the core-irradiation position. At the end of a predetermined time the sample is transferred back to the receiving terminal, where it is removed for measurement. The transfer time from the core to the terminal is about seven seconds, making this method of irradiating samples particularly useful for experiments involving radioisotopes with short half-lives. The flux in the core terminal is approximately 5×10^{12} n/cm^{2}s when the reactor is at full power.

In-Core Facilities

The central thimble is a water-filled irradiation chamber about 3 cm in diameter. It provides the highest available neutron flux, about 1×10^{13} n/cm^{2}s. Special sample holders are used in the central thimble to provide maximum flexibility in experiment design.

A source holder assembly can also be used. The chamber fits into a fuel-element position within the core itself. It holds only one specially positioned irradiation container 7.5 cm in length and 2.5 cm in diameter.

Foil-insertion holes, 0.8 cm in diameter, are drilled at various positions through the grid plates. These holes allow inserting special holders containing flux wires into the core, to obtain neutron flux maps of the core.

In-Pool Facilities

Near core, in-pool irradiation facilities can be arranged for larger samples. Neutron fluxes will be lower than in the lazy susan and will depend on the sample location.

Beam Facilities

The central thimble can be evacuated with gas, producing a vertical neutron beam. This beam can be used to generate directional neutron flux, or for limited irradiations above the tank. Neutron radiography is also possible. The flux above the beam exit is approximately 1×10^{3} n/cm^{2}s when the reactor is at full power.

USERS

Reactor Visitors

A total of 1,820 individuals visited the Reed Reactor Facility during the year, as derived from the visitors log - Entry List B. Individuals who visited more than once are counted for each visit. Visitors include all individuals who are not listed as facility staff. A large percentage of these were students in classes at area colleges and schools as discussed below. A monthly breakdown of the number of visitors is shown on Table A; a list is included as Appendix A.

Reactor Operations Seminar

The Reed Reactor Facility conducts an annual seminar series for students from Reed and other area educational institutions. This non-credit course serves as an introduction to nuclear reactor theory, health physics, and reactor operation. Some of the students continue with in-depth reactor operator training and subsequently apply for a reactor operator license. If successful, the individual may be hired to operate the reactor. In addition, existing reactor operators may take the NRC senior reactor operator exam to upgrade their licenses.

- During the reporting period, 8 out of 9 reactor operator candidates and 10 out of 10 senior reactor operator candidates passed the NRC exams.

Nuclear Science Consortium

In order to better use the resources of the Reed Reactor Facility, several area colleges and universities established the Nuclear Science Consortium of the Willamette Valley in 1970. Funding for the Consortium has been derived from Reactor Use Sharing Grants of the U.S. Department of Energy. This made the facility available without charge to classroom groups and unfunded research projects for consortium members.

The following institutions have participated in facility tours, experiments, and research projects in the reporting period.

COLLEGE TOURS/USERS

Concordia University
Lewis and Clark College
Linfield College
Linfield School of Nursing
Massachussets Institue of Technology
Ohio State University
Oregon State University
Pacific University
Portland Community College
Portland State University
Rocky Mountain College
University of Oregon
University of Southern California
University of California at Santa Cruz
Warner Pacific College

HIGH SCHOOL & MIDDLE SCHOOL TOURS/USERS

Arbor High School
Central Catholic High School
Cleveland High School
Connestoga Middle School
Creswell Middle School
Da Vinci Middle School
David Douglas High School
Estacada Junior High School
Franklin High School
Fremont High School
Hamilton High School
Hollywood High School
Hood River Valley High School
Hosford Middle School
Jesuit High School
Kennedy High School
Lincoln High School
Los Angeles High School Magnet
Math and Science Academy
Middle College High School
Millicoma Middle School
Morgistown Board School
Mt. Tabor Middle School
Newman School
Oregon City High School
Oregon Episcopal School
Philomanth High School
Rex Putnam High School
Roosevelt High School
Skyview High School
Southern Eugene High School
Southridge High School
St. Gregory College Prep
Sunset High School
Toledo Middle School
Walt Morey Middle School
Westview High School
Wilson High School

SPECIAL GROUPS

Advocates for Women in Science, Engineering, and Mathematics (AWSEM)
Apprenticeships in Science and Engineering
Bring Child to Work Day
Foshay Learning Center
Metro Learning Center
Portland Community College Engineering Club
Portland Public Schools - Talented And Gifted Students Program (TAG)
Saturday Academy

Many reactor tours include hands-on use of facility equipment to conduct experiments in radiation science, health physics, and nuclear physics. A typical lab involves determining the background of a geiger-müller scalar system and then determining the half-life of radioactive material. College classes are generally more closely tailored to the individual

interests and needs of the Consortium faculty member involved. Experiments include more direct use of the reactor itself by the students, more detailed analysis of materials, and emphasize the incorporation of other classroom activities as much as possible.

