GASTON COUNTY, NC

RADIOLOGICAL MONITORING and EXPOSURE CONTROL

GUIDANCE

Includes:

- **Equipment**
- **Potassium Iodide (KI)**
- **Communication**
- **Reporting**

This guidance can be altered and modified when needed for specific conditions and situation

In support of North Carolina Emergency Response Plans for Catawba and McGuire Nuclear Sites

On line edition of guidance is current for the nuclear plan

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I. PURPOSE

To establish guidance for radiological monitoring and decontamination of personnel, vehicles, and equipment and for exposure control, record keeping, and communications relative to an incident at Catawba (CNS) or McGuire (MNS) Nuclear Stations.

II. EXECUTION

A. The Gaston County Warning Point (911 Center) will receive initial notification from CNS or MNS of an incident at the site. The Warning Point will notify the Gaston County Emergency Management Administrator or alternate who will evaluate the seriousness of the incident and activate the EOC for direction and control, if necessary. Should off-site emergency response activities be necessary (including RM&D), the EOC will coordinate these efforts with the Offsite Response Organizations (ORO).

B. Radiological monitoring and decontamination (RM&D) stations will be set up and/or activated only upon direction of the EOC.

III. SCOPE

This guidance recommends the methods and equipment used to monitor emergency workers and evacuees for contamination. In addition, methods and materials used for decontamination of individuals, vehicles, and equipment are also recommended.

IV. CONCEPT of OPERATIONS

A. Direction and Control

1. Radiological monitoring and decontamination (RM&D) is the responsibility of Gaston County Emergency Management. Direction and coordinating instructions will be issued by the Gaston County Emergency Operations Center (EOC). Upon declaration by the Governor of a State of Disaster, overall responsibility for direction and control of emergency operations will be assumed by the State Emergency Response Team (SERT). Technical guidance on RM&D activities will be provided by the State Division of Radiation Protection (DRP), which has overall statewide responsibility for coordination of monitoring, decontamination, and radiological waste disposal actions.

   Each RM&D station is to select a RAD Officer for that site to oversee and direct operations.

2. **Public evacuees** monitor and decontamination station will be set up at location specified in Figure 1. All emergency workers will report to the RM&D station for their assigned response area after exiting the EPZ.

3. **Emergency Workers** monitor and decontamination station will be established at the location and operated by the agencies listed in Figure 1 as directed by the EOC.

Figure 1

McGUIRE SITE RM&D STATIONS		
Type Station	Location	Responsible Organization
Evacuee Reception Center	Stuart Cramer High School	Gastonia Fire Haz-Mat GEMS/STAR
Emergency Worker Monitor and Decon Station	Stuart Cramer High School	Gastonia Fire Haz-Mat, assisting Fire Departments, GEMS/STAR

CATAWBA SITE RM&D STATIONS		
Type Station	Location	Responsible Organization
Evacuee Reception Center	Stuart Cramer High School	Gastonia Fire Haz-Mat GEMS/STAR
Emergency Worker Monitor and Decon Station	Stuart Cramer High School	Gastonia Fire Haz-Mat, assisting Fire Departments, GEMS/STAR

B. Equipment and Supplies

1. Equipment and supplies improvements are a fluid process and can change as needed to improve the operation of monitoring and decontaminating evacuees, emergency workers vehicles and equipment.

   Equipment and supplies that have been identified as needing to do these operations have been obtained and are stored in trailers located at the Emergency Management Office and are deployable to site(s) selected.

   Supplies include but not limited to cleaning products, items to prevent spread of contamination, signage, wash supplies etc.

   Equipment includes but not limited to walk-thru monitors, hand-held monitors, TLDs and dosimeters, KI etc.

2. All supplies will be provided by Emergency Management upon activation of RM&D stations.

3. Initially gowns and or tyvek suits are provided for covering of evacuees that have been cleaned and with assistance from supporting agencies replacement clothing will be provided as necessary and available.

