



Rensselaer

DEPARTMENT OF MECHANICAL,
AEROSPACE, AND NUCLEAR ENGINEERING

RCF 10-02
June 28, 2010

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

Re: Response to Request for Additional Information

Dear Sir:

This letter provides the information requested by your letter dated May 5, 2010, "Rensselaer Polytechnic Institute, Request for Additional Information Regarding the Renewal of Facility Operating License (TAC No. ME1591).

The requested information is provided in three parts; the first part contains the responses to the detailed technical questions, the second contains the revised Technical Specifications, and the third contains the responses to detailed financial questions. The consolidated financial statements for the years ended June 2008 and 2009 are also included.

The Nuclear Safety Review Board has reviewed and approved the revised Technical Specifications.

Sincerely,

Dr. Timothy H. Trumbull, Director
L. David Walthousen Laboratory
RPI Reactor Critical Facility

I declare under penalty of perjury that the foregoing is true and correct.

Executed on:

6/28/10
Date

Dr. David V. Rosowsky, Dean of Engineering

Cc:

Dr. Michael Podowski, Chairman
RPI NSRB

Dr. Tim Wei, Chairman
MANE

Dr. Peter Caracappa
RPI Radiation Safety Officer
Environmental Health and Safety Office

Mr. Jason Thompson, Operations Supervisor
RPI RCF

A020
NRB

Response to Detailed Questions

1. Provide a table of contents for the proposed TS.

Remedy:

Table of contents included.

2. TS 1.3 contains definitions that do not appear to be used in the proposed TS. Examples include "certificate or charter," "certified," "Class A reactor operator," "Class B reactor operator," "facility-specific definitions," "licensed," "licensee," "owner or operator," "permit," "research reactor," "research reactor facility," "responsible authority," and "supervisory reactor operator." Explain the reason for including these definitions, and revise the proposed TS as appropriate.

Remedy:

These definitions were added to be consistent with the example technical specifications we were working from. Deleted unused definitions of "certificate or charter," "certified," "Class A reactor operator," "Class B reactor operator," "facility-specific definitions," "licensed," "licensee," "owner or operator," "permit," "research reactor," "research reactor facility," "responsible authority," and "supervisory reactor operator."

3. The proposed TS use the terms "on the bottom," "bottomed," "inserted," and "fully inserted" to describe the positions of the control rods. Clarify whether these terms are synonymous, and revise the proposed TS to use consistent terminology as appropriate.

Remedy:

Definition for "bottomed" and "fully inserted" added. All references to "on the bottom" were changed to "bottomed" with the exception of one in 5.3 used to define the location of the hydraulic buffer. References to "inserted" were changed to "fully inserted" or "bottomed." Shutdown reactivity had a reference to "fully inserted," this was changed to "bottomed."

4. The wording of the definitions of "reactor operator," "research reactor," and "research reactor facility" are not specific to the RCF. Explain the reasons for not making these definitions specific to the RCF, and revise the definitions as appropriate.

Remedy:

Definition of "reactor operator" changed. "research reactor" and "research reactor facility" definitions removed in response to RAI 2.

5. The proposed TS do not appear to contain requirements for reporting SL violations as required by 10 CFR 50.36(c)(1)(i)(A). In accordance with the regulation, propose TS for reporting SL violations. (See RAI 8)

Remedy:

Section 6.6 has been added stating the required actions in the event of a safety limit violation.

6. The definition of "reportable occurrences," item 4., states that, "Operation in violation of limiting conditions for operation unless prompt remedial action is taken," is reportable. The use of the phrase, "unless prompt remedial action is taken," is inconsistent with the requirement of 10 CFR 50.36(c)(2)(i) that, "When a limiting condition for operation of a nuclear reactor is not met,... the licensee shall notify the Commission." Revise the definition to be consistent with the regulatory requirement.

Remedy:

Definition reworded, phrase "unless prompt remedial action is taken" was removed.

7. The definition of "shutdown margin" states that the nonscramable rods are assumed to be in their most reactive position. The safety analysis report does not describe any nonscramable rods. Clarify whether the RPI RCF has any nonscramable rods, and revise the proposed TS as appropriate.

Remedy:

Reference to nonscramable rods was removed. The RCF has no nonscramable rods.

8. The proposed TS do not contain a SL for the RPI RCF. According to 10 CFR 50.36(c), "technical specifications will include... safety limits." In accordance with the regulation, propose SLs for the RPI RCF derived from appropriate analyses in the safety analysis report.

Remedy:

A safety limit has been added for the fuel pellet temperature. The applicability, objective, specification and basis for the limit is included in TS 2.1.

9. TS 3.9 contains facility-specific limiting conditions for operation, but does not contain bases. In accordance with 10 CFR 50.36(a)(1), provide bases for the proposed TS. (Consider also including "Applicability" and "Objective" statements consistent with the formatting of ANS/ANSI-15.1.)

Remedy

Section 3.9. of the TS has been modified to include Applicability, Objective, Specification, and a Bases section.

10. In accordance with 10 CFR 50.36(a), provide bases for the specifications in Section 5 of the proposed TS.

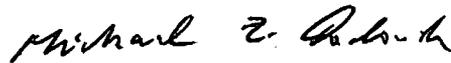
Remedy

Bases are provided for the design features of the facility listed in Section 5.

**TECHNICAL SPECIFICATIONS
CRITICAL EXPERIMENTS FACILITY
RENSSELAER POLYTECHNIC INSTITUTE**

May 2010

Approved:



**Dr. Michael Podowski, Chair
Nuclear Safety Review Board**

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Technical Specifications

1. INTRODUCTION

1.1 Scope

The following constitute the Technical Specifications for the RPI Critical Experiments Facility (RCF), as required by 10 CFR 50.36.

1.2 Application

Content and section numbering are in accordance with section 1.2.2 of ANS-5.1-2007.

1.3 Definitions

bottomed: A control rod is bottomed if it is resting on the carrier plate in the hydraulic buffer at the bottom of the core.

channel: A channel is the combination of sensor, line, amplifier, and output devices that are connected for the purpose of measuring the value of a parameter.

channel calibration: A channel calibration is an adjustment of the channel such that its output corresponds with acceptable accuracy to known values of the parameter that the channel measures. Calibration shall encompass the entire channel, including equipment actuation, alarm, or trip, and shall be deemed to include a channel test.

channel check: A channel check is a qualitative verification of acceptable performance by observation of channel behavior, or by comparison of the channel with other independent channels or systems measuring the same parameter.

channel test: A channel test is the introduction of a signal into the channel for verification that it is operable.

control rod: A control mechanism consisting of a stainless steel basket that houses two absorber sections, one above the other. These absorber sections contain boron in iron clad in stainless steel. All are of the same dimensions, nominally 2.6 inches square, with their poisons uniformly distributed. The absorbers, when fully inserted, shall extend above the top and to within one inch of the bottom of the fueled portion of the core.

core configuration: The core configuration includes the number, type, or arrangement of fuel elements, reflector elements, and control rods occupying the core grid.

excess reactivity: Excess reactivity is that amount of reactivity that would exist if all reactivity control devices and movable experiments were moved to the maximum reactive condition from the point where the reactor is exactly critical ($k_{eff} = 1$) at reference core conditions or at a specified set of conditions.

experiment: Any operation, hardware, or target (excluding devices such as detectors, foils, etc.) that is designed to investigate reactor characteristics or that is intended for

irradiation within the reactor.

fully inserted: A control rod is fully inserted if it is within 2 inches of being bottomed. At this height the rods are prevented from being driven in further to prevent damaged to the control rod drive mechanism.

known core: A core configuration for which the power indicating instrumentation has been calibrated in accordance with surveillance procedures and the following parameters have been measured:

1. excess reactivity,
2. shutdown reactivity, all rods bottomed and one rod stuck in the full out position,
3. reactivity worth of most reactive fuel pin.

license: The written authorization, by the responsible authority, for an individual or organization to carry out the duties and responsibilities associated with a personnel position, material, or facility requiring licensing.

measured value: The measured value is the value of a parameter as it appears on the output of a channel.

movable experiment: A movable experiment is one where it is intended that all or part of the experiment may be moved in or near the core or into and out of the reactor while the reactor is operating.

operable: Operable means a component or system is capable of performing its intended function.

operating: Operating means a component or system is performing its intended function.

protective action: Protective action is the initiation of a signal or the operation of equipment within the reactor safety system in response to a parameter or condition of the reactor facility having reached a specified limit.

reactor operating: The reactor is operating whenever the reactor tank contains moderator and any fuel, and any control rod is not bottomed.

reactor operator: An individual who is deemed capable and qualified by the senior reactor operator on duty to manipulate the controls of the reactor. The individual may be the senior reactor operator on duty, another senior reactor operator or someone without a senior reactor operator license.

reactor safety systems: Reactor safety systems are those systems, including their associated input channels, that are designed to initiate automatic reactor protection or to provide information for initiation of manual protective action.

reactor secured: A reactor is secured when

1. *Either* there is insufficient moderator available in the reactor to attain criticality, control rods are bottomed, and the console keys are removed,
2. *Or* all fuel pins have been removed from the reactor.

reactor shutdown: The reactor is shut down if all control rods are bottomed and it is subcritical by at least one dollar in the reference core condition with the reactivity worth of all installed experiments included.

reactivity worth of an experiment: The reactivity worth of an experiment is the value of the reactivity change that results from the experiment being inserted into or removed from its intended position.

readily available on call: An operator is readily available on call if within 60 minutes normal travel time and 25 miles of the facility and personnel at the facility can readily contact the individual.

reference core condition: The condition of the core when it is at ambient temperature (cold) and the control rods are bottomed.

reportable occurrences

1. Release of radioactivity from the facility above allowed limits;
2. Discovery of loose surface contamination, excluding contamination due to naturally occurring radionuclides such as radon daughters;
3. Operation with actual safety system setting less conservative than the limiting safety system settings;
4. Operation in violation of limiting conditions for operation;
5. Any reactor safety system component malfunction that could render the safety system incapable of performing its intended function;
6. An unanticipated or uncontrolled change in reactivity greater than 60 cents; or
7. An observed inadequacy in the implementation of administrative or procedural controls such that the inadequacy causes or could have caused the existence or development of an unsafe condition with regard to reactor operations.

review and approve: The reviewing group or persons shall carry out a review of the matter in question and may either approve or disapprove it. Before it can be implemented, the matter in question must receive approval from the reviewing group or persons.

safety channel: A channel in the reactor safety system.

scram time: Scram time is the elapsed time between the initiation of a scram signal and indication that the control rod has bottomed.

secured experiment: A secured experiment is any experiment, experimental apparatus, or component of an experiment that is held in a stationary position relative to the reactor by mechanical means. The restraining forces must be substantially greater than those to which the experiment might be subjected by hydraulic, pneumatic, buoyant, or other forces that are normal to the operating environment of the experiment, or by forces that can arise as a result of credible malfunctions.

secured shutdown: The reactor is secured and the facility administrative requirements

are met for leaving the facility with no licensed operators present.

senior reactor operator: An individual who is licensed to direct the activities of reactor operators at the RCF. Such an individual is also a reactor operator.

shall, should, and may: The word "shall" is used to denote a requirement; the word "should" is used to denote a recommendation; and the word "may" is used to denote permission, neither a requirement nor a recommendation.

shutdown margin: Shutdown margin is the minimum shutdown reactivity necessary to provide confidence that the reactor can be made subcritical by means of the control and safety systems starting from any permissible operating condition and with the most reactive rod in the most reactive position, and that the reactor will remain subcritical without further operator action.

shutdown reactivity: The reactivity of the reactor at ambient conditions with all control rods fully inserted, including the reactivity of installed experiments.

surveillance frequency: Unless otherwise stated in these specifications, periodic surveillance tests, checks, calibrations, and examinations shall be performed within the specified surveillance intervals. In cases where the elapsed interval has exceeded 100% of the specified interval, the next surveillance interval shall commence at the end of the original specified interval. Allowable surveillance intervals, as defined in ANSI/ANS 15.1 (2007) shall not exceed the following:

Annual (interval not to exceed 15 months).

Semiannual (interval not to exceed seven and one-half months).

Daily prior to the first reactor startup of the day

surveillance interval: The surveillance interval is the calendar time between surveillance tests, checks, calibrations, and examinations to be performed upon an instrument or component when it is required to be operable.

true value: The true value is the actual value of a parameter.

unknown core: Any core configuration that is not a known core.

unscheduled shutdown: An unscheduled shutdown is defined as any unplanned shutdown of the reactor caused by actuation of the reactor safety system, operator error, equipment malfunction, or a manual shutdown in response to conditions that could adversely affect safe operation, not including shutdowns that occur during testing or checkout operations.

2. SAFETY LIMITS AND LIMITING SAFETY SYSTEM SETTINGS

2.1 Safety Limits – Fuel Pellet Temperature

Applicability

Applies to the maximum temperature reached in any in-core fuel pellet as a result of either normal operation or transient effects.

Objective

To identify the maximum temperature beyond which material degradation to the fuel and/or its cladding is expected, and to define a safety limit below this level.

Specification

Fuel pellet temperature at any point in the core, resulting from normal operation or transient effects, shall be limited to no more than 1000 °C.

Bases

Specific determination of the melting point of the SPERT fuel has not been reported. A safety limit of 1000 °C is well below the listed melting point of UO₂ under a wide variety of conditions. The chosen value is conservative in view of variations that might result because of the presence of small quantities of impurities and the comparatively high vapor pressure of UO₂ at elevated temperatures. The safety limit specified is about 1700 °C below the measured melting point of UO₂ in a helium atmosphere.¹ Additionally, the safety limit of 1000 °C is below most referenced values for the melting point of Stainless Steel 304², the cladding material. Therefore, with the conservative assumption that the clad is at the same temperature as the fuel, the cladding integrity would not be compromised.

2.2 Limiting Safety System Settings

Applicability

Applies to the settings to initiate protective action for instruments monitoring parameters associated with the reactor power limits.

Objective

To assure protective action before safety limits are exceeded.

Specification

The limiting safety system settings on reactor power shall be as follows:

Maximum Power Level	100 watts
Minimum Period	5 seconds

Bases

¹ W.A. Duckworth, ed., "Physical Properties of Uranium Dioxide," Uranium Dioxide: Properties and Nuclear Applications, Naval Reactors, Division of Reactor Development, Washington D.C., pp. 173-228 (1961).

² E.A. Avallone, T.B. Baumeister, III, ed., Mark's Standard Handbook for Mechanical Engineers, 9th Edition, pp. 6-11, McGraw-Hill, Inc., New York, (1987).

The maximum power level trip setting of 100 watts on Log Power and Period Channel 2 (PP2) correlates with the operating license limit. The scram set point is used in the safety analysis with the assumption that initial power is at 100 watts indicated power.

The minimum 5-second period is specified so that the automatic safety system channels have sufficient time to respond in the event of a very rapid positive reactivity insertion. Power increase and energy deposition subsequent to scram initiation are thereby limited to well below the identified safety limit. This scram is not used in the analysis of the most severe accident since the analysis assumes that the safety channel with a fast rate scram fails concurrent with the reactivity addition.

3. LIMITING CONDITIONS FOR OPERATION

3.1 Reactor Core Parameters

Applicability

These specifications apply to reactivity in the control rods plus the maximum reactivity contained in movable experiments.

Objective

The purpose of these specifications is to ensure that the reactor is operated within the range of parameters that have been analyzed.

Specifications

The excess reactivity of the reactor above cold, clean critical shall not be greater than 0.60\$.

Bases

Excess reactivity must be limited to ensure any reactivity addition accident is restricted to one that has been analyzed and shown to cause no core damage. The assumption in this analyzed accident is a step insertion of 60 cents of reactivity above critical.

3.2 Reactor Control and Safety Systems

Applicability

Applies to all methods of changing core reactivity available to the reactor operator.

Objective

To assure that available shutdown reactivity is adequate and that positive reactivity insertion rates are within those analyzed in the SAR.

Specifications

1. The maximum reactivity worth of any clean fuel pin shall be 0.20\$.
2. There shall be a minimum of four operable control rods. The reactor shall be subcritical by more than 0.70\$ with the most reactive control rod fully

withdrawn. The minimum shutdown reactivity with all four control rods bottomed shall be \$1.00.

3. The total control rod drop time for each control rod from its fully withdrawn position to its fully inserted position shall be less than or equal to 1.5 seconds. This time shall include a maximum instrument response time of 600 milliseconds. Instrument response may be measured separately from rod drop time if desired. If the total time is measured and is less than required, then instrument response time need not be separately measured to determine if the 600 millisecond time is met.
4. The auxiliary reactor scram (moderator-reflector water dump) shall add negative reactivity within one minute of its activation.
5. The normal moderator-reflector water level shall be established not greater than 10 inches above the top grid of the core.
6. The minimum safety channels that shall be operating during the reactor operation are listed in Table 1.
7. After a scram, the moderator dump valve may be re-closed by a senior reactor operator if the cause of the scram is known, all control rods are verified to have scrammed and it is deemed wise to retain the moderator shielding in the reactor tank.
8. The interlocks that shall be operable during reactor operations are listed in Table 2.
9. The thermal power level shall be controlled so as not to exceed 100 watts, and the integrated thermal power for any consecutive 365 days shall not exceed 2 kilowatt-hours.

TABLE 1: Minimum Safety System Channels

Reactor Conditions - Ranges		Channels	Minimum Number	Functions
Start-up:	2 cps - 10^4 cps	Log Count Rate	1	Minimum Flux Level
Power:	10^{-3} - 10^{-11} amps	Linear Power	2	High Neutron Level Scram
	10^{-3} - 10^{-14} amps +999 - -999 seconds	Log-N; Period	1	High Neutron Level and Period Scram
		Manual Scram ^(a)	2	Reactor Scram

Building Power	1	Reactor Scram
Reactor Scram ^(b)	Door 1	Reactor Scram

(a) The manual scram shall consist of a regular manual scram at the console and a manual electric switch which shall disconnect the electrical power of the facility from the reactor, causing a loss of power scram.

