NRC FORM 313
(1-84)
10 CFR 30, 32, 33, 34, 35 and 40

U.S. NUCLEAR REGULATORY COMMISSION
APPROVED BY OMB
3150-0120
Expires: 5-31-87

APPLICATION FOR MATERIAL LICENSE

INSTRUCTIONS: SEE THE APPROPRIATE LICENSE APPLICATION GUIDE FOR DETAILED INSTRUCTIONS FOR COMPLETING APPLICATION. SEND TWO COPIES OF THE ENTIRE COMPLETED APPLICATION TO THE NRC OFFICE SPECIFIED BELOW.

FEDERAL AGENCIES FILE APPLICATIONS WITH:

U.S. NUCLEAR REGULATORY COMMISSION
DIVISION OF FUEL CYCLE AND MATERIAL SAFETY, NMSS
WASHINGTON, DC 20555

ALL OTHER PERSONS FILE APPLICATIONS AS FOLLOWS, IF YOU ARE LOCATED IN:

CONNECTICUT, DELAWARE, DISTRICT OF COLUMBIA, MAINE, MARYLAND, MASSACHUSETTS, NEW JERSEY, NEW YORK, PENNSYLVANIA, RHODE ISLAND, OR VERMONT, SEND APPLICATIONS TO:

U.S. NUCLEAR REGULATORY COMMISSION, REGION I
NUCLEAR MATERIAL SECTION B
631 PARK AVENUE
KING OF PRUSSIA, PA 19406

ALABAMA, FLORIDA, GEORGIA, KENTUCKY, MISSISSIPPI, NORTH CAROLINA, PUERTO RICO, SOUTH CAROLINA, TENNESSEE, VIRGINIA, VIRGIN ISLANDS, OR WEST VIRGINIA, SEND APPLICATIONS TO:

U.S. NUCLEAR REGULATORY COMMISSION, REGION II
MATERIAL RADIATION PROTECTION SECTION
101 MARIETTA STREET, SUITE 2900
ATLANTA, GA 30323

IF YOU ARE LOCATED IN:

ILLINOIS, INDIANA, IOWA, MICHIGAN, MINNESOTA, MISSOURI, OHIO, OR WISCONSIN, SEND APPLICATIONS TO:

U.S. NUCLEAR REGULATORY COMMISSION, REGION III
MATERIALS LICENSING SECTION
799 ROOSEVELT ROAD
GLEN ELLYN, IL 60137

ARKANSAS, COLORADO, IDAHO, KANSAS, LOUISIANA, MONTANA, NEBRASKA, NEW MEXICO, NORTH DAKOTA, OKLAHOMA, SOUTH DAKOTA, TEXAS, UTAH, OR WYOMING, SEND APPLICATIONS TO:

U.S. NUCLEAR REGULATORY COMMISSION, REGION IV
MATERIAL RADIATION PROTECTION SECTION
611 RYAN PLAZA DRIVE, SUITE 1000
ARLINGTON, TX 76011

ALASKA, ARIZONA, CALIFORNIA, HAWAII, NEVADA, OREGON, WASHINGTON, AND U.S. TERRITORIES AND POSSESSIONS IN THE PACIFIC, SEND APPLICATIONS TO:

U.S. NUCLEAR REGULATORY COMMISSION, REGION V
MATERIAL RADIATION PROTECTION SECTION
1450 MARIA LANE, SUITE 210
WALNUT CREEK, CA 94596

PERSONS LOCATED IN AGREEMENT STATES SEND APPLICATIONS TO THE U.S. NUCLEAR REGULATORY COMMISSION ONLY IF THEY WISH TO POSSESS AND USE LICENSED MATERIAL IN STATES SUBJECT TO U.S. NUCLEAR REGULATORY COMMISSION JURISDICTION.

