1. INTRODUCTION

The description of the ELMO BUMPY TORUS reactor contained in this report differs in several respects from the description given in the TASK I and TASK II reports. Helium has been selected as the coolant in order to provide a common base of comparison for other alternative fusion concepts. This does not represent an optimized design for the EBT concept.

The primary changes are substitutions of helium as the primary coolant instead of a molten salt, increasing the wall loading from 1.1 to 2 MW/n.m² and reducing the number of magnets from 36 to 24.

The blanket design is an adaptation of a design developed jointly by Westinghouse and Oak Ridge National Laboratory for a Tokamak type reactor operating at 4 MW/m². By reducing the wall loading to 2MWn/m² for an EBT type reactor, with a major radius of 30m and a wall radius of 1.2m, the net electrical output will be on the order of 1000MWe which is the desired level.

The plasma physics, and general mechanical design remains as described in ORNL/TM-5669(1) for an EBT-24 configuration. This document will present a summary of the material contained in that reference plus a description of the blanket design concept. The appendices referred to in this report will be the appendices of that document.

2. EBTR Reference Design Parameters

An EBTR reference design has been developed. Preliminary power balance calculations suggest that the toroidal plasma should be heated to ignition conditions using neutral beam injection and that the stabilizing relativistic electron rings should be sustained by microwaves. Figure 1 is a plan view of the first configuration considered for the EBTR using 48 coils and including 4 divertors. The current reference design uses 24 coils with half the major radius (30 m.).

The reactor is fueled by deuterium and tritium and operates in the ignited mode. It produces 3660 MW thermal including blanket