



**Section 2: Narrative**

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## General Considerations

### Overview

#### What is Nuclear Medicine?

Nuclear Medicine is a specialized area of imaging that uses very small amounts of radioactive substances to examine organ function and structure. It utilizes the nuclear properties of radioactive and stable nuclides to perform diagnostic evaluations and to provide therapy. The key benefit of Nuclear Medicine is the ability to identify metabolic functions.

Radioactive isotopes are administered either orally, by inhalation, intravenously, or in selected instances by direct injection to obtain diagnostic evaluations of anatomic and / or physiologic or path physiologic conditions. These evaluations require a wide range of services encompassing patient consultation and examination, interpretation of images, correlation with other diagnostic methods, determination of metabolic functions, drug levels and body constituents, imaging / computerization and recommendations of the significance of the findings.

Energies utilized in Nuclear Medicine are a form of ionizing radiation that does have known health risks. However, the level of exposure, when appropriately prescribed, does not present significant health risks.

#### Current Trends

Nuclear medicine is composed of several functional units such as Nuclear Clinical Imaging and Radiobioassay, known as bench work or, formerly, Radioimmunoassay. The process is particularly useful for obtaining quantitative functional information on organs, such as the kidney, heart, brain, and thyroid, systems such as urinary and gastrointestinal tract, and processes such as infection, impaired circulation, and malignancies. Nuclear Medicine is the preferred method of cancer diagnosis and monitoring of oncologic therapies.

Picture Archiving and Communication System (PACS) has become the VA standard for the captive transfer and storage of diagnostic images. This system consists of workstations for image interpretation, a web server for distribution, printers for file records, image servers for information transfer and holding, and an archive for off-line information. A high –end monitor system should be provided in areas where physician viewing and diagnosis occur, either within nuclear medicine or remotely.

Although some VA facilities still employ conventional film technology, total conversion to PACS is anticipated and reflected in this Design Guide.

#### Future Trends

The expansion of telecommunication nuclear networks with tertiary missions will result in the affiliate sites being located in smaller inpatient and ambulatory care facilities that are close to the patient's residence. Technologies are in development to expand the range of metabolic functions that are able to be identified and will vastly improve patient outcomes. As technology advances, it is important that our imaging facilities be designed to accept whatever

changes in equipment and treatment is developed. At the same time, the needs of the patient must not get lost in all this change. It is critical to provide an environment that not only addresses the requirements of technology but also the needs of the patient.

## Functional Considerations

### Operations

Nuclear Medicine is a referral-based diagnostic service. In addition to diagnostic nuclear imaging procedures, other services performed in this area may include Radiobioassay, Specimen Analysis, and Cardiac Stress Testing. Support functions for these services may be shared between Nuclear Medicine/Cardiology and Radiation Therapy Services.

#### Imaging Process

The patient is referred to Nuclear Medicine.

Upon arrival, the patient is received, their records are verified, and the patient is directed to either outpatient or inpatient waiting.

Prior to imaging, patients may go to the Radiopharmacy / Injection area, or dedicated Patient Dose Administration Room, where dose administration is performed.

Depending upon the examination prescribed, the patient may access a separate waiting area designed to accommodate dosed patients.

The patient now proceeds to the procedure areas where the examination is administered.

Electronic and / or video images are viewed and enhanced at imaging consoles within the procedure rooms or within the adjoining control room to ensure the quality of the images.

The Nuclear Medicine physician receives the images for interpretation.

Image records are stored electronically and available for retrieval for consultation and follow up exam comparisons. This may be accomplished both in central viewing areas and remotely.

#### Radiobioassay Process

Referring physicians send work orders to the diagnostic lab.

Specimens are received and / or collected.

Specimens are processed, examined, and results are reported to the referring physician.

### **Patient Care Concept**

Providing convenient access to healthcare in a non-institutional, non-threatening environment is an objective of the Nuclear Medicine Service. Patient education and family consultation may be used to further reduce the stress sometimes associated with NM Procedures.