4. Fire apparatus for wash down will be provided by the fire departments. This equipment will be moved to the assigned duty station upon activation of the RM&D stations as needed.

5. Other equipment and or supplies that are identified and not in hand of RM&D teams can be requested thru the EOC for obtaining needed items.

V. EXPOSURE CONTROL

Exposure control measures will be utilized to assure that the accumulated dose of Emergency Workers remains as low as reasonably achievable and not to exceed the Environmental Protective Action Guide of:

- 1R Call In value
- 2.5R for all activities
- Up to 5R for life saving or protection of large populations when lower dose is not practicable
- >5R for life saving or protection of large populations only on a voluntary basis to persons fully aware of the risks involved.

A. Emergency Workers Definition:
There are two categories of Emergency Workers:

1. Category 1 is defined as Emergency Workers inside of the 10 mile Emergency Planning Zone (EPZ) who due to their assignment may have the potential to place them in or will be working in a potentially high exposure rate area (greater than O.1 R/h). MINIMUM DOSIMETRY CAT.1 TLD, 0-20 R or 0-5R Dosimeter.

2. Category 2 is defined as Emergency Workers outside of the 10 mile EPZ who could be exposed to ionizing radiation or during the Ingestion Pathway phase provided the radiation levels will not exceed 0.1 R/h. MIMIMUM DOSIMETRY CAT.2 TLD, 0-20R or 0-5R Dosimeter.

3. NOTE: Emergency Workers should be limited to non-pregnant adults

4. Radiation exposure after emergency has ended should be limited to Federal Radiation Protection Guidance for Occupational Exposure. 5 Rem per year Adult 1/10R for minors and the unborn.

B. Monitoring Exposure Guidance and Option

1. **Centrally located workers option**: For situations where responders work together as a team in close proximity to each other or there are not sufficient dosimeters for each individual, a direct reading dosimeter and a TLD, may be worn by the team leader or a designated team member and these items be placed in a strategically selected work area (example: radiological monitors at a reception center) to monitor exposure and all workers in that area can be assumed to have received exposure as indicated by the centrally location dosimeters.

2. The following devices will be used to maintain adequate exposure control:
   - 0-20R or 0-5R self-reading dosimeters and
   - TLDs or similar device
   - These items will be distributed to all Emergency Workers thru Emergency Management and the EOC

   a. 0-20R or 0-5R Dosimeter

   - Charge dosimeter before initial use and record reading on Dose Cards.
   - Keep dosimeters on your person while on duty. Wear the self-reading dosimeter outside clothing, including protective clothing to allow easy access for reading dosimeter.
   - Read dosimeter every 30 minutes; if movement is indicated, read every 10-15 minutes.
   - If accumulated doses exceed 1R, notify supervisor and await instructions
   - If reading is off-scale for any dosimeter, record, notify the RAD Officer, charge dosimeter, and await instructions.

   RADIATION EXPOSURE LIMITS -- EMERGENCY ONLY

   (a) Call In value: 1R

   (b) Turn-back value: 2.5R

   (c) By Special Approval: Up to 5R

   (d) Volunteer ONLY for life saving or protection of large populations: >5R

   - Notify the RAD Officer of each increase in your accumulated exposure at the end of work shift or as directed.

- At end of shift:
    - Read dosimeter
    - Record date, time, and actual reading
    - Subtract initial reading from final reading
    - Record the resultant exposure
    - Record the accumulated exposures
    - Compare to guides and limits listed above in this Attachment
    - Complete any record forms and Personal Exposure Record (Attachment 1) and make copy before handing in
    - Dosimeters can be re-charged and reset and used by another staff member

