RESULTS OF THE INSPECTION OF WNP-2 CYCLE I DISCHARGED FUEL

August 22, 1986

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Results of the Examination

The assemblies appeared to have good structural integrity. The upper tie plates were level, rod springs had ample compression space, tie rod nuts were snug, there was not apparent rod bow and all rods were properly seated in the lower tie plate. The spacers were perpendicular to the rods and properly located.

Small scratches attributed to channeling and dechanneling were observed on some peripheral fuel pins and on spacer surfaces. Several locking tab washers were bent. In general, the mechanical integrity of the fuel appears to be good.

On the seven medium enriched bundles, nodular corrosion was observed on some of the spacer grids. The nodules can be characterized as ranging from discrete nodules to relatively complete coverage. On these same bundles, the fuel pins exhibit large areas completely covered with a white-appearing layer. At the extremes of the covered regions, a region covered in varying degrees with white particles can be observed. This spotted region can be found as a transition zone both above and below the completely covered region. Typically, the extreme ends of the fuel pins are free of any apparent deposit.

The apparent thickness of the deposition layer seems to correlate with the specific power being generated by the fuel. The apparent peak deposition on the fuel appears to be approximately one third up the fuel.

A key question is the composition of the observed deposition on the fuel. General Electric has characterized it as crud. They believe that if it were brushed off, some nodular corrosion would be observed. Another reviewer has characterized the deposit itself as nodular corrosion. It appears to Supply System engineers that at least some of the deposition is nodular corrosion rather than crud.

The one assembly of natural enrichment appear to be relatively free of any corrosion or crud.

Summary

The inspected fuel appears to be free of significant mechanical damage. Mechanical phenomena appear to be limited to minor scratches and distortion of the tie rod locking tab washers. The rod locking tab washers were probably distorted during channeling.

Nodular corrosion to a significant degree exists on some of the spacer grids; some nodular corrosion also exists on some of the fuel pins. The specific degree of nodular corrosion on the fuel cannot be further characterized except to say that it is apparent the integrity of the fuel is not presently at risk.

Introduction

In accordance with the WNP-2 FSAR, Section 4.2.4.3, a visual inspection of discharged fuel assemblies from WNP-2, Cycle 1, was performed.

Selection of Assemblies

Eight assemblies were selected for inspection representing greater than 5 percent of the discharged fuel (see Figure 1 attached). The selected assemblies included seven medium enriched assemblies and one natural assembly. They were selected to be representative of the total discharged fuel batch. Four assemblies, LJT 270, LJT 187, LJT 255, and LJT 216 were located in symmetric locations in the core and, in addition, are the high burnup assemblies discharged at the end of Cycle 1. They are all medium enriched assemblies. Three assemblies, LJT 295, LJT 248, and LJT 218, when combined with LJT 216 mentioned above, constitute a radial line from the high burnup location towards the core center. These three assemblies are also medium enriched. LJT 144 is a natural enriched bundle located on the core periphery along the same radial line defined by LJT 295, LJT 248, etc. Given the excellent core power symmetry that WNP-2 observed during Cycle 1, the selected pattern of assemblies to be inspected represents the spatial and exposure effects of the total discharge batch from Cycle 1.