### **Patient Base**

VA Nuclear Medicine facilities are focused upon serving the Veteran and may include sharing agreements, joint ventures, and referrals. The aging veteran patient population with comorbidities and increased severity of illness necessitate design features that emphasize safety and prevention of risks.

### **Medical Records**

Diagnostic evaluations generated within the department become part of the Veteran's Consolidated Health Record. Evaluations are communicated to the ordering physician in electronic form. Image manipulation, interpretation, archiving, retrieval, and distribution procedures may occur within the Nuclear Medicine Service or remotely.

### **Special Requirements**

Teaching facilities may require more technical support space to accommodate small groups that are participating in consultation, interpretation, and image manipulation.

Currently, most VA facilities contract with outside vendors to provide the radioactive isotopes required for Nuclear Medicine examinations. However, a larger facility may be able to justify the need to produce these isotopes "in house". In this case, a Cyclotron will be required to be provided within the facility. It should be located near the Radiopharmacy.

## **Space Planning Issues**

### **Flexibility**

All procedure and computer support areas should be planned with flexibility to accommodate the rapid technological improvements occurring in this field. When possible, all areas should be on one floor and contiguous.

Infrastructure support areas (e.g., electrical and telecommunications rooms) should be located in proximity to the Nuclear Medicine Suite.

### **Efficiency**

Shared support and qualified technical staff cross-training and coordination are possible if Nuclear Medicine and other allied services are adjacent. Shared patient and staff support may include staff lockers, lounges, patient waiting, inpatient holding and registration. Segregated patient post-dosing areas may be required for radioisotope therapy and PET/CT patient waiting areas.

Location of PET/CT equipment should be coordinated between Nuclear Medicine and Radiology Services.

## Human Factors

The VA is committed to providing a healthcare facility that includes components that create a healing environment. It is important that the design of Nuclear Medicine reinforces this concept. Patient's vulnerability to stress from noise, lack of privacy, poor lighting, and other causes, and the harmful effects it can have on the healing process is well known and documented. Large-sized unfamiliar equipment and negative public perception of nuclear issues are additional causes of patient stress. Patient dignity and self-determination should be accommodated while considering operational efficiencies. De-emphasizing the institutional image of traditional health care facilities and surrounding the patient and family members with architectural finishes and furnishings that are familiar and non-threatening should be a prime objective. It is important to remember, however, that this is a healthcare environment and ease of maintenance, durability, and sanitation should be primary considerations when selecting materials and finishes.

Due to the length of time a patient is relatively motionless for some Nuclear Medicine preparations and exams, it is helpful to provide the patient diversions to minimize the perceived length of time. One way to accomplish this is to provide a television within the patient's field of view. This can be connected to a system to provide selected patient education such as a DVD player.

Planning, design, and detail consideration should address security issues. The application of ABA and ADA design standards for space and fixed equipment locations satisfy accessibility requirements.

An inherent opportunity exists in the design of Nuclear Medicine to address these issues and put forth creative solutions that enhance patient comfort and contribute to positive outcomes.

## Technical and Environmental

Telecommunications networks provide the opportunity for the patient imaging to occur in one location, while the physician interpretation occurs in another location. The design of Nuclear Medicine facilities should consider the separation of non-radioactive areas from radioactive sensitive areas. Such consideration can reduce or eliminate the need for excess radiation protection. Such segregation also ensures the integrity of radiation-sensitive imaging and quantitative techniques in both the nuclear imaging and lab settings. A physicist should be engaged to determine if and what level of radiation protection is required.

Dosed patients awaiting procedures may require dedicated "hot" waiting / uptake rooms and toilet facilities in order to protect other individuals from unnecessary exposure to low and short-lived levels of radiation. This is required for PET procedures that utilize higher energy radiopharmaceuticals. Dedicated "hot" areas may not be required for other nuclear medicine procedures that utilize lower energy isotopes.