b. TLDs or similar device

- TLDs will be distributed to all emergency workers by the Emergency Management Office.
- Wear the TLD on the front of the body between the neck and waist (ie. left breast pocket unless prohibited by protective clothing.)
- Wear TLD on the first layer of clothing. The TLD should not be worn outside protective clothing (ie. Tyvek coveralls.)
- Wear TLD with front side facing away from the body. The company name and serial number will be printed on the front side. The TLD should be attached with the spring loaded clip in such a manner to secure the TLD during normal work activities.
- Each emergency worker will be assigned the same TLD for the duration of the radiation incident or until a switch-out for a new TLD is recommended by the appropriate agency. The transfer of a TLD to another emergency worker is prohibited.
- TLDs will be returned to the Emergency Management Office at the conclusion of the incident. TLDs will be read by contract company and dose levels analyzed by Division of Radiation Protection
- Drill or Evaluations Only: Wear a simulated TLD for exercises (ie. pieces of paper, cardboard, plastic, etc. to simulate that portion of the emergency plan.) TLDs will not be worn for exercises or drills.

C. Protective Clothing

1. The EPA Manual of Protective Action Guides and Protective Actions for Nuclear Incidents (EPA 400-R-92-001, dated May 1992, beginning on page 2-11) states in part that, "Some workers performing emergency services will have little or no health physics training, so dose minimization through use of protective equipment cannot always be assumed. However, the use of respiratory protective equipment can reduce dose from inhalation, and clothing can reduce beta dose".

2. Having established that there is a need for respiratory and skin protection from alpha and beta particles, personal protective equipment (PPE) is required. However, minimum appropriate level is Level D, commonly referred to as the Field or Duty Uniform Level. Also per the EPA, Level D must consist at a minimum of the following:

   a. Coveralls or Tyvek suits
   b. Gloves – doubling gloves will reduce contact and or cross contamination
   c. Boots or duty shoes with disposable outer coverings (for contamination control)

   Option items to reduce airborne and or decon operations as needed:
   a. N95 particulate respirator or equivalent
   b. Safety glasses or a face shield (to protect the eyes from beta damage to the corneas)

3. All emergency workers whether inside the 10 mile EPZ or outside the 10 mile EPZ will be provided kits containing all items needed to meet the Level D protection guidance.
   a. Emergency workers who are in positions whereas they may not come in contact with evacuees **MAY only be outfitted with gloves and shoe coverings** if conditions allows for this level to meet personal exposure protection.
   b. **Example of positions that only gloves and shoe covering may be allowed:**
      1. Staff assisting with parking, directing traffic flow, monitoring, backup route alerting and registration etc.
   c. **Example of positions that full Level D will be required:**
      1. Staff performing any decon operations or subject to come in contact with people, vehicles or pets etc or areas that may already be contaminated

4. The EOC or the RAD Officer for the site will instruct emergency workers in approved protective measures requirements and monitor thru-out the operation and make adjustment as needed.

VI. POTASSIUM IODIDE

General

Potassium Iodine (KI) is a thyroid-blocking agent that has shown effectiveness in preventing long-term development of abnormalities in the human thyroid gland as a result of exposure to radioactive iodine. Although KI is a relatively simple compound and has beneficial effects in most humans, it can have adverse effects on individuals who may be allergic to iodine or iodine salts (iodide). Published information indicates KI is beneficial only under the following circumstances:

- Only when radioactive exposure is imminent or has actually occurred.
- Only when the level of radioactive iodine exposure to the thyroid gland exceeds 25 rems.
- Only when it is administered to an individual not allergic to KI.

Prior to Distribution
KI for Emergency Worker is stored at the Gaston County Emergency Management Office. KI for Institutionalized and public is stored at the Gaston County Health Department under the control of the Health Director. If incident forecasts and projections include information that a release beyond the site limits of Catawba or McGuire are made, EOC staff and the Health Director will prepare plans for KI distribution.

Distribution
The Gaston County Emergency Management staff is responsible for distributing KI to the Emergency Workers

KI will be relocated from the secured Storage Room and be distributed to emergency workers in their assignment kits or to work stations prior to deployment to their assignment. KI transporters will maintain in radio contact with the EOC, from the time of departing the EOC to the Staging Area.

