Missouri State
UNIVERSITY

July 3, 2008

Mr. Loren Hueter
Nuclear Regulatory Commission, Region III
801 Warrenville Road, Suite 255
Lisle, Illinois 60532-4351
PHONE: 630-829-9829; FAX: 630-515-1078

Subject: Application for an Amendment to License Number 24-11585-04 (Docket Number 030-18583)

Dear Mr. Hueter:

Missouri State University (MSU) hereby submits this application for an amendment to License Number 24-115850-04 to change the Radiation Safety Officer from Tracey L. Poston to Erin E. Parrish. The University also submits a request to change the authorized user from Tracey L. Poston to Erin E. Parrish for six of the seven materials listed in License item 11.A.1: Am-241, Ni-63, Co-60, C-14, Ca-45, and P-33. The seventh item, P-129, was previously used as a calibration source for a gamma counter, and MSU requests to again use it in such manner under authorized user, Dr. Thomas E. Tomasi.

Missouri State University additionally requests that a multinuclide standard, including Pb-210, Am-241, Cd-109, Co-57, Te-123, Cr-51, Sn-113, Sr-85, Cs-137, Co-60, and Y-88, be added to the license. The total activity of all the combined isotopes in calibration standard will be 1.33 µCi. The standard will be used as a calibration source for a gamma spectrometer (CG4020 GE Co-Axial Detector with DSA Digital Spectrum Analyzer) for the analysis of sediment samples. In addition, MSU requests to add Dr. Robert Pavlowsky as an authorized user for this standard.

Missouri State University furthermore requests that an additional facility be added to the conditions in License item 10. Licensed materials described in Items 6.D and 6.I. are desired to be used at the University's facilities located at the Roy Blunt Jordan Valley Innovation Center, 524 N. Boonville, Springfield, MO, under authorized user Dr. Paul Durham. Dr. Durham's research and laboratory will be moved to the third floor of the Jordan Valley Innovation Center when it is completed in December 2008.

Enclosed is the application regarding the above requests. Please contact Erin Parrish at (417) 836-4132 if you have any questions regarding this application.

Sincerely,

Frank Einhellig, PhD
Associate Provost and Dean of the Graduate College

Encl: MSU License Amendment Application

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MISSOURI STATE UNIVERSITY
SPRINGFIELD, MO

APPLICATION FOR REVISION
US NRC LICENSE NUMBER 24-11585-04
DOCKET NUMBER 030-18583

July 3, 2008

PERSON TO BE CONTACTED ABOUT APPLICATION

All correspondence pertaining to this license should be addressed to:

Erin E. Parrish
Research Scientist/RSO
Missouri State University
901 South National
Carrington, Room 422A
Springfield, MO 65897

Phone: (417) 836-4132
Fax: (417) 836-8818
Email: erinparrish@missouristate.edu

ITEM 5: RADIOACTIVE MATERIAL POSSESSED

LINE	ELEMENT AND MASS NUMBER	CHEMICAL AND/OR PHYSICAL FORM	MAXIMUM NUMBER OF MILLICURIES AND/OR SOURCES AND MAXIMUM ACTIVITY PER SOURCE	ACTION
No.	a	b	c	d
1	Pu-239	Sealed source	32 grams as Pu-Be source 2 curies	Transferred to NSSI Sources & Services, Inc. on March 24, 2006
2	Any byproduct material from (1)	Activation products	See 6-(2)	
3	Am-241	Plated source	0.1 microcurie	Still in storage
4	Am-241	Sealed source	No single source to exceed 10 millicuries	Transferred to NSSI Sources & Services, Inc. on March 24, 2006
5	Ni-63	Plated source	2 sources not to exceed 15 millicuries each	In storage with intent to dispose
6	Co-60	Sealed source	1 millicurie	In storage with intent to dispose
7	P-32	Any	10 millicuries	
8	S-35	Any	15 millicuries	
9	C-14	Any	25 millicuries	In storage with intent to dispose
10	Ca-45	Any	2 millicuries	In storage with intent to dispose
11	I-129	Any	0.1 millicuries	
12	P-33	Liquid	1 millicurie	In storage with intent to dispose
13	I-125	Any	10 millicuries	
14	Pb-210 Am-241 Cd-109 Co-57 Te-123m Cr-51 Sn-113 Sr-85 Cs-137 Co-60 Y-88	Multinuclide Source	Pb-210 (0.3 microcuries) Am-241 (0.03 microcuries) Cd-109 (0.287 microcuries) Co-57 (0.011 microcuries) Te-123m (0.014 microcuries) Cr-51 (0.357 microcuries) Sn-113 (0.052 microcuries) Sr-85 (0.066 microcuries) Cs-137 (0.048 microcuries) Co-60 (0.056 microcuries) Y-88 (0.109 microcuries) **Total Source Activity = 1.33 microcuries**	

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

(1) The Pu-239 source was transferred to DOE ownership on April 18, 2006 and is stored under the DOE license exemption.

(2) The Pu-239 source was transferred to DOE ownership on April 18, 2006 and is stored under the DOE license exemption.

(3) In storage: LANL would not pick up 0.1 microcurie Am-241 source due to low activity.

(4) The AM-241 (10 mci) source was transferred to DOE ownership on April 18, 2006 and is stored under the DOE license exemption.

(5) Possession and storage only with intent to dispose.

(6) Possession and storage only with intent to dispose.

(7) To be used for student instruction. (May be used for research and development as defined in Section 30.4 of 10 CFR Part 30).

(8) To be used for student instruction. (May be used for research and development as defined in Section 30.4 of 10 CFR Part 30).

(9) Possession and storage only with intent to dispose.

(10) Possession and storage only with intent to dispose.

(11) To be used for instrument calibration.

(12) Possession and storage only with intent to dispose.

(13) To be used for in vitro laboratory testing and in vivo animal studies as approved in Amendment No.9.