(b) The reactor door scram may be bypassed during maintenance checks and radiation surveys with the specific permission of the Operations Supervisor provided that no other scram channels are bypassed.

TABLE 2: Interlocks

Interlocks	Action if Interlock Not Satisfied
Reactor Console Keys (2) "On"	Reactor Scram
Reactor Period <15 sec	Prevents Control Rod Withdrawal
Neutron Flux <2 cps	Prevents Control Rod Withdrawal
Line Voltage to Recorders < 100 V	Prevents Control Rod Withdrawal
Moderator-Reflector Water Fill On	Prevents Control Rod Withdrawal

Bases

The worth of a single fuel pin varies considerably depending upon where the pin is located. Removal of a pin near the center will increase reactivity for under-moderated configurations while removal of a pin on the periphery will reduce reactivity. A maximum worth is specified to provide additional margin to the limit of 60 cents excess reactivity in any experiment that removes a fuel pin. Limiting worth to 20 cents also ensures that the operator will not have difficulty controlling power during the normal operation of measuring reactivity changes by pulling control rods to the top stop and measuring reactor period.

The minimum number of four control rods is specified to ensure that there is adequate shutdown capability even for the stuck control rod condition.

The insertion time of less than 1.5 seconds for each control rod from its fully withdrawn position is specified to ensure that the insertion time does not exceed that assumed when analyzing the consequence of the most severe credible accident. Experience shows that rod drop time of less than 900 milliseconds is typical, therefore 600 milliseconds of the total 1.5 second drop time is allocated to instrument response.

The auxiliary reactor scram is specified to assure that there is a secondary mode of shutdown available during reactor operations. The requirement that negative reactivity be introduced in less than one minute following activation of the scram is established to minimize the consequences of any potential power transients. The maximum water height of 10" above the top of the core ensures that the water dump will insert negative reactivity within one minute of activation, provides a large upper reflector to allow consistency between critical position measurements and experiments, and prevents instrument tube flooding that could disable a safety system channel.

The safety system channels listed in Table 1 provide a high degree of redundancy to assure that human or mechanical failures will not endanger the reactor facility or the general public.

The interlock system listed in Table 2 ensures that only authorized personnel can operate the reactor and the proper sequence of operations is performed. It also limits the actions that an operator can take, and assists the operator in safely operating the reactor. The minimum flux level has been established at 2 cps to prevent a source-out startup and provide a positive indication of proper instrument function before any reactor startup.

The annual limit for integrated power is set at 2 kWh to ensure that the maximum dose in any unrestricted area will not exceed 100 mrem per year and the maximum dose in any restricted area (not including the reactor room itself, which should not normally be occupied during operation) will not exceed 5 rem per year.

3.3 Coolant systems – None required

3.4 Containment or confinement – None required

3.5 Ventilation Systems – None required

3.6 Emergency Power – None required

3.7 Radiation Monitoring

Applicability

These specifications apply to the minimum radiation monitoring requirements for reactor operations.

Objective

The purpose of these specifications is to ensure that adequate monitoring is available to preclude undetected radiation hazards or uncontrolled release of radioactive material.

Specifications

1. The minimum complement of radiation monitoring equipment required to be operating for reactor operation shall include:
 - a. A criticality detector system that monitors the main fuel storage area and also functions as an area monitor. This system shall have a visible and an audible alarm in the control room.

- b. An area gamma monitoring system that shall have detectors at least in the following locations: (1) control room; (2) reactor room near the fuel vault; (3) reactor room (high level monitor), and; (4) outside the reactor room window.
 - c. The radiation monitors required by 3.3.1 a and b, may be temporarily removed from service if replaced by an equivalent portable unit.
 2. During normal operation, a calibrated and operational portable survey meter capable of measuring ambient radiation exposure shall be available.
 3. During fuel loading or unloading, or during any experiments involving the addition or removal of material from the core (activation foils, etc.) a thin-window GM detector shall be available to check for personnel or area contamination.

Bases

The continuous monitoring of radiation levels in the reactor room and other stations ensures the warning of the existence of any abnormally high radiation levels. The availability of instruments to measure the amount of particulate activity in the reactor room air ensures continued compliance with the requirements of 10 CFR Part 20. The availability of required portable monitors provides assurance that personnel will be able to monitor potential radiation fields before an area is entered and during fuel handling.

In all cases, the low power levels encountered in operation of the critical assembly minimizes the probable existence of high radiation levels.

3.8 Experiments

Applicability

These specifications apply to all experiments placed in the reactor tank.

Objective

The objective of these specifications is to define a set of criteria for experiments to ensure the safety of the reactor and personnel.

Specifications

1. No new experiment shall be performed until a written procedure that has been developed to permit good understanding of the safety aspects is reviewed and approved by the Nuclear Safety Review Board (NSRB) and approved by the Operations Supervisor. Experiments that fall in the general category, but with minor deviations from those previously performed, may be approved directly by the Operations Supervisor.
2. No experiment shall be conducted if the associated experimental equipment could interfere with the control rod functions or with the safety functions of the nuclear instrumentation.
3. For movable experiments with an absolute worth greater than 0.35\$, the maximum reactivity change for withdrawal and insertion shall be 0.20\$/sec.

Moving parts worth less than 0.35\$ may be oscillated at higher frequencies in the core.

4. The maximum positive step insertion of reactivity that can be caused by an experimental accident or experimental equipment failure of a movable or unsecured experiment shall not exceed 0.60\$.
5. Experiments shall not contain materials which can cause a violent chemical reaction. Unencapsulated experiments shall not contain a material that may produce significant airborne radioactivity. Encapsulated experiments may contain materials that can cause a minor release of airborne radioactivity, subject to the limits in Technical Specifications section 3.8.8.
6. Experiments containing known explosives or highly flammable materials shall not be installed in the reactor.
7. All experiments that corrode easily and are in contact with the moderator shall be encapsulated within corrosion resistant containers.
8. All experiments containing radioactive material shall be evaluated for their potential release of airborne radioactivity and limits shall be established for the permissible concentration of radioisotopes in the experiments such that a complete release of all gaseous, volatile, or particulate constituents to the reactor room air would not exceed the limitations for exposure of individuals in restricted or unrestricted areas.

Bases

The basic experiments to be performed in the reactor programs are described in the Safety Analysis Report (SAR). The present programs are oriented toward reactor operator training, the instruction of students, and with such research and development as is permitted under the terms of the facility license. To ensure that all experiments are well planned and evaluated prior to being performed, detailed written procedures for all new experiments must be reviewed by the NSRB and approved by the Operations Supervisor.

Since the control rods enter the core by gravity and are required by other technical specifications to be operable, no equipment should be allowed to interfere with their functions. To ensure that specified power limits are not exceeded, the nuclear instrumentation must be capable of accurately monitoring core parameters.

All new reactor experiments are reviewed and approved prior to their performance to ensure that the experimental techniques and procedures are safe and proper and that the hazards from possible accidents are minimal. A maximum reactivity change is established for the remote positioning and for oscillation of experimental samples and devices during reactor operations to ensure that the reactor controls are readily capable of controlling the reactor.

All experimental apparatus placed in the reactor must be properly secured. In consideration of potential accidents, the reactivity effect of movable apparatus must be limited to the maximum accidental step reactivity insertion analyzed. This corresponds

to a 0.60\$ positive step while operating at full power followed by one failure in the reactor safety system.

Restrictions on irradiations of explosives and highly flammable materials are imposed to minimize the possibility of explosion of fires in the vicinity of the reactor.

To minimize the possibility of exposing facility personnel or the public to radioactive materials, no experiment will be performed with materials that could result in a violent chemical reaction, produce airborne activity in excess of the limits of TS §3.8.8 or cause a corrosive attack on the fuel cladding.

Specification 8 will ensure that the quantities of radioactive materials contained in experiments will be so limited that their failure will not result in exposures to individuals in restricted or unrestricted areas to exceed the maximum allowable exposures stated in 10 CFR 20. The restricted area maximum is defined in 10 CFR 20.1201 through 10 CFR 20.1204. The unrestricted area maximum is defined in 10 CFR 20.1301 and 10 CFR 20.1302.

3.9 Facility-specific Limiting Conditions for Operations

Applicability

The limiting conditions for operations presented in this section are applicable at any time the reactor is not secured.

Objective

To prevent inadvertent addition of reactivity to the core and radiation exposure to facility personnel.

Specification

All fuel transfers shall be conducted under the direction of a licensed senior reactor operator.

Operating personnel shall be familiar with health physics procedures and monitoring techniques, and shall monitor the operation with appropriate radiation instrumentation.

For a completely unknown or untested core, fuel loading shall follow the inverse multiplication approach to criticality and, thereafter, meet Specification 4.2. Should any interruption of the loading occur (more than four days), all fuel elements except the initial loading step shall be removed from the core in reverse sequence and the operation repeated.

For a known core, up to a quadrant of fuel pins may be removed from the core or a single stationary fuel pin be replaced with another stationary pin only under the following conditions:

1. The net change in reactivity has been previously determined by measurement or calculation to be negative or less than 0.20\$;
2. The reactor is subcritical by at least 1.00\$ in reactivity;
3. There is initially only one vacant position within the active fuel lattice;

4. The nuclear instrumentation is on scale and the dump valve is not bypassed; and
5. The critical rod bank position is checked after the operation is complete.

Bases

The Basis for fuel transfers being monitored by a licensed senior reactor operator is to ensure that the fuel transfers are performed in accordance with facility specifications. During movement of fuel, the basis for radiation monitoring is to provide indication of the level of radioactivity in the vicinity of the fuel and core. The basis for limiting the re-arrangement of fuel is to prevent inadvertent insertion of excess reactivity above the 0.60\$ limit and to ensure adequate shutdown reactivity exists,

4. SURVEILLANCE REQUIREMENTS

4.1 Reactor Core Parameters

Applicability

These specifications apply to the verification of shutdown reactivity, reactivity worth of fuel, and reactor power levels that pertain to reactor control.

Objective

The purpose of these specifications is to ensure that the analytical bases are and remain valid and that the reactor is safely operated.

Specifications

The following parameters shall be determined during the initial testing of an unknown or previously untested core configuration:

- a. excess reactivity;
- b. worth of most reactive fuel pin;
- c. reactor power measurement; and
- d. shutdown reactivity.

Bases

Measurements of the above parameters are made when a new reactor configuration is assembled. Whenever the core configuration is altered to result in an unknown or untested configuration, the core parameters are evaluated to ensure that they are within the limits of these specifications and the values analyzed in the SAR. During this test period of the reactor, measurements are performed using the approved experimental procedures.

The excess reactivity measurement is made to verify that this configuration is not subject to a reactivity addition accident more severe than that analyzed and described in the SAR, Section 13.2.

This same accident assumes a scram signal at a maximum power level of 100 watts indicated so it is necessary to measure reactor power and make any necessary adjustments to the instrumentation that indicates reactor power. The scram signals are based in detector current while the visual display is in watts. The high current scram must be verified to not exceed an indicated 100 watts.

Lastly, the accident analysis assumes the reactor is shutdown by at least 1.00\$ reactivity after the high current scram occurs. Shutdown reactivity is also measured to ensure the reactor meets the definition of shutdown when all control rods are bottomed.

4.2 Reactor Control and Safety Systems

Applicability

These specifications apply to the surveillance of the safety and control apparatus and instrumentation of the facility.

Objective

The purpose of these specifications is to ensure that the safety and control equipment is operable and will function as required in Technical Specification 3.2.

Specifications

1. The total control rod drop time, including instrument response time shall be measured semiannually to verify that the requirements of Specification 3.2, Item 3, are met.
2. The moderator-reflector water dump time shall be measured semiannually to verify that the requirement of Specification 3.2, Item 4, is met.
3. All safety system channels shall be calibrated annually.
4. A channel test of the safety system channels (intermediate, and power range instruments) and a visual inspection of the reactor shall be performed daily prior to reactor startup. The interlock system shall be checked daily prior to reactor startup to satisfy rod drive permit. These systems shall be rechecked following a shutdown in excess of 8 hours.
5. The moderator-reflector water height shall be checked visually prior to reactor startup to verify that the requirements of Specification 3.2, Item 5, are met.
6. These tests may be waived when the instrument, component, or system is not required to be operable, but the instrument, component or system shall be tested prior to being declared operable.

Bases

Past performance of control rods and control rod drives and the moderator-reflector water fill and dump valve system have demonstrated that testing semiannually is adequate to ensure compliance with Specification 3.2, Items 3 and 4.

Visual inspection of the reactor components, including the control rods, prior to each day's operation, is to ensure that the components have not been damaged and that the core is in the proper condition. Redundant safety channels are provided by having three

independent channels provide high current scrams if necessary and by requiring all three channels be operable. The analysis of the most severe accident shows no fuel damage even if one channel fails. Random failures should not jeopardize the ability of the overall system to perform its required functions. The interlock system for the reactor is designed so that its failure places the system in a safe or non-operating condition. However, to ensure that failures in the safety channels and interlock system are detected as soon as possible, frequent surveillance is desirable and thus specified. All of the above procedures are enumerated in the daily startup checklist.

Past experience has indicated that, in conjunction with the daily check, calibration of the safety channels annually ensures the proper accuracy is maintained.

4.3 Coolant Systems

Applicability

These specifications apply to moderator in the storage tank or reactor tank.

Objective

The purpose of these specifications is to ensure the continued validity of radiation protection standards in the facility.

Specification

Analyze moderator for radioactivity prior to discharge to the environment.

Bases

Experience has demonstrated that the moderator does not accumulate radioactive material due to the low operating neutron fluence. Therefore, periodic monitoring is not necessary. Verification is necessary, however, prior to discharge to the environment.

4.4 Containment or Confinement – None required

4.5 Ventilation Systems – None required

4.6 Emergency Power – None required

4.7 Radiation Monitoring

Applicability

These specifications apply to the surveillance of the area radiation monitoring equipment and all portable radiation monitoring instruments.

Objective

The purpose of these specifications is to ensure the continued validity of radiation protection standards in the facility.

Specification

The criticality detector system, and area gamma monitors shall be tested with a radiation source at least monthly and daily if the reactor is operated and calibrated semiannually. Portable instruments shall be calibrated annually.

Bases

Experience has demonstrated that calibration of the criticality detectors and gamma monitors semiannually is adequate to ensure that significant deterioration in accuracy does not occur. Furthermore, the operability of these radiation monitors is included in the daily pre-startup checklist. If the reactor is not operated for more than a month, the instruments are required to be checked to ensure operability. Portable instruments are calibrated at the manufacturer recommended frequency.

4.8 Experiments – None required

4.9 Facility-specific Surveillance Requirements – None required

5. DESIGN FEATURES

5.1 Site and Facility Description

Applicability

These specifications apply to the design of the RCF and the surrounding site.

Objective

The purpose of these specifications is to provide a layout of the site and the structures that contain the reactor in a means to protect personnel.

Specification

The facility is located on a site situated on the south bank of the Mohawk River in the City of Schenectady. An inner fence of greater than 30 feet radius defines the restricted area. An outer fence and riverbank of greater than 50 feet radius defines the exclusion area.

The facility is housed in the reactor building. The security of the facility is maintained by the use of two fences; one at the site boundary and the other defining the restricted area around the reactor building itself.

The reactor room is a 12-inch reinforced concrete enclosure with approximate floor dimensions of 40x30 feet. The height from the ground floor to the ceiling shall be about 30 feet. The roof is a steel deck covered by 2 inches of lightweight concrete, five plies of felt and asphalt, with a gravel surface. Access to the reactor room is through a sliding fireproof steel door that also contains a smaller personnel door. Near the center of the room is a pit 14.5 x 19.5 feet wide and 12 feet deep with a floor of 18-inch concrete. This part contains the 3500 gallon water storage tank and other piping and auxiliary equipment.

Bases

The inner and outer fences provide for the security of the facility. The sliding steel access door provides a means to move equipment into and out of the reactor room. The smaller personnel door permits personnel access without sliding the door out of position.

The 3500 gallon water storage tank allows for the storage of approximately 2000 gallons needed to fill the reactor tank for operations with an additional volume to maintain net positive suction head for the reactor fill pump.

5.2 Reactor Coolant System

Applicability

These specifications apply to design of the reactor tank and the methods by which the tank can be dumped or filled.

Objective

The purpose of these specifications is to demonstrate the size of the reactor tank and its connection to the water tank and how the water is to be introduced into or removed from the reactor tank.

Specification

The reactor core is installed in a stainless steel reactor tank that has a capacity of approximately 2000 gallons of water. The tank nominal dimensions are 7 feet in diameter and 7 feet high. The tank is supported at floor level above the reactor room by 8-inch steel I-beams. There are no side penetrations in the reactor tank.

The reactor tank is connected to the water storage tank via a six-inch quick dump line. Therefore, it is required that the storage tank be vented to the atmosphere such that its freeboard volume can always contain all water in the primary system. The water handling system allows remote filling and emptying of the reactor tank. It provides for a water dump by means of a failsafe butterfly-type gate valve when a reactor scram is initiated. The filling system shall be controlled by the operator, who must satisfy the sequential interlock system before adding water to the tank. A pump is provided to add the moderator-reflector water from the storage dump tank into the reactor tank. A fill rate of about 50 gpm is provided. A nominal six-inch valve is installed in the dump line and has the capability of emptying the reactor tank on demand of the operator or when a reactor scram is initiated, unless bypassed with the approval of the licensed senior operator on duty. A valve is installed in the bottom drain line of the reactor tank to provide for completely emptying the reactor tank.