## Organizational Concepts

The reception area controls access to the patient areas and areas where radionuclides are stored or used. Signage is required by law to identify areas where radioactive products are used.

Patient areas are consolidated to control patient access and to maintain patient privacy, security, and dignity.

Staff support areas which deal with image manipulation and quality control are consolidated into a core area to ensure image quality, staff efficacy, and patient record security and privacy.

Clinical administrative areas addressing referral, reading interpretation and consultation functions are accessible to physicians. Consultation and interpretation areas are not accessible to patients and should be private staff work areas.

Patient and Staff circulation should be separated. Staff functions may be located within the service or in a convenient location that is shared with another service.

In-vitro specimens received from outside the department require access to lab by cart or hand delivery. Box conveyors and pneumatic tube systems can not be justified by volume and may affect the quality of the specimen. In-vitro specimen traffic should not mix with out-patient traffic. Provide space within the department if blood drawing and / or biopsies are performed.

Locate clean and soiled utility functions close to the patient areas they support. Ancillary support staff (housekeeping, janitorial, maintenance, engineering, etc...) standard procedures may require modification in response to nuclear safety and security concerns, such as restricted access and decay verification.

### **Staff Utilization and Cross-Training**

The nuclear physics aspect of Nuclear Medicine requires specialized staffing. Endocrinology and Cardiology diagnostic services utilize nuclear techniques and may benefit from joint activities with Nuclear Medicine. Other departments, such as the Radiology Service use digital image technology. The stress testing activities of Nuclear Medicine, Cardiology, and Ultrasound may be consolidated if patient safety and / or test results are not compromised.

### **Patient Access / Way-finding**

Minimize travel distance from parking and main patient entrance to Nuclear Medicine Service waiting. Location with other diagnostic facilities assists in Way-finding and coordination of patient services. Provide separate inpatient access.

### **Functional Adjacencies**

Nuclear Medicine should be located as follows:

Close and on the same floor:

- Radiology Service
- Laboratory Service

Close / different floor acceptable:

- Ambulatory Care
- Nursing Service – CCU
- Nursing Units – ICU
- Nursing Units – MS&N

Nursing Units – Respiratory

Separation Desirable:

- Audiology and Speech Pathology
- Canteen / Dining
- Dietetic Service
- Rehabilitation Medicine

### Services Access

Nuclear Medicine gamma camera installations and replacements usually do not require special construction other than for load considerations and level flooring. Floor trenches for electrical cabling are frequently not required. Positron Emission Tomography (PET) requires special dedicated facilities that may have special requirements including load considerations, shielding and ventilation. PET/CT also requires special dedicated facilities that may include structural reinforcing, floor leveling, shielding and space for additional support equipment.

## Technical Considerations

### General

#### Seismic

Where required, install all components and equipment with seismic provisions as outlined in the various discipline specific VA Design manuals for healthcare projects. Refer to VA Construction Standard Handbook PG-18-03 (CD-54), “Natural Disaster Resistant Design Non-structural” for additional information.

#### Mycobacterium Tuberculosis

Current Center for Disease Control (CDC) requirements for design of public areas within the building to accommodate Mycobacterium Tuberculosis patients must be addressed by architectural and mechanical disciplines. Check current requirements with the VA task force on transmission of Mycobacterium Tuberculosis, TB criteria in HVAC Design Manual for Hospital Projects, and the CDC Guidelines for Preventing the Transmission of Mycobacterium tuberculosis in Healthcare Settings, 2005.