Administration of KI
Distribution of KI to Emergency Workers will be done prior to assignment; but advised to not take any KI until instructed.

- Each person who may be exposed to the 25 rems or above will receive four (4) blister packs of KI with an informational pamphlet

- Upon distribution of the KI unit, the recipient wills login his name, address, and emergency assignment of log sheets provided at distribution points

- Recipients of KI will take two tablets only and are not to share the remaining tablets with others.

- Upon receipt of KI, the emergency worker will record required information on the log sheets at each distribution point. The log sheets will be turned over the the Health Director or designee

- Gaston County's Health Director is empowered to authorize distribution of KI to emergency workers when the exposure to individuals is reasonably projected to exceed 15 rems from inhaled or ingested radioiodine. The Health Director shall make all reasonable efforts to consult with the NC Division of Health Services or Radiation Protection Services.

Precautions

KI may be taken by all emergency workers except those who may be allergic to iodine salts (iodide).

- Side effects to KI include:
  a. Skin rashes.
  b. Swelling of salivary glands.
  c. Idolism (metallic taste, burning mouth and throat, sore teeth and gums, symptoms of a head cold, and possibly stomach upset and diarrhea.)
  d. Over-activity, under-activity, or enlargement of the thyroid gland (goiter). [This side effect is rare.]

- More serious allergic reactions to KI include:
  a. Fever and joint pain.
  b. Swelling of parts of face and body.
  c. Occasionally severe shortness of breath requiring immediate medical attention.

- Side effects may occur when higher doses are taken for long periods of time. Only the recommended dose should be taken.

KI for the Public: Gaston County Health Department has in storage a supply of KI for the general public and is responsible for the plan and distribution of KI to the evacuees at Reception Center(s) and Shelter(s).

VII. COMMUNICATIONS AND REPORTS

Communications between the Gaston County EOC and each RM&D station will be established to ensure a timely flow of information regarding areas of contamination and incident status. The RAD officer at each station shall be responsible for maintaining timely communications with the EOC.

A. The primary means of communication will be telephone with fire department radio as back up. If available, amateur radio may also serve as a back-up communications system.

B. RM&D reports shall be made to the EOC:
   1. Upon activation of the RM&D station

   2. Upon first detection of contamination on people, vehicles, and/or equipment

   3. At the request of the EOC

   4. If an individual cannot be successfully decontaminated

   5. To provide facility status reports on at least an hourly basis

C. The EOC will inform the RM&D stations of:

1. An actual or expected release of radioactivity from CNS or MNS.

2. First report of contamination discovered at any RM&D station in the area

3. Any anticipated large influx of evacuees to the RM&D station

4. Any information of interest or concern

VIII. TERMINATION

Following termination of emergency response activities:

1. Complete activity logs and secure decontamination records

2. Inventory equipment used

3. Replenish supplies

4. Submit report of RM&D activities along with other documentation records to Gaston County Emergency Management. (The report should contain information such as: time RM&D station was activated, number of people or vehicles processed, special problems, adequacy of guidelines and equipment, and recommendations for improvement.)

5. Ensure that all radioactive material is properly logged, tagged, and stored in a controlled area for later disposal.

6. Ensure that RM&D station is monitored and, if contaminated, areas of contamination are marked by rope or tape and signs, and entry by unauthorized individuals prevented (by locked doors, security personnel, etc.)

IX. INJURIES

A. Information pertaining to possible sick or injured contaminated individuals will be transmitted to Gaston County EOC for appropriate action.

B. Emergency care of the sick, injured or contaminated people will be provided by Gaston County EMS and the State's Medical Plan in accordance with emergency medical care practices and operating procedures.

X. RECORDS

A. Radiological Monitoring Teams and individuals will maintain adequate records relative to individual exposure, personnel monitoring / decontamination, emergency vehicles monitoring/ decontamination, and communications.