Several special programs for gifted children used the reactor. These are designed to enrich their educational program and prepare them for college. Some of the groups who use the reactor target minority and disadvantaged youth who are historically under-represented in science professions.

High School Student Projects

The Reed Reactor Facility continued to be used in independent science projects initiated by students from several Oregon high schools. Some of the projects included checking glazed cups leached by acidic foods to see if heavy metals lead out, checking for gold in fingernails based on wearing jewelry and dental fillings, accuracy and purity of herbal supplements, looking for micrometeorite showers, looking for radioactive particles in cigarette smoke , looking for pigments in ancient papyrus, trace elements in toy action figures,, trying to change the half-life of chlorine 38, looking for heavy metals in drinking water, looking for radioactivity in sediment samples in the Columbia River downstream of the Hanford reservation, checking if plants can remove metals from wetlands, determining why some plants grow better in some soils, inducing genetic damage in Euglena,.

Pacific University Modern Physics Lab

Each year the Modern Physics Lab at Pacific University spends lab sessions at the reactor. The students do several labs including basic health physics, sub-critical multiplication, and neutron activation analysis.

Concordia University

The reactor provides training and experiments involving radiation, radioactive material, environmental sampling, and trace element analysis for the Environmental Remediation & Hazardous Material Management Program (ERHMM) at Concordia University

Scaler Kits

Through the generosity of Portland General Electric, the reactor lends out suitcases containing a geiger counter, a scaler, and some small exempt sources to local high schools for their use in their program.

Reed Classes

- Chemistry 271 students conducted a lab using neutron activation analysis to determine chemical composition of an unknown.
- One senior unsuccessfully tried to develop a prompt gamma facility to look for lithium in superconductors as part of his thesis project.
- One senior used the reactor to check the elemental composition of a compound to check a synthesis process as part of his thesis project.

- One senior used the reactor to look for contamination in a compound as part of his thesis project.

Industrial and Commercial Applications

The Reed Reactor Facility is available for industrial or commercial concerns when it does not conflict with our educational goals. As in past, the primary operations involved neutron activation analysis of materials or environmental samples.

The facility also provides radiation protection training to interested parties and schools in the area.

REACTOR OPERATIONS

Operations

During the year the reactor was taken critical 267 times on 123 days. The total energy produced was 34.62 megawatt-hours. Operating history by month appear in Table A:

Table A - Operating History

	Times Critical	Days Operated	MW-hrs	Visitors
Sep.	21	10	0.50	84
Oct.	22	9	1.23	197
Nov.	23	12	2.61	179
Dec.	10	7	2.72	36
Jan.	24	14	3.29	172
Feb.	27	13	9.45	83
Mar.	31	14	3.91	261
Apr.	36	16	1.87	290
May	15	8	1.61	153
Jun.	9	7	0.46	150
Jul.	18	11	5.17	80
Aug.	9	6	1.70	135
Total	245	127	34.51	1820

Unplanned Reactor Shutdowns

There were 11 inadvertent reactor shutdowns (scrams) as shown in Table B; none were unexplained. The number of unplanned reactor shutdowns is consistent with past experience.

Table B - Unplanned Reactor Shutdowns

Date	Scram Type	Cause Of Scram
9/27/00	Period	Operator Error, trainee inattention
11/18/00	Period	Electrical transient
1/19/01	Linear Power	Operator Error, did not range correctly
3/8/01	Period	Operator Error, trainee inattention
3/13/01	Period	Operator Error, tourist inattention
3/28/01	Linear Power	Operator Error, trainee inattention
4/6/01	Percent Power	Operator Error, inattention
4/15/01	Percent Power	Operator Error, trainee inattention
4/26/01	Percent Power	Operator Error, inattention
7/9/01	Linear Power	Operator Error, inattention
7/13/01	Linear Power	Operator Error, inadvertent pressing of range button

REACTOR MAINTENANCE

Significant Maintenance

Routine equipment checks are conducted by reactor staff members on a daily, weekly, bimonthly, semiannual (January and July) and annual (January) basis as required by facility procedures. Reed College maintenance personnel assist with routine preventative maintenance to auxiliary equipment. Significant maintenance operations which were not part of a regular schedule are listed in Table D.

