SUMMARY

The use of prestressed concrete in vessels and/or containment structures of nuclear power plants goes back at the beginning of the decade of the 60's. The function of the prestressed concrete of a nuclear power plant goes beyond the pure structural function; this one must ensure that the containment structure can counteract the internal pressure that would occur in the case of an accident in the nuclear reactor and in turn protects the system of external aggressions.

This association of prestressed concrete to the structural integrity and to the security of the external environment, forces to take a control of the same along the useful life of the structure. The features and methodologies of this control are gathered in a specific inspection program for each plant.

In Spain there are now 3 containment structures in operation that have been made in prestressed concrete, the two groups of the Ascó's NPP and the group II of the Vandellós's NPP. The characteristics of the used systems are different, so, on one hand there is varied experience, but on the other hand this situation has not helped to the obtaining of performance in the mentioned experience.

Once arrived at the half of the useful life of the 3 Spanish Containment Structures, it was thought necessary to review all the realized inspections to see the evolution of the prestressed system, as well as making a document where would reflect the state of knowledge about this subject.

The object of this thesis is to announce the prestressed technology in the containment structures of the nuclear power plants, gathering, in addition, all the experience acquired until today in the various inspections that have been made in the containment structures of the three Spanish nuclear power plants that use this technology.

It is important to indicate the singularity of the document because there are reflected the results of 16 inspections which is not an habitual fact in a field so unknown like the treated. An important work of data collection has been done with the help of technical personnel of nuclear power plants.

The thesis is divided into two parts: the first one, which includes chapters 1, 2 and 3, describes the technology in the containment structures and presents in detail the lift-off test, one of those who form part on the Inspection Program. In the second part, which includes chapters 4 and 5, are analyzed and valued the results obtained in the different inspections and from this analysis there are extracted the conclusions and recommendations that conclude the thesis.

To finish two annexes are included. The first one describes the other tests that form part of the Prestressed Inspection Program: the visual inspection and the tendons test. The second annex presents all the data that have been analyzed in chapter 4, being this the first document that presents all the results achieved in the different Spanish Nuclear Power Plants all together.