1. THIS IS AN APPLICATION FOR *(Check appropriate item)*

- [X] A. NEW LICENSE
- [ ] B. AMENDMENT TO LICENSE NUMBER _____
- [ ] C. RENEWAL OF LICENSE NUMBER _____

2. NAME AND MAILING ADDRESS OF APPLICANT *(Include Zip Code)*

Radiation Calibration Laboratory , Division of
Bio-Medical Radiation Systems, Inc., N.J. CORP
1177 McCarter Highway
Newark, New Jersey 07104

3. ADDRESS(ES) WHERE LICENSED MATERIAL WILL BE USED OR POSSESSED.

1177 McCarter Highway, Newark, New Jersey 07104

4. NAME OF PERSON TO BE CONTACTED ABOUT THIS APPLICATION

Thomas J. Reed

TELEPHONE NUMBER: (201) 482-4809

SUBMIT ITEMS 5 THROUGH 11 ON 8½ x 11" PAPER. THE TYPE AND SCOPE OF INFORMATION TO BE PROVIDED IS DESCRIBED IN THE LICENSE APPLICATION GUIDE.

5. RADIOACTIVE MATERIAL
a. Element and mass number, b. chemical and/or physical form, and c. maximum amount which will be possessed at any one time. see attached

6. PURPOSE(S) FOR WHICH LICENSED MATERIAL WILL BE USED. See attached.

7. INDIVIDUAL(S) RESPONSIBLE FOR RADIATION SAFETY PROGRAM AND THEIR TRAINING AND EXPERIENCE. See attached.

8. TRAINING FOR INDIVIDUALS WORKING IN OR FREQUENTING RESTRICTED AREAS. See attached.

9. FACILITIES AND EQUIPMENT. See attached.

10. RADIATION SAFETY PROGRAM. see attached.

11. WASTE MANAGEMENT. See attached.

12. LICENSEE FEES *(See 10 CFR 170 and Section 170.31)*
FEE CATEGORY: 3F
AMOUNT ENCLOSED: $580.00

13. CERTIFICATION. *(Must be completed by applicant)* THE APPLICANT UNDERSTANDS THAT ALL STATEMENTS AND REPRESENTATIONS MADE IN THIS APPLICATION ARE BINDING UPON THE APPLICANT.

THE APPLICANT AND ANY OFFICIAL EXECUTING THIS CERTIFICATION ON BEHALF OF THE APPLICANT, NAMED IN ITEM 2, CERTIFY THAT THIS APPLICATION IS PREPARED IN CONFORMITY WITH TITLE 10, CODE OF FEDERAL REGULATIONS, PARTS 30, 32, 33, 34, 35, AND 40 AND THAT ALL INFORMATION CONTAINED HEREIN, IS TRUE AND CORRECT TO THE BEST OF THEIR KNOWLEDGE AND BELIEF.

WARNING: 18 U.S.C. SECTION 1001 ACT OF JUNE 25, 1948, 62 STAT. 749 MAKES IT A CRIMINAL OFFENSE TO MAKE A WILLFULLY FALSE STATEMENT OR REPRESENTATION TO ANY DEPARTMENT OR AGENCY OF THE UNITED STATES AS TO ANY MATTER WITHIN ITS JURISDICTION.

SIGNATURE–CERTIFYING OFFICER	TYPED/PRINTED NAME	TITLE	DATE
[signature]	Michael T. Gasparik	President	June 21, 1985

14. VOLUNTARY ECONOMIC DATA

a. ANNUAL RECEIPTS

- [X] <$250K
- [ ] $250K–500K
- [ ] $500K–750K
- [ ] $750K–1M
- [ ] $1M–3.5M
- [ ] $3.5M–7M
- [ ] $7M–10M
- [ ] >$10M

b. NUMBER OF EMPLOYEES *(Total for entire facility excluding outside contractors)*: 6

c. NUMBER OF BEDS:

d. WOULD YOU BE WILLING TO FURNISH COST INFORMATION *(dollar and/or staff hours)* ON THE ECONOMIC IMPACT OF CURRENT NRC REGULATIONS OR ANY FUTURE PROPOSED NRC REGULATIONS THAT MAY AFFECT YOU? *(NRC regulations permit it to protect confidential commercial or financial–proprietary–information furnished to the agency in confidence)*

