MPM
RESEARCH & CONSULTING

MS16
Q-6

September 5, 1997

U. S. Nuclear Regulatory Commission
Region I
475 Allendale Road
King of Prussia, PA 19406-1415

Attn: James M. Bondick

Docket No. 030-34522
Control No. 124857

Dear Mr. Bondick:

Thank you for your prompt reply to my license request of 1 Aug 97. The information requested in your letter of 12 Aug 97 is listed below in the same numerical sequence as in your letter.

1. The facility in State College is in an I-RD zone (light industry and research and development).

2. Item 5 in the application contained a typographical error. The possession limit should have been listed as 150 millicuries (mCi). This activity is essentially all activation products from the irradiation of steel reactor vessel test specimens. The activities for the radioisotopes identified in a typical set of test specimens are listed. These radioisotopes have atomic numbers in the range Z=24-28. However, there may also be radioisotopes present, which are produced from unknown amounts of trace impurities in the steel, such as Sc, Zn, As, Sb, etc.. These radioisotopes might be present but not be detectable by the usual analyses, because of the low activity compared to the radioisotopes with Z=24-28. In order to make sure that the license covers these radioisotopes, if they are present, the range of atomic numbers Z=3-83 was used. The Z=3-83 range also covers sources in the microcurie range used to calibrate the smear counters and possibly a gamma spectrometer and possible surface contamination on specimens from activation and fission products in the reactor water systems. A revised version of Item 5 that separates these

915 Pike Street, PO Box 840
Office (814) 234-8860
Lemont, PA 16851-0840
Fax (814) 234-0248

categories is listed below.

ITEM 5. RADIOACTIVE MATERIAL

Radioisotope	Physical and Chemical Form	Activity millicuries
Z=24-28	activation products in metal	150 millicuries
Z-3-83	Any Activation products in metal, surface contamination, calibration standards, check sources	1 millicurie

The radioactive material is in the form of activation products in ferritic steel test specimens which have been irradiated in nuclear power reactors. The radioisotope composition varies with time of irradiation and time after removal from the reactor. The estimated composition of a set of test specimens that will be used under this license is:

^{51}Cr	0.02	millicurie
^{55}Fe	57.	millicurie
^{54}Mn	11.	millicurie
^{59}Fe	0.3	millicurie
^{60}Co	1.5	millicurie
^{58}Co	0.1	millicurie
^{63}Ni	0.2	millicurie
Total	70.	millicurie

The license limit of 150 mCi is to allow for uncertainties in the estimated activity for the specimens and for additional specimens. Calibration and check sources will be needed for the radiation measuring and detection instruments.

3. For the composition or radioisotopes activity listed in Item 5, we estimate that up to a total activity of about 170 mCi is in the range of 1,000-10,000 times the values in Appendix B of 10 CFR 30. This requires a financial assurance of $150,000 or the value determined by a decommissioning plan. A decommissioning plan is enclosed. Financial

assurance will be provided on approval of the license and prior to receipt of any radioactive material under the license.

4. a. The consultant-RSO will have the same control as an officer of MPM Technologies. He reports directly to me and has authority to stop work until radiation safety problems are corrected.

b. The RSO has provided a list of equipment needed for the radiation safety program and an estimate of his time for radiation safety activities for licensing and testing of the first set of specimens. I have agreed to these expenditures. The RSO has agreed to be available for additional time, if it is needed.

c. The RSO has sufficient time available to meet his commitment to MPM Technologies. He will be retired from his present full-time position as of 1 Oct 97 and his other commitments average less than 1-2 days/week. Our requirements are not for a specified amount of time for the RSO per week. Our activities may require 20-30 hours during a week when testing is in progress and only 1-2 hours/month for routine monitoring and record keeping when specimens are in storage between test periods. On average the RSO will probably be on site 4 hours/week.

d. I will be the in-house representative in the RSO's absence. I am qualified and competent to conduct radiation and contamination surveys. I will also probably do most of the specimen testing and will, therefore, usually be present when specimens are not in storage.

e. The RSO is available on an as-needed basis in person or by phone, FAX or e-mail. He lives within 5 minutes of the Lemont facility and 10 minutes of the State College facility. He is essentially as available as a regular employee might be and has been responding to emergencies for over 35 years.

5. As indicated in Item 8 of the application, radiation safety for personnel other than radioisotope users will be part of the routine safety training for all personnel. This is for persons who have unescorted access to restricted areas. Security requirements for our facility

require an escort for all unauthorized persons in the laboratory area. If the licensed material is in locked storage and the radiation and contamination levels in the restricted area meet the limits for unrestricted areas, training will not be required. The instruction will cover safety and handling procedures, posting and labeling, requirements for supervision of tasks by radioisotope users, and emergency notification. Retraining will be required annually.

Training for persons handling radioactive material will be as specified in Item 8 of the application. Retraining will be required annually.

6. This is covered in 5 above.

7. Survey instruments will be calibrated at least annually with no more than 12 months between calibrations. Calibrations will be performed by the instrument manufacturer or by vendors licensed by the NRC or an agreement state.

8. A draft procedure for opening packages is enclosed. We reserve the right to modify procedures, as needed, without notification of the NRC, as long as the regulatory requirements and the radiation safety requirements are not reduced.

9. The reference on page 8 of the application to 10 CFR 20.105 for radiation levels in unrestricted areas should have been 10 CFR 20.1301. On page 9 of the application the reference to 10 CFR 20.303 for disposal to the sanitary sewer system should have been 10 CFR 20.2003. We will use the current regulations in 10 CFR 20.1001 through 20.2402.

10. We are aware of the solubility requirements of 10 CFR 20.2003. Any liquid waste released to the sanitary sewer will be filtered before release or assayed by one of the methods in Information Notice 94-07 to determine the concentration of insoluble radioactive material.

11. Radioactive material will be assigned an inventory number and logged, when received. A log with receipts and disposals (corrected for radioactive decay) will be kept with a running inventory total to insure that license limits are not exceeded.

Thank you for your assistance in this matter. Your prompt attention to our request is appreciated.

Sincerely,

Michael P. Manahan
President

enc. Decommissioning Plan
Procedure for receipt of packages

MPM Technologies, Inc.
Standard Operating Procedures

Receipt of radioactive material shipments

APPROVAL:_____ **DATE:**_____

APPROVAL:_____ **DATE:**_____

1.0 PURPOSE AND SCOPE

This standard operating procedure describes the regulatory requirements and the procedure for receiving shipments containing radioactive material.