(14) To be used as a calibration source for a gamma spectrometer (CG4020 GE Co-Axial Detector with DSA Digital Spectrum Analyzer) for the analysis of sediment samples.

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

The responsibility for administration of this license rests with the Institutional Official, the Associate Provost and Dean of the Graduate College, at Missouri State University. The direct responsibility for operational oversight of activities conducted under the license rests with the Principal Investigators. The Radiation Safety Officer (RSO) directly reports to the Associate Provost and Dean of the Graduate College (IO) and the Vice President for Research and Economic Development, for all matters regarding the license. In addition, the RSO works closely with the Director of Environmental Management/Environmental Health and Safety on waste disposal issues.

The Radiation Safety Committee (RSC) and RSO shall have sufficient authority, organizational freedom, and management prerogative to communicate with upper levels of administration and provide direction to personnel regarding NRC regulation and license provisions.

The Institutional Official (IO) is responsible for activities conducted under this license and shall have the prime responsibility for compliance with the terms and conditions of the license and the University Radiation Safety Program. The IO shall provide competent personnel and make certain they have adequate facilities and equipment to accomplish assignments expeditiously, economically, safely, and to maintain exposures as low as reasonably achievable. The IO shall either personally or through the RSO assure that the proper reviews and approvals are made by the RSC.

The IO shall assure that annual audits of the program are conducted to ensure the safe operation and compliance with regulatory requirements. The annual audit shall include mechanisms to correct and resolve problems in an expeditious manner. Such audits may be conducted by the RSO, the RSC, or the Director of Environmental Management/Environmental Health and Safety.

Radiation Safety Committee

The Radiation Safety Committee (RSC) shall review and evaluate operational and safety performance. This shall be accomplished through discussions at scheduled meeting, audits, and by inspection of operating areas. Minutes of all RSC meetings and audit reports shall be retained in accordance with regulatory requirements.

The RSC shall have at least 5 members chosen to provide both administrative and technical competence. Members of the RSC shall be appointed by the IO. The RSC shall consist of the RSO; at least one member of administration; and persons representing the groups or activities that will use radioactive material. In addition, when experiments using animals or plants require prior RSC approval, there shall be at least one scientist with expertise in plant pathogens or plant pest containment and one scientist with animal containment expertise on the RSC. The administrative member of the RSC is not required to have a background in radiation safety. The minimum number of members constituting a quorum is at least one-half of the RSC membership including the Chairman (or authorized delegate) and RSO (or his/her designee).

It is the responsibility of the RSC to establish appropriate policies and procedures to ensure control of the procurement and use of byproduct, source, and radioactive materials; completion of safety evaluations of proposed uses; and the overall development and implementation of the radiation safety program. The duties and responsibilities of the RSC include but are not limited to the following:

- Conduct periodic reviews and audits of the radiation safety program
- Conduct safety evaluations of proposed uses of licensed materials
- Assure the development of procedures and criteria for training and testing radiation workers
- Assure the development of radiation safety manuals, as necessary
- Specific approval of any facility or building for the use of any radioactive material which has not been previously approved

The RSC shall meet on a needed basis, but at least quarterly, and shall maintain a record of the minutes of each meeting. A copy of all RSC minutes shall be distributed to administration having responsibility for activities conducted under the license.

The RSC shall conduct an audit of activities conducted under this license at least annually. Audit areas include but are not limited to facility reviews, waste collection and disposal, exposure and effluent trends, environmental surveillance, license compliance, and inventory of radioactive material. The results of such audits shall be documented. These reviews may be conducted by an independent auditor.

The current membership of the RSC includes:
Paul M. Toom, PhD, Chairman of RSC, Professor and Acting Head of the Department of Chemistry, Missouri State University (MSU)
Lazlo G. Kovacs, PhD, Associate Research Professor, Department of Agriculture, MSU-Mt. Grove Campus
Shyang Huang, PhD, Professor, Department of Physics, Astronomy, and Materials Sciences, MSU
Tomas E. Tomasi, PhD, Professor and Associate Dean of the Graduate College, Department of Biology, MSU
David Vaughan, Director, Environmental Health and Safety Department, MSU
Erin E. Parrish, Research Scientist/RSO, MSU

Radiation Safety Officer
The Radiation Safety Officer (RSO) is responsible for the establishment and guidance of programs in radiation protection. He/she also evaluates potential and/or actual radiation exposure, establishes appropriate control measures, approves written procedures, and assures compliance with pertinent policies and regulations. Under his/her direction: collecting samples, performing analyses, taking measurements, maintaining records, and general assistance in performing the technical aspects of the radiation safety program.

In general, the RSO will have the knowledge and ability necessary to respond effectively to the radiation safety need of the University. The RSO will have a background of training and experience and maturity

of judgment sufficient to recognize the need for expert assistance as an early stage in the development of potential radiation safety problems involving disciplines outside his or her area of expertise. Specifically, the RSO will have access to individuals with the following skills and knowledge, as necessary to support the radiation safety program:

- Ability to communicate clearly, both verbally and in writing
- Knowledge of current standards, guides, and reports published by various organizations (e.g. National Academy of Sciences, International Commission of Radiological Protection) and the ability to understand, interpret, and effectively apply them
- Knowledge of applicable NRC regulations, regulatory guides, and NUREG-series reports, and ability to understand, interpret, and effectively apply them
- Knowledge and ability sufficient to operate instruments used in the program for measure radiation and radioactive materials and interpret the resulting measurements
- Knowledge and ability sufficient to perform calibrations of instruments used in the program for measuring radiation and radioactive materials
- Knowledge and ability sufficient to select radiation and radioactive materials measuring instruments appropriate to their proposed use in the program
- Knowledge and ability sufficient to evaluate the need for shielding and to determine the types and amounts of shielding required
- Knowledge and ability sufficient to calculate radioactive decay, buildup, and secular and transient equilibrium
- Knowledge and ability sufficient to calculate internal and external radiation doses.
- Knowledge of personnel monitoring devices and the ability to select the proper device for a specific application
- Knowledge and ability sufficient to manage or conduct a radiation safety training program for facility personnel
- Knowledge and ability sufficient to recognize and anticipate existing and potential radiation safety problems
- Knowledge and ability sufficient to recognize potentially critical problems and to take appropriate and timely action with respect to such problem s
- Knowledge of current radioactive effluent treatment methods, equipment, and procedures, and the ability to effectively use them
- Knowledge and ability sufficient to recognize the potential for contamination associated with work with radioactive materials, to control contamination, and to decontaminate equipment, facilities, and personnel.
- Knowledge and ability sufficient to prepare a facility emergency plan and to conduct or manage the conduct of operations in accordance with plans
- Knowledge and ability sufficient to evaluate, select, maintain, effectively use, and supervise the use of protective clothing
- Knowledge and ability sufficient to evaluate, design, test, maintain, and supervise the maintenance (from the radiation safety aspect) of process control and confinement systems such as glove boxes and hoods

