

risk impact from all expected specified conditions (*i.e.*, all expected plant conditions caused by mode changes

with various TS systems and components unavailable).

$$\Delta CDF = \sum (\Delta CDF_i) = \sum ICCDP_i f_i \quad (2)$$

Where:

$\Delta CDF_i$  = the CDF increase due to specified condition *i*

$ICCDP_i$  = the ICCDP associated with specified condition *i*

$f_i$  = the average yearly frequency of occurrence of specified condition *i*

A similar expression can be used for  $\Delta LERF$  by substituting the measure of risk, *i.e.*, LERF for CDF. The magnitude of the  $\Delta CDF$  and  $\Delta LERF$  values associated with plant conditions applicable to LCO 3.0.4(b) allowances can be managed by controlling the temporary risk increases, in terms of both CDF and LERF (*i.e.*, ICCDP and ICLERP), and the frequency (*f*), of each of such conditions. In addition to the points made in the previous section regarding temporary risk increases, the following points put into perspective how the key elements of the proposed risk-informed approach, used to justify an LCO 3.0.4(b) allowance, are expected to prevent significant cumulative risk increases by limiting the frequency of its use:

- The frequency of risk significant conditions will be limited by not providing the LCO 3.0.4(b) allowances to the higher risk systems and components.
- The frequency of risk significant conditions will be limited by the requirement to assess the likelihood that the LCO will be satisfied following the mode change.
- The frequency of risk significant conditions is limited by the fact that such conditions can occur only when the plant is returning to power following shutdown, *i.e.*, during a small fraction of time per year (data over the past five years indicate that the plants are averaging 2.1 startups per year).

The addition of the proposed LCO 3.0.4(b) allowances to the plant maintenance activities is not expected to change the plant's average (cumulative) risk significantly.

### 3.1.3 Risk Assessment and Risk Management of Mode Changes

With all safety systems and components operable, a plant can transition up in mode to power operation. With one or more system(s) or component(s) inoperable, this change permits a plant to transition up in mode to power operation if the inoperable

system(s) or component(s) are not in the pre-analyzed higher risk category, a 10 CFR 50.65(a)(4) based risk assessment is performed prior to the mode transition, and the requisite risk management actions are taken. The proposed TS Bases state, "When an LCO is not met, LCO 3.0.4 also allows entering MODES or other specified conditions in the Applicability following assessment of the risk impact and determination that the impact can be managed. The risk assessment may use quantitative, qualitative, or blended approaches, and the risk assessment will be conducted using the plant program, procedures, and criteria in place to implement 10 CFR 50.65(a)(4), which requires that risk impacts of maintenance activities to be assessed and managed." It should be noted that, the risk assessment, for the purposes of LCO 3.0.4(b), must take into account all inoperable TS equipment regardless whether the equipment is included in the licensee's normal 10 CFR 50.65(a)(4) risk assessment scope. The risk assessments will be conducted using the procedures and guidance endorsed by Regulatory Guide 1.182, "Assessing and Managing Risk Before Maintenance Activities at Nuclear Power Plants." The results of the risk assessment shall be considered in determining the acceptability of entering the MODE or other specified condition in the Applicability, and any corresponding risk management actions.

\* \* \* A risk assessment and establishment of risk management actions, as appropriate, are required for determination of acceptable risk for entering MODES or other specified conditions in the Applicability when an LCO is not met. Elements of acceptable risk assessment and risk management actions are included in Section 11 of NUMARC 93-01 "Assessment of Risk Resulting from Performance of Maintenance Activities," as endorsed by RG 1.182, which addresses general guidance for conduct of the risk assessment, gives quantitative and qualitative guidelines for establishing risk management actions, and provides example risk management actions. These risk management actions include actions to plan and conduct other activities in a manner that controls overall risk, actions to increase risk awareness by shift and management

personnel, actions to reduce the duration of the conditions, actions to minimize the magnitude of risk increases (establishment of backup success paths or compensatory measures), and determination that the proposed MODE change is acceptable.

The guidance references state that a licensee's risk assessment process should be sufficiently robust and comprehensive to assess risk associated with maintenance activities during power operation, low power and shutdown conditions (all modes of operation), including changes in plant conditions. NUMARC 93-01 states that the risk assessment should include consideration of: the degree of redundancy available for performance of the safety function(s) served by the out-of-service equipment; the duration of the out-of-service condition; component and system dependencies that are affected; the risk impact of performing the maintenance during shutdown versus at power; and, the impact of mode transition risk. For power operation, key plant safety functions are those that ensure the integrity of the reactor coolant pressure boundary, ensure the capability to shut down and maintain the reactor in safe shutdown condition, and ensure the capability to prevent or mitigate the consequences of accidents that could result in potentially significant offsite exposures.

While the inoperabilities permitted by the completion times of technical specification required actions take into consideration the safety significance and redundancy of the system or components within the scope of an LCO, the completion times generally do not address or consider concurrent system or component inoperabilities in multiple LCOs. Therefore, the performance of the 10 CFR 50.65(a)(4) risk assessment which looks at the entire plant configuration is essential (and required) prior to changing operational mode. The 10 CFR 50.65(a)(4) based risk assessment will be used to confirm (or reject) the appropriateness of transitioning up in mode given the actual status of plant safety equipment.

The risk impact on the plant condition of invoking an LCO 3.0.4(b) allowance will be assessed and managed through the program established to