2.0 REGULATORY REQUIREMENT (10 CFR 20.1906)

2.1 Within three hours of the receipt of a radioisotope shipment (or within 3 hours of the beginning of the next work day, for packages received after working hours) the following shall be done:

2.1 (a) monitor the external surface of packages marked with a White I, Yellow II, or Yellow III label for radioactive contamination, unless the package contains only radioactive material in the form of a gas or in special form. The limit for external contamination is 22 dpm/cm^2 for beta-gamma contamination, as determined with a smear covering 300 cm^2.

(c) monitor the radiation level at the external surface of the packages marked with a White I, Yellow II, or Yellow III label, unless the package contains quantities of radioactive material that are less than or equal to the Type A quantity listed in Appendix A of 10 CFR71. The limit for external radiation is 200 mrem/hr (1000 mrem/hr for exclusive use shipments).

(c) monitor any package known to contain radioactive material for contamination and radiation levels, if the package shows evidence of degradation of package integrity, such as packages that are crushed, wet or damaged.

(d) If contamination or radiation levels on the exterior of the package exceeds the levels in 2.1(b) or 2.1(c) the final delivery carrier must be notified immediately. The

Administrator of the Region I Office of the Nuclear Regulatory Commission must also be notified immediately by telephone and telegram, mailgram or facsimile. The address is USNRC, Region I, 475 Allendale Road, King of Prussia, PA 19406-1415, phone 610 337-5000.

3.0 PACKAGE RECEIPT

The following procedure is to be followed for receiving packages that require monitoring as are listed in 2.1 (a), (b), and (c).

3.1 The President and/or the RSO should be notified of the expected arrival time of packages containing radioactive material. One of them will be present to receive the package or will designate one of the persons who have had the training required to use radioactive material at MPM Technologies to receive the package. Packages should be transferred to the laboratory area as soon as possible and may not be left at the reception desk or receiving area overnight. Packages will not be received outside of normal business hours, unless prior arrangements have been made with the shipper or carrier to have a qualified person available to receive the package. Record the results of the radiation and contamination survey on the survey form.

3.2 (a) Wearing gloves transfer the package to the laboratory area for monitoring. Large or heavy packages, such as drums or casks, should be checked for radiation levels and transferrable contamination (towel wipe) during or before unloading.

(b) In the laboratory the outside of the package should be monitored for radiation levels on contact and at a distance of 1 meter. The reading at 1 meter should be the same as the Transport Index on the package label for Yellow II and Yellow III packages. The radiation level at the surface of the package should not exceed 200 mrem/hr (1000 mrem/hr for exclusive use shipments). If the surface radiation level exceeds 200 mrem/hr (1000 mrem/hr for exclusive use shipments) notify the President or the RSO immediately for further instructions.

(c) Wipe an area of at least 300 square centimeters on the outside of the package with a paper towel and check the towel for contamination with a GMSM in an area of low background. If any contamination is detectable the notify the President or the RSO immediately for further instructions. Any persons that handled the package should also be checked for

contamination and notified of the radiation levels.

3.3 Packages containing licensed radioactive material may only be opened by a person authorized to handle radioactive material. The package should be opened in the laboratory area.

3.4 If the radiation or contamination levels exceed the limits in 2.1(a) or 2.1(b) or shows contamination in the wipe test of 3.2 (b), a complete contamination survey is required.

a. The package should be placed on a tray or paper and inspected carefully for damage.

b. Smears to check for contamination should be taken of the outside of the package.

c. The package should then be opened and the interior containers checked with smears.

d. Examine the radioisotope container for damage and check that the label corresponds to the material on the shipping papers and the material that was expected to be received.

3.5 If transferable contamination in excess of 100 dpm of beta-gamma or 10 dpm of alpha activity per smear is present on the inner container, an attempt should be made to decontaminate it.

a. Nonessential packaging material, which is contaminated, may be discarded as radioactive waste.

b. Packaging which is not contaminated may be discarded as nonradioactive waste. All radioactive material labels must be removed or defaced before disposal.

c. If there is excessive contamination or evidence of leakage or damage to the inner container, notify the RSO for instructions on how to handle or dispose of the contaminated material.

d. The presence of transferable contamination, which cannot be removed from the inner container, should be noted on the survey form.

3.6 Record the receipt of the material in the radioactive material logbook.

MPM TECHNOLOGIES, INC.
DECOMMISSIONING FUNDING PLAN
for
RADIOISOTOPE FACILITIES

INTRODUCTION

The license issued to MPM Technologies, Inc. by the Nuclear Regulatory Commission for testing irradiated steel specimens includes unsealed radioisotopes with half-lives in excess of 120 days. The sum of the ratios of the activities of the radioisotopes with half-lives in excess of 120 days to the activity listed in Appendix B to 10 CFR 30 is in the range of 1,000 to 10,000. Financial assurance for decommissioning the radioisotope laboratory of MPM Technologies must, therefore, be provided in the amount of $150,000 or the estimated actual cost of decommissioning. The estimated cost of decommissioning the radioisotope laboratory of MPM Technologies, Inc. is presented in this plan.

DETERMINATION OF DECOMMISSIONING COSTS

The NRC license includes two locations, one in Lemont and one in State College. The Lemont facility will be used until construction of the radioisotope laboratory at the State College facility is completed. When the State College facility is complete the Lemont facility will be decommissioned and any radioactive material on hand will be moved to the State College facility. Only one facility will be operated at one time and the decommissioning of only one laboratory is included in this plan.

The operations at this facility involve the testing of irradiated specimens of reactor vessel steel. The specimens include charpy and tensile specimens plus thermal monitors and fracture toughness specimens. The radioactive material is mainly in the form of activation products in the metal. There is some removal contamination on the outside of the specimens from surface contamination and from the activation products. While the specimens are considered unsealed material, the potential for serious contamination is much less than for liquids or powders containing the same level of activity. Decommissioning the laboratory will consist of packaging the specimens for shipment to a licensed radioactive waste disposal site or return to the customer. Any waste from the testing procedures or decontamination will also be packaged for shipment to a disposal site. The laboratory areas are kept within very low removable contamination limits (100 dpm/100 cm^2) so no significant decontamination will be required. A few small equipment items, such at the tools used to handle the specimens and the chucks on the testing equipment, may also need to be disposed as radioactive waste. The liners of the storage shields are disposable and are included in the waste generated during decommissioning.

