

ENCLOSURE 3

**LICENSE AMENDMENT REQUEST 257:
PERMANENTLY DEFUELED EMERGENCY PLAN
AND EMERGENCY ACTION LEVEL SCHEME**

PERMANENTLY DEFUELED EMERGENCY ACTION LEVEL BASIS DOCUMENT

<u>Title:</u>	Permanently Defueled Emergency Action Level Basis Document
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<u>Revision Number</u> 0 DRAFT 4	<u>Effective Date</u> TBD
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Revision Summary:

Permanently Defueled Emergency Action Level Basis Document describes the station's classification scheme for emergencies that may arise at Kewaunee Power Station while in a permanently shutdown and defueled configuration.

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1. Purpose

This document provides the detailed set of Emergency Action Levels (EALs) applicable to the Kewaunee Power Station (KPS) and the associated Technical Bases using the EAL development methodology found in NEI 99-01 Revision 6. As a Permanently Defueled Station, KPS will use the Recognition Category "PD" (Permanently Defueled) providing a stand-alone set of ICs/EALS for a Permanently Defueled nuclear power plant to consider for use in developing a site-specific emergency classification scheme. (Permanently defueled station ICs and EALs are addressed in Appendix C of NEI 99-01, Rev. 6.)

Personnel responsible for implementation of EPIP-AD-02, "Emergency Class Determination," and the Emergency Action Level Matrix may use this document as a technical reference and an aid in EAL implementation. The primary tool for determining the emergency classification level is the Emergency Action Level Matrix. The user of the Emergency Action Level Matrix may (but is not required to) consult the EAL Technical Basis Document in order to obtain additional information concerning the EALs under classification consideration.

2. Discussion

2.1 Permanently Defueled Station

NEI 99-01 provides guidance for an emergency classification scheme applicable to a permanently defueled station. This is a station that generated spent fuel under a 10 CFR § 50 license, has permanently ceased operations and will store the spent fuel onsite for an extended period of time. The emergency classification levels applicable to this type of station are consistent with the requirements of 10 CFR § 50 and the guidance in NUREG 0654/FEMA-REP-1.

In order to relax the emergency plan requirements applicable to an operating station, the owner of a permanently defueled station must demonstrate that no credible event can result in a significant radiological release beyond the site boundary. It is expected that this verification will confirm that the source term and motive force available in the permanently defueled condition are insufficient to warrant classifications of a Site Area Emergency or General Emergency. Therefore, the generic Initiating Conditions (ICs) and Emergency Action Levels (EALs) applicable to a permanently defueled station may result in either an Unusual Event or Alert classification.

2.2 Independent Spent Fuel Storage Installation (ISFSI)

Selected guidance in NEI 99-01 is applicable to licensees electing to use their 10 CFR § 50 emergency plan to fulfill the requirements of 10 CFR § 72.32 for a stand-alone ISFSI. The emergency classification levels applicable to an ISFSI are consistent with the requirements of 10 CFR § 50 and the guidance in NUREG 0654/FEMA-REP-1. The initiating conditions germane to a 10 CFR § 72.32 emergency plan (as described in NUREG-1567) are subsumed within the classification scheme for a 10 CFR § 50.47 emergency plan.

The analysis of potential onsite and offsite consequences of accidental releases associated with the operation of an ISFSI is contained in NUREG-1140, *A Regulatory Analysis on Emergency Preparedness for Fuel Cycle and Other Radioactive Material Licensees*. NUREG-1140 concluded that the postulated worst-case accident involving an ISFSI has insignificant consequences to public health and safety. This evaluation shows that the maximum offsite dose to a member of the public due to an accidental release of radioactive materials would not exceed 1 rem Effective Dose Equivalent.

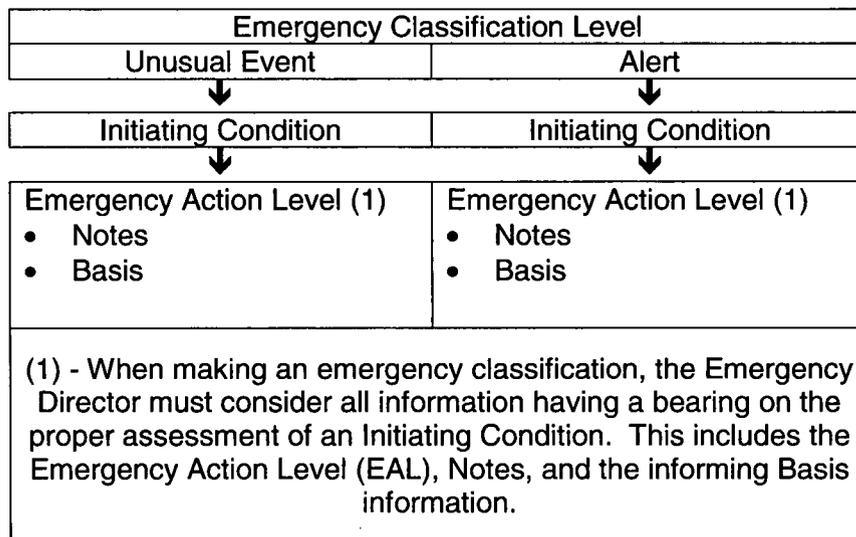
Regarding the above information, the expectations for an offsite response to an Alert classified under a 10 CFR § 72.32 emergency plan are generally consistent with those for a Notification of

Unusual Event in a 10 CFR § 50.47 emergency plan (e.g., to provide assistance if requested). Also, the licensee's Emergency Response Organization (ERO) required for 10 CFR § 72.32 emergency plan is different than that prescribed for a 10 CFR § 50.47 emergency plan (e.g., no emergency technical support function)

When all spent fuel is moved into ISFSI, only IC/EALs associated with E-HU1, PD-HU1, PD-HA1, PD-HU3, and PD-HA3 will be applicable. All other Permanently Defueled IC/EALs will no longer apply and can be deleted from the KPS EAL scheme.