Table D - Significant Maintenance Operations

Date	Maintenance
11/7/00	Replaced the fan belt on the air compressor
11/9/00	Replaced the coupling on the primary pump
11/12/00	Replaced the GSM with a NaI scintillation detector and added initiation of ventilation isolation to GSM
11/29/00	Added green light on console to show when ventilation is in isolation
11/30/00	Fixed actuator on ventilation damper #14
12/6/00	Installed additional speakers to the evacuation alarm
1/30/01	Installed new Rod Position Indicator provided by OSU
2/19/01	Installed primary water make up meter
5/22/01	Repaired broken wire in CAM
7/10/01	Installed a new blower and motor for GSM and APM
8/7/01	Patched minor leaks in rabbit system
8/13/01	Replaced motor on Safety Rod

Safety Reviews

There were two changes performed during the reporting period under the provisions of 10CFR50.59:

Title: **Prompt Gamma Neutron Activation Analysis Facility**
Date: January 31, 2001
Summary of Change:

This change constructs a Prompt Gamma Neutron Activation Analysis (PGNAA) setup in order to detect elements not detectable by our current methods. The PGNAA detection equipment consists of the sample, a sample holder, the detector, the Dewar (if using HPGe), and the associated shielding. The detector will be either sodium iodide (NaI) or high purity germanium (HPGe). This equipment will be located on the bridge at the top of the central thimble (CT), around the rod drive motors so that the sample can be irradiated by the CT beam. Other than the location and the added neutron shielding,

this will be similar to our current NAA equipment. The intent is to use a NaI detector, but to use a HPGe detector if better energy resolution is required.

The computer and electronics will be located to the side of the reactor, not over the pool.

In addition to lead shielding to reduce the background at the detector (which is likely to be high due to its proximity to the reactor and the pool water), neutron shielding will be necessary to protect the detector from neutrons scattered off the sample. Lead bricks will be used to shield gammas from all directions, primarily from the bottom. Neutron shielding such as cadmium or boron will be between the sample and the detector. The type of shielding will depend on the elements being analyzed (i.e., one cannot use boron for neutron shielding if boron is the element being analyzed). The neutron shielding is especially important for the HPGe detector.

During the first several runs, an area monitor will be located next to the north wall to ensure that radiation scattered off the sample does not produce a dose rate in excess of 2 mR/hour (the legal limit for the public outside the reactor room). The experimental procedure will follow the established procedure for a beam irradiation (SOP 55).

From a health physics viewpoint, this experiment will pose few new safety issues. We have been doing CT irradiations off and on for 30 years and have established procedures in dealing with the neutron beam. Surveys will have to be conducted to mark off Radiation Areas and High Radiation Areas. The only new aspect will be the PGNAA equipment, which may slightly increase the radiation dose due to scatter.

From an engineering standpoint, this experiment will not pose new safety issues. Caution must be exercised when installing and constructing the detector and shield to ensure nothing falls into the water or onto the reactor structures. When we construct the PGNAA equipment, we will make sure that the equipment will not interfere with the working of the rod motors and that the equipment will be secured so that it will not pose a risk of falling into the tank. The bridge can hold the weight.

Title: **LabVIEW Console**
Date: February 21, 2001
Summary of Change:

This change connects outputs from control console to the computer in the control room. A program called LabVIEW by National Instruments is used to analyze the information from the console. In addition to data analysis, it can provide a graphical interface and post the information on the world wide web. This not only facilitates routine calculations like argon integral or power history, it will also allow accessing information on the status of the reactor remotely. Since LabVIEW is easily customized by the user, it is possible to add additional features such as a computer alarm when approaching a scram setpoint, or other feedback.

The computer is and will be located behind the operator in the control room. The console electronics will continue to be the primary indication for the operator. Operators will always us the primary indication on the control console to operate the reactor and to make decisions. The computer will facilitate some aspects of operation and log keeping.

Each LabVIEW card can only handle eight instruments. The instruments planned to be used with new LabVIEW card are the linear channel, the logarithmic channel, the Gaseous Stack Monitor, the Air Particulate Monitor, the Continuous Air Monitor, and all three control rod positions. If this is successful, and additional LabVIEW interface card will be purchased next year and additional instruments will be added such as the Percent Power channel, primary inlet, outlet, and pool temperature, the count rate channel, etc.

Of primary concern is that the LabVIEW connections do not affect the console indications. The reactor will not be operated with the connections in place until we are satisfied that there will be no interference.

RADIATION PROTECTION

Personnel Dosimetry

During the period July 1, 2000 to June 30, 2001 personnel dosimeters were issued to 40 Reed students and staff and 1 contractor. Since dosimeters are changed on a calendar quarter schedule, this period is the closest to the reporting period. Individuals were issued beta-gamma sensitive ring badges and whole-body badges. The Director and Associate Director were issued beta-gamma-neutron sensitive dosimetry. The college changed dosimeter companies in July 2000. The new dosimeters are much more sensitive and can measure as little as 1 mrem during a three month period.

During the year the largest reading on a whole body dosimeter was 12 mrem deep dose equivalent. The largest reading on a ring dosimeter was 100 mrem shallow dose equivalent. Thus no one exceeded 1% of their federal limits.

Fixed Area Dosimetry

Radiation levels are continually monitored to provide an indication of the average radiation levels in the reactor bay and dose outside the facility. The locations of these dosimeters are shown on Figure 1. All dosimeters monitor beta and gamma radiation. Locations A and C also measure neutron dose.