A survey for contamination and radiation levels in the radioisotope laboratory and other areas of the building will then be conducted to determine that those areas are within the limits for free release. Radiation surveys of all areas will also be conducted to assure that the areas are at background levels.

The estimated cost of decommissioning either the Lemont or the State College facility is listed below. Transportation of the waste to disposal site is assumed to be done by a broker. The disposal cost is estimated at $10/lb. The specimens are assumed to be packaged in a 55-gallon drum with about 500 pounds of shielding. A second drum with a weight of about 300 pounds is assumed to carry the other waste from decommissioning. Decommissioning is assumed to be conducted by MPM Technologies, Inc. employees at an average cost of $50/hr. The estimates for time and disposal are considered to be conservative, therefore no contingency is included. The largest portion of the cost is for disposal of the specimens. It is expected that specimens will be returned to the customers, and if not the disposal cost will be included in the contract. Thus, the disposal cost could be removed from the plan.

ITEM	PERSON-HOURS	COST
package specimens for return or disposal	16	$ 800
decontaminate laboratory	8	$ 400
package cleaning waste	8	$ 400
radiation survey	4	$ 200
contamination survey	8	$ 400
waste disposal, 2 drums, 800 pounds		$ 8,000
Total	44	$10,200

FINANCIAL ASSURANCE

Financial assurance in the amount of $10,200 will be provided to the NRC in the form of a surety method, insurance or other method acceptable to the NRC.

Signed: M P Manahan, Jr. Date: 9/5/97

Michael P. Manahan, President

NRC FORM 665S (4-2002) U.S. NUCLEAR REGULATORY COMMISSION

ADAMS DOCUMENT SUBMISSION

Single Document

Originated By	Telephone	Mail Stop	LAN ID	Date
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Document Title or Accession No.

NMM Technologies, Inc. application dated August 1, 1997
License # 37-30408-01 Docket # 03034522 MC 12485?

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NRC FORM 313 (7-96)
10 CFR 30, 32, 33
34, 35, 36, 39 and 40

U. S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB: NO. 3150-0120 EXPIRES: 7/31/99

Estimated burden per response to comply with this information collection request: 7 hours. Submittal of the application is necessary to determine that the applicant is qualified and that adequate procedures exist to protect the public health and safety. Forward comments regarding burden estimate to the Information and Records Management Branch (T-6 F33), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, and to the Paperwork Reduction Project (3150-0120), Office of Management and Budget, Washington, DC 20503. NRC may not conduct or sponsor, and a person is not required to respond to, a collection of information unless it displays a curently valid OMB control number.

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.

APPLICATION FOR DISTRIBUTION OF EXEMPT PRODUCTS FILE APPLICATIONS WITH:

DIVISION OF INDUSTRIAL AND MEDICAL NUCLEAR SAFETY
OFFICE OF NUCLEAR MATERIALS SAFETY AND SAFEGUARDS
U.S. NUCLEAR REGULATORY COMMISSION
WASHINGTON, DC 20555-0001

ALL OTHER PERSONS FILE APPLICATIONS AS FOLLOWS:

IF YOU ARE LOCATED IN:

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

LICENSING ASSISTANT SECTION
NUCLEAR MATERIALS SAFETY BRANCH
U.S. NUCLEAR REGULATORY COMMISSION, REGION I
475 ALLENDALE ROAD
KING OF PRUSSIA, PA 19406-1415

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

NUCLEAR MATERIALS LICENSING SECTION
U.S. NUCLEAR REGULATORY COMMISSION, REGION II
101 MARIETTA STREET, NW, SUITE 2900
ATLANTA, GA 30323-0199

IF YOU ARE LOCATED IN:

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

MATERIALS LICENSING SECTION
U.S. NUCLEAR REGULATORY COMMISSION, REGION III
801 WARRENVILLE RD.
LISLE, IL 60532-4351

ALASKA, ARIZONA, ARKANSAS, CALIFORNIA, COLORADO, HAWAII, IDAHO, KANSAS, LOUISIANA, MONTANA, NEBRASKA, NEVADA, NEW MEXICO, NORTH DAKOTA, OKLAHOMA, OREGON, PACIFIC TRUST TERRITORIES, SOUTH DAKOTA, TEXAS, UTAH, WASHINGTON, OR WYOMING, SEND APPLICATIONS TO:

NUCLEAR MATERIALS LICENSING SECTION
U.S. NUCLEAR REGULATORY COMMISSION, REGION IV
611 RYAN PLAZA DRIVE, SUITE 400
ARLINGTON, TX 76011-8064

LL 30408
030-34522
03620

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 JURISDICTIONS.

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)*
   MPM Technologies, Inc.
   915 Pike Street
   Box 840
   Lemont, PA 16851-0840

3. ADDRESS(ES) WHERE LICENSED MATERIAL WILL BE USED OR POSSESSED
   915 Pike Street
   Lemont, PA
   and
   2161 Sandy Drive, State College, PA (after 1 Jan 98)

4. NAME OF PERSON TO BE CONTACTED ABOUT THIS APPLICATION
   Rodger W. Granlund

   TELEPHONE NUMBER
   814 238-2952

SUBMIT ITEMS 5 THROUGH 11 ON 8-1/2 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.

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

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

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

9. FACILITIES AND EQUIPMENT.

10. RADIATION SAFETY PROGRAM.

11. WASTE MANAGEMENT.

12. LICENSEE FEES *(See 10 CFR 170 and Section 170.31)*
    FEE CATEGORY 3M
    AMOUNT ENCLOSED $ 1,900.00

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, 36, 39 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 OFJUNE 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.