Bases

The capacity of the reactor tank is adequate to contain the core support structure, lattice plates, detectors, control rods, immersion heaters, and agitator, while still providing adequate moderation and reflector savings for the core. The 6-inch dump line and fail-safe butterfly valve provide for rapidly draining the moderator from the reactor tank to the storage tank in the event of a scram. The fill rate of approximately 50 gpm allows for completing the reactor tank fill in a reasonable amount of time. The sequential interlock system prevents the simultaneous addition of moderator with control rod withdrawal.

5.3 Reactor Core and Fuel

Applicability

These specifications apply to the makeup of the fuel pellets and the support structure that contains the fuel.

Objective

The purpose of these specifications is to provide a detailed makeup of the fuel composition and to give the fuel pin design and configuration with support structures.

Specification

The reactor core shall consist of uranium fuel in the form of 4.81 weight percent or less enriched UO_2 pellets in metal cladding, arranged in roughly a cylindrical fashion with four control rods placed symmetrically about the core periphery. The total core configuration and the arrangement of individual fuel pins, including any experiment, shall comply with the requirements of these Technical Specifications found in Sections 3.1 and 3.2 of this license. The core shall consist of all SPERT (F-1) fuel described in 5.4.3.

The fuel pins are supported and positioned on a fuel pin support plate, drilled with holes to accept tips on the end of each pin. The support plate rests on a carrier plate, which forms the base of a three-tiered overall core support structure. An upper fuel lattice plate rests on the top plate, and both are drilled through with holes with the prescribed arrangement to accommodate the upper ends of the fuel pins. The lower fuel pin support plate, a middle plate, and the upper fuel pin lattice plate are secured with tie rods and bolts. The entire core structure is supported vertically and anchored by four posts set in the floor of the reactor tank.

Core fuel pins to be utilized are 4.81 weight percent enriched SPERT (F-1) fuel rods. Each fuel rod is made up of sintered UO_2 pellets, encased in a stainless steel tube, capped on both ends with a stainless steel cap and held in place with a chromium nickel spring. Gas gaps to accommodate fuel expansion are also provided at both the upper end and around the fuel pellets. Figure 4.5 of the SAR depicts a single fuel pin and its pertinent dimensions. NUREG-1281 describes these fuel pins in additional detail.

Four control rod assemblies are installed, spaced 90 degrees apart at the core periphery. Each rod consists of a 6.99-cm square stainless steel tube, which passes through the core and rests on a hydraulic buffer on the bottom carrier plate of the support structure.

Housed in each of these "baskets" are two neutron-absorber sections, one positioned above the other as depicted in Figure 4.6 of the SAR

Bases

The basis for the fuel pin specifications comes from the SPERT fuel pin description in NUREG-1281. The support structure and lattice plates are designed to support a nominal core load of fuel pins and the four perimeter control rods. The control rod absorber sections are arranged such that the combination of the four rods meet the values given in Table 13.2 of the SAR, with regard to reactivity with one stuck rod and shutdown reactivity.

The total core configuration and the arrangement of individual fuel pins, including any experiment, shall comply with the requirements of these Technical Specifications found

in Sections 3.1 and 3.2 of this license. The core shall consist of all SPERT (F-1) fuel described in 5.4.3. Depictions of the core support structure as seen in the SAR demonstrate its effectiveness and all components are composed of stainless steel, eliminating the risk of corrosion. Fuel pins have been qualified by the DOE and NRC in accordance with their standards details of compositions and a depiction of the fuel pins can be found in the SAR. The design criteria of the fuel pins was set to minimize the risk of fission product release. The enriched boron absorber sections are strategically positioned one above the other, as seen in Figure 4.6 of the SAR. In the end, each of the four rods has approximately the same reactivity effect.

5.4 Fissionable Material Storage

Applicability

These specifications apply to the storage of fuel not loaded in the reactor core.

Objective

The purpose of these specifications is to define the storage of fuel when it is not needed in the reactor core and what precautions are taken to keep the stored fuel from becoming critical.

Specification

When not in use, the SPERT (F-1) fuel shall be stored within the storage vault located in the reactor room. The vault shall be closed by a locked door and shall be provided with a criticality monitor near the vault door. The fuel shall be stored in cadmium clad steel tubes with no more than 1 kg fuel per tube mounted on a steel wall rack. A storage tube in the storage vault cannot contain more than 15 SPERT (F-1) fuel pins at any time. The center-to-center spacing of the storage tubes, together with the cadmium clad steel tubes, ensures that the infinite multiplication factor is less than 0.9 when the vault is fully flooded with water.

Bases

Fuel not loaded in the reactor is stored in the fuel vault for security and for criticality safety. The spacing of the tubes, the limit of 15 pins per storage tube, and the cadmium sheet wrapped on the storage tube ensure conditions in the vault remain subcritical in the event of a complete flood of the vault. The criticality monitor provides for indication of an inadvertent criticality in the fuel vault.

6. ADMINISTRATIVE CONTROLS

6.1 Organization

Structure

The organization for the management and operation of the reactor facility shall include the structure indicated in Figure 6.1.

- Level 1: The Dean, School of Engineering, appoints the Chair, Nuclear Safety Review Board.
- Level 2: The Facility Director reports to the Chair, Mechanical, Aerospace and Nuclear Engineering for administrative purposes.
- Level 3: The Operations Supervisor reports to the Facility Director.
- Level 4: Licensed operators and senior operators are the operating staff and report to the Facility Director for administrative purposes.

Responsibility

The Dean, School of Engineering, is responsible for the facility license and appoints the Chair, Nuclear Safety Review Board. The Facility Director is responsible for facility administration and safety. The Operations Supervisor is responsible for the day-to-day safety and operation of the facility.

The RPI Radiation Safety Officer (RSO) who is organizationally independent of the reactor operations group shall provide advice as required by the Facility Director and the Operations Supervisor in matters concerning radiological safety. The RSO also has interdiction responsibility and authority.

Staffing

- (a) The minimal staffing when the reactor is not shutdown as described in these specifications shall be:
 - 1) An operator or senior operator licensed pursuant to 10 CFR 55 present at the controls.
 - 2) One other person in the control room certified by the senior reactor operator on duty as qualified to activate manual scram and initiate emergency procedures. This person is not required if an operator and a senior operator are in the control room.
 - 3) A licensed senior operator shall be present or readily available on call. The identity of and method for rapidly contacting the licensed senior operator on call shall be known to the operator.
- (b) The minimal staffing when the reactor is shutdown, but not in safe shutdown is a senior reactor operator in the control room and a second senior reactor operator present or readily available on call.
- (c) A list of reactor facility personnel by name and telephone number shall be readily available in the control room for use by the operator. The list must include:
 - 1) Management personnel.
 - 2) Radiation safety personnel.
 - 3) Other operations personnel.
- (d) Events requiring the direction of the Operations Supervisor:

- 1) All fuel or control rod relocations within the reactor core unless the activity is part of an approved experiment.
- 2) Recovery from unplanned or unscheduled shutdown.

Selection and Training of Personnel

The selection, training and requalification of operations personnel shall meet or exceed the requirements of American National Standard for Selection and Training of Personnel for Research Reactors, ANSI/ANS-15.4-1988, Sections 4-6.

Additionally, the minimum requirements for the Operations Supervisor are at least four years of reactor operating experience and possession of a Senior Operator License for the RPI Critical Facility. Years spent in baccalaureate or graduate study may be substituted for operating experience on a one-for-one basis up to a maximum of two years.

6.2 Review and Audit

A Nuclear Safety Review Board (NSRB) shall review and audit reactor operations and advise the Facility Director in matters relating to the health and safety of the public and the safety of facility operations.

Composition and Qualifications

The NSRB shall be appointed by the Dean School of Engineering in accordance with the NSRB Charter.

Charter and Rules

The NSRB Charter shall describe the composition of the board. The NSRB shall function under the following rules:

- (a) The NSRB shall meet at least semiannually.
- (b) The quorum shall consist of not less than a majority of the full NSRB and shall include the Chairman or his designated alternate.
- (c) Minutes of each NSRB meeting shall be distributed to the Dean, NSRB members, and such others as the Chairman may designate.

Review Function

The following items shall be reviewed and approved by the NSRB before implementation:

- (a) Proposed experiments and tests utilizing the reactor facility that are significantly different from tests and experiments previously performed at the facility.
- (b) Reportable occurrences.
- (c) Proposed changes to the Technical Specifications and proposed amendments to facility license.
- (d) Operating, Emergency and Surveillance procedures.

Audit Function

- (a) The audit function shall include selective (but comprehensive) examination of operating records, logs, and other documents. Where necessary, discussions with cognizant personnel shall take place. In no case shall the individual immediately responsible for the area audit in the area. The following areas shall be audited at least annually.
- (b) Reactor operations and reactor operational records for compliance with internal rules, regulations, procedures, and with licensed provisions;
- (c) Existing operating procedures for adequacy and to ensure that they achieve their intended purpose in light of any changes since their implementation;
- (d) Plant equipment performance with particular attention to operating anomalies, abnormal occurrences, and the steps taken to identify and correct their use.

6.3 Radiation Safety

The Radiation and Nuclear Safety Committee and the Radiation Safety Officer shall be responsible for the implementation of the Radiation Safety Program for the RCF. The primary purpose of the program is to assure radiological safety for all University personnel and the surrounding community.

AS LOW AS IS REASONABLY ACHIEVABLE (ALARA) PROGRAM

Control of ionizing radiation exposure is based on the assumption that any exposure involves some risk. However, occupational exposure within accepted limits represents a very small risk compared to the other risks voluntarily encountered in other work environments.

The policy of RPI is to maintain occupational exposures of individuals to be well within allowable limits as are defined in the appropriate regulations. The individual and collective dose to workers is maintained as low as reasonably achievable (ALARA).

ALARA is a part of the normal work process where people are working with ionizing radiation. Management at all levels, as well as each individual worker, must take an active role in minimizing this radiation exposure.

Exposures at the facility are routinely reviewed by the Radiation Safety Officer and Radiation and Nuclear Safety Committee to ensure that proper radiation safety procedures are in place and ALARA is maintained.

6.4 Procedures

Written procedures shall be prepared, reviewed and approved prior to initiating any of the activities listed in this section. The procedures, including applicable check lists, shall be reviewed by the NSRB and followed for the following operations:

- 1) Startup, operation and shut down of the reactor.
- 2) Installation and removal of fuel pins, control rods, experiments, and experimental facilities.

- 3) Corrective actions to be taken to correct specific and foreseen malfunctions such as for power failures, reactor scrams, radiation emergency, responses to alarms, moderator leaks and abnormal reactivity changes.
- 4) Periodic surveillance of reactor instrumentation and safety systems, area monitors, and continuous air monitors.
- 5) Implementation of the facility security plan.
- 6) Implementation of facility emergency plan in accordance with 10 CFR 50, Appendix E.
- 7) Maintenance procedures that could have an effect on reactor safety.

Substantive changes to the above procedures shall be made only with the prior approval of the NSRB. Temporary changes to the procedures that do not change their original intent may be made with the approval of the Operations Supervisor. All such temporary changes to the procedures shall be documented and subsequently reviewed by the NSRB.

6.5 Experiment Review and Approval

- 1) All new experiments or classes of experiments that might involve an unreviewed safety question shall be reviewed by the NSRB. NSRB approval shall ensure that compliance with the requirements of the license technical specifications and 10 CFR50.59 and shall be documented. A licensee shall obtain a license amendment pursuant to Sec. 50.90 prior to implementing a proposed change, test, or experiment if the change, test, or experiment would:
 - (a) Result in more than a minimal increase in the frequency of occurrence of an accident previously evaluated in the final SAR;
 - (b) Result in more than a minimal increase in the likelihood of occurrence of a malfunction of a structure, system, or component (SSC) important to safety previously evaluated in the final SAR;
 - (c) Result in more than a minimal increase in the consequences of an accident previously evaluated in the final safety analysis report;
 - (d) Result in more than a minimal increase in the consequences of a malfunction of an SSC important to safety previously evaluated in the final safety analysis report;
 - (e) Create a possibility for an accident of a different and potentially more severe than any previously evaluated in the final SAR;
 - (f) Create a possibility for a malfunction of an SSC important to safety with a different result than any previously evaluated in the final SAR;
 - (g) Result in a design basis limit for a fission product barrier as described in the SAR being exceeded or altered; or

- (h) Result in a departure from a method of evaluation described in the SAR used in establishing the design bases or in the safety analyses.
- 2) Substantive changes to previously approved experiments shall be made only after review and approval in writing by NSRB. Minor changes that do not significantly alter the experiment may be approved by the Operations Supervisor.
- 3) Approved experiments shall be carried out in accordance with established approved procedures.
- 4) Prior to review, an experiment plan or proposal shall be prepared describing the experiment, including any safety considerations.
- 5) Review comments of the NSRB setting forth any conditions and/or limitations shall be documented in committee minutes and submitted to the Facility Director.

6.6 Required Actions in the Event of a Safety Limit Violation

- 1) The reactor shall be shutdown and reactor operations shall not be resumed until authorized by the Nuclear Regulatory Commission.
- 2) The safety limit violation shall be promptly reported to Facility Director or designated alternates and to the NSRB.
- 3) The safety limit violation shall be reported to the Nuclear Regulatory Commission in accordance with Section 6.8.2.
- 4) A safety limit violation report shall be prepared. The report shall describe the following:
 - a. Applicable circumstances leading to the violation including, when known, the cause and contributing factors.
 - b. Effect of the violation upon reactor facility components, systems, or structures and on the health and safety of personnel and the public.
 - c. Corrective action to be taken to prevent reoccurrence.

The report shall be reviewed by the NSRB and any follow-up report shall be submitted to the Nuclear Regulatory Commission when authorization is sought to resume operation of the reactor.

6.7 Required Actions in the Event of a Reportable Occurrence

- 1) The reactor shall be shut down. Operations shall not be resumed unless authorized by the Chair, NSRB.
- 2) Occurrence shall be reported to the Facility Director or designated alternate, the NSRB and to the NRC not later than the following working day by telephone and confirmed in writing to licensing authorities, to be followed by a written report that describes the circumstances of the event within 14 days of the event.

- 3) All such conditions, including action taken to prevent or reduce the probability of a recurrence, shall be reviewed by the NSRB. The NSRB shall concur with corrective actions.

6.8 Reports

In addition to the requirements of applicable regulations, and in no way substituting therefore, all written reports shall be sent to the U.S. Nuclear Regulatory Commission, Attn: Document Control Desk, Washington, D.C. 20555, with a copy to the Region I Administrator.

Operating Reports

A written report covering the previous year shall be submitted by March 1 of each year. It shall include the following:

- (a) Operations Summary. A summary of operating experience occurring during the reporting period that relates to the safe operation of the facility, including:
 - 1) Changes in facility design;
 - 2) Performance characteristics (e.g., equipment and fuel performance);
 - 3) Changes in operating procedures that relate to the safety of facility operations;
 - 4) Results of surveillance tests and inspections required by these Technical Specifications;
 - 5) A brief summary of those changes, tests, and experiments that require authorization from the Commission pursuant to 10 CFR 50.59, and;
 - 6) Changes in the plant operating staff serving in the following positions:
 - a) Facility Director;
 - b) Operations Supervisor;
 - c) RSO;
 - d) Nuclear Safety Review Board Members.
- (b) Power Generation. A tabulation of the integrated thermal power during the reporting period.
- (c) Shutdowns. A listing of unscheduled shutdowns that have occurred during the reporting period, tabulated according to cause, and a brief description of the preventive action taken to prevent recurrence.
- (d) Maintenance. A tabulation of corrective maintenance (including major preventative maintenance) performed during the reporting period on safety related systems and components.
- (e) Changes, Tests and Experiments. A brief description and a summary of the safety evaluation for all changes, tests, and experiments that were carried out without prior Commission approval pursuant to the requirements of 10 CFR Part 50.59.

- (f) A summary of the nature, amount and maximum concentrations of radioactive effluents released or discharged to the environs beyond the effective control of the licensee as measured at or prior to the point of such release or discharge.
- (g) Radioactive Monitoring. A summary of the TLD dose rates taken at the exclusion area boundary and the site boundary during the reporting period.
- (h) Occupational Personnel Radiation Exposure. A summary of radiation exposures greater than 25% of the values allowed by 10 CFR 20 received during the reporting period by facility personnel (faculty, students or experimenters) and visitors.

Special Reports

- (a) Reportable Operational Occurrence Reports. Notification shall be made within 24 hours by telephone in accordance with 10CFR50.36(c)(7) followed by a written report in accordance with 10CFR50.36(c)(5) within 10 days in the event of a reportable operational occurrence as defined in Section 1.3. The written report on these reportable operational occurrences, and to the extent possible, the preliminary telephone and e-mail notification shall: (1) describe, analyze, and evaluate safety implications; (2) outline the measures taken to ensure that the cause of the condition is determined; (3) indicate the corrective action (including any changes made to the procedures and to the quality assurance program) taken to prevent repetition of the occurrence and of similar occurrences involving similar components or systems; and (4) evaluate the safety implications of the incident in light of the cumulative experience obtained from the record of previous failures and malfunctions of similar systems and components.
- (b) Unusual events. A written report in accordance with 10CFR50.36(c)(5) shall be submitted as specified in 10CFR 50.4 within 30 days in the event of discovery of any substantial errors in the transient or accident analyses or in the methods used for such analyses, as described in the SAR or in the bases for the Technical Specifications.
- (c) Key changes in Organization. A written report in accordance with 10CFR50.36(c)(5) submitted as specified in 10CFR 50.4 shall be provided for any change in Level 1 or Level 2 personnel.

