

COMANCHE PEAK NUCLEAR POWER PLANT

EMERGENCY PLAN MANUAL

**EMERGENCY EXPOSURE GUIDELINES  
AND PERSONNEL DOSIMETRY**

PROCEDURE NO. EPP-305

REVISION NO. 13

ELECTRONIC CONTROLLED COPY

**CHANGES ARE NOT INDICATED**

**LATEST CHANGE NOTICE EFFECTIVE DATE** \_\_\_\_ / \_\_\_\_

Verify current status in the Document Control Database prior to use.

EFFECTIVE DATE: 10/12/2009

**MAJOR REVISION**

CHANGES NOT INDICATED

PREPARED BY (Print): Gary Wiechering EXT: 0180

TECHNICAL REVIEW BY (Print): Kelly Faver EXT: 5628

APPROVED BY: David Fuller DATE: 10/08/2009

**EMERGENCY PLANNING MANAGER**

<p style="text-align: center;"><b>CPNPP EMERGENCY PLAN MANUAL</b></p>		<p style="text-align: center;"><b>PROCEDURE NO. EPP-305</b></p>
<p style="text-align: center;"><b>EMERGENCY EXPOSURE GUIDELINES AND PERSONNEL DOSIMETRY</b></p>	<p style="text-align: center;"><b>REVISION NO. 13</b></p>	<p style="text-align: center;"><b>PAGE 2 OF 10</b></p>
<p>1.0 <u>PURPOSE</u> [C-09056]</p> <p>This procedure provides instructions and guidelines for monitoring and documenting exposures to ionizing radiation for Emergency Response Organization personnel during a declared emergency. Also included is guidance for authorizing and documenting emergency exposures.</p> <p>2.0 <u>APPLICABILITY</u></p> <p>This procedure becomes effective upon declaration of an emergency at Comanche Peak Nuclear Power Plant.</p> <p>2.1 This procedure applies to the:</p> <p>Emergency Coordinator;  EOF Radiation Protection Coordinator;  OSC Radiation Protection Coordinator;  TSC Onsite Radiological Assessment Coordinator;  Radiation Protection Manager;  Radiation Protection Technicians; and  Emergency Planning Manager.</p> <p>2.2 This procedure applies to:</p> <p>2.2.1 All personnel remaining within the boundaries of Comanche Peak Nuclear Power Plant (CPNPP) or arriving onsite after the declaration of an emergency; and</p> <p>2.2.2 All CPNPP or contractor employees engaged in offsite activities in support of an emergency at CPNPP.</p> <p>3.0 <u>DEFINITIONS</u></p> <p>3.1 <u>CPNPP Administrative Levels</u> - Maximum exposure levels imposed by CPNPP, less than the exposure limits imposed by Federal regulation.</p> <p>3.2 <u>Emergency Response Organization (ERO)</u> - Personnel assigned to perform selected emergency response tasks during a declared emergency.</p> <p>3.3 <u>Radiologically Controlled Area (RCA)</u> - Any area where access is controlled by the licensee for the purpose of protection of individuals from exposure to ionizing radiation and radioactive materials.</p> <p>3.4 <u>Personnel Dosimetry</u> - Devices worn by personnel and used to record exposure to ionizing radiation. Examples of these are optically stimulated luminescence (OSL), the thermoluminescent dosimeter (TLD), the pocket ion chamber (PIC), and electronic or alarming dosimeters (e.g., MGs, Thermo or equivalent).</p> <p>3.5 <u>Emergency Exposure Limit</u> - Special limits which allow a worker to receive radiation exposure greater than 10 CFR 20 limits for the sole purpose of immediate life saving activities or activities needed to restore the plant to a safe shut-down condition.</p>		