3. Key Terminology Used

There are several key terms that appear throughout the NEI 99-01 methodology. These terms are introduced in this section to support understanding of subsequent material. As an aid to the reader, the following table is provided as an overview to illustrate the relationship of the terms to each other.



3.1 Emergency Classification Level (ECL)

One of a set of names or titles established by the US Nuclear Regulatory Commission (NRC) for grouping off-normal events or conditions according to (1) potential or actual effects or consequences, and (2) resulting onsite and offsite response actions. The emergency classification levels, in ascending order of severity, are:

- Unusual Event
- Alert

3.1.1 Unusual Event

Events are in progress or have occurred which indicate a potential degradation of the level of safety of the plant or indicate a security threat to facility protection has been initiated. No releases of radioactive material requiring offsite response or monitoring are expected unless further degradation of safety systems occurs.

Purpose: The purpose of this classification is to assure that the first step in future response has been carried out, to bring the operations staff to a state of readiness, and to provide systematic handling of unusual event information and decision-making.

3.1.2 Alert

Events are in progress or have occurred which involve an actual or potential substantial degradation of the level of safety of the plant or a security event that involves probable life threatening risk to site personnel or damage to site equipment because of HOSTILE ACTION. Any releases are expected to be limited to small fractions of the EPA PAG exposure levels.

Purpose: The purpose of this classification is to assure that emergency personnel are readily available to respond if the situation becomes more serious or to perform confirmatory radiation monitoring if required, and provide offsite authorities current information on plant status and parameters.

3.2 Initiating Condition (IC)

An event or condition that aligns with the definition of one of the two emergency classification levels by virtue of the potential or actual effects or consequences.

Discussion: An IC describes an event or condition, the severity or consequences of which meets the definition of an emergency classification level. An IC can be expressed as a continuous, measurable parameter (e.g., radiation monitor readings) or an event (e.g., an earthquake).

Appendix 1 of NUREG-0654 does not contain example Emergency Action Levels (EALs) for each ECL, but rather Initiating Conditions (i.e., plant conditions that indicate that a radiological emergency, or events that could lead to a radiological emergency, has occurred). NUREG-0654 states that the Initiating Conditions form the basis for establishment by a licensee of the specific plant instrumentation readings (as applicable) which, if exceeded, would initiate the emergency classification. Thus, it is the specific instrument readings that would be the EALs.

3.3 Emergency Action Level (EAL)

A pre-determined, site-specific, observable threshold for an Initiating Condition that, when met or exceeded, places the plant in a given emergency classification level.

Discussion: EAL statements may utilize a variety of criteria including instrument readings and status indications; observable events; results of calculations and analyses; entry into particular procedures; and the occurrence of natural phenomena.

4. Guidance on Making Emergency Classification

4.1 General Considerations

When making an emergency classification, the Emergency Director must consider all information having a bearing on the proper assessment of an Initiating Condition (IC). This includes the Emergency Action Level (EAL) plus Notes and the informing Basis information.

All emergency classification assessments should be based upon valid indications, reports or conditions. A valid indication, report, or condition, is one that has been verified through appropriate means such that there is no doubt regarding the indicator's operability, the condition's

existence, or the report's accuracy. For example, validation could be accomplished through an instrument channel check, response on related or redundant indicators, or direct observation by plant personnel. The validation of indications should be completed in a manner that supports timely emergency declaration.

For ICs and EALs that have a stipulated time duration (e.g., 15 minutes, 60 minutes, etc.), the Emergency Director should not wait until the applicable time has elapsed, but should declare the event as soon as it is determined that the condition has exceeded, or will likely exceed, the applicable time. If an ongoing radiological release is detected and the release start time is unknown, it should be assumed that the release duration specified in the IC/EAL has been exceeded, absent data to the contrary.

A planned work activity that results in an expected event or condition which meets or exceeds an EAL does not warrant an emergency declaration provided that 1) the activity proceeds as planned and 2) the plant remains within the limits imposed by the operating license. Such activities include planned work to test, manipulate, repair, maintain or modify a system or component. In these cases, the controls associated with the planning, preparation and execution of the work will ensure that compliance is maintained with all aspects of the operating license provided that the activity proceeds and concludes as expected. Events or conditions of this type may be subject to the reporting requirements of 10 § CFR 50.72.

The assessment of some EALs is based on the results of analyses that are necessary to ascertain whether a specific EAL threshold has been exceeded (e.g., gaseous and liquid effluent sampling, etc.); the EAL and/or the associated basis discussion will identify the necessary analysis. In these cases, the declaration period starts with the availability of the analysis results that show the threshold to be exceeded (i.e., this is the time that the EAL information is first available).

While the EALs have been developed to address a full spectrum of possible events and conditions which may warrant emergency classification, a provision for classification based on operator/management experience and judgment is still necessary. The NEI 99-01 scheme provides the Emergency Director with the ability to classify events and conditions based upon judgment using EALs that are consistent with the Emergency Classification Level (ECL) definitions (refer to PD-HU3 and PD-HA3). The Emergency Director will need to determine if the effects or consequences of the event or condition reasonably meet or exceed a particular ECL definition.

4.2 Classification Methodology

To make an emergency classification, the user will compare an event or condition (i.e., the relevant plant indications and reports) to an EAL(s) and determine if the EAL has been met or exceeded. The evaluation of an EAL(s) must be consistent with the Notes. If an EAL has been met or exceeded, then the IC is considered met and the associated ECL is declared in accordance with plant procedures.

When assessing an EAL that specifies a time duration for the off-normal condition, the EAL time duration runs concurrently with the emergency notification time duration.

4.3 Classification of Multiple Events and Conditions

When multiple emergency events or conditions are present, the user will identify all met or exceeded EALs. The highest applicable ECL identified during this review is declared. For example:

- If an Unusual Event EAL and an Alert EAL are met, an Alert should be declared.

There is no “additive” effect from multiple EALs meeting the same ECL. For example:

- If two Alert EALs are met, an Alert should be declared.