- [ ] YES
- [X] NO

FOR NRC USE ONLY

TYPE OF FEE	FEE LOG	FEE CATEGORY	COMMENTS	APPROVED BY
application	Aug-5 I	3N"	per 5/8/85 telecon	[signature]
AMOUNT RECEIVED	CHECK NUMBER			DATE
$580 / $350	1012 / 1037			9/4/85

"OFFICIAL RECORD COPY" 04070
ML10
JUL 08 1985

PRIVACY ACT STATEMENT ON THE REVERSE

PRIVACY ACT STATEMENT

Pursuant to 5 U.S.C. 552a(e)(3), enacted into law by section 3 of the Privacy Act of 1974 (Public Law 93-579), the following statement is furnished to individuals who supply information to the Nuclear Regulatory Commission on NRC Form 313. This information is maintained in a system of records designated as NRC-3 and described at 40 Federal Register 45334 (October 1, 1975).

1. **AUTHORITY**: Sections 81 and 161(b) of the Atomic Energy Act of 1954, as amended (42 U.S.C. 2111 and 2201(b)).

2. **PRINCIPAL PURPOSE(S)**: The information is evaluated by the NRC staff pursuant to the criteria set forth in 10 CFR Parts 30, 32, 33, 34, 35 and 40 to determine whether the application meets the requirements of the Atomic Energy Act of 1954, as amended, and the Commission's regulations, for the issuance of a radioactive material license or amendment thereof.

3. **ROUTINE USES**: The information may be (a) provided to State health departments for their information and use; and (b) provided to Federal, State, and local health officials and other persons in the event of incident or exposure, for their information, investigation, and protection of the public health and safety. The information may also be disclosed to appropriate Federal, State, and local agencies in the event that the information indicates a violation or potential violation of law and in the course of an administrative or judicial proceeding. In addition, this information may be transferred to an appropriate Federal, State, or local agency to the extent relevant and necessary for an NRC decision or to an appropriate Federal agency to the extent relevant and necessary for that agency's decision about you.

4. **WHETHER DISCLOSURE IS MANDATORY OR VOLUNTARY AND EFFECT ON INDIVIDUAL OF NOT PROVIDING INFORMATION**: Disclosure of the requested information is voluntary. If the requested information is not furnished, however, the application for radioactive material license, or amendment thereof, will not be processed. A request that information be held from public inspection must be in accordance with the provisions of 10 CFR 2.790. Withholding from public inspection shall not affect the right, if any, of persons properly and directly concerned need to inspect the document.

5. **SYSTEM MANAGER(S) AND ADDRESS**: U.S. Nuclear Regulatory Commission
Director, Division of Fuel Cycle and Material Safety
Office of Nuclear Material Safety and Safeguards
Washington, D.C. 20555

APPLICATION FOR MATERIAL LICENSE - RADIATION CALIBRATION LABORATORY
DIVISION OF BIO-MEDICAL RADIATION SYSTEMS, INC.

ITEM 5 RADIOACTIVE MATERIALS

A: Element & Mass No.	B: Chem/Physical Form	C: Max Amt. Possessed any one time
a) Any by product material with Atomic Numbers 1 to 83, inclusive	Sealed sources	No source to exceed 500 microcuries. Total not to exceed 3 millicuries.
b) Americium 241	Sealed source (Amersmam/Searle model AMC 2084)	One source of 10 millicuries
c) Americium 241	Sealed source (Amersmam/Searle model AMC 36)	One source of 100 millicuries
d) Cesium 137	Sealed source (3M model 6B6G)	One source of 2.7 millicuries
e) Cesium 137	Sealed source (Atomchem Corp. model CS 2-10)	Once source of 100 millicuries

ITEM 6 Purpose For Which Licensed Material Will Be Used.