CPNPP EMERGENCY PLAN MANUAL		PROCEDURE NO. EPP-305
EMERGENCY EXPOSURE GUIDELINES AND PERSONNEL DOSIMETRY	REVISION NO. 13	PAGE 3 OF 10
<p>4.0 <u>INSTRUCTIONS</u></p> <p>4.1 <u>Responsibilities</u></p> <p>4.1.1 The Emergency Coordinator/Recovery Manager is responsible for authorizing personnel exposures in excess of Title 10, Code of Federal Regulations, Part 20 exposure limits. [C-06380]</p> <p>4.1.2 The <u>EOF Radiation Protection Coordinator</u> is responsible for:</p> <p>4.1.2.1 Ensuring personnel radiation exposures are maintained in accordance with 10 CFR, Part 20 limits, except when higher exposures are authorized by the Emergency Coordinator. [C-05671]</p> <p>4.1.2.2 Providing for 24-hour-per-day capability to determine doses received by ERO personnel involved in an emergency at CPNPP.</p> <p>4.1.2.3 Assessing the need for and issuing of personnel dosimetry to various members of the ERO.</p> <p>4.1.3 The <u>TSC Onsite Radiological Assessment Coordinator</u> is responsible for assuming the responsibilities of the EOF Radiation Protection Coordinator prior to activation of the Emergency Operations Facility (EOF).</p> <p>4.1.4 The <u>Radiation Protection Manager</u> is responsible for developing and implementing the Exposure Monitoring program in accordance with STA-655, "Exposure Monitoring Program."</p> <p>4.1.5 <u>Radiation Protection Technicians</u> are responsible for:</p> <p>4.1.5.1 Maintaining personnel exposure records;</p> <p>4.1.5.2 Assisting personnel to determine their current exposure;</p> <p>4.1.5.3 Issuing and collecting dosimetry; and</p> <p>4.1.5.4 Processing dosimetry used during an emergency in a timely manner.</p> <p>4.1.6 The <u>Emergency Planning Manager</u> is responsible for ensuring sufficient numbers of dosimeters are available for use by members of the ERO and all non-ERO personnel responding to the emergency.</p> <p>4.1.7 <u>All personnel responding to an emergency at CPNPP</u> are responsible for receiving, wearing, and returning dosimetry equipment in accordance with instructions contained within this procedure, Radiation Worker Training and/or instructions provided them at the time dosimetry is issued.</p>		

<b>CPNPP EMERGENCY PLAN MANUAL</b>		<b>PROCEDURE NO. EPP-305</b>
<b>EMERGENCY EXPOSURE GUIDELINES AND PERSONNEL DOSIMETRY</b>	<b>REVISION NO. 13</b>	<b>PAGE 4 OF 10</b>

4.2 General Requirements and Instructions

- 4.2.1 During a declared emergency at CPNPP, personnel exposures shall be maintained in accordance with the exposure limits given in Title 10, Code of Federal Regulations, Part 20, except as specified in this procedure. [C-06380]
- 4.2.2 Radiation Protection personnel should issue dosimetry devices to appropriate members of the ERO in accordance with approved Radiation Protection procedures and instructions.
- 4.2.3 If warranted, based on the radiological conditions in the area, the EOF Radiation Protection Coordinator should direct Radiation Protection personnel to issue dosimetry devices to ERO Personnel reporting to the Emergency Operations Facility.

4.3 Emergency Exposure Authorization

- 4.3.1 No individual at CPNPP shall intentionally exceed the exposure limits given in 10 CFR 20 without specific authorization. Authorization for personnel to exceed exposure limits set forth in 10 CFR 20 is obtained from the Emergency Coordinator/Recovery Manager. [C-06380]

NOTE: Attachment 1, "Emergency Exposure Guidelines," sets forth the limits for planned exposures in accordance with Environmental Protection Agency guidelines.

- 4.3.1.1 If time permits, the Emergency Coordinator or the EOF Radiation Protection Coordinator shall discuss with a member of the Nuclear Regulatory Commission (preferably the Radiological Health Branch), the rationale for authorizing exposures above 10 CFR 20 limits.
- 4.3.1.2 Using Form EPP-305-2, "Emergency Exposure Authorization," document whether or not the NRC was contacted.