Related guidance concerning classification of rapidly escalating events or conditions is provided in Regulatory Issue Summary (RIS) 2007-02, *Clarification of NRC Guidance for Emergency Notifications during Quickly Changing Events*.

4.4 Classification of Imminent Conditions

Although EALs provide specific thresholds, the Emergency Director must remain alert to events or conditions that could lead to meeting or exceeding an EAL within a relatively short period of time (i.e., a change in the ECL is IMMIDENT). If, in the judgment of the Emergency Director, meeting an EAL is IMMIDENT, the emergency classification should be made as if the EAL has been met. While applicable to all emergency classification levels, this approach is particularly important at the higher emergency classification level since it provides additional time for implementation of protective measures.

4.5 Emergency Classification Level Upgrading and Downgrading

An ECL may be downgraded when the event or condition that meets the highest IC and EAL no longer exists, and other site-specific downgrading requirements are met. If downgrading the ECL is deemed appropriate, the new ECL would then be based on a lower applicable IC(s) and EAL(s). The ECL may also simply be terminated.

The following approach to downgrading or terminating an ECL is recommended.

ECL	Action When Condition No Longer Exists
Unusual Event	Terminate the emergency in accordance with plant procedures.
Alert	Downgrade or terminate the emergency in accordance with plant procedures.

As noted above, guidance concerning classification of rapidly escalating events or conditions is provided in RIS 2007-02.

4.6 Classification of Short-Lived Events

Event-based ICs and EALs define a variety of specific occurrences that have potential or actual safety significance. By their nature, some of these events may be short-lived and, thus, over before the emergency classification assessment can be completed. If an event occurs that meets or exceeds an EAL, the associated ECL must be declared regardless of its continued presence at the time of declaration. Examples of such events would be an earthquake or an explosion.

4.7 Classification of Transient Conditions

Many of the ICs and/or EALs contained in this document employ time-based criteria. These criteria will require that the IC/EAL conditions be present for a defined period of time before an emergency declaration is warranted. In cases where no time-based criterion is specified, it is recognized that some transient conditions may cause an EAL to be met for a brief period of time (e.g., a few seconds to a few minutes). The following guidance should be applied to the classification of these conditions.

EAL momentarily met during expected plant response - In instances where an EAL is briefly met during an expected (normal) plant response, an emergency declaration is not warranted provided that associated systems and components are operating as expected, and operator actions are performed in accordance with procedures.

EAL momentarily met but the condition is corrected prior to an emergency declaration – If an operator takes prompt manual action to address a condition, and the action is successful in correcting the condition prior to the emergency declaration, then the applicable EAL is not considered met and the associated emergency declaration is not required.

It is important to stress that the emergency classification assessment period is not a “grace period” during which a classification may be delayed to allow the performance of a corrective action that would obviate the need to classify the event; emergency classification assessments must be deliberate and timely, with no undue delays.

4.8 After-the-Fact Discovery of an Emergency Event or Condition

In some cases, an EAL may be met but the emergency classification was not made at the time of the event or condition. This situation can occur when personnel discover that an event or condition existed which met an EAL, but no emergency was declared, and the event or condition no longer exists at the time of discovery. This may be due to the event or condition not being recognized at the time or an error that was made in the emergency classification process.

In these cases, no emergency declaration is warranted; however, the guidance contained in NUREG-1022 is applicable. Specifically, the event should be reported to the NRC in accordance with 10 CFR § 50.72 within one hour of the discovery of the undeclared event or condition. The licensee should also notify appropriate State and local agencies in accordance with the agreed upon arrangements.

4.9 Retraction of an Emergency Declaration

Guidance on the retraction of an emergency declaration reported to the NRC is discussed in NUREG-1022.

5. References

- 5.1 NEI 99-01 Rev. 6 Final, Development of Emergency Action Levels for Non-Passive Reactors, November 2012
- 5.2 10 CFR § 50, Domestic Licensing of Production and Utilization Facilities
- 5.3 RIS 2007-02, Clarification of NRC Guidance for Emergency Notifications During Quickly Changing Events, February 2, 2007
- 5.4 NUREG-1022, Event Reporting Guidelines: 10CFR50.72 and 50.73
- 5.5 10 CFR § 50.72, Immediate Notification Requirements for Operating Nuclear Power Reactors
- 5.6 KPS Offsite Dose Calculation Manual (ODCM)
- 5.7 10 CFR 50.82, Termination of License
- 5.8 NUREG-0654/FEMA-REP-1, REV 1, Criteria for Preparation and Evaluation of Radiological Emergency Response Plans and Preparedness in Support of Nuclear Power Plants
- 5.9 10 CFR § 72.32, Emergency Plan
- 5.10 NUREG-1567, Spent Fuel Dry Storage Facilities
- 5.11 10 CFR § 50.47, Emergency Plans

- 5.12 NUREG-1140, A Regulatory Analysis on Emergency Preparedness for Fuel Cycle and Other Radioactive Material Licensees
- 5.13 EPIP-AD-02, Emergency Class Determination

Appendix A

Independent Spent Fuel Storage Installation

E-HU1

ECL: Unusual Event

Initiating Condition: Damage to a loaded cask CONFINEMENT BOUNDARY.

Emergency Action Levels: E-HU1.1

E-HU1.1 Damage to a loaded cask CONFINEMENT BOUNDARY as indicated by a radiation reading greater than two times the ISFSI Technical Specification allowable levels

Basis:

This IC addresses an event that results in damage to the CONFINEMENT BOUNDARY of a storage cask containing spent fuel. It applies to irradiated fuel that is licensed for dry storage beginning at the point that the loaded storage cask is sealed. The issues of concern are the creation of a potential or actual release path to the environment, degradation of one or more fuel assemblies due to environmental factors, and configuration changes which could cause challenges in removing the cask or fuel from storage.