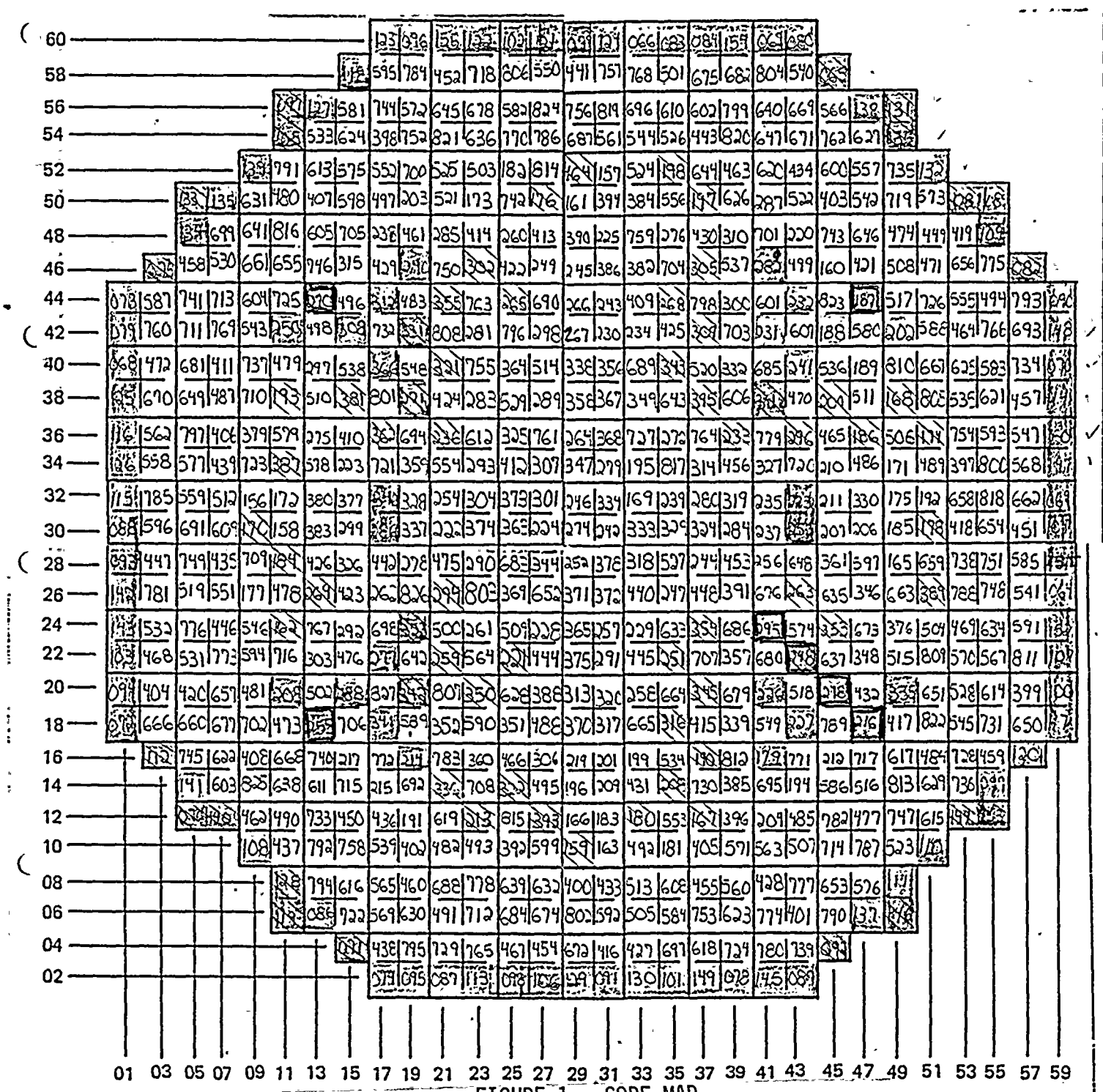
Inspection Technique

The poolside visual examination was performed by means of an underwater camera system with the results of the fuel inspection being recorded on video tape. In general, two sides of each fuel assembly selected for inspection were viewed. The sides viewed were orientated based on the location indicator on the assembly bale handle. The inspection procedure involved moving the fuel assembly in a vertical direction past the fixed camera. This was accomplished by placing the fuel assembly in the fuel preparation machine and utilizing the fuel preparation machine as an elevator. In a typical inspection, a view was first taken of the upper bale and then one side viewed top to bottom. The camera was then moved to a location 90 degrees to the initial location and a second side viewed bottom to top as the fuel preparation machine was driven down.

Inspection Criteria

Visual inspection of the selected assemblies was performed to determine the extent of the following phenomena:

- Proper rod seating in the lower tie plate.
- Rod bow and spacing.
- Spacer location and perpendicularity.
- Relative rod growth.
- Condition of tie rod hex nuts and other structural components.
- Nodular corrosion and crud formation.
- Rod fretting.



Legend

□ = Fuel Bundles Inspected

FIGURE 1 - CORE MAP