6.9 Operating Records

The following records and logs shall be maintained at the RCF or at RPI for at least five years.

- (a) Normal facility operation (except retain checklists for one year) and principal maintenance operations;
- (b) reportable occurrences;
- (c) tests, checks, and measurements documenting compliance with surveillance requirements;
- (d) experiments performed with the reactor;

- (e) fuel shipments, inventories, and receipts;
- (f) reactor facility radiation and contamination surveys;
- (g) approved changes to operating procedures;
- (h) records of NSRB meetings and audits.

Records to be retained for at least one certification cycle

Records of training or retraining of certified operations personnel shall be maintained at all times the individual is employed or until the certification is renewed.

The following records and logs shall be maintained at the RCF or at RPI for the life of the RCF.

- (a) gaseous and liquid radioactive releases from the facility;
- (b) TLD environmental monitoring systems;
- (c) radiation exposures for all RPI Critical Facility personnel (students and experimenters) and visitors;
- (d) the present as-built facility drawings and new updated or corrected versions.

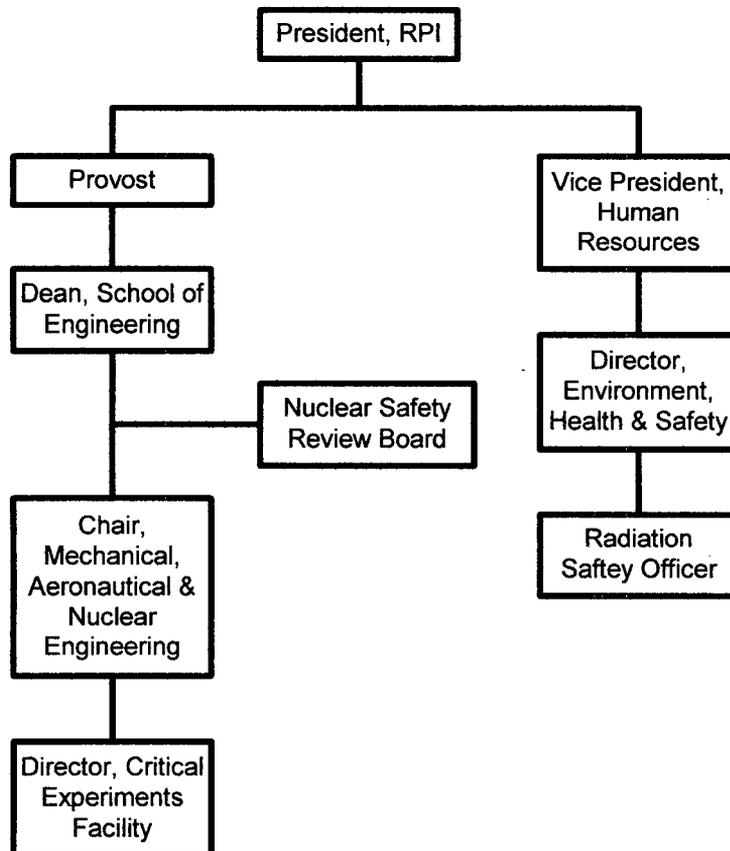


Figure 6.1: RCF Management Organization

Financial Qualifications

1. Pursuant to 10 CFR 50.33(d), "Contents of applications; general information," certain information is required by the applicant, Rensselaer Polytechnic Institute (RPI). To comply with the regulation, please update the application to include the names, addresses and citizenship of RPI's directors (Board of Trustees) and principal officers. Also, please state whether RPI is owned, controlled, or dominated by an alien, foreign corporation, or foreign government, and if so give details.

RPI Response – RPI is a New York corporation principally doing business in New York. The corporation is not owned, controlled, or dominated by an alien, a foreign corporation, or a foreign government. RPI is certified by the Internal Revenue Service as a IRC 501(c)(3) organization. A copy of the IRS certification is attached.

Trustees of Rensselaer Polytechnic Institute

Name	Address	Citizenship
Stephen Barre	Servo Corporation of America, 123 Frost Street, Westbury, NY 11590-5026	USA
Cornelius J. Barton	2 Guardhouse Drive, Redding, CT 06896-1827	USA
Thomas R. Baruch	CMEA Ventures, One Embarcadero Center, Suite 3250, San Francisco, CA 94111	USA
John H. Broadbent, Jr.	One Chestnut Hill Drive, Mohnton, PA 19540-9313	USA
George Campbell, Jr.	Cooper Union for the Advancement of Science and Art, 30 Cooper Square, 7 East 7th Street, 7th Floor, New York, NY 10003-7120	USA
John W. Carr, Esq.	Simpson Thacher & Bartlett, LLP, 425 Lexington Avenue, New York, NY 10017	USA
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Nicholas M. Donofrio	NMD Consulting, LLC, P O Box 428, Richfield, CT 06453	USA
Arthur J. Gajarsa	U.S. Court of Appeals, The National Courts Building, Suite 814, 717 Madison Place, NW, Washington, DC 20439	USA
Arthur Golden	Davis, Polk and Wardwell, 450 Lexington Ave, New York, NY 10017	USA
Samuel Frank Heffner	Dickinson-Heffner, Inc., P.O. Box 8691, BWI Airport, Baltimore, MD 21240-0691	USA
Michael E. Herman	Herman Family Trading Company, 6201 Ward Parkway, Kansas City, MO 64113	USA
David M. Hirsch	Mustang Partners, LLC, 170 Westminster Street Suite 1050, Providence, RI 02903	USA
Thomas N. Iovino	Judlau Contracting, 26-15 Ulmer Street, College Point, New York 11354-1137	USA
Jeffrey L. Kodosky	National Instruments – Res. & Dev., 11500 North Mopac, Austin, TX 78759	USA

Name	Address	Citizenship
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Paul J. Severino	680 Strawberry Hill Road, Concord, MA 01742-5406	USA
Paula Loring Simon	Wildlife Conservation Society, 2300 Southern Boulevard, Bronx, NY 10460	USA
Jackson P. Tai	75 Lower Cross Road, Greenwich, CT 06831	USA
G. Robert Tod	5 Ebb Tide Drive, Cumberland Foreside, ME 04110	USA
Harry Tutunjian	One Monument Square, City Hall, Troy, NY 12180-3276	USA
Ed Zander	9 Vasquez Trail, Carmel, CA 93923	USA
Admiral Ronald J. Zlatoper	The Estate of James Campbell, 900 Fort Street Mall, Suite 1115, Honolulu, Hawaii 96813	USA

Officers of Rensselaer Polytechnic Institute

Shirley Ann Jackson, President

Robert Palazzo, Provost

Charles Carletta, Secretary of the Institute and General Counsel

Laban Coblenz, Chief of Staff and Associate Vice President for Policy and Planning

Virginia Gregg, Vice President, Finance

John Kolb, Vice President for Information Services and Technology and Chief Information Officer

Eddie Ade Knowles, Vice President, Student Life

John Minasian, Vice President and Dean, Rensselaer Hartford Campus

Paul Marthers, Vice President, Enrollment, and Dean, Undergraduate and Graduate Admissions

Curtis Powell, Vice President, Human Resources

Claude Rounds, Vice President, Administration

Francine Berman, Vice President, Research

Brenda Wilson-Hale, Vice President, Institute Advancement

William Walker, Vice President, Strategic Communications and External Relations

All officers are US citizens. The RPI business address to use for all officers is:

Rensselaer Polytechnic Institute
110 8th St.
Troy, NY 12180

2. The U. S. Nuclear Regulatory Commission (NRC) staff will analyze the financial statements for the current year, which are required by 10 CFR 50.71(b), to determine if the applicant is financially qualified to operate the RPI RCF. Since RPI's financial statements are out of date, please provide a copy of the latest annual financial statements for the NRC staff's review.

RPI Response – FY 2009 audited financial statements attached (pdf file)

3. Pursuant to 10 CFR 50.33(f)(2), “[t]he applicant shall submit estimates for total annual operating costs for each of the first five years of operations of the facility.” Since the information included in the 2002 application, and RPI's RAI response dated July 21, 2008, is now out of date, please update the application by providing the following additional information:

(a) Projected operating costs of the RPI RCF for each of the years FY2011 through FY2015 (the first five year period after the projected license renewal).

(b) RPI's source(s) of funding to cover the operating costs for the above-mentioned fiscal year.

RPI Response – The RCF operating cost projections for 2011 – 2015 are below. A labor cost adjustment of 5% per year has been applied and a 10% adjustment per year has been applied to Other costs, of which utilities makes up the vast majority. The additional miscellaneous costs in that section are too small to track within the Mechanical, Aerospace, and Nuclear Engineering (MANE) Department budget.

Year	Labor	Other
2011	\$22,000	\$10,000
2012	\$23,100	\$11,000
2013	\$24,255	\$12,100
2014	\$25,468	\$13,310
2015	\$26,741	\$14,641

The labor and miscellaneous costs are supported by the MANE Department budget. The cost for utilities is managed through the Physical Facilities budget as part of the overall Institute utilities costs.

4. RPI indicates in its July 21, 2008, RAI response that the cost for decommissioning the RPI RCF was \$390,692.19 in 2008 dollars. NRC RAI 4(c) to RPI dated May 28, 2008, requested that RPI provide a description and bases of the means of adjusting the cost estimate and associated funding level periodically over the life of the facility to comply with 10 CFR 50.75(d). The NRC staff also requested that RPI provide a numerical example showing how the cost estimate will be updated periodically. In order to complete the financial qualifications review, the NRC staff needs the following information based upon estimated license renewal in fiscal year 2010:

(a) A current decommissioning cost estimate in 2010 dollars for the RPI RCF (to meet the NRC's radiological release criteria for decommissioning the facility for unrestricted use). Provide the basis for how the cost estimate was developed, showing costs, in current dollar amounts, specifically broken down into the categories of labor, waste disposal, other items (i.e., equipment and supplies), and a contingency factor (normally 25 percent) pursuant to 10 CFR 50.75(d)(2).

(b) A description of the means of adjusting the cost estimate and associated funding level periodically over the life of the facility, to comply with 10 CFR 50.75(d)(2)(iii). Also, please provide a detailed numerical example showing how the 2010 decommissioning cost estimate will be updated periodically in the future.

RPI Response – The anticipated costs for decommissioning in 2010 dollars, based upon reasonably conservative assumptions about characterization needs and waste disposal volume are:

	Reactor Critical Facility	
Labor	\$	168,600.00
Waste Disposal	\$	149,060.00
Other (Equipment and Supplies)	\$	37,983.03
Total Decommissioning Cost with 25% Contingency	\$	444,553.78

The decommissioning method used will be decontamination of the primary structure and disposal of appropriate equipment. Waste disposal cost estimates are based upon disposal of the primary reactor components at Clive, UT. Labor costs cover both characterization and disposal operations and are based upon prevailing wages for each category of worker.

The decommissioning cost estimate will be reviewed annually. The primary drivers of the cost estimate are the labor and waste disposal. Waste disposal cost will be recalculated by replacing existing per cubic foot estimates with current disposal rates at EnviroCare.

Labor cost escalation will be based on the changes in New York State hourly wages for Specialty Trades Contractors as reported by the New York State Department of Labor (at <http://www.labor.state.ny.us/stats/ceshourearn2.asp>). For each worker, the charge rate will be adjusted by:

$$\text{Current Year Charge Rate} = \text{Previous Year Charge Rate} \times \frac{\text{NYS Specialty Contractor Hourly Rate (July current year)}}{\text{NYS Specialty Contractor Hourly Rate (July previous year)}}$$

Costs for other items (equipment and supplies) will be adjusted by the change in the consumer price index, reported by the Bureau of Labor Statistics (at <ftp://ftp.bls.gov/pub/special.requests/cpi/cpi.txt>), such that:

$$\text{Current Year Cost} = \text{Previous Year Cost} \times \frac{\text{BLS CIP-U (July current year)}}{\text{BLS CIP-U (July previous year)}}$$

5. On July 21, 2008, RPI submitted a response to NRC RAI 5 that RPI would like to “achieve self-liquidity” (i.e., use a self-guarantee as the method to provide funds for decommissioning). If the applicant intends to use the self-guarantee method for decommissioning funding assurance, please comply with 10 CFR Part 30, Appendix E regarding the self-guarantee test and submit all of the applicable documentation as described in Section A.14 of Appendix A of NUREG-1757, Vol. 3, “Consolidated NMSS Decommissioning Guidance.”

RPI Response – RPI is committed to executing a self-guarantee in fulfillment of financial assurance requirements for decommissioning, and is preparing the required documentation described in NUREG-1757, referenced above. RPI meets all of the conditions specified under 10CFR30, Appendix E, and is waiting on the auditor’s special report, and will be delivered to the Commission under separate cover no later than July 31, 2010.

Rensselaer Polytechnic Institute
Consolidated Financial Statements

For the Years Ended
June 30, 2009 and 2008

Rensselaer Polytechnic Institute
Consolidated Financial Statements

For the Years Ended
June 30, 2009 and 2008

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Report of Independent Auditors

To The Board of Trustees
Rensselaer Polytechnic Institute

In our opinion, the accompanying consolidated statements of financial position and the related consolidated statements of activities and cash flows present fairly, in all material respects, the financial position of Rensselaer Polytechnic Institute and its affiliates ("Rensselaer") at June 30, 2009 and June 30, 2008, and the change in their net assets and their cash flows for the years then ended in conformity with accounting principles generally accepted in the United States of America. These financial statements are the responsibility of the Rensselaer's management. Our responsibility is to express an opinion on these financial statements based on our audits. We conducted our audits of these statements in accordance with auditing standards generally accepted in the United States of America. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the financial statements are free of material misstatement. An audit includes examining, on a test basis, evidence supporting the amounts and disclosures in the financial statements, assessing the accounting principles used and significant estimates made by management, and evaluating the overall financial statement presentation. We believe that our audits provide a reasonable basis for our opinion.

PricewaterhouseCoopers LLP

September 23, 2009

Rensselaer Polytechnic Institute
Consolidated Statements of Financial Position
At June 30, 2009 and June 30, 2008
(in thousands of dollars)

<i>Assets</i>	<i>2009</i>	<i>2008</i>
Cash and cash equivalents (Note B)	\$ 2,720	\$ 4,068
Accounts receivable, net (Note B)		
Student related and other	8,635	8,395
Research, training and other agreements (Note E)	27,886	21,832
Contributions receivable, net (Note D)	37,859	39,120
Contributions from external remainder trusts (Note H)	7,783	9,374
Inventories (Note B)	2,050	2,492
Prepaid expenses and other assets	7,443	8,297
Deposits with bond trustees (Note K)	2,138	77,106
Student loans receivable, net (Note B)	33,246	31,683
Investments, at market (Note H)	616,552	807,865
Land, buildings and equipment, net (Note J)	743,356	651,206
Total assets	\$ 1,489,668	\$ 1,661,438

<i>Liabilities</i>		
Accounts payable and accrued expenses	\$ 47,745	\$ 53,982
Short term borrowings (Note K)	16,010	-
Deferred revenue	20,752	20,625
Liability on interest rate swap agreements (Notes B and H))	50,684	32,413
Split interest agreement obligations (Note F)	7,599	10,431
Other liabilities	8,890	8,384
Pension liability (Note L)	89,069	43,470
Accrued postretirement benefits (Note L)	13,555	12,446
Refundable government loan funds	26,427	26,012
Capital Leases payable (Note M)	19,946	83
Long-term debt (Note K)	653,957	619,941
Total liabilities	\$ 954,634	\$ 827,787

<i>Net Assets</i>		
Unrestricted	187,664	467,904
Temporarily restricted	90,694	117,348
Permanently restricted	256,676	248,399
Total net assets	535,034	833,651

Total liabilities and net assets	\$ 1,489,668	\$ 1,661,438
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The accompanying notes are an integral part of these consolidated financial statements.

