MARLA is an easy-to-use tool for planning and optimizing BWR fuel shuffles. MARLA addresses the industry need for licensing-grade reactivity analysis in support of core alterations by fully analyzing each intermediate core configuration for SDM.

One Tool. Mission Accomplished.
MARLA is capable of planning an entire fuel shuffle, including design and optimization of the fuel movement schedule, analysis of core shutdown margin, and generation of the Fuel Movement Checklist for operations.

With tools to manage fuel pools and nuclear components as well as automate the choice of bundles to be loaded into dry storage casks, MARLA replaces many task-specific and in-house software programs currently in use at many utilities.

By providing superior reactivity management and increased shuffle efficiency, MARLA dramatically reduces planning time and outage costs.

Streamlined Process
MARLA allows core designers and reactor engineers to work on the same platform to prepare for an outage.

Core designers will prepare the project files for reactor engineers, who will then be able to plan and analyze the shuffle.

Shuffle Planning
MARLA automates shuffle design by splitting it into two phases: Phase I shuffles the core to open the maintenance window and Phase II shuffles the core out of the maintenance window to reach the new reference loading pattern.

Each phase is designed independently, and MARLA allows the user to define a separate type of shuffle in each phase. Shuffles can be performed by quadrant or on a core-wide basis.

MARLA also provides automation to perform a full core offload of all bundles at any point during the shuffle plan.

Maintenance Work
A single, interactive maintenance canvas allows the user to specify tasks, such as:

- Control blade and/or drive replacement
- Detector replacement or inspection
- Bundle inspection, sipping, or re-channelling
- IVVI work

Users may also specify core locations needing to be left open until the end of the shuffle or locations where bundles need to remain fixed until the end of the shuffle.
**Shutdown Margin**
MARLA executes a series of SIMULATE cases to fully analyze each intermediate core configuration for SDM. SDM is analyzed as the shuffle design progresses to ensure that each step provides the desired margin, as defined by the user.

Existing shuffle plans can be re-analyzed at any time and all calculations are performed using the licensing-grade 3-D, nodal methods used in SIMULATE. There are no additional geometry or spectral approximations used.

For any given core configuration, SDM is controlled via a dynamic process that determines the extent to which cells surrounding an inserted bundle are influenced.

SDM calculations are entirely controlled by MARLA and require no working knowledge of SIMULATE.

**Pool Management**
MARLA is capable of managing the contents of the spent fuel pool between outages. The user can easily re-arrange the contents of the pool or sub-divide the pool for different storage zones. MARLA stores the moves in a database and generates the corresponding Fuel Movement Checklist for the bridge operators.

MARLA features an automated implementation of B.5.b guidelines for spent fuel storage; automatically arranging the pools to open holes in a 1-in-5 pattern using cooling times to define hot and cold bundles.

**DCS Campaign Planning**
MARLA can be used to determine the bundles that should be loaded into dry storage casks to meet future storage needs. After future cask loading dates have been input, MARLA finds bundles in the storage pool that will meet target heat loads and constraints imposed by the cask vendor.

MARLA contains an internal library of cask designs from which the user can choose. The software plans the loading of bundles into casks well into the future in order to ensure that the plant will be able to fully load all casks safely without violating heat load limits.

**Point. Click. Done.**
MARLA utilizes point-and-click graphics for quick and easy definition of all maintenance work scheduled to take place during the refuelling outage.

Built on a solid foundation of Java, MARLA supports multiple screens, docking and undocking of fuel pool windows, and a host of other usability features.

**Requirements for MARLA**
MARLA requires a valid SIMULATE license and a personal computer running Windows, Linux, Solaris, or Mac OS X.

Since SDM cases are run simultaneously, at least one quad-core processor and 4 GB of memory is recommended.