The deep dose equivalent radiation measured by fixed dosimeters during the period July 1, 2000 to June 30, 2001 are shown in Table E. Since dosimeters are changed on a calendar quarter schedule, this period is the closest to the reporting period. There are radioactive material sample storage locations along the north wall: a radioactive source storage safe and a lead enclosed sample box where samples are placed immediately upon removal from the reactor. The neutron howitzer is stored on the east wall.

Table E - Area Radiation Dosimeters
(doses are in mRem per calendar quarter)

Location		Height (m)	Radiation Detected	Jul 1 - Sep 30	Oct 1 - Dec 31	Jan 1 - Mar 31	Apr 1 - Jun 30	Total
A	East Wall	1.5	β, γ, n	11	8	16	5	**40**
B	North Wall	1.6	β, γ	1	5	11	7	**24**
C	West Wall	1.0	β, γ n	3	2	4	0	**9**
D	South Wall	1.6	β, γ	1	4	4	0	**9**
E	North Wall	2.3	β, γ	11	10	18	6	**45**
F	North Outside	2.8	β, γ	0	0	3	0	**3**
G	Roof Outside	0.4	β, γ	0	1	0	1	**2**
H	East Outside	1.5	β, γ	0	0	0	0	**0**
I	South Outside	0.4	β, γ	0	0	0	0	**0**

Gaseous Releases

The only routine release of gaseous radioactivity is from Ar-41 (1.83 hour half-life) and N-16 (7.13 second half-life). These come from activation of pool water and air dissolved in the pool water and in the irradiation facilities. For calendar year 2000, the average gaseous activity at the site boundary was 1.31×10^{-11} µCi/ml which would deliver a dose to a member of the public of approximately 0.07 mrem per year; well below regulatory guidelines and constraints.

Liquid Waste Releases

No liquid radioactive waste was released from the Reed Reactor Facility during this report period.

Solid Waste Disposal

No solid radioactive waste was shipped from the Reed Reactor Facility during this report period.

Environmental Sampling

Soil samples taken from the area surrounding the facility showed no activity above background. Water samples taken from the facility's secondary cooling system showed no activity above background.

APPENDIX A - VISITORS

Date	Institution	Purpose	Number	URR Share
9/4/00	Reed	Tour	2	No
9/6/00	Reed	Maintenance	1	No
9/7/00	Reed	Maintenance	1	No
9/8/00	Reed	Experiment	1	No
9/11/00	Reed	Training	47	No
9/13/00	Reed	Training	1	No
9/18/00	Reed	CSO Training	2	No
9/18/00	Reed	Tour	1	No
9/19/00	Reed	Training	2	No
9/20/00	Reed	Training	1	No
9/20/00	Reed	Weekly	1	No
9/21/00	Reed	Training	7	No
9/23/00	LLNL Dorn Associates	Visit	2	No
9/27/00	ABC Fire	Fire Protection Check	1	No
9/27/00	Reed	Training	7	No
9/28/00	Reed	Training	3	No
9/30/00	Reed	Tour	6	No
10/2/00	Reed	Tour	3	No
10/3/00	Reed	Training	1	No
10/3/00	Hood River Valley H.S.	Tour	32	Yes
10/3/00	Reed	Physical Maintenance	1	No
10/4/00	Reed	Training	10	No
10/4/00	Reed	CSO Training	10	No
10/5/00	Reed	Training	5	No
10/5/00	Reed	Experiment	1	No
10/10/00	Oregon State University	Tour	1	No
10/11/00	Reed	Training	7	No
10/12/00	Reed	Training	8	No
10/13/00	Reed	Tour	1	No
10/14/00	Reed	Tour	2	No
10/19/00	Reed	Tour	3	No
10/19/00	Reed	Training	3	No
10/20/00	Reed	Tour	2	No
10/21/00	Reed	Training	2	No
10/22/00	Portland Fire Bureau	Emergency Training	6	No
10/23/00	Portland Fire Bureau	Emergency Training	6	No
10/24/00	Portland Fire Bureau	Emergency Training	12	No
10/24/00	Affiliated FM Insurance	Insurance	1	No
10/25/00	Portland Fire Bureau	Emergency Training	5	No
10/25/00	Reed	Training	5	No
10/26/00	ABC Fire	Fire Protection Check	2	No
10/26/00	Reed	Training	7	No
10/27/00	Reed	Training	1	No
10/28/00	Reed	Training	2	No
10/29/00	Reed	Tour	2	No