(a) through (d) above: Calibration of instruments.
(e) above: For use in EON Corp. Model 64-764. Calibrator which is used for instrument calibration.

ITEM 7

Individual responsible for radiation safety program and his training and experience: **THOMAS J. REED**

In 1967 through 1971, he was assistant radiation safety officer under the direction of Mr. Ronald J. Martone at the PICKER NUCLEAR CORPORATION plant in North Haven, Conn. Mr. Martone instructed him in the proper use, storage, and disposal of the various radioactive materials used in the calibration and evaluation of scintillation measuring and imaging equipment manufactured by Picker.

His subsequent experience with Bionucleonics, Inc., of Fanwood, N.J. and Kenilworth, N.J., allowed him to work directly under the supervision of Anthony J. Esposito, H. Bert Weinstein, and other radiation physicists who taught him in more detail the use and calibration of high flux sources (and low flux too) such as used in various teletherapy systems e.g., Cobalt-60, Cesium-137, HV X-Ray, and linear accelerators.

Selman's and Johns's textbooks on radiation physics were used by him to learn the necessary techniques as well as serving as the fundamental texts for courses he had to teach to X-Ray technicians and resident physicians at the client hospitals of Bionucleonics in northern New Jersey, Pennsylvania, and Connecticut.

He learned and practiced treatment planning under the supervision of the above-named radiation physicists. He also formulated QC Programs for X-Ray & nuclear medicine departments in these client hospitals.

He was in charge of the instrument calibration laboratory at Bionucleonics and he developed and designed the QC Analyzer for E.R. Squibb & Sons, Inc., as well as several other devices that, however, never became commercially viable.

Bio-Med Associates took over the operation of the radiation instrument calibration department of Bionucleonics when Bionucleonics started having financial problems. In his purchase of the assets of Bionucleonics in September 1982, the calibration business reverted to Reed Instruments, Inc., as part of the assets package.

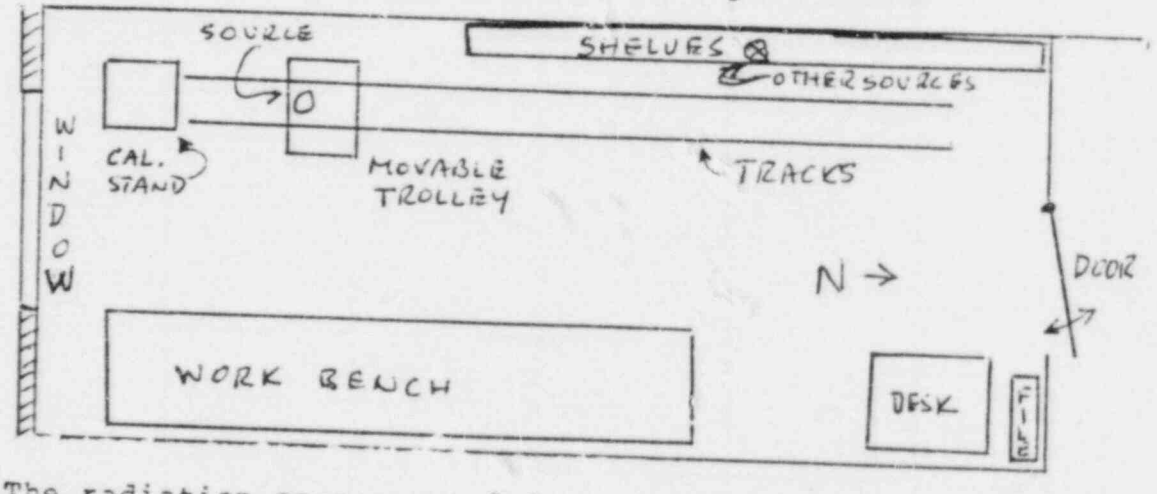
Reed Instruments, Inc., has performed calibration services for the E.R. Squibb & Sons, Inc., Medotopes division for the years September 1982 to March 1985. During this period of time a new microprocessor controlled radiation monitoring systems was designed and proposed by him at Squibb's request, but a new management team decided it was unnecessary.