Rensselaer Polytechnic Institute
Consolidated Statement of Activities
For The Year Ended June 30, 2009, with comparative June 30, 2008 totals
(in thousands of dollars)

	<i>Unrestricted</i>	<i>Temporarily Restricted</i>	<i>Permanently Restricted</i>	<i>Total June 30, 2009</i>	<i>Total June 30, 2008</i>
<i>Operating Revenue:</i>					
Student related revenue:					
Student tuition and fees, net					
Undergraduate	\$ 106,028	\$ -	\$ -	\$ 106,028	\$ 94,242
Graduate	35,402			35,402	31,715
Education for working professionals	19,883			19,883	18,622
Fees	1,573			1,573	1,533
Auxiliary services	44,409			44,409	41,339
Student related revenue	<u>207,295</u>	<u>-</u>	<u>-</u>	<u>207,295</u>	<u>187,451</u>
Gifts	22,160	2,581		24,741	33,560
Grants and contracts:					
Direct:					
Federal	49,919			49,919	49,081
State	17,053			17,053	14,132
Private	7,089			7,089	5,418
Indirect	17,312			17,312	15,036
Grants and contracts	<u>91,373</u>	<u>-</u>	<u>-</u>	<u>91,373</u>	<u>83,667</u>
Investment return:					
Dividends and interest	7,393	813		8,206	12,585
Realized accumulated gains used to meet spending policy	19,555	2,559		22,114	18,585
Endowment spending for Rensselaer Plan initiatives	30,900			30,900	38,339
Interest on student loans	114			114	114
Investment return	<u>57,962</u>	<u>3,372</u>	<u>-</u>	<u>61,334</u>	<u>69,623</u>
Rensselaer Technology Park	4,698			4,698	4,248
Other	8,926	51		8,977	11,633
Net assets released from restrictions	15,586	(15,586)		-	-
Total operating revenue	<u>408,000</u>	<u>(9,582)</u>	<u>-</u>	<u>398,418</u>	<u>390,182</u>
<i>Operating Expense:</i>					
Instruction	135,565			135,565	131,395
Research:					
Sponsored	93,076			93,076	86,417
Un-sponsored	13,719			13,719	15,897
Student services	13,032			13,032	12,853
Institutional and academic support	92,241			92,241	92,845
Externally funded scholarships and fellowships	15,526			15,526	13,702
Auxiliary services	27,935			27,935	26,179
Rensselaer Technology Park	3,623			3,623	3,861
Defined benefit pension and postretirement	9,662			9,662	12,587
Total operating expenses	<u>404,379</u>	<u>-</u>	<u>-</u>	<u>404,379</u>	<u>395,736</u>
Change in net assets from operating activities	<u>3,621</u>	<u>(9,582)</u>	<u>-</u>	<u>(5,961)</u>	<u>(5,554)</u>
<i>Non-operating:</i>					
Realized and unrealized gains (losses), net of spending policy	(205,834)	(14,841)	(219)	(220,894)	(70,367)
Realized and unrealized gains (losses), interest rate swaps	(25,788)			(25,788)	(23,239)
Adjustment for pension and postretirement benefits liability	(51,109)			(51,109)	(5,889)
Life income and endowment gifts		(5)	9,197	9,192	14,866
Loss on extinguishment of debt				-	(4,800)
Change in value of life income contracts		(2,226)	(701)	(2,927)	(874)
Gain (loss) on disposal of fixed assets	(1,130)			(1,130)	(813)
Change in net assets from non-operating activities	<u>(283,861)</u>	<u>(17,072)</u>	<u>8,277</u>	<u>(292,656)</u>	<u>(91,116)</u>
Change in net assets	<u>(280,240)</u>	<u>(26,654)</u>	<u>8,277</u>	<u>(298,617)</u>	<u>(96,670)</u>
Net assets at beginning of year	467,904	117,348	248,399	833,651	930,321
Net assets at end of year	<u>\$ 187,664</u>	<u>\$ 90,694</u>	<u>\$ 256,676</u>	<u>\$ 535,034</u>	<u>\$ 833,651</u>

The accompanying notes are an integral part of these consolidated financial statements.

Rensselaer Polytechnic Institute
Consolidated Statement of Activities
For The Year Ended June 30, 2008
(in thousands of dollars)

	Unrestricted	Temporarily Restricted	Permanently Restricted	Total June 30, 2008
<i>Operating Revenue:</i>				
Student related revenue:				
Student tuition and fees, net				
Undergraduate	\$ 94,242	\$ -	\$ -	\$ 94,242
Graduate	42,945			42,945
Education for working professionals	7,392			7,392
Fees	1,533			1,533
Auxiliary services	41,339			41,339
Student related revenue	<u>187,451</u>	-	-	<u>187,451</u>
Gifts	21,639	11,921		33,560
Grants and contracts:				
Direct:				
Federal	49,081			49,081
State	14,132			14,132
Private	5,418			5,418
Indirect	15,036			15,036
Grants and contracts	<u>83,667</u>	-	-	<u>83,667</u>
Investment return:				
Dividends and interest	11,451	1,134		12,585
Realized accumulated gains used to meet spending policy	16,684	1,901		18,585
Endowment spending for Rensselaer Plan initiatives	38,339			38,339
Interest on student loans	114			114
Investment return	<u>66,588</u>	<u>3,035</u>	-	<u>69,623</u>
Rensselaer Technology Park	4,248			4,248
Other	11,557	76		11,633
Net assets released from restrictions	13,172	(13,172)		-
Total operating revenue	<u>388,322</u>	<u>1,860</u>	-	<u>390,182</u>
<i>Operating Expense:</i>				
Instruction	131,395			131,395
Research:				
Sponsored	86,417			86,417
Un-sponsored	15,897			15,897
Student services	12,853			12,853
Institutional and academic support	92,845			92,845
Externally funded scholarships and fellowships	13,702			13,702
Auxiliary services	26,179			26,179
Rensselaer Technology Park	3,861			3,861
Defined benefit pension and postretirement	12,587			12,587
Total operating expenses	<u>395,736</u>	-	-	<u>395,736</u>
Change in net assets from operating activities	<u>(7,414)</u>	<u>1,860</u>	-	<u>(5,554)</u>
<i>Non-operating:</i>				
Realized and unrealized gains (losses), net of spending policy	(69,098)	(1,812)	543	(70,367)
Realized and unrealized gains (losses), interest rate swaps	(23,239)			(23,239)
Adjustment for pension and postretirement benefits liability	(5,889)			(5,889)
Life income and endowment gifts		3,508	11,358	14,866
Loss on extinguishment of debt	(4,800)			(4,800)
Change in value of life income contracts		(744)	(130)	(874)
Gain (loss) on disposal of fixed assets	(813)			(813)
Change in net assets from non-operating activities	<u>(103,839)</u>	<u>952</u>	<u>11,771</u>	<u>(91,116)</u>
Change in net assets	(111,253)	2,812	11,771	(96,670)
Net assets at beginning of year	579,157	114,536	236,628	930,321
Net assets at end of year	<u>\$ 467,904</u>	<u>\$ 117,348</u>	<u>\$ 248,399</u>	<u>\$ 833,651</u>

The accompanying notes are an integral part of these consolidated financial statements.

Rensselaer Polytechnic Institute
Consolidated Statements of Cash Flows
For the years ended June 30, 2009 and 2008
(in thousands of dollars)

	2009	2008
Cash flow from operating activities:		
Total change in net assets	\$ (298,617)	\$ (96,670)
Adjustments to reconcile change in net assets to net cash provided by (used in) operating activities:		
Depreciation and amortization	34,054	29,015
Accretion expense	380	336
Loss on disposal of assets	1,130	813
Uncollectible contributions writeoff	545	2,045
Loan forgiveness	-	(3,660)
Loss on extinguishment of debt	-	4,800
Provision for uncollectible accounts and loans	37	(184)
Realized and unrealized (gains) losses on investments	167,879	13,443
Unrealized loss on interest rate swap	18,271	20,481
Contributions of equipment and other capital items	(184)	(112)
Receipt of contributed securities	(2,987)	(3,429)
Contribution restricted for long term investment	(9,192)	(14,866)
Change in value from external trusts	1,591	(3,282)
Changes in operating assets and liabilities:		
Accounts receivable	(6,474)	(1,972)
Contributions receivable	716	(7,616)
Inventories	442	(27)
Prepaid expense and other assets	657	(22)
Accounts payable and accrued expenses	668	(1,051)
Change in pension liability	45,599	(1,628)
Present value of split interest agreements, net of terminations	(2,832)	(2,312)
Deferred revenue	633	6,932
Accrued postretirement benefits	1,109	(1,244)
Net cash used in operating activities	(46,575)	(60,210)
Cash flow from investing activities:		
Proceeds from sale of investments	199,335	217,314
Purchase of investments	(172,914)	(199,810)
Additional student loans granted	(5,619)	(8,162)
Student loans paid	4,199	4,006
Deposit with bond trustees	74,968	(55,176)
Proceeds from sale of land, building, and equipment	827	75
Purchase of land, building, equipment	(112,267)	(98,375)
Net cash used in investing activities	(11,471)	(140,128)
Cash flow from financing activities:		
Contributions restricted for endowments	9,192	14,866
Payment of annuity obligations	(1,301)	(1,434)
Proceeds from issuance of bonds	-	141,795
Proceeds from loans/line of credit	261,293	241,065
Repayment of debt/line of credit	(212,901)	(199,017)
Deferred financing costs	-	(805)
Government loan funds	415	326
Net cash provided by financing activities	56,698	196,796
Net decrease in cash and cash equivalents	(1,348)	(3,542)
Cash and cash equivalents at beginning of the year	4,068	7,610
Cash and cash equivalents at end of year	\$ 2,720	\$ 4,068
<i>Non cash investing activities</i>		
Gifts of equipment and other capital items	\$ 184	\$ 112
Contributed securities	2,987	3,429
Seller financed debt	1,598	-
Capital Leases	19,899	-
(Decrease) increase of capital assets included in accounts payable	(5,984)	5,522
<i>Supplemental disclosures of cash flow information</i>		
Cash paid during the year for interest	\$ 18,780	\$ 21,389

The accompanying notes are an integral part of these consolidated financial statements.

Rensselaer Polytechnic Institute
Notes to the Consolidated Financial Statements
For the Years Ended June 30, 2009 and June 30, 2008

Note A- Organization

Rensselaer Polytechnic Institute (Rensselaer) is a nonsectarian, coeducational institution composed of five schools: Architecture, Engineering, Humanities and Social Sciences, Lally School of Management and Technology, and Science. More than 130 programs and 700 courses lead to bachelors', masters', and doctoral degrees in all five schools. Rensselaer Technology Park is a university related park for technology ventures seeking a unique environment focused on the interface between industry and education.

Note B- Summary of Significant Accounting Policies

Basis of Consolidation

The accompanying consolidated financial statements of Rensselaer have been prepared on the accrual basis and include Rensselaer Hartford Graduate Center, Inc. (Center). All significant inter-organizational accounts have been eliminated.

Net Asset Classification

Unrestricted Net Assets include all resources which are not subject to donor-imposed restrictions other than those which only obligate Rensselaer to utilize funds to further its educational mission.

Temporarily Restricted Net Assets carry specific, donor-imposed restrictions on the expenditure or other use of contributed funds. Temporary restrictions may expire either because of the passage of time or because certain actions are taken by Rensselaer which fulfill the restrictions.

Permanently Restricted Net Assets are those that are subject to donor-imposed restrictions which will never lapse, thus requiring that the funds be retained permanently.

Dividends, interest and net gains or losses on investments are reported as follows:

- i) as increases in permanently restricted net assets if the terms of the gift require that they be added to the principle of a permanent endowment fund.
- ii) as increases in temporarily restricted net assets if the terms of the gift impose restrictions on the current use of the income or net gains.
- iii) as increases in unrestricted in all other cases.

Expenses are generally reported as decreases in unrestricted net assets. Expirations of donor-imposed stipulations that simultaneously increase one class of net assets and decrease another are reported as "net assets released from restrictions".

Use of Estimates

The preparation of financial statements in conformity with accounting principles generally accepted in the United States of America requires management to make estimates and assumptions that affect the reported amounts of assets and liabilities and disclosure of contingent assets and liabilities at the date of the financial statements and the reported amounts of revenues and expenses during the reporting period. Actual results could differ from those estimates.

Reclassifications

It is the Institute's policy to reclassify, where appropriate, prior year financial statements to conform to the current year presentation.

Tax Exempt Status

Rensselaer and Rensselaer Hartford Graduate Center, Inc are tax exempt 501(c) (3) Corporations under the Internal Revenue Service Code.

Effective July 1, 2008, Rensselaer adopted the FASB Interpretation No. 48 ("FIN48"), *Accounting for Uncertainty in Income Taxes*-an interpretation of SFAS No. 109, *Accounting for Income Taxes*. The adoption did not have a material effect on the financial statements.

Rensselaer Polytechnic Institute
Notes to the Consolidated Financial Statements
For the Years Ended June 30, 2009 and June 30, 2008

Note B- Summary of Significant Accounting Policies, (continued)

Contributions

Unconditional contributions are recognized as contributions receivable at their estimated net present value when pledged. Temporarily restricted net assets are reclassified to unrestricted net assets when an expense is incurred that satisfies the donor-imposed restriction. Expenses are generally reported as decreases in unrestricted net assets. Contributions of assets other than cash are recorded at their estimated fair value at the date of gift. Conditional promises to give are not recognized until the conditions on which they depend are substantially met.

Recently Issued Accounting Pronouncements

In February 2007, the FASB issued Statement of Financial Accounting Standard No. 159, *The Fair Value Option for Financial Assets and Financial Liabilities* (SFAS 159). The standard permits entities to choose to measure many financial instruments and certain other items at fair value. Rensselaer elected not to adopt the provisions of this statement.

Non-Operating Activities

Rensselaer considers the change in net assets from operating activities on the consolidated statement of activities to be its operating indicator. Non-operating activities include realized and unrealized gains or losses on investments not used to support operations, realized and unrealized gains or losses on interest rate swap agreements, changes in the value of split interest agreements, loss on extinguishment of debt, adjustment for pension and postretirement benefits liability, life income and endowment gifts and loss on disposal of fixed assets.

Cash and Cash Equivalents

Cash and cash equivalents include all highly liquid debt instruments with maturity of three months or less when purchased.

Accounts and Notes Receivable

Accounts and notes receivable arising from tuition fees, Rensselaer Technology Park activity and amounts owed on research contracts are carried net of an allowance for doubtful accounts as follows (in thousands):

	<u>June 30, 2009</u>	<u>June 30, 2008</u>
Student-related receivables	\$ 849	\$ 765
Loans to students	1,464	1,607
Other	14	14
Rensselaer Technology Park	36	36
Research, training and other agreements	<u>305</u>	<u>212</u>
Total allowances for doubtful accounts	<u>\$2,668</u>	<u>\$2,634</u>

It is not practicable to determine the fair value of student loan receivables because they are primarily federally sponsored student loans with U.S. government mandated interest rates and repayment terms and subject to significant restrictions as to their transfer or disposition.

Inventories

Inventories consist mainly of bookstore and computer store goods and maintenance supplies and are stated at the lower of cost or current market value, based upon the first-in, first-out method.

Investments

Purchase and sale transactions are recorded on a trade date basis. Realized gains and losses are recognized on an average cost basis when securities are sold.

Net appreciation (depreciation) in the fair value of investments, which consists of the realized gains on losses and the unrealized appreciation or depreciation on those investments, is recognized in the Statement of Activities.

Rensselaer Polytechnic Institute
Notes to the Consolidated Financial Statements
For the Years Ended June 30, 2009 and June 30, 2008

Note B- Summary of Significant Accounting Policies, (continued)

Land, Buildings and Equipment

Land, buildings and equipment are carried at cost or at the fair market value at the date of the gift. Depreciation is computed on a straight-line basis over the estimated useful lives of buildings (50 years) and equipment (3-20 years). All gifts of land, buildings and equipment are recorded as unrestricted operating activity unless explicit donor stipulations specify how the donated assets must be used. Absent explicit donor stipulations about how long those long-lived assets must be maintained, the donor restrictions are reported as being released when the donated or acquired long-lived assets are placed in service. Gifts of land, buildings and equipment with explicit donor stipulations specifying how the assets must be used or how long the assets must be maintained are recorded as temporarily restricted operating activity and reported as being released over the period of time required and be maintained as the assets are used for its specified purpose.

Interest Rate Swap Agreements

Rensselaer has entered into various interest rate swap agreements in order to convert variable rate debt to a fixed rate, thereby economically hedging against changes in the cash flow requirements of Rensselaer's variable rate debt obligations. Rensselaer has also entered into an interest rate swap to convert fixed rate debt to variable rate, thereby economically hedging against changes in the fair value of the debt. Accordingly, the interest rate swap contracts are reflected at fair value in Rensselaer's combined statements of financial position and the related portions of the debt being hedged are reflected at an amount equal to their carrying value.

Net payments or receipts under the swap agreements along with the change in fair value of the swaps are recorded in non-operating activities as realized and unrealized gains or losses on interest rate swap agreements.

Note C- Tuition Revenue

The undergraduate student discount rate was 43.9% and 44.1% for the years ended June 30, 2009 and 2008, respectively.

Student tuition by segment and location is as follows (in thousands):

	<u>2009</u>	<u>2008</u>
Undergraduate tuition:		
Troy Campus	\$189,075	\$168,617
Less institutional aid	<u>(83,047)</u>	<u>(74,375)</u>
Total undergraduate tuition	<u>\$106,028</u>	<u>\$ 94,242</u>
Graduate tuition:		
Troy Campus	<u>\$ 35,402</u>	<u>\$ 31,715</u>
Total graduate tuition	<u>\$ 35,402</u>	<u>\$ 31,715</u>
Education for working professionals:		
Troy Campus	\$ 6,506	\$ 6,515
Hartford Campus	<u>13,377</u>	<u>12,107</u>
Total education for working professionals	<u>\$ 19,883</u>	<u>\$ 18,622</u>

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Notes to the Consolidated Financial Statements
For the Years Ended June 30, 2009 and June 30, 2008

Note D- Contributions Receivable

Contributions receivable are expected to be collected as follows at June 30 (in thousands):

	<u>2009</u>	<u>2008</u>
In one year or less	\$ 3,875	\$ 1,620
Between one year and three years	18,593	17,014
Greater than three years	22,368	29,358
Less:		
Present value discount (0.56 – 5.14%)	(6,172)	(8,062)
Allowance for uncollectible pledges	<u>(805)</u>	<u>(810)</u>
Total contributions receivable	<u>\$37,859</u>	<u>\$39,120</u>

Conditional pledges, which are not accrued, approximate \$6,986,000 at June 30, 2009, of which \$320,000 was unrestricted as to purpose. The remaining conditional pledges are restricted to purpose as follows: \$4,840,000 current programs; \$1,678,000 endowment; and \$148,000 plant. Bequest expectancies totaling \$100,280,000 have been excluded from these amounts and are not recorded in the financial statements. In compliance with donor stipulations related to a \$360,000,000 transformational gift, income is being recognized as periodic cash payments are received.

Note E- Research Grants and Contracts

Rensselaer has been awarded approximately \$76,594,000 and \$84,014,000 of grants and contracts which have not been advanced or expended as of June 30, 2009 and 2008, respectively, and accordingly, are not recorded in the financial statements.