Date	Institution	Purpose	Number	URR Share
10/30/00	Sunset H.S.	Tour	26	Yes
10/31/00	Sunset H.S.	Tour	19	Yes
10/31/00	Reed	Training	1	No
11/1/00	Reed	Training	4	No
11/2/00	Reed	Training	8	No
11/3/00	Reed	Experiment	2	No
11/3/00	Reed	Tour	56	No
11/5/00	Reed	Tour	2	No
11/6/00	Reed	Beam Irradiation	6	No
11/7/00	Reed	Physical Maintenance	2	No
11/8/00	Reed	Physical Maintenance	1	No
11/8/00	Reed	Training	6	No
11/9/00	Advocates For Women in Science	Tour	8	Yes
11/9/00	Reed	Training	9	No
11/11/00	Reed	Training	1	No
11/13/00	Jesuit H.S.	Tour	6	Yes
11/13/00	Reed	Training	2	No
11/15/00	Reed	Training	8	No
11/15/00	Reed	Tour	1	No
11/16/00	Reed	Chem 271 Lab	12	No
11/16/00	Reed	Training	8	No
11/17/00	Reed	Chem 271 Lab	8	No
11/18/00	Oregon Episcopal School	Tour	9	Yes
11/18/00	Reed	Training	6	No
11/27/00	Reed	Training	3	No
11/29/00	NRC	Inspection	1	No
11/29/00	NRC	Inspection	1	No
11/29/00	Oregon Electrical Group	Maintenance	1	No
11/29/00	ABC Fire	Fire Protection Check	2	No
11/30/00	NRC	Inspection	1	No
12/1/00	Oregon State University	Tour	1	Yes
12/6/00	Oregon Electrical Group	Maintenance	1	No
12/6/00	Reed	Training	1	No
12/6/00	NRC	Exam	1	No
12/6/00	NRC	Exam	1	No
12/6/00	Reed	Training	1	No
12/7/00	NRC	Exam	1	No
12/7/00	NRC	Exam	1	No
12/11/00	ABC Fire	Fire Protection Check	2	No
12/11/00	Oregon Episcopal School	Tour	1	Yes
12/11/00	Reed	Training	1	No
12/12/00	Rex Putnam H.S.	Tour	15	Yes
12/13/00	Portland Police Bureau	Emergency Training	3	No
12/14/00	Portland Police Bureau	Emergency Training	3	No
12/20/00	Oregon Episcopal School	Tour	2	Yes
12/20/00	Reed	Tour	2	No

Date	Institution	Purpose	Number	URR Share
1/3/01	PBS Environmental	Asbestos Survey	1	No
1/4/01	Concordia University	Tour	2	Yes
1/5/01	Oregon Episcopal School	Tour	3	Yes
1/8/01	Reed	Training	10	No
1/9/01	Reed	Training	13	No
1/9/01	Oregon Electrical Group	Maintenance	1	No
1/10/01	Reed	Training	12	No
1/11/01	Reed	Training	11	No
1/16/01	Reed	Training	8	No
1/17/01	Reed	Training	5	No
1/19/01	Reed	Training	5	No
1/19/01	Reed	Tour	1	No
1/21/01	Reed	Training	2	No
1/22/01	Reed	Audit	1	No
1/23/01	Oregon Episcopal School	Experiment	12	Yes
1/23/01	Warner Pacific College	Tour	3	Yes
1/24/01	Oregon Episcopal School	Experiment	1	Yes
1/25/01	Reed	Training	1	No
1/26/01	Oregon State University	Tour	1	Yes
1/26/01	Reed	Training	1	No
1/26/01	Oregon Episcopal School	Experiment	1	Yes
1/26/01	Portland Community College Engineering Club	Tour	6	Yes
1/26/01	Reed	Training	1	No
1/27/01	Reed	Training	3	No
1/27/01	Concordia University	Tour	8	Yes
1/30/01	Oregon State University	Maintenance	1	No
1/30/01	Reed	Training	1	No
1/31/01	Reed	Training	1	No
2/2/01	Reed	Training	1	No
2/3/01	Reed	Training	2	No
2/5/01	Reed	Prospective Student	1	No
2/5/01	Reed	Training	2	No
2/7/01	Reed	Training	5	No
2/8/01	Reed	Training	8	No
2/11/01	Visitor	Tour	1	No
2/11/01	Reed	Training	5	No
2/12/01	Oregon Electrical Group	Maintenance	1	No
2/13/01	Sloan Plumbing	Maintenance	1	No
2/13/01	Reed	Tour	3	No
2/13/01	Reed	Training	3	No
2/14/01	Reed	Training	3	No
2/15/01	Oregon Electrical Group	Maintenance	1	No
2/15/01	Reed	Training	3	No
2/17/01	Reed	Tour	4	No
2/18/01	Reed	Experiment	1	No
2/19/01	Sloan Plumbing	Maintenance	1	No