The existence of "damage" is determined by radiological survey. The technical specification multiple of "2 times" is used here to distinguish between non-emergency and emergency conditions. The emphasis for this classification is the degradation in the level of safety of the spent fuel cask and not the magnitude of the associated dose or dose rate. It is recognized that in the case of extreme damage to a loaded cask, the fact that the dose rate limit is exceeded may be determined based on measurement of a dose rate at some distance from the cask.

This IC/EAL applies while irradiated fuel is stored in the Spent Fuel Pool or loaded into dry storage casks.

Security-related events for ISFSIs are covered under ICs PD-HU1 and PD-HA1.

KPS Basis Reference(s):

1. Final Safety Evaluation Report, Transnuclear Inc. Standardized NUHOMS Horizontal Modula Storage System for Irradiated Nuclear Fuel, Dkt. No. 72-1004 NUHOMS 32PT System Amendment No. 9
2. Attachment A, Technical Specifications, Transnuclear Inc. Standardized NUHOMS Horizontal Modular Storage System, Certificate of Compliance No. 1004 Amendment No. 9 Dkt. No. 72-1004

Appendix B

Abnormal Rad Levels/Rad Effluent

PD-AU1

ECL: Unusual Event

Initiating Condition: An uncontrolled release of gaseous or liquid radioactivity for 60 minutes or longer.

Emergency Action Levels: PD-AU 1.1 or PD-AU 1.2 or PD-AU1.3

NOTE: The Emergency Director should declare the Unusual Event promptly upon determining that 60 minutes has been exceeded, or will likely be exceeded.

NOTE: If an ongoing release is detected and the release start time is unknown, assume that the release duration has exceeded 60 minutes.

NOTE: If the effluent flow past an effluent monitor is known to have stopped due to actions to isolate the release path, then the effluent monitor reading is no longer valid for classification purposes.

PD-AU1.1 Reading on ANY effluent radiation monitor that is greater than the reading shown for 60 minutes or longer.

Auxiliary Building

Action Value

R-13 Aux Bldg Vent Exhaust
R-14 Aux Bldg Vent Exhaust

4.0E+05 cpm
4.0E+05 cpm

Liquid Radwaste

R-18 Waste Disposal System Liquid
R-20 Aux Bldg SW Return

2 x Discharge Permit Limit
2.0E+03 cpm

PD-AU1.2 Confirmed sample analysis for a gaseous release indicates a concentration greater than 5.4E-03 $\mu\text{Ci/cc}$ for 60 minutes or longer.

PD-AU1.3 Confirmed analysis for a liquid effluent sample indicates a concentration or release rate greater than 2 times the ODCM limits for 60 minutes or longer.

Basis:

This IC addresses a potential or actual decrease in the level of safety of the plant as indicated by an uncontrolled, low level radiological release for an extended period of time. It includes any gaseous or liquid radiological release, monitored or un-monitored, including those for which a radioactivity discharge permit is normally prepared.

With the station being permanently shut down for more than 100 days, the only radionuclide of any significance available to be released in gaseous form is the noble gas Kr-85. Kr-85 decays

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emitting a beta particle and low abundance gamma, and is therefore not a significant contributor to Total Effective Dose Equivalent (TEDE). The gaseous release portion of this IC (detected by either an effluent monitor or by sample analysis) is not based on any particular ODCM values of dose or dose rate but rather the radiological release that results from damage to a fuel assembly and cannot be controlled. The liquid release portion of this IC is based on an uncontrolled release that exceeds two times the radiation monitor discharge permit limit (R-18) or ODCM default setpoint value (R-20).

KPS incorporates design features intended to control the release of radioactive effluents to the environment. Further, there are administrative controls established to prevent unintentional releases. For gaseous and liquid releases, these controls are located in the ODCM. The occurrence of extended, uncontrolled radioactive releases to the environment is indicative of degradation in these features and/or controls.

Radiological effluent EALs are also included to provide a basis for classifying events and conditions that cannot be readily or appropriately classified on the basis of plant conditions alone. The inclusion of both plant condition and radiological effluent EALs more fully addresses the spectrum of possible accident events and conditions.

Classification based on effluent monitor readings assumes that a release path to the environment is established. If the effluent flow past an effluent monitor is known to have stopped due to actions to isolate the release path, then the effluent monitor reading is no longer valid for classification purposes.

PD-AU1.2 and PD-AU1.3 addresses uncontrolled gaseous or liquid releases that are detected by sample analyses or environmental surveys.

Releases should not be prorated or averaged. For example, a release exceeding 4 times release limits for 30 minutes does not meet the EAL.

Recording equipment can be used to determine the start time of a release.

This IC/EAL applies only while irradiated fuel is stored in the Spent Fuel Pool or there is sufficient volume of radioactive liquid that, if released, could exceed two times the ODCM limits.

Escalation of the emergency classification level would be via IC PD-AA1.

KPS Basis Reference(s):

1. USAR Section 11.2.3 Radiation Monitoring System, Rev. 24
2. NEI 99-01 Revision 6, Methodology for Development of Emergency Action Levels, dated November 2012
3. KPS ODCM Section 1.0 Liquid Effluents Methodology, Rev. 15
4. KPS ODCM Section 2.0 Gaseous Effluents Methodology, Rev. 15
5. C10690, ODCM Setpoint Calculations, Rev. 2
6. C11805, EAL Calculation for Abnormal Radiological Releases, Rev. 0
7. Calculation RA-0049 Rev. 1, Kewaunee Emergency Action Levels for Post-Cessation of Power Operations

Appendix B

Abnormal Rad Levels/Rad Effluent

PD-AA1

ECL: Alert

Initiating Condition: An uncontrolled release of gaseous or liquid radioactivity resulting in detectable levels at the site boundary.

Emergency Action Levels: PD-AA1.1 or PD-AA1.2 or PD-AA1.3

NOTE: The Emergency Director should declare the Alert promptly upon determining that the applicable time has been exceeded, or will likely be exceeded.

NOTE: If an ongoing release is detected and the release start time is unknown, assume that the release duration has exceeded 15 minutes.

NOTE: If the effluent flow past an effluent monitor is known to have stopped due to actions to isolate the release path, then the effluent monitor reading is no longer valid for classification purposes.