Note F- Split Interest Agreements

Split interest gift agreements consist primarily of irrevocable charitable remainder trusts, pooled income funds and charitable gift annuities for which Rensselaer is the remainder beneficiary. Assets held in these trusts are included in investments and recorded at their fair value when received. The value of split interest assets included in the investments at June 30, 2009 and 2008 were \$22,837,000 and \$29,349,000, respectively. Contribution revenues are recognized at the dates the trusts are established net of the liabilities for the present value of the estimated future payments to be made to the donors and/or other beneficiaries. The liabilities are adjusted during the term of the agreements for changes in the value of the assets, accretion of the discount and other changes in the estimates of future benefits. Discount rates range from 2.8% to 10.6%. The liability for the present value of deferred gifts of \$7,599,000 and \$10,431,000 at June 30, 2009 and 2008, respectively, is based upon actuarial estimates and assumptions regarding the duration of the agreements and the rates to discount the liability. Circumstances affecting these assumptions can change the estimate of this liability in future periods.

Rensselaer is also beneficiary of certain perpetual trusts held and administered by others. The present values of the estimated future cash receipts from the trusts are recognized as contributions from external trusts and contribution revenue at the date Rensselaer is notified of the establishment of the trust. Distributions from the trusts are recorded as investment income in the period they are received. Changes in fair value of the trusts are recorded as non-operating gains or losses in temporarily or permanently restricted net assets.

Rensselaer Polytechnic Institute
Notes to the Consolidated Financial Statements
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Note G- Natural Expense Classification

The following table compares expenses by type for the years ended June 30, 2009 and 2008, respectively (in thousands):

	<u>2009</u>	<u>2008</u>
Salaries and wages	\$154,674	\$149,589
Employee benefits excluding retirement	29,200	30,431
Retirement plan expense	<u>15,495</u>	<u>17,736</u>
Subtotal employee benefits	<u>44,695</u>	<u>48,167</u>
Total compensation	<u>\$199,369</u>	<u>\$197,756</u>
Supplies & services	73,284	73,867
Utilities	14,505	14,497
Employee travel	6,830	7,799
Taxes & insurance	8,267	6,522
Telecommunications	288	450
Library materials	2,328	2,194
Interest on debt	18,089	21,004
Depreciation and amortization	34,054	29,015
Student aid and fellowships	42,191	38,523
Operating lease agreements	4,559	3,414
Provision for uncollectible accounts	<u>615</u>	<u>695</u>
Total non salary	<u>204,854</u>	<u>197,980</u>
Total expenses	<u>\$404,379</u>	<u>\$395,736</u>

Note H- Investments

The carrying value and cost of investments at June 30 is as follows (in thousands):

	<u>2009</u>		<u>2008</u>	
	Carrying Value	Cost	Carrying Value	Cost
Short-term investments	\$ 25,833	\$ 25,799	\$ 15,423	\$ 15,419
Bonds and notes	136,369	147,220	129,279	122,532
Domestic equity securities	66,200	84,868	144,968	132,879
Foreign equity securities	59,344	55,167	113,503	82,859
Real estate	110,022	132,447	112,335	101,545
Marketable alternatives	65,781	64,143	149,985	120,374
Private equity partnerships	<u>153,003</u>	<u>185,696</u>	<u>142,372</u>	<u>160,242</u>
Total investments	<u>\$616,552</u>	<u>\$695,340</u>	<u>\$807,865</u>	<u>\$735,850</u>

Approximately \$59,364,000 of the investment portfolio at June 30, 2009 is invested in international securities that are subject to the additional risk of currency fluctuation.

At June 30, 2009, Rensselaer has committed to investing an additional \$242.7 million in various equity and real asset partnerships.

Spending from Endowment Funds

Rensselaer has adopted a "total return" policy for endowment spending. This approach considers current yield (primarily interest and dividends) as well as the net appreciation in the market value of investments when determining a spending amount. Under this policy, the Board of Trustees establishes a spending rate which is then applied to the average market value of investments. Current yield is recorded as revenue and the difference between current yield and the spending rate produces the use of realized gains spent under the total return formula.

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Notes to the Consolidated Financial Statements
For the Years Ended June 30, 2009 and June 30, 2008

Note H- Investments, (continued)

Dividends, Interest and Realized and Unrealized Gains and Losses

Total dividends, interest and realized and unrealized gains (reflected as both operating and non-operating activity) are as follows (in thousands):

	<u>2009</u>	<u>2008</u>
Dividends and interest available for spending	\$ 8,206	\$ 12,585
Realized gains (loss)	(16,673)	45,817
Unrealized gains (loss)	<u>(151,206)</u>	<u>(59,260)</u>
Net return	<u>(159,673)</u>	<u>(858)</u>

Investment management fees were \$1,525,000 and \$2,028,000 in 2009 and 2008, respectively, and are netted against realized and unrealized gains.

In May 2000 Rensselaer's Board of Trustees approved the Rensselaer Plan, a strategic roadmap to achieving greater prominence in the 21st century as a top-tier world-class technological research university with global reach and global impact. The Board also committed to endowment withdrawals in excess of Rensselaer's spending formula, as necessary, to fund investment in Plan initiatives. To date, \$293.7 million has been spent or committed for such initiatives, exclusive of capital expenditures. In fiscal year 2005, an initial withdrawal from quasi-endowment of \$20 million was recognized and displayed in the Statement of Activities as "endowment spending for Rensselaer Plan initiatives." For fiscal years 2006, 2007, 2008 and 2009, the amount reflected as "endowment spending for Rensselaer Plan initiatives" equals \$34 million, \$35.5 million and \$38.3 million and \$30.9, respectively. These amounts reflect Board approved commitments against the endowment with the residual being funded from operations.

Derivative Financial Instruments

Investments include derivative financial instruments that have been acquired to reduce overall portfolio risk by hedging exposure to certain assets held in the portfolio. At June 30, 2009, there were approximately \$45,000 of open or unsettled forward exchange contracts to sell foreign currency and \$45,000 of open or unsettled forward exchange contracts to purchase foreign currency. These contracts are denominated in two North American and European currencies and will settle at various dates through July, 2009. The impact on the combined statement of activities is not significant.

Forward contracts are marked to market monthly. The market and credit risks related to these derivative investments are not materially different from the risks associated with similar underlying assets in the portfolio. These derivative financial instruments are recorded at estimated fair value in investments.

Fair Value Measurement

Effective July 1, 2008, Rensselaer adopted Statement of Financial Accounting Standards No. 157, "Fair Value Measurements" ("SFAS 157"). SFAS 157 defines fair value, establishes a framework for measuring fair value under generally accepted accounting principles and enhances disclosures about fair value measurements. The new standard provides a consistent definition of fair value focusing on an exit price which is the price that would be received to sell an asset in an orderly transaction between market participants at the measurement date.

SFAS 157 establishes a hierarchy of valuation inputs based on the extent to which the inputs are observable in the marketplace. Observable inputs reflect market data obtained from sources independent of the reporting entity and unobservable inputs reflect the entities own assumptions about how market participants would value an asset or liability based on the best information available. Valuation techniques used to measure fair value under SFAS 157 must maximize the use of observable inputs and minimize the use of unobservable inputs. The standard describes a fair value hierarchy based on three levels of inputs, of which the first two are considered observable and the last unobservable, that may be used to measure fair value.

Rensselaer Polytechnic Institute
Notes to the Consolidated Financial Statements
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Note H- Investments, (continued)

The following describes the hierarchy of inputs used to measure fair value and the primary valuation methodologies used by Rensselaer for financial instruments measured at fair value on a recurring basis. A financial instrument's categorization within the valuation hierarchy is based upon the lowest level of input that is significant to the fair value measurement. The three levels of inputs are as follows:

- Level 1 - Quoted prices in active markets for identical assets or liabilities. Market price data is generally obtained from exchange or dealer markets.
- Level 2 - inputs other than Level 1 that are observable, either directly or indirectly, such as quoted prices for similar assets or liabilities; quoted prices in markets that are not active; or other inputs that are observable or can be corroborated by observable market data for substantially the same term of the assets or liabilities. Inputs are obtained from various sources including market participants, dealers, and brokers.
- Level 3 - Pricing inputs are unobservable and include situations where there is little, if any, market activity for the investment.

The following table presents the financial instruments carried at fair value as of June 30, 2009, by caption on the consolidated statement of financial position by the SFAS 157 valuation hierarchy defined above (in thousands):

<u>Assets</u>	Quoted Prices in Active Markets <u>Level 1</u>	Significant Other Observable <u>Level 2</u>	Significant Unobservable <u>Level 3</u>	Total Fair Value
Investments:				
Short-term investments	\$ 25,026	\$ -	\$ 807	\$ 25,833
Fixed income securities	23,882	-	112,486	136,368
Domestic equity securities	37,301	-	28,898	66,199
Foreign equity securities	14,478	-	44,866	59,344
Real assets	2,308	-	107,715	110,023
Marketable alternatives	-	-	65,782	65,782
Private equity partnerships	-	-	<u>153,003</u>	<u>153,003</u>
Investments	<u>\$102,995</u>	<u>\$-</u>	<u>\$513,557</u>	<u>\$616,552</u>
Contributions from external trusts	-	-	<u>7,783</u>	<u>7,783</u>
Total	<u>\$102,995</u>	<u>\$-</u>	<u>\$521,340</u>	<u>\$624,335</u>
 <u>Liabilities</u>				
Liability on interest rate swap agreements	\$ -	<u>\$ 50,684</u>	\$-	<u>\$ 50,684</u>
Total liabilities at fair value	<u>\$-</u>	<u>\$ 50,684</u>	<u>\$-</u>	<u>\$ 50,684</u>

Investments included in Level 3 primarily consists of Rensselaer's ownership in alternative investments (principally limited partnership interests in marketable alternatives, private equity, real estate, and other similar funds) The value of certain alternative investments represent the ownership interest in the net asset value (NAV) of the respective partnership; 32.8% of investments held by the partnerships consist of marketable securities and 67.2% are securities that do not have readily determinable fair values. The fair values of the securities held by limited partnerships that do not have readily determinable fair values are determined by the general partner taking into consideration, among other things, the cost of the securities, prices of recent significant placements of securities of the same issuer, and subsequent developments concerning the companies to which the securities relate. Rensselaer regularly reviews and evaluates the values provided by the investment managers and agrees with the valuation methods and assumptions used in determining the fair value of these investments.

Rensselaer Polytechnic Institute
Notes to the Consolidated Financial Statements
For the Years Ended June 30, 2009 and June 30, 2008

Note H- Investments, (continued).

Included in investments at June 30, 2009 and 2008 are investments held by others in the amount of \$46,888,000 and \$60,179,000, respectively. These investments are classified as Level 3 in the table above.

Interest rate swaps are valued using both observable and unobservable inputs, such as quotations received from the counterparty, dealers or brokers, whenever available and considered reliable. In instances where models are used, the value of the interest rate swap depends upon the contractual terms of, and specific risks inherent in, the instrument as well as the availability and reliability of observable inputs. Such inputs include market prices for reference securities, yield curves, credit curves, measures of volatility, prepayment rates, assumptions for nonperformance risk, and correlations of such inputs. Certain of the interest rate swap arrangements have inputs which can generally be corroborated by market data and are therefore classified within level 2.

The methods described above may produce a fair value calculation that may not be indicative of net realizable value or reflective of future fair values. Furthermore, while Rensselaer believes its valuation methods are appropriate and consistent with other market participants, the use of different methodologies or assumptions to determine the fair value of certain financial instruments could result in a different estimate of fair value at the reporting date.

The following table is a rollforward of the consolidated statement of financial position amounts for financial instruments classified by Rensselaer within Level 3 of the fair value hierarchy defined above (in thousands):

	Significant Unobservable Inputs (Level 3)							Total
	Short Term Investments	Fixed Income	Domestic Equity	Foreign Equity	Real Assets	Marketable Alternatives	Private Equity Partnerships	
Fair value, July 1, 2008	\$ 1,039	\$ 102,223	\$ 39,668	\$ 92,629	\$ 108,232	\$ 142,364	\$ 148,455	\$ 634,610
Realized gains/(losses)	34	(218)	(554)	(966)	1,406	(4,114)	4,482	70
Unrealized gains/(losses)		(20,825)	(16,029)	(25,667)	(31,401)	(15,658)	(21,885)	(131,465)
Net purchases, sales, settlements	-266	6,823	(5,490)	(20,238)	29,478	(21,024)	24,126	13,409
Transfers in/out		24,483	11,303	(892)	-	(35,786)	(2,175)	(3,067)
Fair value, June 30, 2009	\$ 807	\$ 112,486	\$ 28,898	\$ 44,866	\$ 107,715	\$ 65,782	\$ 153,003	\$ 513,557
		Contributions from External remainder trusts						
Fair value, July 1, 2008	\$	9,374						
Realized gains/(losses)		-						
Unrealized gains/(losses)		(1,200)						
Net purchases, sales, settlements		(391)						
Fair value, June 30, 2009	\$	7,783						

All net realized and unrealized gain/(losses) in the table above are reflected in the accompanying consolidated statement of activities. Net unrealized gains/(losses) relate to those financial instruments held by Rensselaer at June 30, 2009.

Rensselaer Polytechnic Institute
Notes to the Consolidated Financial Statements
For the Years Ended June 30, 2009 and June 30, 2008

Note I- Endowment

Rensselaer's endowment consists of approximately 611 individual donor restricted endowment funds and 168 board-designated endowment funds for a variety of purposes plus the following where the assets have been designated for endowment: pledges receivables, split interest agreements, and other net assets. The endowment includes both donor-restricted endowment funds and funds designated by the Board of Trustees to function as endowments. The net assets associated with endowment funds including funds designated by the Board of Trustees to function as endowments, are classified and reported based on the existence or absence of donor imposed restrictions.

Endowment and similar funds are invested under direction of the Board of Trustees to achieve maximum long-term total return with prudent concern for the preservation of investment capital. All investments of endowment and similar funds are recorded in the statement of financial position as long-term investments, including cash balances held by external investment managers. The fair value of endowment investments (separately invested and pooled) was \$589,048 and \$766,899 as of June 30, 2009 and June 30, 2008, respectively.

The Board of Trustees of Rensselaer determines the method to be used to appropriate endowment funds for expenditure. Calculations are performed for individual endowment funds at a rate of 5.0 percent of the rolling 16 quarter average market value on a unitized basis one year subsequent to the calculation. The corresponding calculated spending allocations are distributed in equal quarterly installments on the first day of each quarter from the current net total or accumulated net total investment returns for individual endowment funds. In establishing this policy, the Board considered the expected long term rate of return on its endowment.

During fiscal year 2009, Rensselaer adopted FASB Staff Position (FSP) FAS 117-1, "Endowment of Not-for-Profit Organizations: Net Asset Classification of Funds Subject to an Enacted Version of the Uniform Prudent Management of Institutional Funds Act (UPMIFA), and Enhanced Disclosures for All Endowment Funds." The FSP applies to not-for-profit organization with donor-restricted endowment funds and is effective for fiscal years ending after December 15, 2008. The information provided below regarding Rensselaer's interpretation of the relevant law and the composition of the endowment and similar funds has been included to comply with the disclosure requirements of FSP FAS 117-1.

The Board of Trustees of Rensselaer has interpreted New York State's Not-for-Profit Corporate Law as requiring the preservation of the fair value of the original gift as of the gift date of the donor-restricted endowment funds absent explicit donor stipulations to the contrary. As a result of this interpretation, Rensselaer classifies as permanently restricted net assets (a) the original value of gifts donated to the permanent endowment, (b) the original value of subsequent gifts to the permanent endowment, and (c) accumulations to the permanent endowment made in accordance with the direction of the applicable donor gift instrument at the time the accumulation is added to the fund. Unspent appropriations related to the donor restricted endowment fund are classified as temporarily restricted net assets until the amounts are expended by Rensselaer in a manner consistent with the donor's intent. The remaining portion of the donor-restricted endowment fund that is not classified as permanently or temporarily restricted net assets is classified as unrestricted net assets in accordance with New York State law.