### Sustainability

In 2006, the Department of Veterans Affairs joined other Federal agencies who are participating in principles outlined in the Memorandum of Understanding for the Federal Leadership in High Performance and Sustainable Buildings. The purpose of these guidelines is to encourage the use of life cycle concepts, consensus-based standards, and performance measurement and verification methods that utilize good science and lead to sustainable buildings. The goals of the members of this initiative are to establish and follow a common set of sustainable Guiding Principles for integrated design, energy performance, water conservation, indoor environmental quality, and materials aimed at helping Federal agencies and organizations:

- Reduce the total ownership cost of facilities.
- Improve energy efficiency and water conservation
- Provide safe, healthy, and productive built environments
- Promote sustainable environmental stewardship

These principles should be addressed in the design of all VA facilities.

## Architectural

### Interior Materials and Finishes

#### Partitions

Interior partitions should be primarily painted gypsum wallboard on metal studs. Partitions enclosing physician offices, exam rooms, and treatment rooms should be provided with sound attenuation batts between the studs in accordance with H-18-03, VA construction standard CD 34-1, Noise Transmission Control.

Partitions, windows and doors enclosing Nuclear Medicine rooms that require radiation shielding must have the shielding engineered by an appropriately certified Health Physicist. Refer to H-18-03 VA Construction Standard 64-1, X-Ray Radiation shielding and Special Control Room Requirements. Construction documents will require written certification by a registered Health Physicist.

#### Floors

Floors in offices, conference rooms and waiting areas should be carpet with a 4 inch high resilient base. Floors in toilet rooms should be ceramic tile with a ceramic tile base. Floors in Imaging Units, Radiobioassay Units, and Radiopharmacy should have welded seam sheet flooring with an integral base. Floors in exam rooms and most other spaces should be vinyl composition tile with a 4-inch high resilient base. Treatment rooms and other spaces where higher doses of radiation or longer lived isotopes will be administered should be of welded seam sheet construction.

Floor assemblies enclosing Nuclear Medicine rooms that require radiation shielding must have the shielding engineered by an appropriately certified Health Physicist. Refer to H-18-03 VA Construction Standard 64-1, X-Ray Radiation shielding and Special Control Room Requirements. Construction documents will require written certification by a registered Health Physicist.

#### Ceilings

Ceilings should be primarily lay-in acoustic ceiling tile. Certain areas, such as procedure rooms and treatment rooms, should have lay-in acoustic ceiling tile with a washable sprayed plastic finish. Coordinate the ceiling height requirements with the equipment manufacturer. Pathways above ceilings for cable assemblies should be provided for specific equipment types.



Ceiling assemblies enclosing Nuclear Medicine rooms that require radiation shielding must have the shielding engineered by an appropriately certified Health Physicist. Refer to H-18-03 VA Construction Standard 64-1, X-Ray Radiation shielding and Special Control Room Requirements. Construction documents will require written certification by a registered Health Physicist.

### Wall Protection

Wall and corner guards should be used in corridors and all other areas where damage from cart and stretcher traffic is anticipated.

### Interior Doors and Hardware

Interior doors should be 1 ¾ inch thick solid core flush panel wood doors or hollow metal doors in hollow metal frames. Doorjambs, except in rooms with radiation shielding, should have hospital type sanitary stops that stop 8 inches from the floor to facilitate mopping. Doors in wall assemblies that require shielding must be rated to provide the same shielding level as that in adjacent partitions. Hollow metal doors should be used where high impact is a concern and where fire rated doors are required. Kick / mop plates should generally be applied to both sides of the doors. Handicapped accessible hardware should be used throughout.

Refer to VA Handbook PG-18-14, Room Finishes, Door and Hardware Schedule, for additional information.

Doors leading to radionuclide receiving and storage area and radiopharmacy are required to be steel security doors that may in some areas need to have proper lead shielding. Refer to VA Handbook PG-18-14, Room Finishes, Door and Hardware Schedule, for additional information.

## Structural

### General

The size, weight and support requirements for Nuclear Medicine equipment vary greatly. Manufacturer data sheets should be obtained for each type of equipment under consideration. Configure framing systems to accommodate support and serviceability requirements established by the manufacturer.