ITEM 8 Training For Individuals Working in or Frequenting Restricted Areas.

Each person engaged in the use of or who may have occasional access to the restricted area will receive instructions from Mr. Reed on personal safety and the safe handling techniques of the radioactive sources as they apply to our job of meter and instrument calibration.
Each person engaged in the actual utilization of the sources will be instructed in proper meter calibration procedures, radiation safety procedures and NRC regulations. These same people will also receive indoctrination in general radiation safety employing the book: Basic Radiation Protection Technology, by Daniel A. Gollnick; published by Pacific Radiation Corporation at 9827 Daines Drive, Temple City, Ca 91780.

ITEM 9 Facilities and Equipment

The calibration area is located on the third floor of the building located at 1177 McCarter Highway in Newark, New Jersey. It is set apart from all other work areas by means of permanently erected walls and a locked door. The instruments undergoing calibration reside near the outside wall of the building so as to minimize any possible accidental exposure to persons outside the restricted area. A sketch of this area is shown in figure below:



The radiation sources used for meter calibration have had their calibrations verified and corrected by measurements performed with an MDH model 1015 X-Ray monitor, S/N 1171 with model 10 x 5 - 180 ion chamber, S/N 6276. This instrument was calibrated by RADCAL Corp. 19 Dec 1984, Report No. 955.

Long time integral dose measurements were made of the source at various distances from the source and excellent agreement was reached in all cases. The source attenuator was checked in the same manner and found to be correct.

Meters to be calibrated are normally exposed to fields of 75%-90% of the full scale of the meter for each of its ranges (log meters differ). Adjustments are made at this point and then the attenuator is put in place and a low-end reading is made to verify the linearity of the scale.

The calibration source (EON Corp Model 64-764) resides at a constant height above the floor and is moved towards and away from the instrument being calibrated by means of a moving cart that rides in permanently mounted floor tracks. By this means the various intensity radiation fields necessary for meter claibration are produced. In addition, an insertable 10:1 beam attenuator adds another mode of intensity modification.
When the calibrator is not being used, it is pushed up against the calibration stand, facing the outside wall and the attenuator is across its aperture. The source is, of course, dropped into the unexposed position and the case is locked to prevent any further possible unauthorized use. The door to the restricted area is closed and locked when not in use. Higher level radiation measurements i.e., greater than 1000 mR/hr, are contracted out to Nuclear Instrument Co., Rockland, Ma, NRC License No. 20-16972-01.
The general storage area for the other sources is also within the locked room and resides against the west wall which backs up onto a dead storage area on its opposite side. All other sources are in their own shielded containers within locked metal boxes.
Monitoring the area is accomplished by means of a BICRON, surveyor AHS S/N A514A with full scales of 0.5, 5 and 50 mR/hr, which has an alarm as well as measurement function. It is left on during the course of any measurement routines to warn of any possible excessive personnel exposure.
Personnel monitoring is accomplished by means of ring badges for the extremity measurement and a pocket film badge for the torso. These will be either procured from R.S. Landauer or Siemens Gammasonics Health Physics services.
All persons actively engaged in the calibration business will be badged.

ITEM 10 Radiation Safety Program.

a. Survey Program:

The facility consist of two areas of radioactive material storage. A survey meter calibration area and a storage shelf for small sealed calibration sources. All controlled and non-controlled areas will be surveyed annually. The survey of the calibration are (100 mCi Cs-137 source) is performed in both the source "on" and source "off" configurations of the Gamma Calibrator.