- Knowledge and ability sufficient to evaluate, select, design, maintain, and test sealed sources of radiation and devices in which the sources are to be used
- Knowledge and ability sufficient to evaluate, select, design, effectively use, maintain, and supervise the use and maintenance of radioactive waste collection, treatment, packaging, and disposal equipment and facilities to prepare related radiation safety procedures (NOTE: All duties related to the actual physical disposal and shipping of radioactive waste will be handle by the Director of Environmental Health and Safety)
- Working knowledge of transport regulation and requirement as they apply to transport of radioactive materials
- Knowledge and ability sufficient to manage effectively the University radiation safety program

The RSO will be supported by adequate staff, facilities, and equipment, and will have direct access to the IO for matter pertaining to radiation safety.

The RSO is currently Erin E. Parrish. In this capacity Ms. Parrish's responsibilities include oversight of operations supporting the University's Radiation Safety Program.

RESUME

Erin E. Parrish

Education

Master of Natural and Applied Science, Biology & Chemistry – Missouri State University, 2006
Bachelor of Science, Biology – Southwest Missouri State University, 2005

Formal Training in Radiation Safety

1. Radiation Safety Officer Training (40 hours) – Radiation Safety Academy, June 2008
2. DOT HAZMAT Certification – Radiation Safety Academy, June 2008

Additional Experience

1. Research Scientist – Jordan Valley Innovation Center (JVIC), 2003-2007
   Created hazardous waste and environmental management policies and procedures
2. Fundamentals of Radiation Safety (Online Seminar) – Radiation Safety Academy, June 2008
3. Hazardous Materials Transportation Security Awareness (Online Seminar) – Radiation Safety Academy, June 2008

INDIVIDUAL INVESTIGATORS ON LICENSE

A.	Thomas E. Tomasi, PhD	Professor of Biology
B.	Lazlo Kovacs, PhD	Associate Research Professor of Fruit Science
C.	Dennis Schmidt, DVM, PhD	Professor of Agriculture
D.	Paul L. Durham, PhD	Professor of Biology
E.	Robert T. Pavlowsky, PhD	Professor of Geography ***(NEW USER)***

RESUME

Robert T. Pavlowsky

Education:
B.S. (Wildlife Science) – Rutgers University, 1981
M.S. (Geography) – Rutgers University, 1989
Ph.D. (Geography) - University of Wisconsin-Madison, 1995

Formal Training in Radiation Safety:

1. Chemistry course at Rutgers University, 1977-78.
2. Biochemistry and Molecular Biology courses at Boston College, 1984-85.
3. On-the-job training as graduate research assistant, Water Chemistry Program, University of Wisconsin-Madison, 1990-91.
4. Mineralogy and Geochemistry courses at University of Wisconsin-Madison, 1989-90.

Experience (Background and Standard Cs-137 and Pb-210):

1. Sediment and soil sample collection and analysis at University of Wisconsin-Madison, 1989-92.
2. Coursework in applications of radioisotopes for sediment dating purposes: (i) Depositional Environments, Rutgers University (1985) and (ii) Soil Geomorphology & Quaternary Dating Methods, University of Wisconsin-Madison, 1998-99.

ITEM 8: TRAINING FOR INDIVIDUALS WORKING IN OR FREQUENTING RESTRICTED AREAS

Students who perform research with any of the sources are required to study CFR 10 Part 19/20 and understand the difference in shielding required for different types of radiation and the importance of the inverse square law for the point source used. Other faculty and staff will be required to be familiar with the regulations to the extent that they will not use or handle licensed material unless in the presence of a licensed user.

The RSO shall maintain a list of all persons who have been certified and trained in radiation safety commensurate with their radiation exposure potential. Certification of training shall be one of the following:

a. Faculty by credentials submitted with the User Application;
b. Certification submitted, in writing, from the principal investigator that the person is trained in radiation safety and that he/she has read and understand his/her responsibilities as defined in the Campus Radiation Safety Manual; or
c. The Radiation Safety Officer may require the person involved in radiation activities to take an online course as it is deemed necessary.

In addition to the standard radiation safety training, each approved user is required to provide annual in-laboratory training to all persons assigned to or who frequent their laboratories. The following topics shall be covered, but not limited to:

- No eating and drinking
- Security of radioactive materials
- Proper waste disposal
- Laboratory emergencies involving radioactive materials
- Necessary personal protective equipment, if applicable

Such training shall be documented in a timely manner, filed in the laboratory, and copies submitted to the RSO for future inspections.

ITEM 9: FACILITIES AND EQUIPMENT

Jordan Valley Innovation Center (NEW FACILITY)

All work that involves the use of radioactive materials will be performed in the laboratory located in Room 316 of the Jordan Valley Innovation Center (JVIC) under the supervision of authorized user Dr. Paul Durham. Drawings of the third floor of JVIC are shown in attachments at the end of this document. This laboratory is set apart as a cell/molecular laboratory for in vitro laboratory testing and in vivo animal studies. Laboratory 316 is projected to be completed in December 2008 and will be the new location to conduct the research currently being performed in Durham's laboratory in Temple Hall at the main campus of Missouri State University.