PD-AA1.1 Reading on ANY effluent radiation monitor that is greater than the reading shown for 15 minutes or longer:

Auxiliary Building

R-13 Aux Bldg Vent Exhaust
R-14 Aux Bldg Vent Exhaust

Action Value

4.0E+06 cpm
4.0E+06 cpm

Liquid Radwaste

R-18 Waste Disposal System Liquid
R-20 Aux Bldg SW Return

50 x Discharge Permit Limit
5.0E+04 cpm

PD-AA1.2 Confirmed sample analysis for a gaseous release indicates a concentration greater than 5.4E-02 $\mu\text{Ci/cc}$ for 15 minutes or longer.

PD-AA1.3 Confirmed analysis of a liquid effluent sample indicates a concentration or release rate greater than 50 times the ODCM limits for 15 minutes or longer.

Basis:

This IC addresses a release of gaseous or liquid radioactivity that results in detectable levels offsite that are below 1% of the EPA Protective Action Guides (PAGs). It includes both monitored and unmonitored releases. Releases of this magnitude represent an actual or potential substantial degradation of the level of safety of the plant as indicated by a radiological release that could potentially exceed regulatory limits (e.g., a significant uncontrolled release).

With the station being permanently shut down for more than 100 days, the only radionuclide of any significance available to be released in gaseous form is the noble gas Kr-85. Kr-85 decays

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emitting a low abundance gamma, and is therefore not a significant contributor to Total Effective Dose Equivalent (TEDE). The gaseous release portion of this IC (detected by either an effluent monitor or by sample analysis) is not based on any particular ODCM values of dose or dose rate but rather the radiological release that results from damage to multiple fuel assemblies and cannot be controlled. The liquid release portion of this IC is based on an uncontrolled release that exceeds fifty times the radiation monitor discharge permit limit (R-18) or ODCM default setpoint value (R-20).

KPS incorporates design features intended to control the release of radioactive effluents to the environment. Further, there are administrative controls established to prevent unintentional releases. For gaseous and liquid releases, these controls are located in the ODCM. The occurrence of extended, uncontrolled radioactive releases to the environment is indicative of degradation in these features and/or controls.

Radiological effluent EALs are also included to provide a basis for classifying events and conditions that cannot be readily or appropriately classified on the basis of plant conditions alone. The inclusion of both plant condition and radiological effluent EALs more fully addresses the spectrum of possible accident events and conditions.

Classification based on effluent monitor readings assumes that a release path to the environment is established. If the effluent flow past an effluent monitor is known to have stopped due to actions to isolate the release path, then the effluent monitor reading is no longer valid for classification purposes.

PD-AA1.2 and PD-AA1.3 addresses uncontrolled gaseous or liquid releases that are detected by sample analyses or environmental surveys.

Recording equipment can be used to determine the start time of a release.

This IC/EAL applies only while irradiated fuel is stored in the Spent Fuel Pool or there is sufficient volume of radioactive liquid that, if released, could exceed fifty times the ODCM limits.

KPS Basis Reference(s):

1. USAR Section 11.2.3 Radiation Monitoring System, Rev. 24
2. NEI 99-01 Revision 6, Methodology for Development of Emergency Action Levels, dated November 2012
3. KPS ODCM Section 1.0 Liquid Effluents Methodology, Rev. 15
4. KPS ODCM Section 2.0 Gaseous Effluents Methodology, Rev. 15
5. C10690, ODCM Setpoint Calculations, Rev. 2
6. C11805, EAL Calculation for Abnormal Radiological Releases, Rev. 0
7. Calculation RA-0049 Rev. 1, Kewaunee Emergency Action Levels for Post-Cessation of Power Operations

Appendix B

Abnormal Rad Levels/Rad Effluent

PD-AU2

ECL: Unusual Event

Initiating Condition: UNPLANNED rise in plant radiation levels.

Emergency Action Levels: PD-AU2.1 or PD-AU2.2

PD-AU2.1 a. UNPLANNED water level drop in the spent fuel pool as indicated by EITHER of the following:

- Spent Fuel Pool low water level alarm setpoint (3 ft. 4 in. below floor)
- Visual observation

AND

b. UNPLANNED rise in area radiation levels as indicated by EITHER of the following radiation monitors.

- R-5 Fuel Handling Area ALERT Alarm
- R-10 New Fuel Pit Area ALERT Alarm

PD-AU2.2 Area radiation monitor reading or survey result indicates an UNPLANNED rise of 25 mrem/hr over NORMAL LEVELS.

Basis:

This IC addresses elevated plant radiation levels caused by a decrease in water level above irradiated (spent) fuel or other UNPLANNED events. The increased radiation levels are indicative of a minor loss in the ability to control radiation levels within the plant or radioactive materials. Either condition is a potential degradation in the level of safety of the plant.

A water level decrease will be primarily determined by indications from available level instrumentation. Other sources of level indications may include reports from plant personnel or video camera observations (if available). A significant drop in the water level may also cause an increase in the radiation levels of adjacent areas that can be detected by monitors in those locations.

The effects of planned evolutions should be considered. Note that PD-AU2.1 is applicable only in cases where the elevated reading is due to an UNPLANNED water level drop. PD-AU2.2 excludes radiation level increases that result from planned activities such as use of radiographic sources and movement of radioactive waste materials.

This IC/EAL applies only while irradiated fuel is stored in the Spent Fuel Pool.

Escalation of the emergency classification level would be via IC PD-AA1 or PD-AA2.

KPS Basis Reference:

1. NEI 99-01 Revision 6, Methodology for Development of Emergency Action Levels, dated November 2012

Appendix B

Abnormal Rad Levels/Rad Effluent

PD-AA2

ECL: Alert

Initiating Condition: UNPLANNED rise in plant radiation levels that impedes plant access required to maintain spent fuel integrity.