CPNPP EMERGENCY PLAN MANUAL		PROCEDURE NO. EPP-305
EMERGENCY EXPOSURE GUIDELINES AND PERSONNEL DOSIMETRY	REVISION NO. 13	PAGE 5 OF 10
<p>4.3.2 Selection of individuals authorized to receive an emergency exposure for the purpose of conducting lifesaving activities or activities required to protect large numbers of people, shall be based on the following criteria: [C-05645]</p> <p>4.3.2.1 The individual should be a volunteer or a professional rescue person;</p> <p>4.3.2.2 The individual should be familiar with the consequences of exposure to radiation;</p>		
<p><u>NOTE:</u> Attachment 2, “Risks Associated With Emergency Radiation Exposure,” is provided to assist briefing the individual on potential consequences.</p>		
<p>4.3.2.3 The individual shall not be a female capable of reproduction; and</p> <p>4.3.2.4 If more than one volunteer is being considered, preference should be given to individuals who have reached age 45 years or older.</p>		
<p>4.3.3 Selection of individuals authorized to receive an emergency exposure for the purpose of protecting valuable facilities and equipment, eliminating further escape of effluents, or to control fires, shall be based on the following criteria: [C-05646]</p> <p>4.3.3.1 The individual should be a volunteer familiar with the task to be completed.;</p> <p>4.3.3.2 The individual should be familiar with the consequences of exposure to radiation; and</p>		
<p><u>NOTE:</u> Attachment 2, “Risks Associated With Emergency Radiation Exposure,” is provided to assist briefing the individual on potential consequences.</p>		
<p>4.3.3.3 The individual shall not be a female capable of reproduction.</p>		
<p>4.3.4 Once selection of individuals has been completed, the following criteria shall be considered, prior to dispatching these individuals: [C-05645, 05646]</p> <p>4.3.4.1 Dose to the individual should not be planned to exceed the guidelines given in Attachment 1;</p> <p>4.3.4.2 In accordance with the policy of minimizing total dose equivalent, respiratory protection equipment may be used to minimize internal exposure and protective clothing may be used to minimize skin contamination; and</p> <p>4.3.4.3 Limit exposures received under these conditions to once in a lifetime.</p>		

CPNPP EMERGENCY PLAN MANUAL		PROCEDURE NO. EPP-305
EMERGENCY EXPOSURE GUIDELINES AND PERSONNEL DOSIMETRY	REVISION NO. 13	PAGE 6 OF 10
4.3.4.4	Additionally, any individual receiving a TEDE equal to or greater than 25 rem should have a medical evaluation.	
4.3.4.5	Persons receiving exposures as indicated above should be advised to avoid procreation for a period up to a few months.	
4.3.5	Form EPP-305-2, "Emergency Exposure Authorization," should be used to document authorization of exposures greater than those specified in 10 CFR 20.	
4.3.5.1	Prior to being dispatched into a high exposure area, a separate Form EPP-305-2 should be completed for each individual authorized to perform lifesaving or protective/corrective actions.	
4.3.5.2	If conditions preclude completing Form EPP-305-2 prior to dispatch, the form should be completed when time permits.	
4.3.5.3	When Form EPP-305-2 has been completed (with the exception of the post-exposure data section), the Emergency Coordinator/Recovery Manager should authorize the exposure by signing on the appropriate blank. If sufficient time is not available, approval may be granted by telephone.	
4.3.5.4	<p>If the Emergency Coordinator/Recovery Manager has granted authorization by telephone, they should:</p> <ul style="list-style-type: none"> <li>● Record the authorization on Emergency Response Facility Activities Log Sheet, and</li> <li>● Direct the person requesting the authorization to state on Form EPP-305-2 that authorization has been given and is documented in the Emergency Coordinator's/Recovery Manager's log.</li> </ul>	
4.3.6	Personnel selected to receive an emergency exposure extension should receive a briefing prior to being dispatched. The briefing should be the responsibility of the:	
4.3.6.1	Shift Manager (direct a Radiation Protection Supervisor or Lead Radiation Protection Shift Technician to conduct the briefing);	
4.3.6.2	OSC Radiation Protection Coordinator;	
4.3.6.3	TSC Onsite Radiological Assessment Coordinator; or	
4.3.6.4	EOF Radiation Protection Coordinator.	