The laboratory in Room 316 will be equipped with steel laboratory benches with epoxy counters, a built-in sink, eyewash station, spill kit, fire blanket, fire extinguisher, and safety shower. It includes equipment that is typically used for detection of biological macromolecules, including a refrigerated centrifuge, sequencing apparatus, pipettes, thermocycler, refrigerator/freezer, etc. The lab will also contain the same gamma counter as previously used in Temple Hall. For storage of radioisotopes in the refrigerator, lead canisters will be available to provide both shielding and security for the materials. The door to Room 316, as well as each site where radioactive chemicals or waste is stored will be marked with a yellow radiation sign. Room 316 has a functional lock and will be locked when not in use.

ITEM 10: RADIATION SAFETY PROGRAM

PROGRAM STRUCTURE

The Chair of the Radiation Safety Committee is administratively responsible for the radiation safety program within the University and all University facilities, and reports to the Associate Provost. Direct responsibility for implementation of the radiation safety policies and directives established by the Radiation Safety Committee are assigned to the Radiation Safety Officer.

Appointment of the Campus Radiation Safety Program has been approved by the Office of the President and the Radiation Safety Committee. The Radiation Safety Committee (RSC) is responsible for supervision and control of ionizing radiation hazards and will direct the activities of the Campus Radiation Safety Officer.

RESPONSIBILITIES AND AUTHORITY

All persons involved with the handling, use, and storage of radioactive materials and radiation sources have the general responsibilities to:

a. Assure that University personnel, students, and visitors are not subject to undue radiation exposure;
b. Assure full compliance with all federal and state regulations;
c. Assure full compliance with local and state codes and ordinances;
d. Assure full compliance with all University regulations and polices pertaining to radiation safety;
e. Assure full compliance with special project restrictions;
f. Assure that the integrity and usefulness of University facilities are not compromised;
g. Assure that high standards of good practice and safe handling are maintained.

These general responsibilities apply to all individual users, technicians, students, and operating personnel.

Each person who handles radioactive materials or radiation sources must recognize that the ultimate success of a radiation safety program lies in responsible actions by individuals in their daily work.

The Campus Radiation Safety Committee is charged with the responsibility and authority to control the use of radioactive materials and radiation sources on campus. The Campus Radiation Safety Committee can expedite action on radiation safety matters because of its intimate knowledge of local situations and due to its ability to convene quickly. The Campus Radiation Safety Committee has advisory responsibility for:

a) Assuring that user projects comply with license restrictions, University policies and regulations, and standards of good practices;
b) Assuring that proposals for grants and contracts do not pose unacceptable radiological risks to individuals;
c) Assuring that both new construction and renovation of existing buildings meet standards of good practice for using radioactive materials or radiation sources;
d) Assuring that University personnel involved in the control of radiation hazards, including users and their assistants, have appropriate training and experience; and
e) Reviewing the actions of the Radiation Safety Committee

The Radiation Safety Officer is appointed by the President to supervise the radiation safety program in all aspects, with the responsibility for proper control of radiation-related projects on the campus and any other site under campus supervision or control. Approval of the Radiation Safety Officer is required for:

a) All matters pertaining to the University radioactive material license and radiation source registration;
b) All requisitions of radioactive materials and radiation producing equipment;
c) All user projects, including laboratory and teaching uses, research and development projects, and any other activities with potential radiological hazards;
d) All contract grant proposals involving radioactive materials or radiation sources;
e) Training of all personnel who will directly use radioactive materials or radiation frequent the radiation laboratory; and

f) The Radiation Safety Officer (RSO) has the vested authority to act immediately in all matters pertaining to radiation safety for the purpose of assuring individual well-being and the integrity of the University.

ENFORCEMENT

The Campus Radiation Safety Committee (RSC) is authorized to place persons who violate campus radiation safety procedures and/or applicable state/federal regulations on probation or to immediately suspend or revoke their privileges to use radiation producing equipment or radioactive materials.

RADIONULCIDE ORDERS

Only principal investigators may authorize the ordering of radionuclides. When radioactive materials are ordered, the individual ordering should notify the RSO as to what and how much is being ordered along with the name of the vendor. The purpose of this notification is to ensure that the shipments are properly processed and available to the user in a timely fashion.

TRANSFER AND SHIPMENT OF RADIOACTIVE MATERIALS

Federal and state regulations restrict the transfer of radioactive materials to persons and institutions holding valid radioactive materials license.

The RSO will assist in the transfer, including providing specific information on packaging and labeling packages for shipment and giving advice on acceptable shipment methods, applicable regulations, and restrictions. Permanent records of transfers are maintained in the Environmental Health and Safety Department and copies maintained in the office of the RSO. When particularly hazardous shipments are received or sent, records of personnel exposures, shipping cask smears, and other pertinent information are maintained in the Environmental Health and Safety Office and office of the RSO.

STORAGE OF RADIOACTIVE MATERIALS

Individual users are expected to keep on hand in their laboratories only those radioactive materials that are actively in use or those that they feel must remain in their possession. The intent of this policy is to reduce as far as possible the number of places on campus where the security of radiological materials might be jeopardized in emergencies such as fires or explosions.

All storage locations must be posted with approved radiation warning signs, which are available from the RSO or the Department of Environmental Health and Safety. Radioactive material shall be secured to prevent removal or unauthorized use. Security may be accomplished in the following manners:

- A person assigned to the laboratory being physically present in the laboratory
- The laboratory locked
- All radioactive materials locked in a cabinet, refrigerator, or freezer
- All radioactive material locked in a properly labeled box of minimum dimensions of 4x6x6 inches
- Any radiation producing equipment with an on/off key shall have the key removed and be properly safe-guarded
- Sealed sources in portable instruments such as moisture gauges shall be secured by locking or surveillance

- Sealed sources in instruments such as ^{63}Ni electron capture detectors will be considered secure as long as the instrument is not portable

Other methods of security may be approved by the RSO or the RSC on request from an authorized user.