Rensselaer Polytechnic Institute
Notes to the Consolidated Financial Statements
For the Years Ended June 30, 2009 and June 30, 2008

Note I- Endowment, (continued)

Rensselaer had the following endowment activities during the year ended June 30, 2009 delineated by net asset class and donor-restricted versus Board-designated funds:

Endowment net asset composition by type of fund as of June 30, 2009 (in thousands):

	<u>Unrestricted</u>	Temporarily <u>Restricted</u>	Permanently <u>Restricted</u>	<u>Total</u>
Endowment net asset composition	\$ 238,776	\$ 12,499	\$ 244,633	\$ 495,908
Board-designated endowment funds	171,395	916	-	172,311
Less: Commitments for Rensselaer Plan Initiatives	<u>(138,739)</u>	<u>-</u>	<u>-</u>	<u>(138,739)</u>
Board Designated Endowment Funds at Net	<u>32,656</u>	<u>916</u>	<u>-</u>	<u>33,572</u>
Total endowment funds	<u>\$ 271,432</u>	<u>\$ 13,415</u>	<u>\$ 244,633</u>	<u>\$ 529,480</u>

Changes in endowment net assets for the year ended June 30, 2009 (in thousands):

	<u>Unrestricted</u>	Temporarily <u>Restricted</u>	Permanently <u>Restricted</u>	<u>Total</u>
Endowment net assets, beginning of year	\$ 485,208	\$ 28,839	\$ 235,705	\$ 749,752
Investment return:				
Investment Income	6,496	-	-	6,496
Net depreciation (realized and unrealized)	<u>(158,100)</u>	<u>(15,433)</u>	<u>(2,526)</u>	<u>(176,059)</u>
Total investment return	<u>(151,604)</u>	<u>(15,433)</u>	<u>(2,526)</u>	<u>(169,563)</u>
Gifts	1,534	-	10,189	11,723
Appropriation of endowment assets for expenditure	(32,826)	-	-	(32,826)
Commitments for Rensselaer Plan Initiatives	(30,900)	-	-	(30,900)
Donor redesignation	<u>20</u>	<u>9</u>	<u>1,265</u>	<u>1,294</u>
Endowment net assets, end of year	<u>\$ 271,432</u>	<u>\$ 13,415</u>	<u>\$ 244,633</u>	<u>\$ 529,480</u>

Rensselaer Polytechnic Institute
Notes to the Consolidated Financial Statements
For the Years Ended June 30, 2009 and June 30, 2008

Note I- Endowment, (continued)

Description of Amounts Classified as Permanently Restricted Net Assets and Temporarily Restricted Net Assets (Endowments Only)

Permanently restricted net assets (in thousands):

The portion of perpetual endowment funds that is required to be retained permanently by explicit donor stipulation:

Restricted for scholarship support	\$ 52,808
Restricted for fellowship support	19,954
Restricted for faculty support	55,474
Restricted for program support	53,475
Restricted for awards and prizes	2,662
Restricted for unrestricted institutional support	60,260
	<u>\$ 244,633</u>

The portion of permanent endowment funds subject to a time restriction (in thousands):

Restricted for scholarship support	\$ 6,847
Restricted for fellowship support	611
Restricted for faculty support	(45)
Restricted for program support	4,783
Restricted for awards and prizes	1,219
	<u>\$ 13,415</u>

Rensselaer had the following endowment activities during the year ended June 30, 2008 delineated by net asset class and donor-restricted versus Board-designated funds:

Endowment net asset composition by type of fund as of June 30, 2008 (in thousands):

	<u>Unrestricted</u>	Temporarily <u>Restricted</u>	Permanently <u>Restricted</u>	<u>Total</u>
Endowment net asset composition	\$ 364,126	\$ 27,641	\$ 235,705	\$ 627,472
Board-designated endowment funds	228,921	1,198	-	230,119
Less: Commitments for Rensselaer Plan Initiatives	<u>(107,839)</u>	-	-	<u>(107,839)</u>
Board Designated Endowment Funds at Net	<u>121,082</u>	<u>1,198</u>	<u>-</u>	<u>122,280</u>
 Total endowment funds	 <u>\$ 485,208</u>	 <u>\$ 28,839</u>	 <u>\$ 235,705</u>	 <u>\$ 749,752</u>

Rensselaer Polytechnic Institute
Notes to the Consolidated Financial Statements
For the Years Ended June 30, 2009 and June 30, 2008

Note I- Endowment, (continued)

Changes in endowment net assets for the year ended June 30, 2008 (in thousands):

	<u>Unrestricted</u>	<u>Temporarily Restricted</u>	<u>Permanently Restricted</u>	<u>Total</u>
Endowment net assets, beginning of year	\$ 521,307	\$ 31,326	\$ 225,509	\$ 778,142
Investment return:				
Investment Income	10,203	-	-	10,203
Net depreciation (realized and unrealized)	<u>(16,033)</u>	<u>(2,495)</u>	<u>(1,223)</u>	<u>(19,751)</u>
Total investment return	(5,830)	(2,495)	(1,223)	(9,548)
Gifts	185	-	9,519	9,704
Appropriation of endowment assets for expenditure	(32,149)	-	-	(32,149)
Donor redesignation	<u>1,695</u>	<u>8</u>	<u>1,900</u>	<u>3,603</u>
Endowment net assets, end of year	<u>\$ 485,208</u>	<u>\$ 28,839</u>	<u>\$ 235,705</u>	<u>\$ 749,752</u>

Description of Amounts Classified as Permanently Restricted Net Assets and Temporarily Restricted Net Assets (Endowments Only)

Permanently restricted net assets (in thousands):

The portion of perpetual endowment funds that is required to be retained permanently by explicit donor stipulation:

Restricted for scholarship support	\$ 60,609
Restricted for fellowship support	11,339
Restricted for faculty support	48,823
Restricted for program support	54,640
Restricted for awards and prizes	2,522
Restricted for unrestricted institutional support	57,772
	<u>\$ 235,705</u>

The portion of permanent endowment funds subject to a time restriction (in thousands):

Restricted for scholarship support	\$ 11,698
Restricted for fellowship support	1,240
Restricted for faculty support	2,461
Restricted for program support	11,180
Restricted for awards and prizes	2,260
Restricted for unrestricted institutional support	-
	<u>\$ 28,839</u>

Rensselaer Polytechnic Institute
Notes to the Consolidated Financial Statements
For the Years Ended June 30, 2009 and June 30, 2008

Note I- Endowment, (continued)

Endowment Funds with Deficits

From time to time, the fair value of assets associated with individual donor-restricted endowment funds may fall below the value of the initial and subsequent donor gift amounts (deficit). When donor endowment deficits exist, they are classified as a reduction of unrestricted net assets. Deficits of this nature reported in unrestricted net assets were \$8,393,000 and \$170,000 as of June 30, 2009 and 2008, respectively. These deficits resulted from unfavorable market fluctuations that occurred shortly after the investment of newly established endowments, and authorized appropriation that was deemed prudent.

Return Objectives and Risk Parameters

Rensselaer has adopted endowment investment and spending policies that attempt to provide a predictable stream of funding to programs supported by its endowment while seeking to maintain the purchasing power of endowment assets. Under this policy, the return objective for the endowment assets, measured over a full market cycle, shall be to maximize the return against a blended index, based on the endowment's target allocation applied to the appropriate individual benchmarks. Rensselaer expects its endowment funds over time, to provide an average rate of return of approximately 8.0 percent annually. Actual returns in any given year may vary from this amount.

Strategies Employed for Achieving Investment Objectives

To achieve its long-term rate of return objectives, Rensselaer relies on a total return strategy in which investment returns are achieved through both capital appreciation (realized and unrealized gains) and current yield (interest and dividends). Rensselaer targets a diversified asset allocation that places greater emphasis on equity-based investments to achieve its long-term objectives within prudent risk constraints.

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Note J- Land, Buildings, and Equipment

Land, buildings, and equipment consist of the following at June 30 (in thousands):

	<u>2009</u>	<u>2008</u>
Land and improvements	\$ 27,404	\$ 20,946
Buildings	752,888	500,250
Equipment	223,346	212,589
Construction in progress	<u>87,115</u>	<u>237,271</u>
Total land, buildings & equipment	1,090,753	971,056
Less accumulated depreciation	<u>(347,397)</u>	<u>(319,850)</u>
	<u>\$ 743,356</u>	<u>\$651,206</u>

As of June 30, 2009, Rensselaer had \$22,309,656 of open commitments to contractors for construction on work being performed.

Note K- Debt Outstanding

The following table and footnotes illustrate Rensselaer's various debt obligations, all of which are repaid from the general operations of Rensselaer and the Center, as appropriate.

Outstanding bonds and notes payable of Rensselaer are comprised of the following (in thousands):

<i>Debt:</i>	Year of Final <u>Maturity</u>	Weighted Average Annual <u>Interest Rate</u>	June 30,	
			<u>2009</u>	<u>2008</u>
U.S. Department of Education Dormitory Bonds and 1988 Mortgage Loan	2018	3.0%	\$ 1,525	\$ 1,662
Rensselaer County IDA – Industrial Development Facility Issue: Series 1997A (1)	2022	Variable	8,625	8,987
Series 1999A and B (2)	2030	5.14%	29,104	33,512
Series 2006 (8)	2036	4.84%	63,384	63,420
Troy Industrial Development Authority Civic Facility Issue: Series 2002A (3)	2015	5.43%	16,225	16,320
Series 2002B-E (3)	2042	Variable	202,975	202,975
Series 2007 (10)	2037	5.00%	51,708	51,766
Series 2008 A and B (11)	2037	Variable	90,000	90,000
2004 Bank of America Term Loan (4)	2019	4.57%	24,325	26,183
2006 Bank of America Revolving Loan (6)	2011	Variable	35,000	35,000
2006 Bank of America Revolving Loan (7)	2011	Variable	13,000	13,000
2007 Bank of America Revolving Loan (9)	2012	Variable	41,400	41,400
2008 Bank of America Revolving Loan (12)	2013	Variable	9,956	10,000
2008 Bank of America Revolving Loan (13)	2013	Variable	38,300	17,400
<i>Student Loan Program Debt</i> DASNY 1992 CUEL	2009	6.80%	642	983
Rensselaer Technology Park Debt: 2005 Bank of America Term Loan (5)	2013	Variable	6,190	7,333
2009 M & T Bank Loan(14)	2015	5.0%	20,000	0
2009 Whiting Turner Agreement(15)	2015	Variable	<u>1,598</u>	
			<u>\$653,957</u>	<u>\$619,941</u>

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Note K- Debt Outstanding, (continued)

Debt principal outstanding is reflected net of bond discount/premium where applicable in the amount of \$2,461,774 and \$2,595,000 at June 30, 2009 and 2008, respectively. Such costs are being amortized on the straight-line method over the term of the related indebtedness.

Long-term debt and notes payable are collateralized by certain physical properties with a carrying value of \$19,323,000 and \$17,564,000 at June 30, 2009 and 2008 respectively and by pledges of specified portions of tuition, fees and revenues from various facilities. At June 30, 2009 and 2008, Rensselaer had \$2,138,000 and \$77,106,000, respectively of assets held by trustees for construction, debt service and other project-related expenses. Certain of the long term debt and notes payable contain restrictive covenants including the maintenance of specified deposits with trustees.

Notes to Debt Outstanding

1. On March 12, 1997, Rensselaer entered into an agreement with the Rensselaer County Industrial Development Agency, providing for the issuance of \$13,240,000 in variable rate demand revenue bonds for the purpose of financing the renovation of three of Rensselaer's buildings and the acquisition of a new student record system. The bonds are subject to a remarketing agreement and bear a variable interest rate that resets weekly, but in no event may exceed 12% per annum. In the event that Rensselaer receives notice of any option tender on its variable-rate-bonds, or if the bonds become subject to mandatory tender, the purchase price of the bonds will be paid from the remarketing of such bonds. However, if the remarketing proceeds are insufficient, Rensselaer will have a general obligation to purchase the bonds tendered pending reissuance under its multimodal provisions.
2. On June 30, 1999, Rensselaer entered into an agreement with the Rensselaer County Industrial Development Agency, which provided for the issuance of \$41,110,000 in revenue bonds. Proceeds from the issue in the amount of \$24,196,000 were used for the construction and/or renovation of three buildings, issuance costs, and to legally defease Dormitory Authority Series 1991 Bonds. Interest rates on the bonds range from 4.125% to 5.00%.
3. On May 1, 2002, Rensselaer entered into an agreement with the Troy Industrial Development Authority, which provided for the issuance of \$218,875,000 in Series 2002 A-E revenue bonds, including \$202,975,000 in variable rate mode. The transaction also generated a \$1,125,000 premium on the Series 2002A bonds. Proceeds from the issue in the amount of \$203,150,771 were utilized for the construction costs of two buildings, related campus-wide infrastructure improvements, issuance costs and to legally defease Dormitory Authority Series 1993 Bonds. On May 11, 2006 the Series 2002E bonds in the amount of \$25,000,000 were remarketed and converted from variable to a 5-year put option, with interest during the period ending September 1, 2011 set at 4.05% On May 2, 2008 Rensselaer changed the interest rate mode on Series 2002 B, C & D bonds from auction rate securities to variable rate demand bonds backed by three bank letters of credit, these letters of credit have expiration dates of May 2011. In the event that Rensselaer receives notice of any optional tender on its Series B,C or D variable-rate bonds, or if these bonds become subject to mandatory tender, the purchase price of the bonds will be paid from the remarketing of such bonds. However, if the remarketing proceeds are insufficient, Rensselaer will be obligated to purchase the bonds tendered and has secured a standby letters-of-credit for an amount up to an aggregate of \$178 million. These letters of credit expire on May, 2011 and if drawn, must be repaid upon expiration. As a result of extinguishment of debt a \$4,800,000 loss was recognized during fiscal year 2008. In fiscal year 2002, Rensselaer entered into an interest rate swap agreement, with a term of 35 years, on \$150,000,000 (notional) of the Series 2002 B-D bonds issued, in order to convert variable rate borrowings to a fixed rate liability. This swap effectively locks in a fixed rate liability of 5.0325%. In February 2006, Rensselaer entered into an amendment with the counterparty which, in effect, altered the fixed rate liability to 4.30% until June 2011, at which point it converts to 4.593%. The impact on the consolidated Statement of Activities in 2009 as it relates to the fair market value of the interest rate swap was \$10,286,000.
4. On March 4, 2004, Rensselaer entered into an agreement with Bank of America for a \$30,000,000 15-year unsecured term loan for the purpose of financing a portion of its pension obligations and to fund the costs of certain capital improvements. The note bears an interest rate of 4.57% for eight years, at which point it will convert to a floating rate based on the one month LIBOR plus 40 basis points. The loan agreement requires compliance with certain financial ratio covenants.

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Notes to the Consolidated Financial Statements
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Note K- Debt Outstanding, (continued)

5. On December 31, 2005, Rensselaer entered into an agreement with Bank of America for a \$9,834,734 unsecured term loan for purposes of refinancing of Rensselaer Technology Park 1995 and 1998 term loans with Bank of America, as successor to Fleet Bank. The fully amortizing loan matures on December 31, 2013. The note bears interest at LIBOR plus one quarter of one percent. The loan agreement requires compliance with certain financial ratio covenants. In conjunction with this refinancing, on July 19, 2005 Rensselaer entered into a forward starting interest rate swap of \$9,835,000 (notional) with Bank of America beginning January 1, 2006, effectively paying a fixed rate of 5.82% for term of the swap, which is contiguous with the loan's term. The impact on the consolidated Statement of Activities in 2009 as it relates to the fair market value of the interest rate swap was \$172,295.
6. On April 14, 2006, Rensselaer entered into an agreement with Bank of America for a \$35,000,000 unsecured revolving debt facility, which matures on July 1, 2011. Rensselaer has the right to convert to a term loan with a maturity of 2021. The note bears interest at LIBOR plus .48 of one percent. The loan agreement requires compliance with certain financial loan covenants. In conjunction with this transaction, on March 20, 2006, Rensselaer entered into a forward starting interest rate swap of \$35,000,000 (notional) with Bank of America beginning January 1, 2007, effectively paying a fixed rate of 5.57% on the term loan. The maturity date of the swap is June 1, 2021. The impact on the consolidated Statement of Activities in 2009 as it relates to the fair market value of the interest rate swap was \$2,522,000.
7. On May 15, 2006, Rensselaer entered into an agreement with Bank of America for a \$10,000,000 unsecured revolving debt facility, which matures on July 1, 2011. Rensselaer has the right to convert to a term loan with a maturity of 2021. The loan has a revolving feature which permits additional draws up to a total of \$13,000,000 if completed prior to July 1, 2010. The note bears interest at LIBOR plus .48 of one percent. On June 15, 2006, Rensselaer completed a \$10,000,000 advance on this revolving loan. On April 13, 2007 Rensselaer advanced the remaining \$3,000,000 under this agreement bringing the total principal amount outstanding to \$13,000,000. The loan agreement requires compliance with certain financial loan covenants. In conjunction with this transaction, on March 20, 2006 Rensselaer entered into a forward starting interest rate swap of \$10,000,000 (notional) with Bank of America beginning January 1, 2007, effectively paying a fixed rate of 5.57% on the term loan. The maturity date of the swap is June 1, 2021. The impact on the consolidated Statement of Activities in 2009 as it relates to the fair market value of the interest rate swap was \$719,605.
8. On June 15, 2006, Rensselaer entered into an agreement with the Rensselaer County Industrial Development Agency, which provided for the issuance of \$62,380,000 in Series 2006 fixed rate revenue bonds. The transaction generated a \$1,616,000 premium. Proceeds from the issue in the amount of \$63,996,000 was utilized for the construction costs of one building, related campus-wide infrastructure improvements, and issuance costs. On June 7, 2007 Rensselaer entered into a swap transaction with Morgan Stanley, with a notional of \$62,380,000 and a maturity of March 1, 2036, effectively agreeing to pay SIFMA and receive 66.68% of 10 year LIBOR. This agreement was amended on January 11, 2008 to change the terms for the period of January 1, 2008 to March 1, 2011 so that Rensselaer received 68% of one Month LIBOR plus 90.25 bps and pays SIFMA. The impact on the consolidated Statement of Activities in 2009 as it relates to the fair market value of the interest rate swap was \$1,408,000.
9. On May 23, 2007, Rensselaer entered into an agreement with Bank of America for a \$41,400,000 unsecured revolving debt facility, which matures on May 22, 2012. Rensselaer has the right to convert to a term loan with a maturity of 2022. The note bears interest at LIBOR plus .43 of one percent. The loan agreement requires compliance with certain financial loan covenants. In conjunction with this transaction, on April 24, 2007, Rensselaer entered into a forward starting interest rate swap of \$41,400,000 (notional) with the Bank of America beginning April 1, 2008, effectively paying a fixed rate of 5.55% on the term loan. The maturity date of the swap is June 1, 2022. The impact on the consolidated Statement of Activities in 2009 as it relates to the fair market value of the interest rate swap was \$3,163,000.
10. On December 12, 2007, Rensselaer entered into an agreement with the City of Troy Industrial Development Agency, which provided for the issuance of \$50,000,000 in Series 2007 three year fixed rate put bonds. The transaction documents are multi modal and allow for a final bond maturity of 2037. The transaction generated a \$1,795,000 premium. Proceeds from the issue in the amount of \$51,795,000 were utilized for the construction costs of several buildings, related campus-wide infrastructure improvements and issuance costs.