CERTIFYING OFFICER -- TYPED/PRINTED NAME AND TITLE	SIGNATURE	DATE
Michael P. Manahan, Sr., President	Michael P. Manahan, Sr.	8/1/97

FOR NRC USE ONLY

TYPE OF FEE	FEE LOG	FEE CATEGORY	AMOUNT RECEIVED	CHECK NUMBER	COMMENTS
			$		124857
APPROVED BY			DATE		AUG - 4 1997

NRC FORM 313 MPM Technologies, Inc.
1 Aug 97

ITEM 5. RADIOACTIVE MATERIAL

A. Radioisotope	B. Physical and chemical form	C. Activity
Z=3-83	activation products in metal specimens, surface contamination, radioactive waste, calibration standards and check sources.	150 Mci

The radioactive material is in the form of activation products in ferritic steel test specimens which have been irradiated in nuclear power reactors. The radioisotope composition varies with time of irradiation and time after removal from the reactor. The estimated composition of a typical set of 40 to 50 test specimens is:

^{51}Cr	0.02 mCi
^{55}Fe	60. mCi
^{54}Mn	10. mCi
^{59}Fe	0.3 mCi
^{60}Co	2. mCi
^{58}Co	0.1 mCi
^{63}Ni	0.2 mCi
Total	73. mCi

The inclusion of radioisotopes with atomic numbers 3-83 is to allow for trace amounts of radioisotopes produced by the irradiation of impurities in the test metal. Some of the radioactive material will be in the form of radioactive waste generated during the testing procedures, but this is expected to be less than 0.1% of the activity in the specimens. Calibration and check sources in microcurie quantities will be needed for the radiation measuring and detection instruments.

ITEM 6. PURPOSE FOR WHICH LICENSED MATERIAL WILL BE USED

The licensed material will be used in research and development as defined in 10 CFR 30.4 in the testing of irradiated metal specimens for radiation effects. Test specimens that have been removed from reactor surveillance capsules will be shipped to the licensee for testing. The specimens are mainly Charpy and tensile specimens, but thermal monitors and fracture toughness specimens may also be included.

The calibration sources will be used to calibrate the counting equipment used for smear counting and waste assay. The check sources will be used for routine operational checks of counting and survey instruments.

ITEM 7. INDIVIDUALS RESPONSIBLE FOR THE RADIATION SAFETY PROGRAM AND THEIR TRAINING AND EXPERIENCE

Michael P. Manahan, President

Dr. Manahan is President of MPM Technologies, Inc., and he is an Adjunct Professor of Nuclear Engineering at Penn State University. He has over 21 years of experience in nuclear, mechanical, and nuclear materials engineering design, research, and new technology development. He received his B.S degree in mathematics in 1975 from Michigan State University, his B.A degree in Physics in 1975 from Michigan State University, his M.S degree in Nuclear Reactor Physics in 1978, and his Ph.D. degree in Nuclear Materials Engineering from MIT in 1982. He is experienced in both analytical and experimental research in radiation damage in a wide variety of materials. He is a recognized authority in the development of advanced technology for characterizing the microstructure and the mechanical behavior of materials. He is experienced in the advancement of finite-element, radiation transport, and other advanced computational techniques.

Dr. Manahan served as program manager for nuclear pressure vessel surveillance programs while employed at Battelle. He has managed and performed work on surveillance capsules for many utilities. His experience includes research and advancement in methods for Charpy testing, tensile testing, dosimetry analysis, neutron transport analysis, chemical analysis, specimen reconstitution, and P-T curve determination. His industrial experience includes work as a shield design engineer and he has taught graduate courses at Penn State in shielding engineering and radiation protection.

Rodger W. Granlund, Radiation Safety Officer

Mr. Granlund has over 37 years of experience as a health physicist using a variety of radioisotopes in millicurie and curie amounts. He received a B.S. degree from Penn State University in 1958 and attended Vanderbilt University 1958-59 and Oak Ridge National Laboratory 1959-60 on an Oak Ridge Institute of Nuclear Studies Fellowship in Radiological Physics. He served as the University Health Physicist at Penn State University from 1960 to 1997. He was in charge of the university radiation safety program, including over 200 radioisotope laboratories, 35-50 x-ray machines, a 1 megawatt research reactor,a Co-60 irradiation facility and hot-cell testing of the same type of irradiated metal specimens covered by this license application. He has been an instructor for health physics courses and training programs for college students, high

school and college teachers, power plant operators, and industrial radioisotope users. Consulting experience includes industrial and medical radioisotope usage, x-ray and nuclear medicine quality assurance and radiation safety, shielding, laboratory design, training, waste disposal, instrumentation, and nuclear power plant audits. He has been certified in health physics by the American Board of Health Physics since 1967.

ITEM 8. TRAINING AND EXPERIENCE FOR INDIVIDUALS WORKING IN RESTRICTED AREAS

Individuals, other than the persons named in item 7, working with licensed material will be required to complete at least 2 hours of instruction in radiation safety, including a written examination. The instruction will cover the information listed in the outline below. In addition the individuals will be required to demonstrate to the RSO competence for the work that they will be doing. The RSO will certify the completion of the required instruction and training for each individual working in the laboratory.

RADIATION SAFETY INSTRUCTION
OUTLINE

A. Introduction
- Organization of MPM Technologies, Inc.
  - Radiation Safety Officer
  - Laboratory procedures
- Regulations and Licenses
  - Nuclear Regulatory Commission
    - 10CFR19 and NRC-3
    - 10CFR20
    - License conditions
- Emergency Notification

B. TYPES OF RADIATION
- Beta radiation
  - Characteristics
    - attenuation
    - spectrum
    - bremsstrahlung
- Gamma radiation
  - Characteristics
    - shielding
    - spectrum

C. QUANTITIES AND UNITS
- Activity (curie, becquerel)
- Half-life
- Effective Half-life
- Absorbed Dose (rad, gray)
- Equivalent dose (linear energy transfer, rem, sievert)
- Effective Dose
- Exposure (roentgen)

D. BIOLOGICAL EFFECTS OF RADIATION
- Acute effects
  - Whole Body
  - Skin
- Chronic delayed effects and risks
  - somatic
  - genetic

E. POPULATION DOSE
- Natural
- Medical
- Other

F. DOSE LIMITS
- Whole body and critical organs
- Extremities
- Skin
- DAC (airborne)
- Unrestricted area
- Effluents

G. PERSONNEL MONITORING
- Dosimeters, TLD, whole body, extremities, skin
- Sensitivity
- Rules for use
- Bioassay

H. PRINCIPLES OF RADIATION PROTECTION
- Time
- Distance

Shielding
Containment
Surveys

I. POSTING AND LABELING
Rooms
Containers
Waste

J. LABORATORY PROCEDURES
Instrument checks (GMSM, scaler)
Use of gloves
Handling specimens
Portable shields
Double containment
Surveys, GMSM, wipes, smears
Decontamination

K. RADIOISOTOPE TRANSFERS
Receipt
Inventory form
Return to customer
Disposal record

L. WASTE DISPOSAL
Solid
Liquid
Segregation

Radiation safety for personnel other than radioisotope users will be part of the routine safety training for all personnel. The instruction will cover safety and handling procedures, posting and labeling, requirements for supervision of tasks by radioisotope users, and emergency notification.