Date	Institution	Purpose	Number	URR Share
2/19/01	CPCS	Maintenance	1	No
2/19/01	Tradewind	Business	2	No
2/19/01	Reed	Tour	3	No
2/19/01	Reed	Training	3	No
2/20/01	Reed	Training	1	No
2/20/01	Saturday Academy	Experiment	8	Yes
2/21/01	Reed	Tour	1	No
2/21/01	Reed	Training	4	No
2/27/01	Reed	Training	3	No
2/28/01	Reed	Training	1	No
3/1/01	Reed	Training	4	No
3/1/01	Lincoln High School	Tour	22	Yes
3/1/01	Reed	Waxing Floor	2	No
3/2/01	Reed	Tour	5	No
3/2/01	Roosevelt High School	Tour	13	Yes
3/3/01	Hosford Middle School	Tour	1	Yes
3/3/01	daVinci Middle School	Tour	2	Yes
3/3/01	Mt. Tabor Middle School	Tour	3	Yes
3/3/01	Connestoga Middle School	Tour	9	Yes
3/3/01	Millicoma Middle School	Tour	2	Yes
3/3/01	Walt Morey Middle School	Tour	2	Yes
3/3/01	Creswell Middle School	Tour	6	Yes
3/3/01	Toledo Middle School	Tour	2	Yes
3/3/01	Estacada Junior High School	Tour	14	Yes
3/3/01	Philomant High School	Tour	1	Yes
3/3/01	Arbor	Tour	2	Yes
3/3/01	Metro Learning Center	Tour	1	Yes
3/3/01	Educational Development Services	Tour	1	Yes
3/3/01	Rocky Mountain College	Tour	4	Yes
3/4/01	Reed	Training	1	No
3/5/01	Reed	Training	1	No
3/6/01	MIT	Tour	1	Yes
3/6/01	Portland State University	Tour	2	Yes
3/6/01	Reed	Training	1	No
3/6/01	Saturday Academy	Tour	11	Yes
3/7/01	Reed	Training	4	No
3/8/01	Reed	Training	4	No
3/8/01	Pacific University	Tour	14	Yes
3/9/01	Reed	Training	1	No
3/11/01	Reed	Training	1	No
3/12/01	University of Southern California	Visitor	1	No
3/12/01	Reed	Training	1	No
3/12/01	Oregon Episcopal School	Visitor	1	No

Date	Institution	Purpose	Number	URR Share
3/13/01	Reed	Visitor	2	No
3/13/01	Reed	Training	2	No
3/13/01	Saturday Academy	Tour	10	Yes
3/14/01	Reed	Training	3	No
3/15/01	Kennedy High School	Tour	24	Yes
3/15/01	Reed	Training	2	No
3/16/01	Reed	Training	2	No
3/16/01	David Douglas High School	Tour	38	Yes
3/16/01	Pacific University	Tour	15	Yes
3/18/01	Reed	Visitor	1	No
3/21/01	Reed	Training	1	No
3/22/01	Reed	Experiment	2	No
3/22/01	Lincoln High School	Tour	2	Yes
3/22/01	Wilson High School	Tour	1	Yes
3/22/01	Franklin High School	Tour	1	Yes
3/22/01	Cleveland High School	Tour	1	Yes
3/22/01	Central Catholic High School	Tour	1	Yes
3/22/01	Talented and Gifted Students Program	Tour	1	Yes
3/25/01	Reed	Training	1	No
3/25/01	Reed	Tour	2	No
3/26/01	Apprentice in Science/Eng	Tour	1	Yes
3/27/01	Apprentice in Science/Eng	Tour	1	Yes
3/27/01	Oregon City HS	Tour	1	Yes
3/27/01	Reed	Training	2	No
3/28/01	South Eugene High School	Tour	1	Yes
3/28/01	Oregon University	Tour	1	Yes
3/28/01	Cleveland High School	Tour	1	Yes
3/28/01	Oregon City HS	Visitor	1	No
3/28/01	Reed	Training	3	No
3/28/01	Reed	Visitor	5	No
3/28/01	ABC Fire	Fire Protection Check	1	No
3/29/01	Reed	Training	2	No
3/30/01	Apprentice in Science/Eng	Visitor	1	No
3/31/01	Reed	Training	2	No
4/2/01	Math and Science Academy	Tour	1	No
4/2/01	Morgistown Board School	Tour	1	No
4/2/01	St. Gregory College Prep	Tour	1	No
4/2/01	Newman School	Tour	1	No
4/2/01	Westview High School	Tour	1	No
4/3/01	Reed	Training	3	No
4/4/01	Reed	Training	3	No
4/5/01	Southridge High School	Tour	8	Yes