PERSONNEL MONITORING

Radiation does to users of radioactive material under this license are not expected to exceed 10% of the allowable limits in 10 CFR Part 20 from either external or internal sources. However, all employees of Missouri State University handling radioactive materials or using radiation sources of types and quantity such that is possible to receive an exposure equal to or greater than ten percent of the applicable radiation dose limit shall be included in the radiation monitoring program. Long term visiting researchers, post doctoral fellows, and other such persons working with radiation as described above shall also be covered by the program. Other persons may be assigned to the personnel monitoring program at the discretion of the principal investigator and/or the RSO.

The monitoring program includes, where applicable, personnel body dosimeters, personnel extremity dosimeters, rate sensitive area monitors, portable survey instruments, portable and fixed air sampling instruments, surface smears, and bioassay procedures. At the time of project approval, the RSO will determine the type of monitoring techniques required for that project.

Records of individual radiation dose histories are maintained in the Environmental Health and Safety Office and in the office of the RSO. Individuals may check their records at any time. The RSO will respond to request for radiation exposure histories from employers after an individual leaves campus.

ALARA POLICY

The Missouri State University radiation safety program will be conducted in such a manner that exposure to faculty, staff, students, the public and the environment will be **A**s **L**ow **A**s **R**easonably **A**chievable (ALARA) and that no radiation exposure will be received without societal benefit. This will be accomplished without impeding research or teaching objectives.

Missouri State University is committed to make every reasonable effort to minimize radiation exposure to employees, through the following control measures.

a. Personnel will be made aware of the University's commitment to maintain low exposure levels. The ALARA goals are 10% of the regulatory limits however actual does are expected to be less than 10% of these values.
b. The University will periodically review operating procedures to determine steps taken to reduce exposures.
c. The University will ensure that the person, or persons, selected for the RSO responsibilities are fully qualified to administer all aspects of a radiation protection program.
d. The University will ensure that all employees engaged in the use of radioactive materials and/or radiation producing equipment are fully trained in the area of radiation safety.
e. The RSO has full authority to enforce safe operation and to communicate as required with appropriate levels of administration to halt an operation as he/she deems unsafe.

GENERAL SAFE OPERATING PROCEDURES FOR RADIOACTIVE MATERIALS

1. Eating, drinking, storage of eating utensils, smoking or application of cosmetics are not permitted in areas where radioactive materials are used or stored.
2. Personnel monitoring devices (body badge, finger badge, wrist badge, etc.), if applicable, prescribed for the area must be worn.
3. Protective clothing (gloves, laboratory smock, coveralls, goggles, respirator, shoe covers, etc) prescribed for the area must be worn.
4. Proper containment (absorbent paper, trays, secondary liquid containers, etc) required for operations must be in place.
5. Fume hoods are to be used for all operations that potentially involve release of air-borne materials, including gases, volatile compounds, dusts, and aerosols.
6. Prescribed radiation detection equipment and calibrated survey instruments must be available and known to be working.
7. Radioactive materials must be stored and shielded in the manner prescribed for the area and secured to restrict unauthorized persons from using or removing the material.
8. All bottles, jars, boxes, and cabinets containing radioactive materials must be clearly labeled as to the radionuclide, quantity and date, and initialed by the responsible person.
9. All entrances must be properly labeled with signs appropriate to the hazard and posted with names and telephone numbers of individuals to be contracted in case of emergencies.
10. Initial runs or pilot studies on new procedures should be made with non-radioactive materials or less than 10 microcurie amount of radioisotopes.
11. Procedures should be designed to reduce to a minimum transfers from container to container, bench to bench, and room to room as a means of reducing spills.
12. Radiation levels in work areas should be determined before an operation is begun so that proper shielding and remote-handling equipment can be employed to reduce individual exposures.
13. Individuals unfamiliar with radiation hazards and emergency procedures must not be permitted to work with radioactive materials.
14. Pipetting by mouth in areas where radioactive materials are being used is forbidden.
15. All equipment, glassware, and other contents of an area in which radioactive materials are being used or have been used should be considered as contaminated until properly monitored.
16. Any injury, no matter how slight, involving radioactive materials must be monitored by the RSO to determine if the wound is contaminated. Contact the RSO immediately if any injury involving radioactive materials occurs.

EMERGENCY PROCEDURES

MINOR SPILL

Incidents which involve the release of spillage of fewer than 100 microcuries of a radionuclide can generally be regarded as "minor". In such cases:

- Notify all other persons in the room at once
- Clear the room of all persons except those needed to deal with the spill
- Survey the hands and feet of the involved personnel for possible contamination
- Confine the spill immediately

  Liquids: Drop absorbent paper on the spill

  Solids: Dampen thoroughly, taking care not to spread contamination; Use water, unless a chemical reaction would release air contaminants; otherwise use oil

- Notify the laboratory supervisor
- Notify the RSO
- After hours, notify Campus Police
- Do not impede medical treatment

MAJOR SPILL OR RELEASE

An incident that occurs outside a fume hood and that involves the release of more than 100 microcuries of a radionuclide should be considered as "major." In such cases:

- Evacuate the room immediately; Carry a survey meter and shut the doors and windows on the way out
- Survey the hands and feet of the involved personnel for possible contamination
- Notify the laboratory supervisor
- Notify the RSO
- After hours, notify the Campus Police
- Post the laboratory door with a "Keep Out" sign
- In a safe place, assemble those persons who were present in the laboratory
- Wait for assistance
- Do not impede medical treatment

PERSONNEL CONTAMINATION

In the event of suspected personnel contamination:

- Notify the RSO immediately
- Remove all contaminated laboratory personal protective clothing (lab coat, gloves, etc.)
- If possible, wash contaminated area with mild soap and water
- Monitor the contaminated area
- Repeat washing as necessary
- Do not impede medical treatment

ACCIDENTS INVOLVING PERSONAL INJURY

For any accident involving personal injury, medical treatment or assistance will always be the first priority. This may involve administering first aid and/or calling Taylor Health and Wellness (**417-836-4000** or http://health.missouristate.edu/) for emergency medical assistance. Inform the police of the potential for radioactive contamination. For accidents involving radioactive materials, contamination control and exposure control are important but should never delay or impede medical assistance. If radioactive materials are involved, emergency personnel should be notified before treatment takes place.