1. **Individual exposure records** (Attachment 1), will be maintained by each emergency worker who might receive radiation exposure. These records will be maintained on standard forms provided by the Gaston County Emergency Management Office and will be maintained in the manner prescribed by the instructions on the form.

2. **Personnel and Vehicles monitoring/decontamination records** will be maintained by the Radiological Monitoring Team at each site where personnel and vehicles monitoring / decontamination procedures are performed. These records will be maintained on standard forms provided by the Gaston County Emergency Management Office.

B. The Radiological Monitoring Team will turn in all records and forms to the immediate supervisor. The supervisor will collect all forms and turn them in to the Gaston County Emergency Management Office. All records and forms become a part of the official documentation of any accident or incident and will be maintained as such by the Gaston County Emergency Management Office.

XI. OTHER SUPPORTING DOCUMENTS

Due to changes that have to be made due to possible site changes and different equipment, guidance for these are located either in a separate document for a specific site and or placed with that piece of equipment(s). Some of these that should be reference to complete the total monitoring and decon practice are:

- Personal Hand-Held Monitors instructions
- Ludlum Model 52 Portal Monitor
- Ludlum Model 52-1-1 Portal Monitor
- Reception Center Guidance – Stuart Cramer High School
- Emergency Worker Decon Guidance – Stuart Cramer High School

XII. ATTACHMENTS

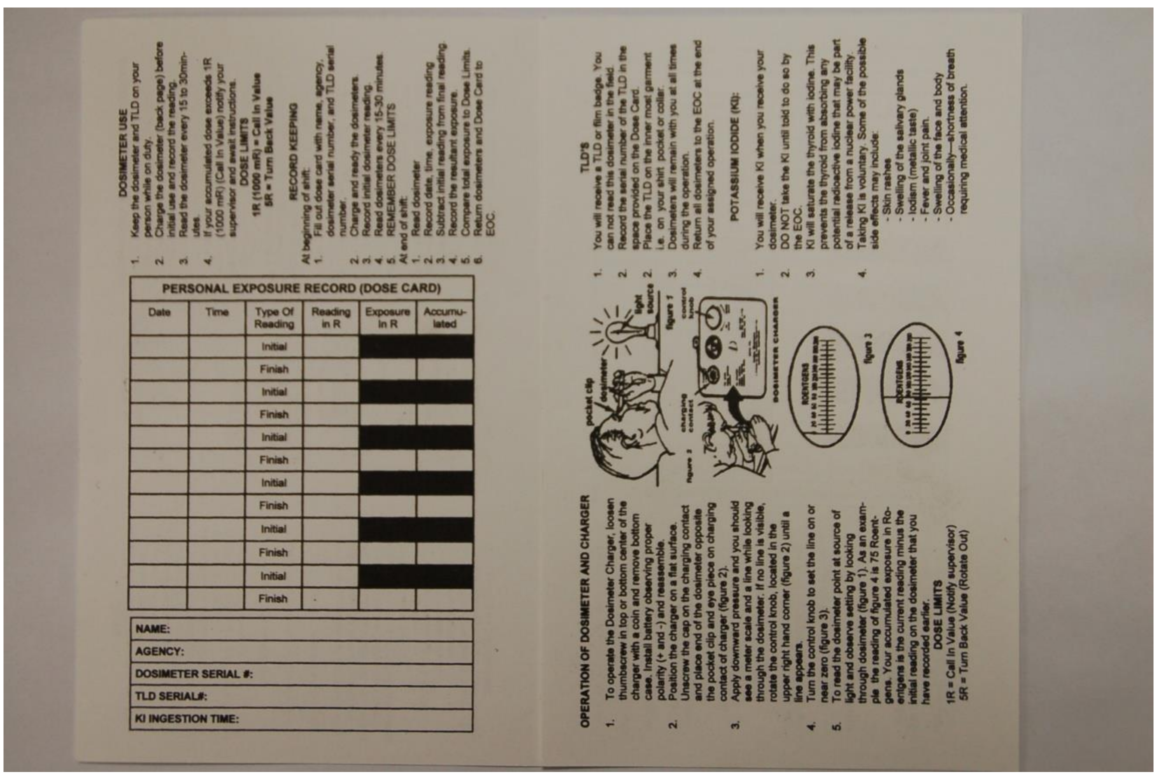
1 - Personal Dose Card – OLDER style but can still be used.