The surveys shall include:

1. Measurement of exposure levels with an instrument sufficiently sensitive to detect 0.1 mR/hr.

2. Areas of measurement keyed to a floor plan.

3. The last calibration date of the survey instrument.

4. A description of the detection equipment used.

5. An evaluation of the exposure levels to assure compliance with 10 CFR 20.101 and 20.105.

6. Identity of individual performing the survey.

Since the operation only uses sealed sources, contamination monitoring is performed during semi-annual leak tests (see Item c.).

b. Records Management Program:

The R.S.O. maintains/reviews the following records:

1) Reviews of personnel monitoring records when received from the badge service.
2) Semi-annual inventory of sealed radioactive sources.
3) Semi-annual sealed source leak-tests.
4) Annual radiation exposure survey.

c. Sealed Source Leak Tests:

Our sealed sources will be wipe tested for presence of removable contamination at intervals not to exceed six (6) months.

Accessible outside surfaces of the containers are wiped with a cotton swab or filter paper and counted in a NaI will crystal detector with pulse height analyzer. A low activity check source of the same material as the sealed source, will be used to stimulate the crystal detection system in order to set the proper counting window.

If removable contamination is found, i.e., anything statistically above background, the source will be removed from use, and sent out for repairs.

ITEM 11

Disposal of any unusable sources will be handled through Teledyne Isotopes in Westwood, N.J., NRC License No. 29-00055-14.

Curriculum Vitae
THOMAS J. REED

Born in Cleveland, Ohio on September 10, 1936. U.S. Citizen, Married; Ht.: 6' 3"; Wt.: 240 Lbs.

Education:

1942-1954 Cleveland, Ohio Public School System, grades K-12 (Major Work Group). John Marshall High School

1954-1958 Rose Polytechnic Institute. Terre Haute, Ind. Electrical Engineering

1959-1961 John Carroll University, Cleveland, Ohio Graduate work in Physics

1965-1967 Rose Hulman Institute of Technology. Terre Haute, Ind. Graduate work in Bioengineering

WORK HISTORY

NASA: Lewis Flight Propulsion Lab. Cleveland, Ohio
July, 1958-June, 1961

I was in the Instrument Research group where I did design work in early pulse width modulation data acquisition systems for rocket engine research and micrometeorite assessment satellites. I developed ultra-low-power (at the time) transistor complementary symmetry circuitry for the satellite experiment. The rocket experiments functioned using the hypergolic combination of hydrogen and fluorine. The instrumentation systems had to be able to withstand the highly corrosive atmospheres produced by these chemicals.

RCA Service Co.: Riverton, N.J. and Cherry Hill, N.J. Field locations included Thule, Greenland; Fylingdales, England; Clear, Alaska and New London, CT.
June, 1961-August, 1966

My first assignment was in Thule as part of the installation team for the AN/FPS-49 Tracking Radar of the BMEWS defense system. I was involved in the installation of the TRDTO (data take-off) subsystem. This equipment converted the radar return signals into target position, distance, direction and velocity data.
From Greenland, I was sent to England for similar work. In Alaska, I was in charge of the installation team for the DTO and countermeasures equipment.

Thomas J. Reed

I spent some time on a special project doing a reliability and redundancy analysis for the BMEWS system in Greenland. I also spent a contract period in New London, CT. doing a classified radio communications in nuclear submarines project at the USN Underwater Sound Lab.

Picker Nuclear Corporation: North Haven, CT.
October, 1967-January, 1971

I was engaged as a project manager for the DYNAPIX, a large medical nuclear scanning imager. I was also made project manager for their small instrument, laboratory line of products. As such, I was heavily involved in the design and production of various pieces of nuclear counting and imaging equipment which utilized geiger tubes, proportional counters, ionization chambers, fluorescent screens, scintillation crystals and photoamplifiers.