LABORATORY SURVEYS

The goal of the laboratory survey program is to maximize the ability to detect contamination, excessive exposure levels and/or procedural problems in all laboratories handling radioactive materials on campus. The survey program is designed to make the most effective possible use of personnel and

radiation resources for timely detection and remediation of potential problems in laboratories using radioactive materials. The RSO has the responsibility for monitoring all locations where radioactive materials and radiation sources are used or stored. Site monitoring checks are normally made at approximately 1 month intervals, but may be at anytime; no prior notification for such a check is given. More frequent site monitoring checks will be made if unusual hazards exist or if a significant change from previous monitoring is detected. Users may request special monitoring on a one time basis or may request more frequent routine monitoring.

Opening Laboratory Surveys

If a laboratory has never been surveyed before or is an inactive laboratory where isotopes were used at some point in the past, an opening survey will be performed before isotopes are used or stored in the laboratory. The principal investigator shall provide a diagram of the basic layout of the laboratory including exits and entrances, benches, desks, sinks, refrigerators, fume hoods, incubators, centrifuges, and waste container(s), as well as indicate on the diagram where the majority of isotope work will be performed. This diagram will be used to make up the permanent laboratory diagram to be kept in the RSO files and submitted with each contamination survey report. All appropriate emergency notification, caution, and "Notice To Employees" signs will be posted during the opening survey by the person conducting it.

Close-Out Surveys

In order for a close out survey to be conducted the principal investigator must notify the RSO at least two weeks in advance that he or she intends to close the laboratory and remove all radioactive materials. Before the close-out survey can be conducted, the principal must demonstrate to the RSO that all isotope sources have been accounted for and that all laboratory equipment and supplies used in connection with radioactive materials have either been properly decontaminated or properly disposed. Additionally, all radioactive wastes must be accounted for and properly disposed. Failure to comply could result in civil or criminal penalties against the responsible individual and/or the University. If a principal investigator has left the University without prior notification to the RSO, the requirements listed in this section become the responsibility of the head of the department where the principal investigator carried out his or her research activities.

Laboratory Surveys by Approved Users

A laboratory survey shall be conducted by the approved user on any day that more than 0.5 millicuries of radioactive material has been used or handled. NOTE: Handling is defined as the touching or picking up a vial or container containing radioactive material. Laboratory surveys may be conducted by swiping surfaces with styrofoam tabs and subsequent counting in the appropriate counting equipment, or in the case of energetic beta emitters and gamma emitter, by survey with the appropriate radiation survey instrument. Typical survey instruments will not detect the presence of Hydrogen-3 or Carbon-14. All survey results shall be documented in writing, copies submitted to the RSO, and retained in the laboratory for a period of two years.