NOTE change of exposure levels as of 1-1-2018 to:

Call In – 1R
Turn Back – 2.5R

Attachment 1

DOSE CARD



DOSIMETER USE

1. Keep the dosimeter and TLD on your person while on duty.
2. Charge the dosimeter (back page) before initial use and record the reading.
3. Read the dosimeter every 15 to 30minutes.
4. If your accumulated dose exceeds 1R (1000 mR) (Call In Value) notify your supervisor and await instructions.

DOSE LIMITS
1R (1000 mR) = Call In Value
5R = Turn Back Value

RECORD KEEPING

At beginning of shift:
1. Fill out dose card with name, agency, dosimeter serial number, and TLD serial number.
2. Charge and ready the dosimeters.
3. Record initial dosimeter reading.
4. Read dosimeters every 15-30 minutes.
5. REMEMBER DOSE LIMITS

At end of shift:
1. Read dosimeter
2. Record date, time, exposure reading
3. Subtract initial reading from final reading.
4. Record the resultant exposure.
5. Compare total exposure to Dose Limits.
6. Return dosimeters and Dose Card to EOC.

PERSONAL EXPOSURE RECORD (DOSE CARD)

Date	Time	Type Of Reading	Reading in R	Exposure in R	Accumulated
		Initial			
		Finish			
		Initial			
		Finish			
		Initial			
		Finish			
		Initial			
		Finish			
		Initial			
		Finish			
		Initial			
		Finish			

NAME:
AGENCY:
DOSIMETER SERIAL #:
TLD SERIAL#:
KI INGESTION TIME:

OPERATION OF DOSIMETER AND CHARGER

1. To operate the Dosimeter Charger, loosen thumbscrew in top or bottom center of the charger with a coin and remove bottom case. Install battery observing proper polarity (+ and -) and reassemble.
2. Position the charger on a flat surface. Unscrew the cap on the charging contact and place end of the dosimeter opposite the pocket clip and eye piece on charging contact of charger (figure 2).
3. Apply downward pressure and you should see a meter scale and a line while looking through the dosimeter. If no line is visible, rotate the control knob, located in the upper right hand corner (figure 2) until a line appears.
4. Turn the control knob to set the line on or near zero (figure 3).
5. To read the dosimeter point at source of light and observe setting by looking through dosimeter (figure 1). As an example the reading of figure 4 is 75 Roentgens. Your accumulated exposure in Roentgens is the current reading minus the initial reading on the dosimeter that you have recorded earlier.

DOSE LIMITS
1R = Call In Value (Notify supervisor)
5R = Turn Back Value (Rotate Out)

TLD'S

1. You will receive a TLD or film badge. You can not read this dosimeter in the field.
2. Record the serial number of the TLD in the space provided on the Dose Card.
2. Place the TLD on the inner most garment i.e. on your shirt pocket or collar.
3. Dosimeters will remain with you at all times during the operation.
4. Return all dosimeters to the EOC at the end of your assigned operation.

POTASSIUM IODIDE (KI):

1. You will receive KI when you receive your dosimeter.
2. DO NOT take the KI until told to do so by the EOC.
3. KI will saturate the thyroid with iodine. This prevents the thyroid from absorbing any potential radioactive iodine that may be part of a release from a nuclear power facility.
4. Taking KI is voluntary. Some of the possible side effects may include:
   - Skin rashes
   - Swelling of the salivary glands
   - Iodism (metallic taste)
   - Fever and joint pain.
   - Swelling of the face and body
   - Occasionally—shortness of breath requiring medical attention.