ITEM 9. FACILITIES AND EQUIPMENT

MPM Technologies, Inc. is currently located in a 2,580 ft^2, two story, wood frame building at 915 Pike Street, Lemont, PA 16851-0840. The test equipment room, where the radioactive specimens will be tested, is a new addition with a concrete floor and an area of about 360 ft^2. Storage of specimens will be in the basement in a shield constructed of solid concrete blocks. A floor plan for the building and a key map is included as Appendix A. A new building is under construction

and MPM Technologies, Inc. operations will move to that site in early 1998. Pending NRC approval of this license application, MPM Technologies, Inc. will conduct radioactive specimen testing in the current building until December 31, 1997 (or until the new facility is completed), and then transfer operations to the new building. The current building will be decommissioned and all radioactive material moved to the new building at that time.

Early in 1998, MPM Technologies, Inc. will move to a new, one-story, metal shell building at 2161 Sandy Drive, State College, PA 16803. The total floor area is about 7,500 ft^2. The area where testing of radioactive specimens will be done is about 1,500 ft^2. A key map and a floor plan for the new building are included as Appendix B. Work surfaces and sinks are of chemically resistant material. Storage wells for radioactive specimens and waste that requires shielding will be provided by steel pipes (about 12 inches in diameter and 6 ft long) buried in the floor with concrete shield plugs (about 12 inches thick) at the top. The wells will have PVC pipe liners that can be removed for cleaning, if required.

Radiation detection instruments will include the following items.

Ludlum model 1000 (or equivalent) scaler with Ludlum model 44-9 (or equivalent) thin-window GM detector and Ludlum model 180-2 (or equivalent) planchet holder for contamination surveys and assay of smears.

Ludlum model 3 (or equivalent) ratemeter with Ludlum model 44-9 (or equivalent) thin-window GM detector for contamination surveys and low level radiation measurements.

Ludlum model 9 (or equivalent) ion chamber for measurement of gamma radiation levels with a minimum range of 5 R/hr.

A beta- and/or gamma-emitting check source will be used to check survey instruments or scalers each day the instrument is used.

Instruments will be calibrated annually, the interval between calibrations not to exceed 13 months. The planchet/smear counter will be calibrated with a NIST traceable beta source. The survey meters will be calibrated by the manufacturer or other vendor providing approved calibration services.

ITEM 10. RADIATION SAFETY PROGRAM

MPM Technologies, Inc. is a small business with 1 full-time and several part-time employees in

addition to the President. The President is directly responsible for all personnel. The Radiation Safety Officer is a consultant under contract to MPM Technologies, Inc. and reports to the President.

The management of MPM Technologies, Inc. is committed to the ALARA principle and the goal is to keep all personnel doses and releases of radioactive material less than 10% of the applicable limits in 10 CFR 20. Exposures or releases of radioactive material or any planned uses that exceed 10% of the limits permitted under 10CFR20 will be reviewed under the ALARA procedure. Procedures for the use of radioactive material require approval of the Radiation Safety Officer and the President.

The radiation safety program is contained in a set of operating procedures that cover the organization and management commitment to radiation safety as well as the operating procedures. The procedures include the following.

Radiation Safety Organization
ALARA Program
Radiation Safety Training
Experiment Review
Personnel Monitoring
Smear Counter Operation
Radiation and Contamination Control
Package Receipts
Waste Disposal

The Charpy test procedure involves the fracture of the specimen with a weighted pendulum. The tension and fracture toughness testing utilizes a servo hydraulic machine to load the specimens. The test procedures are performed with a single specimen at a time. Specimens are handled with tongs or other tools. A typical specimen is expected to contain 1-1.5 mCi total activity, mostly ^{55}Fe. The gamma exposure rate at 30 cm from the ^{60}Co and ^{54}Mn in the specimen is expected to be less than 2 mR/hr. The specimens are cleaned at the reactor site before shipping to MPM Technologies, Inc. and removable contamination is expected to be less than 1000 dpm/smear. To prepare for a test the test area is posted to warn personnel that testing is in progress. The test equipment and the immediate work area is covered with paper or plastic to catch any fragments of the specimen that are produced when the specimen is broken, which is the usual end point of the test. The specimen is inserted into the jaws of the test machine using tongs or other tools. During the remainder of the test the operator is usually a meter or more from the specimen and exposure rates are less than 1 mR/hr. After the test the specimen pieces are removed with tongs and returned to the shielded storage ports. The work area is then surveyed with a GMSM to check

for fragments of the broken specimen. Towel wipes of the work surfaces are also taken and checked with the GMSM to detect contamination. Operators will wear gloves and a lab coat during handling of specimens. Operators will check their hands, clothing and shoes for contamination with a GMSM before leaving the building after handling specimens. A smear survey of the test area, the equipment used, and selected spots in other areas of the building will be performed at least weekly when specimens have been handled. Past experience indicates that the testing can be performed without contamination problems and with personnel doses that are well within the ALARA goals.

Personnel dosimeters will be obtained through a NVLAP-approved vendor (Landauer or equivalent) for persons who require monitoring as specified in 10CFR20.202. Persons handling test specimens will wear a body and an extremity dosimeter. Dosimeter exchange frequency will be quarterly.

The limit for removable contamination for the specimen testing area and the remainder of the building will be 100 dpm/100 cm^2 and will be measured with smears. Removable contamination on test equipment surfaces that contact the test specimens may exceed 100 dpm/smear after cleaning to remove loose contamination. Radiation levels outside the building will be maintained within the limits of 10CFR20.105. Wipe tests and GMSM surveys of work areas will be performed each day that radioactive material is used. Smear surveys for removable contamination will be performed each week that radioactive material is used and the survey data will be recorded.