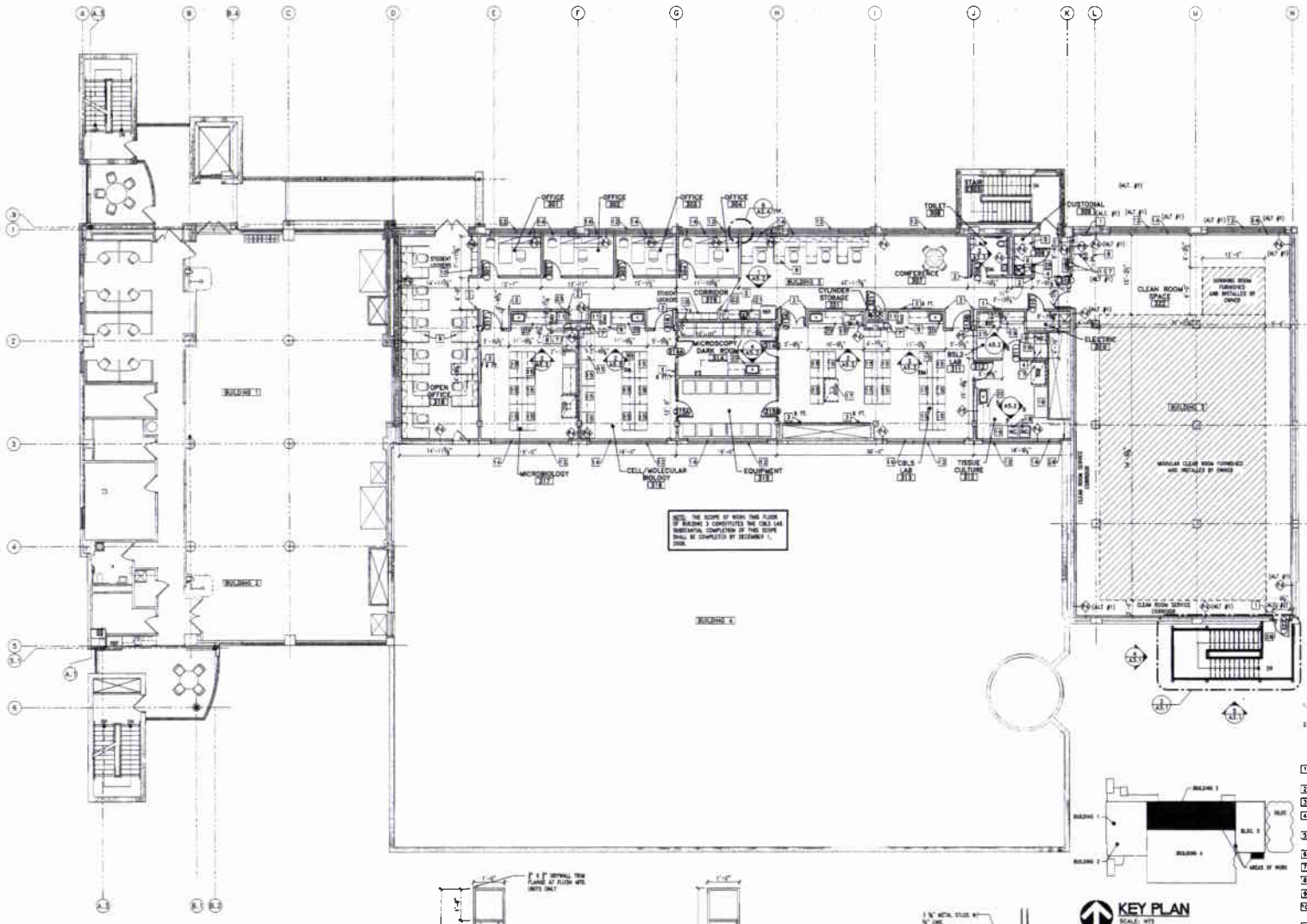
ITEM 11: WASTE MANAGEMENT

Waste will be disposed of in one of the following manners:

a) SHIPPED TO A RADIOACTIVE WASTE DISPOSAL SITE: Solid and organic liquid radioactive wastes with half-lives greater than 120 days will be disposed of in this manner.

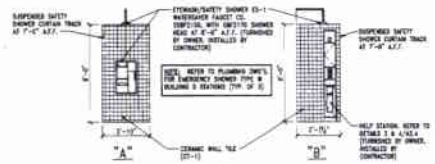
b) HELD FOR DECAY: Radioactive wastes (solid and organic liquid) and radioactive animal carcasses with half-live of less than 120 days will generally be disposed in this manner. After being held for 10 half-lives, the material may be disposed of as ordinary waste. NOTE: Prior to disposal as ordinary waste all containers shall be surveyed to confirm that the radioactive material has decayed. EXCEPTION: Animal carcasses and tissues must be disposed of in accordance with any additional regulations pertaining to such materials. NOTE: Radiation labels shall be removed before placing the type of waste into a radioactive waste container.

c) DUMPED TO THE SANITARY SEWER: Water soluble radioactive waste which does not contain hazardous chemicals and materials, i.e. aqueous liquids can be disposed of in the sanitary sewer. The concentration of the radioactive waste and total millicurie quantity disposed per year is governed by state regulations and is base on University sewage quantities. NOTE: Prior to disposing of the radioactive waste in this manner the generator shall inform the RSO to assure that the concentration and annual quantity released to sanitary sewer are not exceeded.



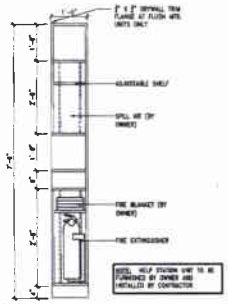
1 THIRD FLOOR PLAN-ARCHITECTURAL

SCALE: 1/8"=1'-0"



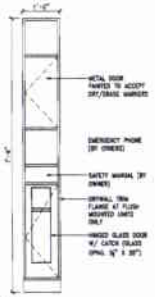
2 ELEVATION AT EYEWASH HELP STATION

SCALE: 1/4" = 1'-0"



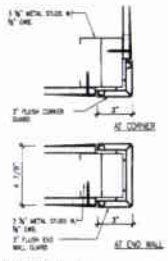
3 TYP. HELP STATION SECTION

SCALE: 3/4" = 1'-0"



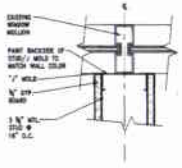
4 TYP. HELP STATION ELEVATION

SCALE: 3/4" = 1'-0"



5 TYP. DTL. • CORNER GUARD

SCALE: 3" = 1'-0"



6 TYP. END WALL TO MULLION CONNECTION

SCALE: 3" = 1'-0"

KEY PLAN

SCALE: NTS

GENERAL NOTES: (THIS SHEET ONLY)

1. ALL WALLS THIS LEVEL ARE TO BE PARTITION TYPE (C) UNLESS NOTED OTHERWISE.
2. PROVIDE AND INSTALL ALL NECESSARY BLOCKING AT ALL WALL MOUNTED ITEMS TYPICALLY. FIRE TREATED WOOD OR 18 GA. SHEET METAL WILL BE ACCEPTABLE.