Date	Institution	Purpose	Number	URR Share
4/6/01	Southridge High School	Tour	9	Yes
4/6/01	Reed	Tour	4	No
4/6/01	Reed	Training	1	No
4/7/01	Reed	Training	3	No
4/7/01	Reed	Visitor	1	No
4/10/01	Reed	Training	4	No
4/10/01	Grant	Tour	1	Yes
4/10/01	Hamilton High School	Tour	2	Yes
4/10/01	Middle College High School	Tour	1	Yes
4/10/01	Foshay Learning Center	Tour	1	Yes
4/10/01	Woodrow Wilson High School	Tour	2	Yes
4/10/01	Hollywood High School	Tour	1	Yes
4/10/01	Los Angeles HS Magnet	Tour	1	Yes
4/10/01	Fremont High School	Tour	1	Yes
4/10/01	Fulfillment Fund	Tour	2	Yes
4/12/01	Reed	Training	6	No
4/12/01	Concordia University	Tour	14	Yes
4/13/01	Reed	Training	1	No
4/14/01	Reed	Training	5	No
4/15/01	Reed	Prospective Student Tour	25	No
4/15/01	Reed	Training	2	No
4/16/01	Reed	Reed Activity Day	6	No
4/17/01	Reed	Training	4	No
4/17/01	Reed	Prospective Student Tour	3	No
417/01	Reed	Tout	3	No
4/17/01	Reed	Training	1	No
4/17/01	Reed	Reed Activity Day	5	No
4/17/01	Reed	Tour	1	No
4/17/01	Reed	Training	1	No
4/18/01	Reed	Reed Activity Day	5	No
4/18/01	Reed	Training	4	No
4/19/01	Reed	Reed Activity Day	11	No
4/19/01	Reed	Training	3	No
4/20/01	Reed	Reed Activity Day	1	No
4/20/01	Ohio State University	Tour	3	Yes
4/20/01	Reed	Tour	13	No
4/20/01	Linfield School of Nursing	Tour	6	Yes
4/20/01	Reed	Community Safety Training	2	No
4/23/01	Linfield School of Nursing	Tour	15	Yes
4/23/01	Lewis & Clark College	Tour	5	Yes
4/24/01	Reed	Training	3	No
4/24/01	Lewis & Clark	Tour	5	Yes
4/24/01	Reed	Training	1	No

Date	Institution	Purpose	Number	URR Share
4/25/01	Linfield College	Tour	23	Yes
4/25/01	Reed	Training	1	No
4/26/01	Reed	Training	1	No
4/26/01	Reed	Tour	2	No
4/26/01	Bring Child To Work	Tour	30	Yes
4/26/01	Warner Pacific College	Tour	9	Yes
4/26/01	Reed	Training	4	No
4/29/01	Reed	Training	9	No
4/30/01	Reed	Exam	1	No
4/30/01	NRC	Exam	1	No
5/1/01	ABC Fire	Fire Protection Check	1	No
5/1/01	Reed	Exam	1	No
5/1/01	NRC	Exam	1	No
5/1/01	Reed	Exam	1	No
5/1/01	NRC	Exam	1	No
5/1/01	Reed	Exam	1	No
5/1/01	NRC	Exam	1	No
5/1/01	FM Global	Insurance	1	No
5/2/01	NRC	Exam	1	No
5/2/01	NRC	Exam	1	No
5/2/01	NRC	Exam	1	No
5/2/01	NRC	Exam	1	No
5/2/01	Reed	Exam	1	No
5/2/01	NRC	Exam	1	No
5/2/01	Reed	Exam	1	No
5/2/01	NRC	Exam	1	No
5/2/01	Reed	Exam	1	No
5/2/01	NRC	Exam	1	No
5/2/01	Reed	Exam	1	No
5/3/01	Reed	Training	1	No
5/4/01	Reed	Training	1	No
5/5/01	Reed	Tour	2	No
5/7/01	Pacific University	Tour	1	Yes
5/7/01	Oregon Electrical Group	Maintenance	2	No
5/8/01	Reed	Tour	2	No
5/9/01	Portland Fire Bureau	Training	2	No
5/9/01	Reed	Tour	2	No
5/11/01	Reed	Training	1	No
5/13/01	Reed	Tour	4	No
5/15/01	Reed	Tour	3	No
5/16/01	Reed	Maintenance	1	No
5/16/01	Reed	Tour	3	No
5/17/01	Reed	Tour	2	No
5/17/01	Reed	Maintenance	1	No
5/21/01	Reed	Maintenance	1	No
5/21/01	Reed	Maintenance	1	No
5/21/01	Reed	Tour	1	No