<p style="text-align: center;"><b>CPNPP EMERGENCY PLAN MANUAL</b></p>		<p style="text-align: center;"><b>PROCEDURE NO. EPP-305</b></p>
<p style="text-align: center;"><b>EMERGENCY EXPOSURE GUIDELINES AND PERSONNEL DOSIMETRY</b></p>	<p style="text-align: center;"><b>REVISION NO. 13</b></p>	<p style="text-align: center;"><b>PAGE 7 OF 10</b></p>
<p>4.3.7 As a minimum, the briefing should include:</p> <p style="margin-left: 40px;">4.3.7.1 The task to be completed;</p> <p style="margin-left: 40px;">4.3.7.2 The location of the task;</p> <p style="margin-left: 40px;">4.3.7.3 The preferred route to reach the specified location;</p> <p style="margin-left: 40px;">4.3.7.4 Recommended protective measures to be taken, including</p> <ul style="list-style-type: none"> <li>● Protective clothing,</li> <li>● Respiratory Protection,</li> <li>● Stay times;</li> </ul> <p style="margin-left: 40px;">4.3.7.5 Projected dose; and</p> <p style="margin-left: 40px;">4.3.7.6 Potential effects of the exposure ( Attachment 2).</p> <p>4.3.8 Arrangements should be made through the EOF Radiation Protection Coordinator to have a qualified Radiation Protection Technician standing by to process the radiation badges used by personnel authorized to receive emergency exposures.</p> <p>4.3.9 Any individual suspected of receiving an exposure in excess of 10 CFR 20 limits, should not be allowed to reenter any known radiation areas until their radiation badge has been processed and an actual dose has been determined.</p> <p>4.3.10 Upon completion of the task for which the emergency exposure authorization was granted, enter the <u>estimated</u> dose received by the worker on the EPP-305-2 form.</p> <p>4.3.11 Route the completed EPP-305-2 form to the EOF Radiation Protection Coordinator for review.</p>		
<p>4.4 <u>Subsequent Actions</u></p> <p>4.4.1 Report all dosimetry findings to the EOF Radiation Protection Coordinator as soon as possible. If the emergency has been terminated and the Emergency Response Organization no longer exists, report all findings to the Radiation Protection Manager.</p> <p>4.4.2 The EOF Radiation Protection Coordinator (the Radiation Protection Manager, if the Emergency Response Organization is no longer in place) should evaluate all dosimetry findings to determine if 10 CFR 20 limits have been exceeded.</p> <p style="margin-left: 40px;">4.4.2.1 If 10 CFR 20 limits have been exceeded, provide this information to the Shift Manager for determination of need to inform the Nuclear Regulatory Commission in accordance with STA-501, “Nonroutine Reporting.”</p> <p>4.4.3 Personnel responsible for collection of documentation relating to dosimetry issue, use, or retrieval, should transmit such documents to the Emergency Planning Manager for review and subsequent retention in accordance with STA-302, “Station Records.”</p>		

<p style="text-align: center;"><b>CPNPP EMERGENCY PLAN MANUAL</b></p>		<p style="text-align: center;"><b>PROCEDURE NO. EPP-305</b></p>
<p style="text-align: center;"><b>EMERGENCY EXPOSURE GUIDELINES AND PERSONNEL DOSIMETRY</b></p>	<p style="text-align: center;"><b>REVISION NO. 13</b></p>	<p style="text-align: center;"><b>PAGE 8 OF 10</b></p>
<p>5.0    <u>REFERENCES</u></p> <p>5.1    Title 10, Code of Federal Regulations, Part 20, “Standards for Protection Against Radiation”</p> <p>5.2    CPNPP Emergency Plan, Section 1, 8, 9, and 11</p> <p>5.3    EPA-400-R-92-001, “Environmental Protection Agency Manual of Protective Action Guides and Protective Actions for Nuclear Incidents”, May 1992.</p> <p>5.4    National Council on Radiation Protection and Measurements (NCRP), Report No. 116, “Limitation of Exposure to Ionizing Radiation,” 1993 (This reports supersedes NCRP Report No. 91).</p> <p>5.5    NUREG-0654, FEMA-REP-1, “Criteria for Preparation and Evaluation of Radiological Emergency Response Plans and Preparedness in Support of Nuclear Power Plants,” Section II.K</p> <p>5.6    STA-302, “Station Records”</p> <p>5.7    STA-501, “Nonroutine Reporting”</p> <p>5.8    STA-655, “Exposure Monitoring Program”</p> <p>6.0    <u>ATTACHMENTS/FORMS</u></p> <p>6.1    <u>Attachments</u></p> <p>        6.1.1    Attachment 1, “Emergency Exposure Guidelines”</p> <p>        6.1.2    Attachment 2, “Risks Associated with Emergency Radiation Exposure”</p> <p>6.2    <u>Forms</u></p> <p>        6.2.1    EPP-305-2, “Emergency Exposure Authorization”</p>		



ATTACHMENT 1  
PAGE 1 OF 1

EMERGENCY EXPOSURE GUIDELINES

Dose Limit <sup>1</sup> (rem)	Activity	Condition
5	All	
10	Protecting valuable property	Lower dose not practicable
25	Life saving or protection of large populations	Lower dose not practicable
>25	life saving or protection of large populations	Only on a voluntary basis to persons fully aware of the risks involved (See Attachment 2)

<sup>1</sup> This is the Total Effective Dose Equivalent (TEDE) to non-pregnant adults from exposure and intake during an emergency condition at CPNPP. Workers performing services during emergencies should limit dose to the lens of the eye to three times the listed value and doses to any other organ (including skin and body extremities) to ten times the listed value. These limits apply to all doses received from an incident, except those received in unrestricted areas as members of the public during the intermediate (ingestion) phase of the incident.