Siemens Corporation--Medical Products Div.: Iselin, N.J.
February, 1971-October, 1972

It was the intention of Siemens to import from Germany their line of nuclear medical imaging products. I was hired to be the national service manager for this line of equipment. I interfaced with medical customers and redesigned equipment to make it more compatible with the needs of the American market. The corporation dropped the product line after 1 1/2 years of trying to penetrate the American market. They eventually represented an American company's products internationally and ultimately they bought a leading American company in the field.

Bionucleonics, Inc.: Fanwood and Kenilworth, N.J.
November, 1972-January, 1982

My first work here was as a Radiological Physicist. The work included radiation treatment planning, calibration of radiation therapy and normal medical X-ray equipment. I worked directly in various client hospitals with the physicians and technologists performing their daily clinical procedures. My job was to teach radiological physics to student technologists, to evaluate equipment function for nuclear medicine, radiology and radiation therapy and to perform regulatory assistance tasks. In the process of all these jobs, I became vice president of development and embarked on designing of some pieces of equipment to answer certain quality control needs in the hospital departments mentioned above.

THOMAS J. REED

E.R. Squibb & Sons, Inc. marketed the Q.C. Analyzer used in nuclear medicine to check the preinjection binding quality of radiopharmaceuticals. This is a microprocessor controlled instrument that I designed in 1975. It is based on Intel 8080 chips. AGFA Gevaert marketed the Chemalert temperature/pH meter designed to verify the proper operation of X-Ray film processors.
As a result of a need to know the high voltage applied to an X-Ray tube, I developed a technique using spectral separation to make the measurement without interrupting the power cables. Another product idea developed and proved feasible based on the spectral separation concept, viz., a bone mineral analyzer. I applied for patents on these, but the company's finances would not sustain the effort.

Reed Instruments, Inc.: Boonton, N.J.
May, 1981- March, 1985
I have been the president and owner. The company is closed. I purchased the assets of Bionucleonics in order to start my business. I have, however, been doing mostly consulting design and contract manufacturing in medical electronics since starting the business.
I hold NRC license No. 29-20636-01 for the possession of radioactive materials for the calibration of radiation survey instruments which I do routinely for E.R. Squibb & Sons, Inc. in New Brunswick, N.J.
I have become very familiar with the field of drug and nutrition delivery systems. I have designed analog, digital and microprocessor controlled enteral and drug delivery pumps. I used a Rockwell 6500 series microcomputer in these designs. One area of drug delivery that I have done serious consideration of is patient-controlled-analgesia. This is the programmed, restricted delivery of morphine or other narcotics upon demand for a seriously ill patient.
I am the holder of an SBIR (Small Business Innovation Research) grant to develop a telemetered 12-lead (stress) EKG system.
I have pursued more work on the X-Ray spectral separation idea for the bone mineral analyzer and as an industrial process control device for which I have had interest from major suppliers, but in all cases I am finance limited.
I have developed designs for dc-dc and dc-ac switching power supplies for prospective customers and have developed several products utilizing carrier current signal processing.

CONVERSATION RECORD

TIME: 1:45 | DATE: 8/8/85

TYPE: ☐ VISIT ☐ CONFERENCE ☒ TELEPHONE ☐ INCOMING ☐ OUTGOING

Location of Visit/Conference:

NAME OF PERSON(S) CONTACTED OR IN CONTACT WITH YOU	ORGANIZATION (Office, dept., bureau, etc.)	TELEPHONE NO
Thomas Reed	Bio Med Lab. Systems	201-483-1309

ROUTING

NAME/SYMBOL	INT

SUBJECT: App ltr 6/21/85 for materials license - Control Number 04070

SUMMARY

I asked Mr Reed if calibrations were for other licensees or strictly in house. Mr. Reed said they wanted to do calibrations for other licensees. I told him of the addl fee due & that I would send him a letter to that effect.

ACTION REQUIRED

NAME OF PERSON DOCUMENTING CONVERSATION	SIGNATURE	DATE
	L Jackson, HPAS	8/8/85

ACTION TAKEN

SIGNATURE	TITLE	DATE