Date	Institution	Purpose	Number	URR Share
5/22/01	Reed	Training	1	No
5/22/01	Reed	Maintenance	1	No
5/22/01	Reed	Tour	1	No
5/23/01	Reed	Maintenance	1	No
5/23/01	Skyview High School	Tour	26	Yes
5/23/01	Reed	Maintenance	1	No
5/24/01	Reed	Maintenance	1	No
5/25/01	Reed	Tour	1	No
5/25/01	Reed	Maintenance	1	No
5/25/01	University of California at Santa Cruz	Tour	3	Yes
5/29/01	Reed	Maintenance	1	No
5/29/01	Portland Community College	Tour	22	Yes
5/30/01	Reed	Maintenance	1	No
5/30/01	Reed	Maintenance	1	No
5/30/01	Reed	Maintenance	1	No
5/30/01	Wilson High School	Tour	24	Yes
5/31/01	ABC Fire	Fire Protection Check	1	No
5/31/01	Reed	Maintenance	1	No
5/31/01	Reed	Maintenance	1	No
5/31/01	Reed	Maintenance	1	No
5/31/01	Oregon Electrical Group	Maintenance	1	No
6/1/01	Reed	Maintenance	1	No
6/1/01	Oregon Electrical Group	Maintenance	5	No
6/3/01	Reed	Tour	8	No
6/4/01	RSO Class	Tour	6	No
6/5/01	RSO Class	Tour	7	No
6/6/01	RSO Class	Tour	5	No
6/7/01	RSO Class	Tour	5	No
6/8/01	RSO Class	Tour	7	No
6/8/01	Reed	Tour	2	No
6/9/01	Reed	Tour	19	No
6/11/01	Oregon Electrical Group	Maintenance	1	No
6/11/01	Reed	Tour	3	No
6/13/01	Reed	Tour	3	No
6/14/01	Reed	Tour	5	No
6/18/01	Reed	Tour	7	No
6/19/01	Portland State University	Tour	3	Yes
6/19/01	Reed	Tour	1	No
6/19/01	Boy Scouts	Tour	16	Yes
6/21/01	Reed	Tour	1	No
6/25/01	Reed	Tour	2	No
6/26/01	Saturday Academy	Tour	12	Yes
6/26/01	Counselor Tour	Tour	8	No
6/27/01	Saturday Academy	Tour	4	Yes
6/29/01	Reed	Tour	11	No
6/29/01	Apprentice in Science/Eng	Tour	1	Yes

Date	Institution	Purpose	Number	URR Share
6/29/01	Apprentice in Science/Eng	Tour	1	Yes
7/3/01	Apprentice in Science/Eng	Maintenance	1	No
7/3/01	Apprentice in Science/Eng	Maintenance	1	No
7/3/01	Oregon Electrical Group	Maintenance	2	No
7/5/01	Oregon Electrical Group	Maintenance	1	No
7/5/01	Apprentice in Science/Eng	Maintenance	1	No
7/5/01	Apprentice in Science/Eng	Maintenance	1	No
7/6/01	Cleveland High School	Tour	1	No
7/9/01	Apprentice in Science/Eng	Maintenance	1	No
7/9/01	Apprentice in Science/Eng	Maintenance	1	No
7/9/01	Apprentice in Science/Eng	Maintenance	1	No
7/9/01	Saturday Academy	Tour	4	Yes
7/12/01	Portland General Electric	Maintenance	2	No
7/13/01	Apprentice in Science/Eng	Maintenance	1	No
7/16/01	Saturday Academy	Tour	4	Yes
7/17/01	Reed Admissions	Tour	13	No
7/18/01	Portland Community College	Tour	1	No
7/19/01	Community Safety	Training	1	No
7/24/01	Reed	Tour	4	No
7/25/01	Reed	Tour	7	No
7/26/01	Apprentice in Science/Eng	Maintenance	2	No
7/27/01	Reed	Tour	5	No
7/30/01	Apprentice in Science/Eng	Maintenance	2	No
7/31/01	Apprentice in Science/Eng	Maintenance	1	No
8/1/01	Reed	Maintenance	1	No
8/2/01	Apprentice in Science/Eng	Maintenance	1	No
8/2/01	FBI	Safety Check	2	No
8/2/01	Apprentice in Science/Eng	Maintenance	1	No
8/3/01	Apprentice in Science/Eng	Maintenance	1	No
8/6/01	Apprentice in Science/Eng	Maintenance	1	No
8/8/01	Reed	Maintenance	1	No
8/8/01	Apprentice in Science/Eng	Maintenance	1	No
8/8/01	Oregon Electrical Group	Maintenance	1	No
8/9/01	Watermetrics	Maintenance	1	No
8/9/01	Reed	Tour	5	No
8/10/01	Reed	Tour	9	No
8/10/01	Apprentice in Science/Eng	Maintenance	1	No
8/10/01	Apprentice in Science/Eng	Maintenance	1	No
8/15/01	Reed	Maintenance	1	No
8/15/01	Apprentice in Science/Eng	Maintenance	1	No
8/15/01	Apprentice in Science/Eng	Maintenance	1	No
8/16/01	Apprentice in Science/Eng	Maintenance	1	No
8/20/01	Reed	Tour	45	No
8/21/01	Apprentice in Science/Eng	Maintenance	1	No
8/21/01	Reed	Tour	25	No
8/22/01	Reed	Tour	8	No

Date	Institution	Purpose	Number	URR Share
8/22/01	Apprentice in Science/Eng	Maintenance	1	No
8/22/01	Apprentice in Science/Eng	Maintenance	1	No
8/24/01	Apprentice in Science/Eng	Maintenance	1	No
8/29/01	ABC Fire	Fire Protection Check	1	No
Total Visitors			1,820	