<b>CPNPP EMERGENCY PLAN MANUAL</b>		<b>PROCEDURE NO. EPP-305</b>
<b>EMERGENCY EXPOSURE GUIDELINES AND PERSONNEL DOSIMETRY</b>	<b>REVISION NO. 13</b>	<b>PAGE 10 OF 10</b>

ATTACHMENT 2  
PAGE 1 of 1

RISKS ASSOCIATED WITH EMERGENCY RADIATION EXPOSURE

The following is a discussion of the biological effects of ionizing radiation, particularly in the range of a 25 rem dose.

**BLOOD CHANGES:**

A 25 rem dose can result in a decrease in red and white blood cells and platelets. Red blood cells carry oxygen to the cells and carry away carbon dioxide and waste. White blood cells function as a major line of defense against bacterial infection. Platelets aid in blood clotting. The amount of decrease, however, would be unnoticeable to the individual and could only be determined by laboratory analysis.

**STERILITY:**

An exposure of 250 rem to men and 150 rem to women could result in temporary sterility. Normal function should return after 1 year.

**CANCER:**

Every individual has approximately one chance in four of getting cancer over a period of a lifetime. A dose of 25 rem could, theoretically, increase that chance by less than one percent.

**GENETIC EFFECTS:**

Genetic effects exceeding normal incidence have not been observed in any study of humans exposed to these levels of radiation.

**DEATH:**

With adequate medical care, death is not likely unless 500 - 700 rem is received.

**SUMMARY:**

Biological effects associated with exposure in the range of 25 rem are limited to unnoticeable changes in blood count. The risk of cancer to individuals or the increase in genetic effects in offspring are so small that they cannot be distinguished from the natural incidence rate of such effects in a given population, at these exposure levels. There should be no impairment to the individual (either long or short term) as a result of receiving this exposure.

Any questions concerning exposures should be directed to the OSC Radiation Protection Coordinator (OSC-RPC) or the TSC Onsite Radiological Assessment Coordinator (ONRAC).

**EMERGENCY EXPOSURE AUTHORIZATION**

Name: \_\_\_\_\_ SSN: \_\_\_\_\_

Emergency Org. Position Title \_\_\_\_\_

IF	THEN exposure limit is:		
	TEDE	Other organs including skin & extremities	Lens of the eye
Life saving or protection of large population	25 rem	250 rem	75 rem
Protecting valuable property	10 rem	100 rem	30 rem

**Individual's Current Exposure**

YTD TEDE from exposure records: \_\_\_\_\_ rem  
Current pocket dosimeter estimate: \_\_\_\_\_ rem  
TOTAL ESTIMATED EXPOSURE: \_\_\_\_\_ rem

**Projected Emergency Exposure**

**TEDE:** \_\_\_\_\_ rem

Was exposure discussed with NRC?       YES       NO

If YES, name of contact: \_\_\_\_\_

**Statements**

I have volunteered for this assignment and I understand the potential effects of the projected exposure listed above.

Signature \_\_\_\_\_ Date / Time \_\_\_\_\_  
Worker

I have evaluated the radiological aspects of this assignment and have briefed this volunteer regarding protective measures and the potential effect of this potential exposure.

Signature \_\_\_\_\_ Date / Time \_\_\_\_\_

<input type="checkbox"/> Shift Supervisor (RP Supervisor or RP Lead Tech to conduct briefing)	<input type="checkbox"/> OSC Radiation Protection Coordinator <input type="checkbox"/> TSC Onsite Rad. Assessment Coordinator <input type="checkbox"/> EOF Radiation Protection Coordinator
---	---

**Authorization**

Authorized by \_\_\_\_\_ Date / Time \_\_\_\_\_  
Emergency Coordinator / Recovery Manager

**Documentation**

This emergency exposure was received at: \_\_\_\_\_ Date / Time \_\_\_\_\_

This individual's estimated TEDE is: \_\_\_\_\_ rem  
Evaluated by: \_\_\_\_\_ Date / Time \_\_\_\_\_  
OSC RPC, TSC ONRAC, EOF OFFRAC

ATTACH COMMENTS, IF ANY, TO BACK OF FORM