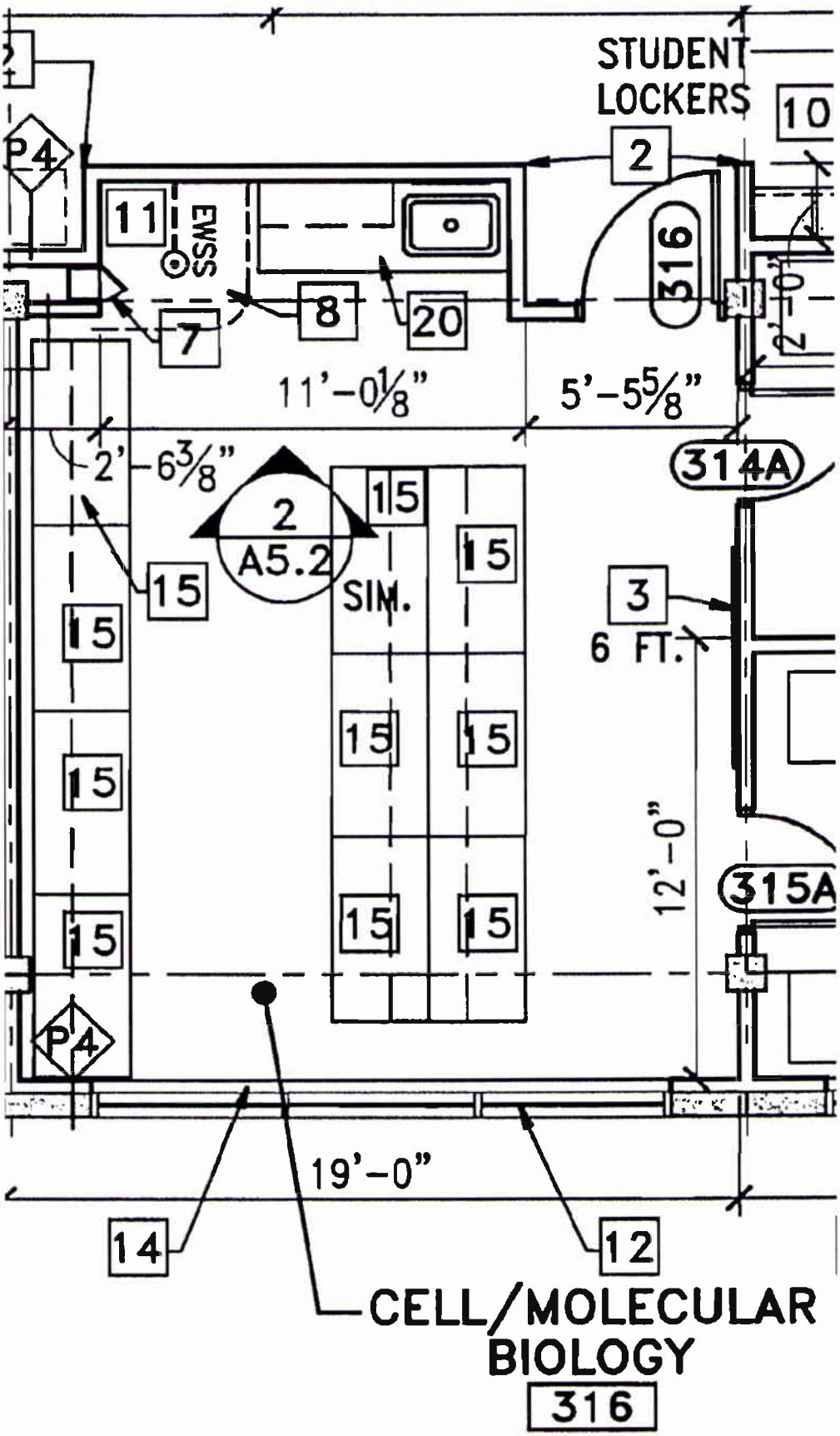
KEYED ARCHITECTURAL NOTES (THIS SHEET ONLY)

1. SEMI-RECESSED FIRE EXTINGUISHER CABINET W/ 10 lb. ABC MULTIPURPOSE EXTINGUISHER (ALL #1)
2. ACROVYN CORNER GUARD. REFER TO TYPICAL DETAIL 2/A3.4.
3. WALL MOUNTED MARKER BOARD. (MB-1) REFER TO FINISH LEGEND ON DWG. A5.1
4. 18" & PLASTIC LAMINATE ADJUSTABLE SHELVING (3 SHELVES). STAINWASH FROM 48" AFF. TO 72" AFF. (SPCI)
5. 12" & PLASTIC LAMINATE ADJUSTABLE SHELVING (3 SHELVES). STAINWASH FROM 39" AFF. TO 72" AFF. (SPCI)
6. WALL MOUNTED BROOM/ MOP HOLDER. (MB-1).
7. HELP COUTER. REFER TO DETAILS 2 & 4/A3.4 (SPCI)
8. CURTAIN/ TRACK ABOVE. (SCR-1)
9. SPECIES FURNITURE BY OTHERS (TYP.).
10. 18" W. x 12" D. x 84" H. PREFINISHED DOUBLE TIER METAL LOCKERS (TYPICAL OF 14 ASSED). REFER TO DETAIL 10/A3.1.
11. EYEWASH/ SAFETY SHOWER. (SPC)
12. WINDOW TREATMENT (WT-1). REFER TO FINISH LEGEND ON DWG. A5.1
13. REFRIGERATOR. (SPCI)
14. PLASTIC LAMINATE WINDOW SILL. LAMINATE COLOR TO MATCH EXISTING SILLS INSTALLED IN BUILDING 1.
15. MODULAR STEEL LABORATORY BENCH W/ EPOXY COUNTER AND ADJUSTABLE SHELVING. (BY OTHERS).
16. 4'-0" BENCH TOP LABORATORY FUME HOOD. (BY OTHERS).
17. BIOSAFETY CABINET. (SPCI)
18. AUTOCLAVE. (SPCI)
19. DESK, LABORATORY TABLE W/ EPOXY COUNTER. (BY OTHERS).
20. FIXED STEEL LABORATORY BENCH W/ EPOXY COUNTER AND ADJUSTABLE SHELVING. (BY OTHERS).
21. MICROSCOPE. (SPCI)
22. COFFEE MAKER. (SPCI)
23. ICE MACHINE. (SPCI)
24. EMBLEMS-PROVIDED BY OWNER.
25. VINYL LANTL. REFER TO SPECIFICATIONS, 2007'L
26. INSTALL CERAMIC TILE @ MOP SINK LOCATIONS TO MINIMUM HEIGHT OF 50" A.F.F. (TYP.) (C3-1).

Missouri State University
JORDAN VALLEY INNOVATION CENTER
Project No.: 070616-134
Boonville & Phelps, Springfield, Missouri
PHASE 2A

THIRD FLOOR PLAN ARCHITECTURAL AND DETAILS

A2.4


STUDENT LOCKERS
10
2
P4
11
EMSS
316
8
20
7
2'-0"
11'-0 1/8"
5'-5 5/8"
2'-6 3/8"
314A
2
A5.2
SIM.
15
3
6 FT.
12'-0"
315A
P4
19'-0"
14
12
CELL/MOLECULAR BIOLOGY
316

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UNIVERSITY

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