1. What are the assumptions in PJM’s System Restoration Plan (i.e. what is the starting point for the system at the time of restoration)?

Response: PJM’s assumes the following in their System Restoration Plan:
- Total system blackout with no outside assistance available,
- Normal weather pattern,
- Intermediate to peak load levels,
- Minimal generation or transmission equipment damage
- Sufficient availability of personnel.

While PJM recognizes that an actual system blackout may or may not meet these assumptions, the possible scenarios are limitless, rendering it impossible to plan for all scenarios.

2. Storms in the summer of 2012 caused long restoration times. Doesn’t this make the argument for additional Black Start generation?

Response: No. Outages caused by infrastructure damage are unrelated to a System Restoration plan. Black Start generation is not utilized for restoration of load due to storm damage.

3. What are the assumptions that are utilized in the EPRI Restoration Study?

Response: The EPRI Restoration Study is an initial assessment of EPRI’s Restoration Tool that is still under development. The purpose of this tool is to:
- Develop a computational method for development and evaluation of system restoration strategy options
- Develop analytical techniques to estimate the time to restore service
- Simulate the proposed restoration strategy with realistic system models

PJM’s role in this initial study will be to provide EPRI a test case (network model inclusive of black start units that will be available in 2015) so that they can test the software and determine if it can provide promising results. PJM will also provide feedback on the tool through this testing process.

As a result of this study, PJM will get an indication of whether or not there is sufficient black start capability as well as a potential restoration time. EPRI will send a draft report to PJM and will welcome feedback and clarification, which EPRI will take under consideration. PJM is welcome to reach out to its membership for additional feedback.
As per EPRI, this specific effort is to test the validity of the software tool, which is expected to be complete by the end of 2012. There may indeed be additional value in a follow on effort to customize the tool for added functionality specifically for the PJM and its members. Further, there can be value garnered by running more detailed case studies using more detailed information from the PJM membership. This potential work would come at a later phase.

The assumptions for this study are:
- Node-branch model is used for the study.
- The time needed to energize the transmission line/crank generator are known/given
- The investigation objective of the site and size of the BS units is to maximize the BS capability and shorten restoration time. Secondary objective is not included at this stage (such as close to the nuclear, etc.)
- Load balance is not considered at this stage

4. Will PJM be performing the EPRI analysis? Are TO’s expected to use this tool?

Response: This would be a PJM function if the EPRI software provides promising results to meet PJM’s needs. TO’s would not be expected to use the tool.

5. Will PJM determine what plants are critical steam plants? The TO may not easily be able to get accurate information to determine this.

Response: In the current proposal, PJM would determine these critical steam plants. PJM already has this information internally. PJM would likely include the TO in this process for concurrence.

6. Should stage 2 (or stage 1) loads include Control Center loads. Even though these loads may seem small, it is a priority of the TO to restore service to its control center. This may involve energizing a circuit with other loads that cannot be easily disconnected.

Response: PJM agrees that Control Center loads should be considered priority load in the TO restoration plan. At the RTO restoration level, however, only the loads critical for RTO restoration (currently and proposed: critical steam, nuclear safe shutdown, and gas infrastructure) are the loads used to identify the Black Start generation requirement.

Control center loads should be included early on in the TO restoration plan but do not need to be supplied by Black Start generation or within 4 hours.

7. If a zone has priority (stage 2) loads that cannot be served from generation in its zone within 4 hours, will PJM (possibly with TO assistance) acquire generation, either Tier 1, Tier 2, or other generation to meet the stage 2 load requirement?

Response: Yes. The plan also allows for supply of these loads from outside the TO zone or aggregation of Black Start between multiple zones if required.

8. If a zone does not have enough generation within its zone to meet the 24-48 hour restoration time, will PJM (possibly with TO assistance) acquire the generation to meet the goal?
Response: No. The 24-48 hour window is for complete RTO restoration (not zonal). However, by default, the zones would also be restored.

9. Why do nuclear owners need off-site power within 4 hours?

Response: While there is no specific requirement for the 4 hour restoration of off-site power, nuclear owners require power to be restored to their facility as a priority to maintain safe shutdown and serve as a backup for their on-site diesel generation. The proposal maintains this 4 hour restoration target.

10. When will nuclear units be available to generate during a system restoration?

Response: Nuclear units are assumed to be unavailable for at least 48-72 hours following a system blackout and are generally not counted on in the System Restoration plans.

11. What startup time will be used for units during restoration?

Response: PJM would assume the hot startup times in eMKT recognizing that these may not be accurate depending on the situation of the blackout. An assumption in the PJM Restoration plan is intermediate to peak load levels where most marginal generation would likely be running.

12. What is meant by “Target time for restoration”.

Response: The target time for restoration is the time when all available transmission has been energized and is capable of carrying load. It does not include all load restoration. The time for load restoration may be impacted by the availability of generation (i.e. nuclear generation) and overall system load level. These times are targets, not requirements. Actual restoration times may be sooner or longer depending on a wide variety of factors such as infrastructure damage, weather, load levels, generation availability, fuel availability, interchange availability and equipment status.

13. In reviewing the matrix, I believe the matrix column titled “NERC Standards” should be revised to include NERC Standard NUC-001. Requirement R9.3.5 of NUC-001 states that the agreements between the Transmission Entities (e.g. PJM, TO’s) and the Nuclear Plant Generator Operator should have “provision for considering, within the restoration process, the requirements and urgency of a nuclear plant that has lost all off-site and on-site AC power”. Basically what this means is that if following a system blackout the nuclear plant’s internal diesel generators do not start, the nuclear plant will contact the Transmission Operator/Owner and request that restoration of that plant’s offsite power be given priority and restored as soon as possible. The expectation would be much less than the “four hour goal” and in this case the Nuclear Plant would want to get back on the grid (for safe shutdown power) as soon as it was available. The restoration plan needs to have a process for acting on this request from the nuclear plant.

My thought is that some flexibility and margin needs to be built into the Tier 1 black start capability to allow PJM and the TOs to respond to this potential request.
Response: There is margin built into the Tier 1 requirement (125% of critical steam aux load) in the current proposal. This margin, coupled with reprioritizing of the available Black start generation in this situation, should cover this requirement. Essentially, in this unlikely scenario, Black start generation that might otherwise have been used to start critical steam units would have to be diverted for use by the crippled nuclear unit. This might be an issue to highlight in PJM/TO restoration plans.

I feel this requirement speaks more to storm related issues (i.e. transmission damage at or near nuclear station).