If contamination is found in excess of the limits, the President or RSO is to be notified and the area or equipment is to be decontaminated immediately. If contamination is found on shoes or clothing, the contamination is to be removed immediately, if possible. Shoes may not be worn without shoe covers, if the removable contamination exceeds 100 dpm on a smear. Clothing or shoes with contamination in excess of 0.1 microcuries may not be removed from the building. Skin contamination is to be removed as completely as possible immediately after detection. Skin contamination in excess of 2 times the background count rate using the GMSM survey meter after cleaning is to be reported to the RSO for evaluation of the skin dose.

Receipts of radioactive material are not expected to occur more than a few times per year. The expected delivery date will be known ahead of time so that the President or RSO can be present to receive the material or can be notified to check the shipment within a short time after delivery. Packages will be checked for radiation levels and contamination as required by 10 CFR 20.1906. If removable contamination in excess of the limits in 10 CFR 71.87 (22 dpm/cm^2) or an unexpected radiation level is found, the President or the RSO will make the required notifications as specified in 10 CFR 20.1906.

The return of specimens to the customer after testing will be in accordance with the regulations in 10 CFR 71 and the DOT regulations in 49 CFR. If type A containers are required the required certification data will be kept on file.

Radioactive material under this license will be secured from unauthorized access when in use or in storage as required by 10 CFR 20.1801 and 1802. MPM Technologies, Inc. security requirements for confidentiality of data and testing procedures require that access to the building be controlled. Visitors must be escorted in the testing area. The radioactive specimens will be stored in locked shields or containers.

ITEM 11. WASTE MANAGEMENT

It is anticipated that test specimens will be returned to the customer after testing. Radioactive waste will consist of contaminated paper and plastic used to contain and clean the work area. There may also be small amounts of liquid waste from cleaning the testing area and test equipment and from temperature baths for the specimens. Licensed brokers will be used, as needed, to provide packages and transport the waste to a disposal site.

The waste management program will use three major elements to reduce the amount of radioactive waste; minimization, segregation, and storage for decay. Testing procedures will be reviewed by the RSO to determine whether generation of radioactive waste has been minimized.

Liquid waste will disposed by release to the sanitary sewer system under the provisions of 10CFR20.303 and in accordance with the ALARA policy. Liquid waste which cannot be disposed in this manner will be stored for decay as noted above or solidified for disposal as solid waste.

The volume of radioactive waste that is generated is expected to be small, 1-2 ft^3 per year, and storage space is not a problem. Used specimens or other waste that requires shielding will be stored in the concrete block shield of the present building or the floor wells in the new building.

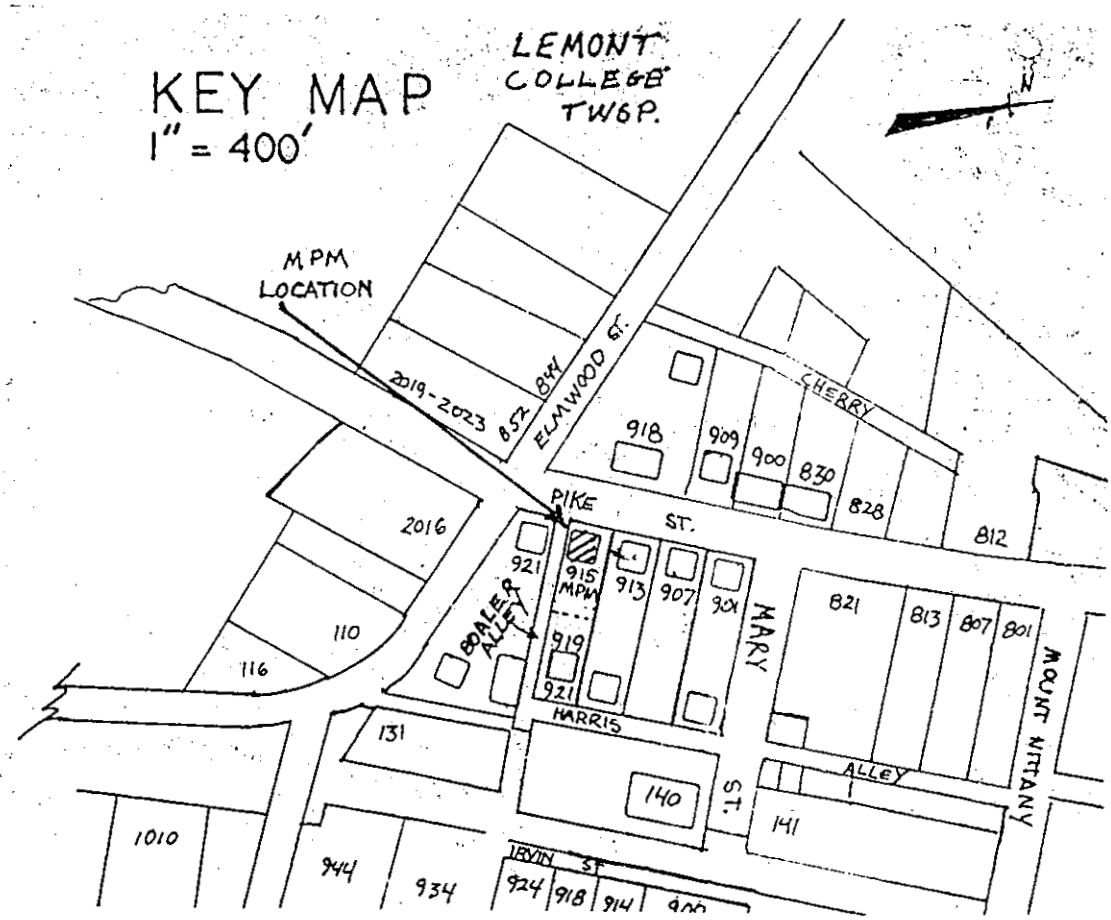
If only radioisotopes with a half-life of 100 days or less are present, the waste will be segregated and stored for 10 half-lives then released as nonradioactive waste. Before release it will be surveyed with a thin end window GMSM in an area with normal background radiation levels to determine that there is no detectable contamination in the waste. However, it is not expected that storage for decay will be applicable to the waste generated under this license.