Emergency Action Levels: PD-AA2.1 or PD-AA2.2

PD-AA2.1 UNPLANNED dose rate greater than 15 mrem/hr in **ANY** of the following areas requiring continuous occupancy to maintain control of radioactive material or operation of systems needed to maintain spent fuel integrity:

- R-1 Control Room Area

PD-AA2.2 Survey results that indicate an UNPLANNED rise of 100 mrem/hr over **NORMAL LEVELS** that impedes access to **ANY** of the following areas needed to maintain control of radioactive material or operation of systems needed to maintain spent fuel integrity.

- Spent Fuel Pool Pump Area (survey)

Basis:

This IC addresses increased radiation levels that impede necessary access to areas containing equipment that must be operated manually or that requires local monitoring, in order to maintain systems needed to maintain spent fuel integrity. As used here, 'impede' includes hindering or interfering, provided that the interference or delay is sufficient to significantly threaten necessary plant access. It is this impaired access that results in the actual or potential substantial degradation of the level of safety of the plant.

This IC/EAL does not apply to anticipated temporary increases due to planned events.

This IC/EAL applies only while irradiated fuel is stored in the Spent Fuel Pool.

KPS Basis Reference:

1. NEI 99-01 Revision 6, Methodology for Development of Emergency Action Levels, dated November 2012

Appendix B

System Malfunction

PD-SU1

ECL: Unusual Event

Initiating Condition: UNPLANNED spent fuel pool temperature rise.

Emergency Action Levels: PD-SU1.1

PD-SU1.1 UNPLANNED spent fuel pool temperature rise to greater than 150°F.

Basis:

This IC addresses a condition that is a precursor to a more serious event and represents a potential degradation in the level of safety of the plant. If uncorrected, boiling in the pool will occur, and result in a loss of pool level and increased radiation levels.

Escalation of the emergency classification level would be via IC PD-AA1 or PD-AA2.

This IC/EAL applies only while irradiated fuel is stored in the Spent Fuel Pool.

KPS Basis Reference:

1. NEI 99-01 Revision 6, Methodology for Development of Emergency Action Levels, dated November 2012

Appendix B

Hazards and Other Conditions Affecting Plant Safety

PD-HU1

ECL: Unusual Event

Initiating Condition: Confirmed SECURITY CONDITION or threat.

Emergency Action Levels: PD-HU1.1 or PD-HU1.2 or PD-HU1.3

PD-HU1.1 A SECURITY CONDITION that does not involve a HOSTILE ACTION as reported by Security Supervision.

PD-HU1.2 Notification of a credible security threat directed at the site.

PD-HU1.3 A validated notification from the NRC providing information of an aircraft threat.

Basis:

This IC addresses events that pose a threat to plant personnel or the equipment necessary to maintain cooling of spent fuel, and thus represent a potential degradation in the level of plant safety. Security events which do not meet one of these EALs are adequately addressed by the requirements of 10 CFR § 73.71 or 10 CFR § 50.72. Security events inside of the VEHICLE BARRIER SYSTEM (VBS) boundary that are assessed as HOSTILE ACTIONS are classifiable under IC PD-HA1.

Timely and accurate communications between Security Supervision and the Control Room is essential for proper classification of a security-related event. Classification of these events will initiate appropriate threat-related notifications to plant personnel and Offsite Response Organizations.

Security plans and terminology are based on the guidance provided by NEI 03-12, Template for the Security Plan, Training and Qualification Plan, Safeguards Contingency Plan [and Independent Spent Fuel Storage Installation Security Program].

PD-HU1.1 references Security Supervision because these are the individuals trained to confirm that a security event is occurring or has occurred. Training on security event confirmation and classification is controlled due to the nature of Safeguards and 10 CFR § 2.39 information.

PD-HU1.2 addresses the receipt of a credible security threat. The procedure to determine the credibility of a threat is considered security-sensitive information and therefore withheld from the EAL. Credible security threat includes a HOSTILE ACTION within the OWNER CONTROLLED AREA outside of the VBS boundary.

PD-HU1.3 addresses the threat from the impact of an aircraft on the plant. The NRC Headquarters Operations Officer (HOO) will communicate to the licensee if the threat involves an aircraft. The status and size of the plane may also be provided by NORAD through the NRC. The procedure to validate the threat is considered security-sensitive information and therefore withheld from the EAL.

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This IC/EAL applies while irradiated fuel is stored in the Spent Fuel Pool or loaded into dry storage casks.

Escalation of the emergency classification level would be via IC PD-HA1.

KPS Basis Reference:

1. Security and Safeguards Contingency Plan
2. NEI 99-01 Revision 6, Methodology for Development of Emergency Action Levels, dated November 2012

Appendix B

Hazards and Other Conditions Affecting Plant Safety

PD-HA1

ECL: Alert

Initiating Condition: HOSTILE ACTION within the VBS boundary or airborne attack threat within 30 minutes.

Emergency Action Levels: PD-HA1.1 or PD-HA1.2

PD-HA1.1 A HOSTILE ACTION is occurring or has occurred within the VBS boundary as reported by Security Supervision.

PD-HA1.2 A validated notification from NRC of an aircraft attack threat within 30 minutes of the site.

Basis:

This IC addresses the occurrence of a HOSTILE ACTION within the VEHICLE BARRIER SYSTEM (VBS) boundary or notification of an aircraft attack threat. This event will require rapid response and assistance due to the possibility of the attack progressing to the PROTECTED AREA, or the need to prepare the plant and staff for a potential aircraft impact.

Timely and accurate communications between Security Supervision and the Control Room is essential for proper classification of a security-related event.

Security plans and terminology are based on the guidance provided by NEI 03-12, *Template for the Security Plan, Training and Qualification Plan, Safeguards Contingency Plan [and Independent Spent Fuel Storage Installation Security Program]*.

As time and conditions allow, these events require a heightened state of readiness by the plant staff and implementation of onsite protective measures (e.g., evacuation, dispersal or sheltering). The Alert declaration will also heighten the awareness of Offsite Response Organizations, allowing them to be better prepared should it be necessary to consider further actions.