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Note K- Debt Outstanding, (continued)

11. On January 24, 2008, Rensselaer entered into an agreement with the City of Troy Industrial Development Agency, which provided for the issuance of \$90,000,000 in Series 2008 A & B variable rate demand bonds. These bonds are credit enhanced with a bank letter of credit having a maturity of January 2011. In the event that Rensselaer receives notice of any optional tender on its Series A&B variable-rate bonds, or if these bonds become subject to mandatory tender, the purchase price of the bonds will be paid from the remarketing of such bonds. However, if the remarketing proceeds are insufficient, Rensselaer will be obligated to purchase the bonds tendered and has secured a standby letters-of-credit for an amount up to an aggregate of \$90 million. The letters of credit expire in January, 2011 and if drawn, must be repaid upon expiration. Proceeds from the issue in the amount of \$90,000,000 were utilized for the construction costs of several buildings, related campus-wide infrastructure improvements and issuance costs.
12. On May 9, 2008, Rensselaer entered into an agreement with Bank of America for a \$10,000,000 unsecured revolving debt facility, which matures on May 8, 2013. Rensselaer has the right to convert to a term loan with a maturity of 2028. The note bears interest at LIBOR plus .65 of one percent or Prime Rate less 1.75 of one percent. The loan agreement requires compliance with certain financial loan covenants.
13. On June 20, 2008, Rensselaer entered into an agreement with Bank of America for a \$38,300,000 unsecured revolving debt facility, which matures on June 19, 2013. Rensselaer has the right to convert to a term loan with a maturity of 2028. The note bears interest at LIBOR plus .65 of one percent or Prime Rate less 1.75 of one percent. The loan agreement requires compliance with certain financial loan covenants.
14. On April 20, 2009 Rensselaer entered into an agreement with M&T Bank for a \$20,000,000 unsecured term loan facility, amortization of which commences April 1, 2010 with a final maturity of April 1, 2015. The note bears interest at a fixed rate of 5.00%. The loan agreement requires compliance with certain financial loan covenants.
15. On April 24, 2009 Rensselaer entered into an agreement with The Whiting-Turner Contracting Company for a loan not to exceed \$15,000,000, amortization of which commences January 1, 2011 with a final maturity of December 31, 2015. The note bears interest at Prime plus 2.00% adjusted monthly until January 1, 2011, after which the interest rate will become fixed at the then current Prime plus 2.00% rate until the note matures.

As of June 30, 2009, Rensselaer had a standby letter of credit with Bank of America totaling \$1,509,000 for workers compensation insurance security purposes. In addition, Rensselaer had standby letters of credit with Bank of America totaling \$1,440,000 and \$250,000 for general liability insurance and professional liability insurance security purposes, respectively, related to current construction projects on the Troy, New York campus. There were no draws against these letters of credit during the fiscal year. Rensselaer also has a mortgage loan guarantee in place for one loan made by HSBC Bank USA in 1996 to finance construction and renovation costs for an on-campus fraternity residential facility. The balance of the mortgage loan, which totaled \$600,000 at inception, was \$290,000 on June 30, 2009.

The Institute has an unsecured line of credit with Bank of America valued at \$30,000,000, with interest calculated on the outstanding balance at a daily rate of term LIBOR plus .30%. There was an outstanding balance of \$6,010,000 on the line of credit at June 30, 2009. The Institute has an unsecured line of credit with TD Bank valued at \$20,000,000, with interest calculated on the outstanding balance at a daily rate of term LIBOR plus 1.50%. There was an outstanding balance of \$10,000,000 on the line of credit at June 30, 2009. Both of these lines of credit are subject to an annual renewal at November 30th.

Principal payments due on all long-term debt as of June 30, 2009 for each of the next five fiscal years are (in thousands):

<u>Year</u>	<u>Amount</u>
2010	\$ 10,131
2011	16,273
2012	19,205
2013	22,026
2014	21,512
Thereafter	564,810

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Note K- Debt Outstanding, (continued)

Rensselaer has letter of credit agreements with various financial institutions to purchase certain of the Institute's variable rate demand bonds in the event they cannot be remarketed. In the event that the bonds covered by these agreements were not remarketed and the agreements were not otherwise renewed, the principal amounts due in the principal debt service payments table (including variable rate demand bonds not subject to a liquidity facility) would be \$18,756, \$284,068, \$19,205, \$22,026, \$21,512 and \$288,390.

The fair value of Rensselaer's long-term debt is estimated based upon the amount of future cash flows, discounted using Rensselaer's current borrowing rates for similar debt instruments of comparable maturities. The fair value of long-term debt was approximately \$577,135,000 and \$544,117,000 at June 30, 2009 and 2008, respectively.

Rensselaer was in violation of a certain financial covenant as of December 31, 2008, related to certain of its debt arrangements, for which it obtained waivers and amended the covenant.

Interest capitalized at June 30, 2009 and 2008 was \$497,000 and \$403,000, respectively.

Note L- Retirement Plans

Defined Benefit Plans

The following table sets forth Rensselaer's defined benefit and postretirement plans' change in projected benefit obligation, change in plan assets, funded status (the postretirement plans are unfunded) and amounts recognized in Rensselaer's balance sheet at June 30, 2009 and 2008. The defined benefit plan calculations were based upon data as of or projected to June 30, 2009 and 2008. Postretirement benefit plan calculations were based upon data as of July 1, 2008 and 2007. Rensselaer's funding policy is based upon and is in compliance with ERISA requirements.

<u>Change in benefit obligation (in thousands):</u>	<u>Defined Benefit</u>		<u>Postretirement</u>	
	<u>2009</u>	<u>2008</u>	<u>2009</u>	<u>2008</u>
Benefit obligation at beginning of year	\$(263,025)	\$(265,896)	\$(12,446)	\$(13,690)
Service cost	(3,669)	(4,494)	(588)	(645)
Interest cost	(17,765)	(16,099)	(852)	(767)
Plan participants' contributions	(232)	(243)	(610)	(817)
Amendments/Curtailments/Special Termination	0	0	0	500
Settlement of Dental & Life Insurance Plans	0	0	82	0
Actuarial (gain)/loss	(265)	7,239	(499)	1,609
Benefits paid	15,157	15,910	1,358	1,364
Administrative expenses paid	789	558	0	0
Benefit obligation at end of year	\$(269,010)	\$(263,025)	\$(13,555)	\$(12,446)

The accumulated benefit obligation for the defined benefit pension plan was \$264,003,000 and \$258,855,000 as of June 30, 2009 and 2008, respectively.

<u>Change in plan assets (in thousands):</u>	<u>Defined Benefit</u>		<u>Postretirement</u>	
	<u>2009</u>	<u>2008</u>	<u>2009</u>	<u>2008</u>
Fair value of plan assets at beginning of year	\$219,555	\$220,798	\$ 0	\$ 0
Actual return on plan assets	(37,215)	(5,818)	0	0
Employer contribution	13,315	20,800	748	547
Plan participants' contribution	232	243	610	817
Benefits paid	(15,157)	(15,910)	(1,358)	(1,364)
Administrative expenses paid	(789)	(558)	0	0
Fair value of plan assets at end of year	\$179,941	\$219,555	\$ 0	\$ (0)

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Notes to the Consolidated Financial Statements
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Note L- Retirement Plans, (continued)

<u>Funded Status and amount recognized in the Statement of financial position (in thousands):</u>	<u>Defined Benefit</u>		<u>Postretirement</u>	
	<u>2009</u>	<u>2008</u>	<u>2009</u>	<u>2008</u>
Liability	<u>\$(89,069)</u>	<u>\$(43,470)</u>	<u>\$(13,555)</u>	<u>\$(12,446)</u>

<u>Amounts recognized in unrestricted net Assets (in thousands):</u>	<u>Defined Benefit</u>		<u>Postretirement</u>	
	<u>2009</u>	<u>2008</u>	<u>2009</u>	<u>2008</u>
Net prior service cost/(credit)	\$ 225	\$ 285	\$ 1,550	\$ 1,692
Net actuarial (gain)/loss	133,834	81,199	456	984
Unrestricted net assets	<u>\$(134,059)</u>	<u>\$(81,484)</u>	<u>\$ 2,006</u>	<u>\$ 2,676</u>

<u>Other changes in plan assets and benefit obligations recognized in unrestricted net assets (in thousands):</u>	<u>Defined Benefit</u>		<u>Postretirement</u>	
	<u>2009</u>	<u>2008</u>	<u>2009</u>	<u>2008</u>
New prior service cost/(credit)	\$ -	\$ -	\$ -	\$ (500)
New net actuarial loss/(gain)	55,889	15,119	499	(1,609)
Settlement of Dental & Life Insurance Plans	-	-	(82)	-
Amortization of:				
Prior service cost/(credit)	(60)	(73)	142	126
Actuarial loss/(gain)	(5,390)	(7,180)	9	5
Settlement Charge	-	-	102	-
Total recognized in non operating (income)/expense	<u>\$50,439</u>	<u>\$ 7,866</u>	<u>\$ 670</u>	<u>\$(1,978)</u>

<u>Net periodic benefit cost is included in the Following components (in thousands):</u>	<u>Defined Benefit</u>		<u>Postretirement</u>	
	<u>2009</u>	<u>2008</u>	<u>2009</u>	<u>2008</u>
Service cost	\$ 3,669	\$ 4,494	\$ 588	\$ 645
Interest cost	17,765	16,099	852	767
Expected return on plan assets	(18,410)	(16,540)	0	0
Amortization of:				
Prior service cost/(credit)	60	73	(142)	(126)
Actuarial loss/(gain)	5,390	7,180	(9)	(5)
Net periodic benefit cost/(income)	<u>8,474</u>	<u>11,306</u>	<u>1,289</u>	<u>1,281</u>
Settlement Charge	0	0	(102)	0
Net periodic benefit cost/(income)	<u>\$ 8,474</u>	<u>\$ 11,306</u>	<u>\$ 1,187</u>	<u>\$ 1,281</u>

In the aggregate, Rensselaer's Defined Benefit Plan will be invested to ensure solvency of the plan over its remaining life and to meet pension obligations as required. A secondary goal is to earn the highest net rate of return within prudent risk limits to ensure the achievement of the primary goal and adherence to the following Rensselaer guiding investment principles:

Capital preservation is a fundamental goal of the Institute's funds, therefore strategies and approaches emphasizing absolute positive returns are favored.

Risk is defined as loss of capital, not deviation from a benchmark, and a Sharpe ratio measurement is preferred to an Information ratio measurement.

The Plan's expected rate of return is the result of periodic asset allocation studies reviewed and approved by the Investment Committee.

Rensselaer Polytechnic Institute
Notes to the Consolidated Financial Statements
For the Years Ended June 30, 2009 and June 30, 2008

Note L- Retirement Plans, (continued)

Weighted average asset allocation at June 30, 2009 and 2008, by asset category are as follows:

Asset Category	<u>Defined Benefit</u>	
	<u>2009</u>	<u>2008</u>
Domestic Equity	10.8%	17.7%
International Equity	10.8%	12.5%
Private Equity	5.9%	3.0%
Marketable Alternatives	18.9%	24.7%
Real Assets	16.2%	11.5%
Fixed income	26.7%	18.1%
Cash	<u>10.7%</u>	<u>12.5%</u>
	<u>100.0%</u>	<u>100.0%</u>

The Plan contains features that allow participants to have a percentage of their benefits fluctuate based on the return of a S&P 500 index account. Rensselaer maintains assets in that index fund to hedge those liabilities that are not part of the above asset allocation.

Rensselaer's expected contributions for fiscal year ending June 30, 2010 are \$18,600,000 and \$794,000 for the defined pension plan and postretirement plan, respectively.

The amounts in unrestricted net assets expected to be recognized as components of the net periodic benefit cost in fiscal year ending June 30, 2010 are \$6,342,000 and (\$147,000) for the defined pension plan and postretirement plan, respectively.

The following are the expected future benefit payments (in thousands):

Fiscal Year Ending in:	<u>Defined Benefit</u>	<u>Postretirement</u>
2010	\$18,356	\$ 794
2011	18,744	880
2012	19,430	911
2013	20,050	970
2014	20,584	1,041
2015-2019	111,374	5,984

The weighted average rates forming the basis of net periodic benefit cost and amounts recognized in Rensselaer's statement of financial position at June 30 were:

	<u>Defined Benefit</u>		<u>Postretirement</u>	
	<u>2009</u>	<u>2008</u>	<u>2009</u>	<u>2008</u>
<i>Benefit obligations</i>				
Discount rate	6.75%	7.00%	7.00%	7.00%
Expected return on plan assets	8.25%	8.25%	-	-
Rate of compensation increase	4.00%	4.00%	-	-
<i>Net periodic benefit cost</i>				
Discount rate	7.00%	6.25%	6.25%	6.25%
Expected return on plan assets	8.25%	8.25%	-	-
Rate of compensation increase	4.00%	4.00%	-	-

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Note L- Retirement Plans, (continued)

For measurement purposes, a 8.0 percent, 7.5 percent and 11.0 percent annual rate of increase in the per capita cost of covered pre-65 medical, post-65 medical benefits and prescription drug benefits, respectively, was assumed for fiscal year 2010. These rates were assumed to decrease gradually to 5 percent for fiscal year 2016 and remain at that level thereafter. A plan amendment established a maximum of \$85 per month for retired employees who retire after normal retirement age. Once Rensselaer's share of medical premiums for Medicare eligible retirees reaches the \$85 per month maximum, the health care cost trend rate will no longer have any effect except for grandfathered participants not subject to the cap and pre-65 coverage.

Assumed health care cost trend rates have a significant effect on the amounts reported for the postretirement benefit. A one-percentage point change in the health care cost trend rates would have the following effects (in thousands):

	1-Percentage Point Increase	1-Percentage Point Decrease
Effect on total of service and interest cost components	\$ 89	(\$ 76)
Effect on postretirement benefit obligation	\$627	(\$548)

Based upon service at retirement date, Rensselaer pays for a portion of health care benefits for retired employees. In addition, Rensselaer Hartford Graduate Center, Inc. pays for dental and life insurance benefits for employees who had retired prior to July 1, 1997.

Defined Contribution Plan

Rensselaer and the Center also have non-contributory Defined Contribution Plans open to full-time employees who have met minimum service requirements. Contributions to these plans (8% of employee salary) were \$7,020,000 and \$6,515,000 in fiscal 2009 and 2008, respectively.

In addition, the Center has its own pension plan in association with Teachers Insurance and Annuity Association and College Retirement Equities Fund (TIAA-CREF). The TIAA-CREF is a money purchase plan so there is no past service cost. The Center's contributions to this plan (8% of employee salary) were \$383,000 and \$327,000 in fiscal 2009 and 2008, respectively.

Note M- Commitments and Contingences

In the normal course of business, Rensselaer has been named a defendant in various claims. Although there can be no assurance as to the eventual outcome of litigation in which Rensselaer has been named, in the opinion of management such litigation will not, in the aggregate, have a material adverse effect on Rensselaer's financial position.

Leases

At June 30, 2009, minimum annual commitments under operating leases for real property and equipment are as follows (in thousands) :

	<u>Operating Leases</u>	<u>Capital Leases</u>
2010	\$ 1,332	\$ 1,366
2011	1,376	1,368
2012	1,410	1,359
2013	1,057	1,368
2014	990	1,383
Thereafter	<u>19,547</u>	<u>36,054</u>
Total	<u>\$25,712</u>	42,898
Less: amount representing interest		<u>(22,952)</u>
Present value of minimum lease payments		<u>\$19,946</u>

Rensselaer Polytechnic Institute
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Note N- Asset Retirement Obligations

In March 2005, the FASB issued FASB Interpretation No. 47, *Accounting for Conditional Asset Retirement Obligations* (FIN 47), which was issued to provide clarity surrounding the recognition of conditional asset retirement obligations, as referred to in FASB Statement No. 143, *Accounting for Asset Retirement Obligations*. FIN 47 defines a conditional asset retirement obligation as a legal obligation to perform an asset retirement activity in which the timing and (or) method of settlement are conditional on a future event that may or may not be within the control of the entity. Based on the guidance in FIN 47, management of Rensselaer determined that sufficient information was available to reasonably estimate the fair value of known retirement obligations.

FIN 47 requires the initial application of the interpretation to be recognized as a cumulative effect of a change in an accounting principle. Specifically, FIN 47 requires the recognition, a cumulative effect, the cumulative accretion and accumulated depreciation for the period from the date the liability was incurred to the date of adoption of this interpretation. The liability incurred date is presumed to be the date upon which the legal requirement to perform the asset retirement activity was enacted.

Upon adoption of FIN 47 on June 30, 2006, Rensselaer recognized asset retirement obligations in the amount of \$6,935,000 related to asbestos contamination in buildings, decommissioning expenses and tank disposals, included in other liabilities.

The following is a summary of the asset retirement obligation:

Change in Asset Retirement Obligation (in thousands):	<u>2009</u>	<u>2008</u>
Asset retirement obligation at beginning of year	\$7,650	\$7,314
Accretion expense	379	336
Less: disposals	<u>(8)</u>	<u>-</u>
Asset retirement obligation at end of year	<u>\$8,021</u>	<u>\$7,650</u>

Note O-Subsequent Events

Rensselaer has performed an evaluation of subsequent events through September 23, 2009, the date on which the consolidated financial statements were issued.