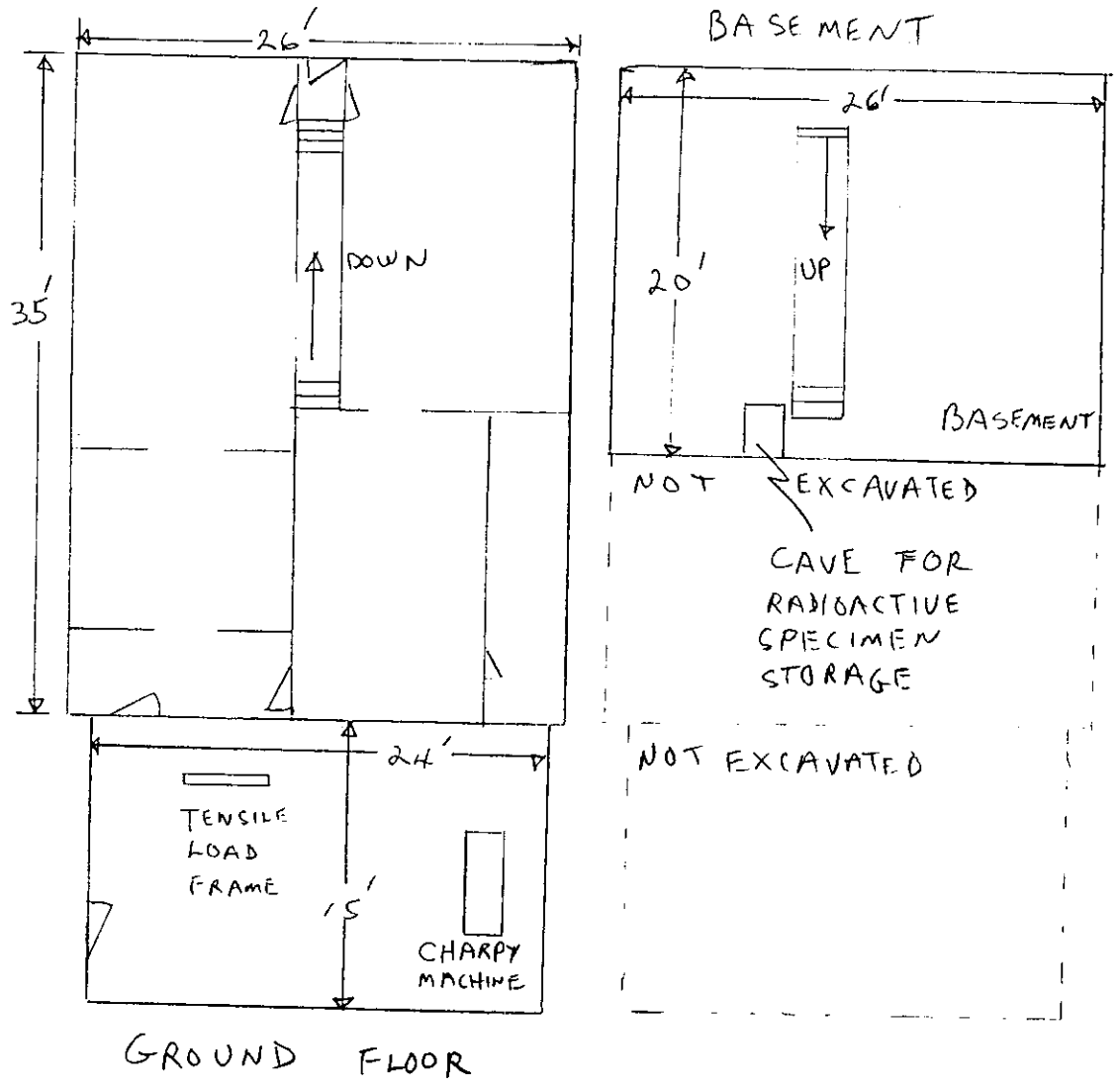
APPENDIX A

Key Map and Floor Plan for Exiting MPM Facility

Key Map
Existing MPM Facility

MPM Technologies, Inc.
915 Pike Street, PO Box 840
Lemont, PA 16851-0840





NOTE: SECOND FLOOR CONTAINS OFFICES FOR ADMINISTRATIVE AND ENGINEERING WORK. NO EXPERIMENTAL WORK IS PERFORMED ON SECOND FLOOR.