### Shielding

Radiation shielding is often necessary to protect adjacent occupancies. Give proper consideration to the weight of shielded partitions, doors, ceilings and floors. In some instances, structural building materials may provide adequate levels of radiation shielding in specific directions and may not require additional layers of supplemental shielding. Floor depressions and / or door jamb reinforcement are sometimes necessary.

## Floor Trenching

Identify areas where floor trenching and /or floor penetrations are required to receive equipment infrastructure.

## Equipment

### Casework

Casework may be millwork or modular. Casework systems should be chosen that provide flexibility for planning and utilization purposes. Casework systems should incorporate components dimensioned for ease of multiple re-use installation applications. Casework systems should provide for cable management and ergonomic placement of workstations and flat screen monitors. Casework used for the storage of radiopharmaceuticals must be shielded. The shielding must be engineered by an appropriately certified Health Physicist.

### Information Management Systems

Information Management Systems shall include elements of image retrieval, processing, storage, treatment planning, electronic patient records including patient registration, patient charges, physician order entry, and patient / staff movement. Additional shielding may be required. These systems elements will require access to the main facility information system as well as the departmental local area network. A standardized structured cable system and pathway system are provided to facilitate current and future network access. All components should be planned for compatibility.

### Picture Archiving and Communications Systems

It is the goal of the VA to implement Picture Archiving and Communications Systems (PACS) in all VA healthcare facilities. As this conversion to PACS is implemented, some existing facilities are currently utilizing conventional film processing. It is anticipated that any significant renovation will include conversion to PACS as a basis for design.

## HVAC

### General

When HVAC services must penetrate a shielded enclosure, coordination is required between HVAC design and the health physicist certifying the construction documents.

### Operation

Air conditioning systems should be provided to heat, cool and ventilate the individual spaces, as required to satisfy the VA design criteria.

Provide a dedicated computer type AC unit to cool the PET/CT System Component Room. Verify the AC requirements with equipment supplier.

Humidification/dehumidification may be required for the PET/CT Scanner Room and/or the PET/CT System Component Room to keep the PET/CT equipment and electronics within the PET/CT vendor tolerances.

Generally, lead lining in walls terminates at or below ceiling level. However, in special instances where lead linings extend higher and ducts penetrate the lining, refer to Lead Shielded Duct Requirements in the VA HVAC Design Manual.

### **Capacities**

The number of people and the air conditioning load noted on the room design standard sheet is for the purpose of establishing the basis of design guide and its use in planning. Verify the actual number of people and the air conditioning load to agree with the project requirements.

Verify equipment AC loads based on the actual equipment furnished on the project.

### **Air Quality and Distribution**

All examination and Equipment rooms not required to be under negative pressure shall have positive air pressure with respect to the adjoining areas. This is to help maintain a reduced dust environment with respect to the electronic equipment.

The transferred air should be no more than 150 cfm (71.0 Liters/second) per undercut door.

Care should be taken to position supply air diffusers so as not to create a draft on patients or on operators.

### **Mycobacterium Tuberculosis**

Refer to General Comments

### **Seismic**

Refer to General Comments

### **Exhaust System**

If any fume hoods are provided, a dedicated exhaust system should be provided for each fume hood. Locate the supply air diffusers as far away from the hood sash opening as possible; and size to eliminate draft conditions and provide proper air flow at the hood.

### **Noise Level**

Select HVAC equipment, ductwork and air distribution devices to achieve noise levels listed in the VA HVAC Design Manual for Hospital Projects and the Master Construction Specification.

## Plumbing

### Water and Waste Systems

The plumbing systems should be provided to satisfy the departmental plumbing needs.

The department's domestic cold water should be piped to all plumbing fixtures and equipment requiring this utility. A hot water return system should be provided to ensure the design temperature at the farthest outlet.