This IC does not apply to incidents that are accidental events, acts of civil disobedience, or otherwise are not a HOSTILE ACTION perpetrated by a HOSTILE FORCE. Examples include the crash of a small aircraft, shots from hunters, physical disputes between employees, etc. Reporting of these types of events is adequately addressed by other EALs, or the requirements of 10 CFR § 73.71 or 10 CFR § 50.72.

PD-HA1.1 is applicable for any HOSTILE ACTION occurring, or that has occurred, in the VBS boundary. This includes any action directed against an ISFSI that is located within the VBS boundary. A HOSTILE ACTION within the OWNER CONTROLLED AREA outside of the VBS boundary is considered a credible security threat and should be evaluated under EAL PD-HU1.2.

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PD-HA1.2 addresses the threat from the impact of an aircraft on the plant, and the anticipated arrival time is within 30 minutes. The intent of this EAL is to ensure that threat-related notifications are made in a timely manner so that plant personnel and Offsite Response Organizations are in a heightened state of readiness. The procedure to validate threat-related information is considered security-sensitive information and therefore is withheld from this IC.

The NRC Headquarters Operations Officer (HOO) will communicate to the licensee if the threat involves an aircraft. The status and size of the plane may be provided by NORAD through the NRC.

In some cases, it may not be readily apparent if an aircraft impact within the VBS boundary was intentional (i.e., a HOSTILE ACTION). It is expected, although not certain, that notification by an appropriate Federal agency to the site would clarify this point. In this case, the appropriate federal agency is intended to be NORAD, FBI, FAA or NRC. The emergency declaration, including one based on other ICs/EALs, should not be unduly delayed while awaiting notification by a Federal agency.

This IC/EAL applies while irradiated fuel is stored in the Spent Fuel Pool or loaded into dry storage casks.

KPS Basis Reference:

1. Security and Safeguards Contingency Plan
2. NEI 99-01 Revision 6, Methodology for Development of Emergency Action Levels, dated November 2012

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Hazards and Other Conditions Affecting Plant Safety

PD-HU2

ECL: Unusual Event

Initiating Condition: Hazardous event affecting SAFETY SYSTEM equipment necessary for spent fuel cooling.

Emergency Action Levels: PD-HU2.1

- PD-HU2.1 a. The occurrence of **ANY** of the following hazardous events:
- Seismic event (earthquake)
 - Internal or external flooding event
 - Low lake level
 - High winds or tornado strike
 - FIRE
 - EXPLOSION
 - Other events with similar hazard characteristics as determined by the Shift Manager

AND

- b. The event has damaged a SAFETY SYSTEM needed for spent fuel cooling.

AND

- c. The damaged SAFETY SYSTEM cannot, or potentially cannot, perform its design function based on **EITHER**:
- Indications of degraded performance
 - VISIBLE DAMAGE

Basis:

This IC addresses a hazardous event that causes damage to a SAFETY SYSTEM needed for spent fuel cooling. At KPS, Service Water System and Spent Fuel Pool Cooling are the systems necessary for cooling the spent fuel pool. The damage must be of sufficient magnitude that the system(s) cannot, or potentially cannot, perform its design function. This condition reduces the margin to a loss or potential loss of the fuel clad barrier, and therefore represents a potential degradation of the level of safety of the plant.

For PD-HU2.1a, the “other” bullet is not intended to address component failures within the SAFETY SYSTEM such as pump bearing failures, electrical grounds or shorts in a pump, failure of valves, etc. Declaration of an event due to the failure of a SAFETY SYSTEM component would be based on PD-SU1.1.

For PD-HU2.1c, the first bullet addresses damage to a SAFETY SYSTEM that is in service/operation since indications for it will be readily available.

For PD-HU2.1c, the second bullet addresses damage to a SAFETY SYSTEM that is not in service/operation or readily apparent through indications alone. Operators will make this

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determination based on the totality of available event and damage report information. This is intended to be a brief assessment not requiring lengthy analysis or quantification of the damage.

This IC/EAL applies only while irradiated fuel is stored in the Spent Fuel Pool.

Escalation of the emergency classification level could, depending upon the event, be based on any of the Alert ICs; PD-AA1, PD-AA2, PD-HA1 or PD-HA3.

KPS Basis Reference:

1. NEI 99-01 Revision 6, Methodology for Development of Emergency Action Levels, dated November 2012

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Hazards and Other Conditions Affecting Plant Safety

PD-HU3

ECL: Unusual Event

Initiating Condition: Other conditions exist which in the judgment of the Emergency Director warrant declaration of a UE.

Emergency Action Levels: PD-HU3.1

PD-HU3.1 Other conditions exist which in the judgment of the Emergency Director indicate that events are in progress or have occurred which indicate a potential degradation of the level of safety of the plant or indicate a security threat to facility protection has been initiated. No releases of radioactive material requiring offsite response or monitoring are expected unless further degradation of safety systems occurs.

Basis:

This IC addresses unanticipated conditions not addressed explicitly elsewhere but that warrant declaration of an emergency because conditions exist which are believed by the Emergency Director to fall under the emergency classification level description for a UE.

This IC/EAL applies while irradiated fuel is stored in the Spent Fuel Pool or loaded into dry storage casks.

KPS Basis Reference:

None

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Hazards and Other Conditions Affecting Plant Safety

PD-HA3

ECL: Alert

Initiating Condition: Other conditions exist which in the judgment of the Emergency Director warrant declaration of an Alert.

Emergency Action Levels: PD-HA3.1

PD-HA3.1 Other conditions exist which in the judgment of the Emergency Director indicate that events are in progress or have occurred which involve an actual or potential substantial degradation of the level of safety of the plant or a security event that involves probable life threatening risk to site personnel or damage to site equipment because of HOSTILE ACTION. Any releases are expected to be limited to small fractions of the EPA Protective Action Guideline exposure levels.

Basis:

This IC addresses unanticipated conditions not addressed explicitly elsewhere but that warrant declaration of an emergency because conditions exist which are believed by the Emergency Director to fall under the emergency classification level description for an Alert.