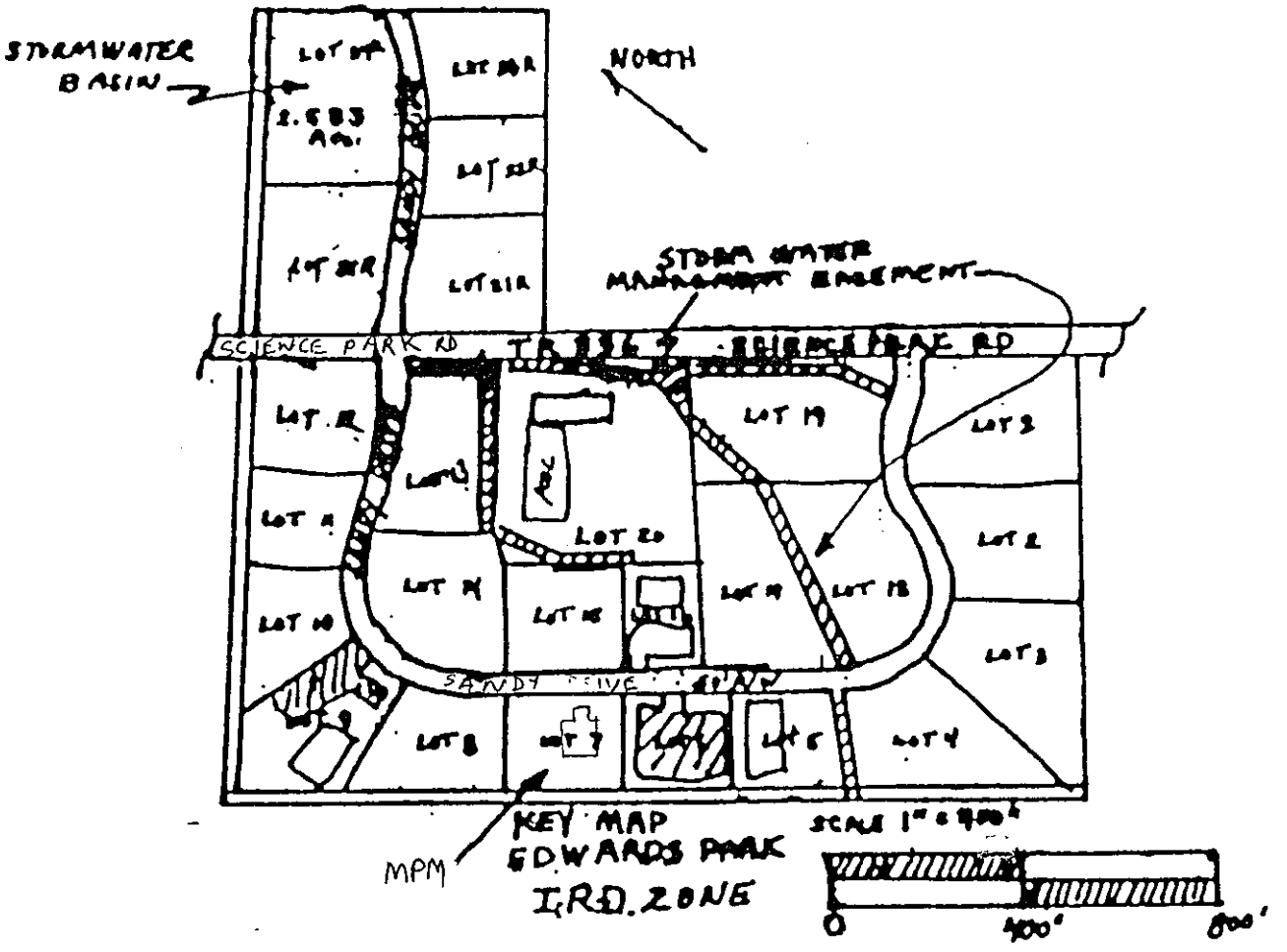
CURRENT MPM BUILDING
915 PIKE STREET
LEMONT, PA 16851-0840

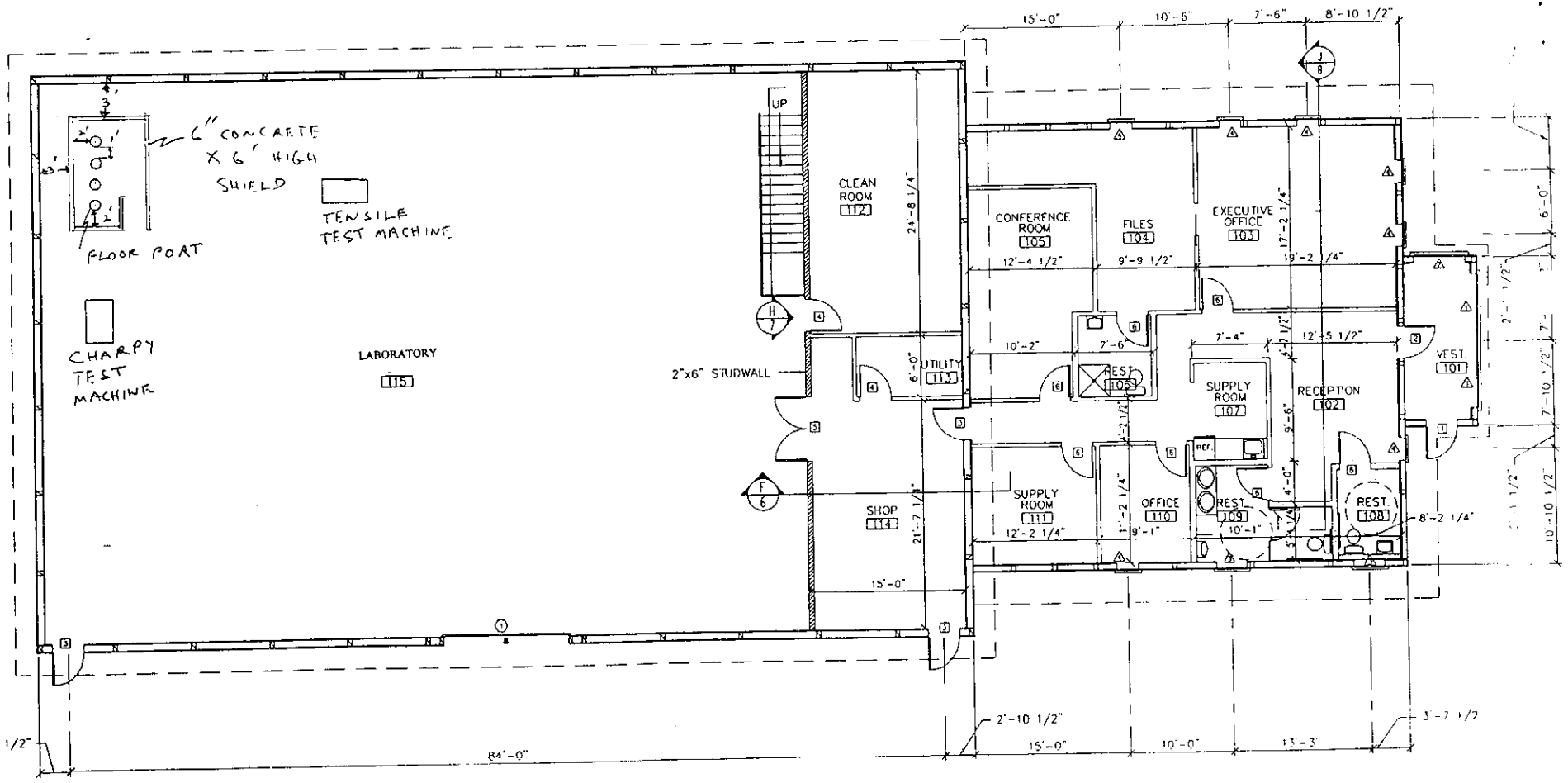
APPENDIX B

Key Map and Floor Plan for New MPM Facility

Key Map
New MPM Facility (under construction)

MPM Technologies, Inc.
2161 Sandy Drive
State College, PA 16803





MPM BUILDING UNDER CONSTRUCTION
2161 SANDY DRIVE
STATE COLLEGE, PA 16803