The department's plumbing fixtures and drains should be drained by gravity through soil, waste, and vent stacks. In addition, the department's special waste should be drained through corrosion-resistant, flame retardant piping into either a local or centralized acid dilution tank.

Plumbing fixtures and equipment shall comply with the Architectural Barriers Act (ABA).

Emergency eyewashes shall comply with ANSI Z-358.1.

### Medical Gas Systems

The department's medical gas outlets are shown to establish a base for the design guide and its use in planning. The engineers/designers shall verify the medical gas location and quantities for individual projects.

## Electrical

### Illumination

Illumination is typically provided utilizing recessed fluorescent luminaires with acrylic prismatic lenses. The fixtures typically use F32T8 lamps in compliance with the National Energy Policy Act of 1992, with subsequent revisions in 1998 and 2005. Lamps have a minimum color rendering index (CRI) of 85 and a color temperature of 4100 degrees Kelvin (K), which is close to the "cool white" color temperature of 4150 degrees K. Lighting intensities conform to the VA design criteria, the IES Lighting Handbook, and ANSI/IESNA RP-29-06, the recommended practice: Lighting for Hospitals and Healthcare Facilities.

Lighting is typically controlled by wall mounted switches located at the entrance to the room. Dimmer switches are utilized for variable lighting levels in control and exam areas. Larger spaces may utilize multiple switching by separate switches for lighting of individual zones or areas. Viewing Rooms will typically have indirect lighting systems for visual comfort, reduced glare, reading accuracy, and critical determinations. Dimmer switches are utilized for the variable illumination level.

For Nuclear Medicine rooms, fixed or mobile procedure lighting may also be required. Lighting fixtures utilized in rooms which require special shielding should have proper shielding provisions per the specific radiation shielding requirements.

Power load densities for lighting are listed by use for the mechanical HVAC load calculation purposes. Load densities should be verified for the actual design, as they may vary depending on the room configuration, fixture types, lamps and ballasts used.

## Power

Nuclear Medicine power requirements have to be specifically coordinated with the equipment manufacturer. Separate power feeds may be required for Nuclear Medicine computer equipment, power conditioners, and air conditioning systems. General purpose duplex receptacles are typically provided on each wall of a room or space. Workstations with personal computers (PC's) are typically provided with quadraplex receptacles for the PC, monitor, printer, or PACS workstations.

Each Hospital determines which specific equipment needs to function during a power outage and be connected to emergency power. Duplex receptacles on the critical branch of the emergency power system are provided for selected pieces of equipment (such as refrigerators and PCs) to allow for limited operation during a power outage. All receptacles essential to the specific procedure should be on the critical branch, while the selected Nuclear Medicine equipment is on the equipment branch. If the modality is used for interventional or emergent imaging, provide emergency power receptacles as required to support critical equipment and patient care.

Junction boxes are provided for equipment requiring a hardwire connection. Provide shielding behind all boxes and other penetrations in shielded scanning room surfaces. Certain modular casework units are provided with a utility access module with surface mounted electrical pre-manufactured raceways, which provides a chase for wiring. Conduits and junction boxes are provided to connect to the utility access module for power wiring.

Power conditioning and uninterruptible power supplies equipment may be required for Nuclear Medicine equipment, computers, or PACS workstations, where an interruption of power would not be acceptable during a specific procedure. Power conditioning and UPS equipment require physical space, working clearances, maintenance access, cooling / ventilation access, and coordination with casework.

Power and grounding of modern medical electronic equipment, computers, and displays requires careful consideration of power quality principles. The basic need for proper voltage and frequency is supplemented by other power quality concerns including:

- Source and load compatibility.
- Distortion of voltage and current wave forms by harmonics present in the power systems.
- Sensitivity and susceptibility of electronic equipment loads to interruptions, surges, harmonic wave form distortions, and noise (RF, EMI, etc.).