This IC/EAL applies while irradiated fuel is stored in the Spent Fuel Pool or loaded into dry storage casks.

KPS Basis Reference:

None

Appendix C

Definitions

The following definitions are taken from Title 10, Code of Federal Regulations, and related regulatory guidance documents.

Alert: Events are in progress or have occurred which involve an actual or potential substantial degradation of the level of safety of the plant or a security event that involves probable life threatening risk to site personnel or damage to site equipment because of HOSTILE ACTION. Any releases are expected to be limited to small fractions of the EPA PAG exposure levels.

Unusual Event: Events are in progress or have occurred which indicate a potential degradation of the level of safety of the plant or indicate a security threat to facility protection has been initiated. No releases of radioactive material requiring offsite response or monitoring are expected unless further degradation of safety systems occurs.

The following are key terms necessary for overall understanding the NEI 99-01 emergency classification scheme.

Emergency Action Level (EAL): A pre-determined, site-specific, observable threshold for an Initiating Condition that, when met or exceeded, places the plant in a given emergency classification level.

Emergency Classification Level (ECL): One of a set of names or titles established by the US Nuclear Regulatory Commission (NRC) for grouping off-normal events or conditions according to (1) potential or actual effects or consequences, and (2) resulting onsite and offsite response actions. The ECLs, in ascending order of severity, are:

- Unusual Event
- Alert

Initiating Condition (IC): An event or condition that aligns with the definition of one of the four emergency classification levels by virtue of the potential or actual effects or consequences.

Selected terms used in Initiating Condition and Emergency Action Level statements are set in all capital letters (e.g., ALL CAPS). These words are defined terms that have specific meanings as used in this document. The definitions of these terms are provided below.

CONFINEMENT BOUNDARY: The barrier(s) between areas containing radioactive substances and the environment.

EXPLOSION: A rapid, violent and catastrophic failure of a piece of equipment due to combustion, chemical reaction or overpressurization. A release of steam (from high energy lines or components) or an electrical component failure (caused by short circuits, grounding, arcing, etc.) should not automatically be considered an explosion. Such events may require a post-event inspection to determine if the attributes of an explosion are present.

FIRE: Combustion characterized by heat and light. Sources of smoke such as slipping drive belts or overheated electrical equipment do not constitute FIRES. Observation of flame is preferred but is NOT required if large quantities of smoke and heat are observed.

HOSTAGE: A person(s) held as leverage against the station to ensure that demands will be met by the station.

HOSTILE ACTION: An act toward a NPP or its personnel that includes the use of violent force to destroy equipment, take HOSTAGES, and/or intimidate the licensee to achieve an end. This includes attack by air, land, or water using guns, explosives, PROJECTILES, vehicles, or other devices used to deliver destructive force. Other acts that satisfy the overall intent may be included. HOSTILE ACTION should not be construed to include acts of civil disobedience or felonious acts that are not part of a concerted attack on the NPP. Non-terrorism-based EALs should be used to address such activities (i.e., this may include violent acts between individuals in the owner controlled area).

HOSTILE FORCE: One or more individuals who are engaged in a determined assault, overtly or by stealth and deception, equipped with suitable weapons capable of killing, maiming, or causing destruction.

IMMINENT: The trajectory of events or conditions is such that an EAL will be met within a relatively short period of time regardless of mitigation or corrective actions.

INDEPENDENT SPENT FUEL STORAGE INSTALLATION (ISFSI): A complex that is designed and constructed for the interim storage of spent nuclear fuel and other radioactive materials associated with spent fuel storage.

NORMAL LEVELS: As applied to radiological IC/EALs, the highest reading in the past twenty-four hours excluding the current peak value or since the last survey.

OWNER CONTROLLED AREA: The area outside the Protected Area fence line, and isolation zones that are owned by Dominion.

PROJECTILE: An object directed toward a NPP that could cause concern for its continued operability, reliability, or personnel safety.

PROTECTED AREA: Boundary within the security isolation zone.

SAFETY SYSTEM: A system required for safe operation of the Spent Fuel Cooling System.

SECURITY CONDITION: Any Security Event as listed in the approved security contingency plan that constitutes a threat/compromise to site security, threat/risk to site personnel, or a potential degradation to the level of safety of the plant. A SECURITY CONDITION does not involve a HOSTILE ACTION.

UNPLANNED: A parameter change or an event that is not 1) the result of an intended evolution or 2) an expected plant response to a transient. The cause of the parameter change or event may be known or unknown.

VEHICLE BARRIER SYSTEM (VBS) – A barrier system that is designed, constructed, installed and maintained to protect the facility against the design basis threat.

VISIBLE DAMAGE: Damage to equipment or structure that is readily observable without measurements, testing, or analysis. The visual impact of the damage is sufficient to cause concern regarding the continued operability or reliability of the affected equipment or structure.

Appendix D

Acronyms and Abbreviations

CDE	Committed Dose Equivalent
CFR	Code of Federal Regulations
EAL	Emergency Action Level
ECL	Emergency Classification Level
EOF	Emergency Operations Facility
EPA	Environmental Protection Agency
EPIP	Emergency Plan Implementing Procedure
FEMA	Federal Emergency Management Agency
FSAR	Final Safety Analysis Report
HSM	Horizontal Storage Module
IC	Initiating Condition
ISFSI	Independent Spent Fuel Storage Installation
NEI	Nuclear Energy Institute
NRC	Nuclear Regulatory Commission
NUMARC ¹	Nuclear Management and Resources Council
OCA	Owner Controlled Area
ODCM	Offsite Dose Calculation Manual
ORO	Off-site Response Organization
PA	Protected Area
PAG	Protective Action Guideline
R	Roentgen
SAR	Safety Analysis Report
TEDE	Total Effective Dose Equivalent
TSC	Technical Support Center
UE	Unusual Event

¹ NUMARC was a predecessor organization of the Nuclear Energy Institute (NEI).