Power systems and equipment characteristics need to be evaluated to determine effective solutions to reduce the potential sources of interference, reduce the susceptibility of the load equipment, or to apply power conditioning equipment (IEEE Std. 1100-1999, the IEEE Recommended Practice for Powering and Grounding Electronic Equipment).

## Security and Access Control

Security and access control requirements may apply to selected areas of the Nuclear Medicine suite. Specific Patient Privacy and HIPPA requirements may affect IT system components location, separation from non-secure components, and local staff screen or display orientation. Radiation Materials storage rooms and cabinets, and PACS server rooms and other critical IT infrastructure areas may require access control systems. Radiation detectors and alarms may be required at selected areas of Nuclear Medicine.

## Life Safety

### Purpose

The life safety program should be developed to provide a reliable system to protect the building occupants, firefighting personnel, building contents, building structure, and building function. This can be accomplished by limiting the development and spread of a fire emergency to the area of origin and thereby reduce the need for total occupant evacuation.

The design aspects of the facility which relate to the fire and life safety include:

- Structural fire resistance;
- Building compartmentalization;
- Fire detection, alarm and suppression;
- Smoke control and exhaust;
- Firefighter access and facilities;
- Emergency power
- Emergency Egress and Exit Lighting

New hospital construction and renovated areas of existing facilities are required to be fully protected by an automatic fire suppression system.

The minimum width of corridors and passageways in Nuclear Medicine areas is 5'-0" in areas used by staff. The minimum width of corridors in areas used by inpatients is 8'-0"

Provide handrails on both sides of the corridors in patient areas.

Nurse control areas are permitted to be open to the corridors.

Waiting areas are also permitted to be open to the corridors.

Refer to the latest editions of NFPA 101 "Life Safety Code", International Building Code and additional standards published by the National Fire Protection Association (NFPA).

## Energy Conservation

The HVAC, Plumbing, Power and Lighting Systems should be designed for overall energy efficiency and lowest life-cycle cost. This should include the use of high efficiency equipment and fixtures and a programmable control system. The minimum energy standard shall be the latest edition of ASHRAE/IESNA Standard 90.1.

## Communications

### Telephone

Telephone outlets are typically provided at each workstation or in each room. Desk outlets are 18" AFF and wall phone outlets are 48" AFF. Desk outlets may be combined with modular data ports into a single-gang outlet. Certain modular casework units are provided with a utility access module that houses communication outlets and provides a chase for cabling. Infrastructure will be extended to local telecommunications room via available pathways util-



izing cable tray, sleeves through fire / smoke partitions, and conduit stubs / backboxes to work area. Conduits and junction boxes are provided to connect to the utility access module for telephone service. Current technologies such as “voice over internet protocol”, or VoIP, and IP wireless systems require coordination with the ADP/LAN telecommunications infrastructure.

### **Automatic Data Processing (ADP)**

ADP, or computer outlets, are typically provided at each workstation with a personal computer (PC) and/or printer. ADP includes local area networks (LAN's), PACS applications, and wireless LAN's (WLAN). Desk outlets are 18" AFF. Multi-port telecommunications outlets are provided in accordance with BICSI and ANSI-EIA/TIA standards for telecommunications. Infrastructure will be extended to local telecommunications room via available pathways utilizing cable tray, sleeves through fire / smoke partitions, and conduit stubs / backboxes to work area. Certain modular casework units are provided with a utility access module that houses communication outlets and provides a chase for cabling. Conduits and junction boxes are provided to connect the utility access module for ADP service. Cable and jack identification and color coding are essential to proper administration of the ADP systems.

### **Public Address**

The Nuclear Medicine department will not have an independent public address (PA) system. The department paging and public address will be included as part of the hospital-wide PA system. Speakers are typically located in corridors and public spaces. The actual system configuration will depend on the overall design layout and the functional requirements.

### **Miscellaneous Systems**

A local sound system may be provided for selected scanning rooms to provide background music during the procedure. Nurse call and/or intercom systems may be provided for communications between the control room and the scanning room. A closed circuit TV system may be provided for direct observation of the patient during the procedure. Other systems, such as MATV, CATV, or local digital video monitoring may be provided.

### **Waste Management**

Waste, soiled linen, recycling materials and reusable utensils from Nuclear Medicine services may come into contact with, and be contaminated by, radiopharmaceutical materials. Depending on the energy of radiopharmaceuticals used for a specific service, normal Waste Management procedures may need to be modified for the safety of staff. Coordinate facility design with specific procedural modifications as required.

### **Medical Waste**

Medical waste is generated in exam and treatment spaces where it is bagged, collected and transported to the soiled utility rooms. Then it is held in separate containers pending transport to the medical waste handling facility.

## General Waste

General waste is generated in all spaces and is held in containers for collection and sorting into carts or bagged and placed in a waste chute and transported to the waste handling facility.

## Recycling

Methods for sorting, collecting, transporting and disposing of recyclable products must be specifically analyzed for each facility and location.

The optional use of disposable and reusable products should be considered.

## Soiled Linen

Soiled reusable linens are generated in exam rooms, treatment spaces, and patient and staff gowning areas. They are collected in carts or hampers in the soiled utility room; or bagged and transported to (a) central collection area(s) via soiled linen chutes or carts.

Disposable linens are included with either general recyclable waste or medical waste as appropriate.

## Utensils

Reusable utensils include bedpans, urinals, emesis basins and other stainless steel items, which are used in exam and treatment areas. They are transported to the soiled utility room where they are processed (if steam washers are available) or collected for reprocessing and transported to the Sterile Processing Department.

## Space Requirements

Space requirements will vary with the selection of waste collection and recycling methods / systems. Space requirements need to be analyzed for each optional method or system considered for new and existing facilities.

## Transportation

### Records

Nuclear Medicine utilizes digital imaging and retrieval techniques. Viewing, interpretation and video image manipulation areas should have data communication access.

### Specimens

Specimens may be drawn in this department.

### Pharmaceuticals

Pharmaceuticals, including narcotics, are transported by pharmacy personnel in locked carts or by a robotic system to the department. Narcotics are delivered to a narcotics locker which



is located in a clean supply or patient prep area and is remotely alarmed to the nearest nursing control station.

Vendors may deliver radionuclides or generator kits for clinical or research uses that require security and special handling. A dedicated area in the Radio Pharmacy or another secured area must be identified for that purpose. Used radiopharmaceutical containers and / or kits and radiation-contaminated waste articles which are retained on-site for the period of decay, are maintained in a double-locked decay storage room or closet as required by the materials stored. The National Council on Radiation Protection and Measurement (NCRP) regulates storage. The Nuclear Regulatory Commission (NRC) regulates radioactive material storage and disposal. A physicist supervises the secured storage within the department, but it may also be in another secured area of the facility.

### **Materials**

Clean supplies are transported by exchange carts which are stored in the Clean Supply Room. Supplies are transported by Service Elevator and through hospital corridors separated from patient traffic where possible. Deliveries are scheduled during hours when patient visits are not scheduled.

### **Linen**

Disposable linens are delivered as part of clean supplies.

### **Sterile Supplies**

The use of sterile supplies is minimal as is accommodated by prepackaged or disposable items delivered with clean supplies.

### **Food**

Meal and nourishment deliveries to Nuclear Medicine are not required.

### **Waste**

Waste is collected by housekeeping staff and transported to the Soiled Utility Room, from where it is disposed.

A small room with shelves to hold radioactive waste for decay may be required in many facilities. These materials may have a very short half-life and may not be significantly radioactive within a short amount of time. Access to commercial waste disposal is very limited and is very expensive when available. "Decay-in storage" is the waste disposal method of choice. The amount of such space is determined by the amount of materials prepared on-site versus the procurements from commercial radiopharmacies to which unused material is ordinarily returned.