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STUDY OF GEOLOGIC AND GEOMORPHOLOGIC PROFILE OF SPECIFIC REGIONS OF SÃO PAULO STATE FOR PRELIMINARY ANALYSES OF DISPOSAL OF LOW ACTIVITY RADIOACTIVE WASTE.

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ABSTRACT

São Paulo State stays in the most developed region of the South American subcontinent and possesses a clinical-hospital infrastructure that satisfies the demand of one of the biggest urban concentrations of the word. The hospitals, clinics, research institutes and centers of the state carry out therapy and diagnosis annually using radiopharmaceuticals, where significant volumes of radionuclide are used. From 1995 to 2001 for example, the demand of technetium generators grew from 5657 to 11300 units.
This activity produces diverse types of waste that are classified according to the "Comissão Nacional de Energia Nuclear (CNEN)" safety standards, with procedures recommended for its package, provisory storage, transport and definitive storage.
Due to the diversification of applications and of the used materials, the necessary time of confinement depends on the radioisotopes contained in the waste and the treatment method depends on its physical-chemical characteristics.
The common sense today, among the nuclear area researchers, is about the necessity for constructing a surface repository for the waste with half-life ranging from 50 to 300 years.
This research project will study the possible places, in the State of São Paulo, that would be appropriate, according to the CNEN and the IAEA safety standards, for the implantation of a surface repository, capable of answering the increase of low and average intensity waste volumes, foreseen in the São Paulo industrial and services expansion.

Key words: Radioactive waste, repository, low activity.

1. INTRODUCTION

The applications derived from the domain of the radioactivity have provided an undeniable improvement of life quality for the society. The acceptance in the most diverse fields of nuclear energy by the population is associated with the benefits of these activities and with the guarantee that the incorporation of this technology is rigorously made using the current security criteria.[1]

However, the radioactivity produces residues that are dangerous when discarded without the use of established norms or when badly manipulated. The use of the radiation for the attainment of a service (like electric energy) or a product from activation analysis produces wastes that need to be deposited definitively in appropriate places. [2]
Many waste types of low and average radioactive intensity, result from the research activities, medicine (diagnostic and therapeutic), industrial and agricultural use. These wastes must be discarded according to the contained radioisotopes, and the treatment method depends on theirs physic-chemical characteristics [3].
Materials having a longer half-life are stored longer (kept in shields for about 20 half-lives), carried to controlled special deposits under the supervision of local authorities, and regulated according to the international norms. [4]
The decommission of health units needs special sites, therefore it deals with materials of higher radioactive intensity.[5]
In the Brazilian case, the responsible agency for the supervision, guidance and inspection of the nuclear activities is the CNEN. The CNEN establishes the norms and regulations of health-protection, permitting, supervising and controlling all nuclear activities in Brazil, since the radioactive material mining to the wastes storage. [6]
The objective of this work is to make an initial study to determine places whit condition to receive a preliminary repository for low and average radioactive intensity waste in the State of São Paulo, obeying the international norms of security effectively, under the geologic and geomorphological aspects, for wastes from the use of radioisotopes in agriculture, industry and medicine.

METHODOLOGY

The development of this work was made based on norms approved by the International Atomic Energy Agency (IAEA) and by the "Comissão Nacional de Energia Nuclear" (CNEN), which supply the necessary installation criteria of the considered repository.
Amongst the criteria that are boarded in this research, it must be detached three excellent aspects in the choice of the interested areas and determination of the preliminary places of implantation: [7, 8, 9]
- The localization of the largest producer of low and average radioactive intensity waste of a given region;
- The physical characteristics of the region (in a ray of 50 kilometers), focusing the geologic and geomorphologic aspects of the areas where the largest sources of residues of low and average radioactive intensity are found inside the São Paulo State;
- The infrastructure capable to take care of the correct functioning of the repository.
The localization of the largest volumes of production of low and average radioactive intensity wastes is necessary as a basis for the determination of an average point among the largest sources of waste. This survey will recognize the cities that are producing greater amounts of wastes with longer half-life, which need constant transfer to a repository.
After determining the regions that make possible a better rationalization for the transport of the wastes, located between the areas of larger waste production, a study will be done aiming to characterize the ideal physical aspects for the installation of a provisory repository for the wastes of low and average radioactive intensity, selecting areas with geologic and geomorphological characteristics, meeting established norms. Concerning the physical qualities of the preliminary areas to be determined, the following topics will have to be analyzed:[10,11, 12, 13]

- Structural Geology and Tectonics - geologic aspects related to the main structural and tectonics features;
- Sismology - information and registers of historical sismos;
- Geomorphology - forms of the land related to the respective geologic, regional and local history;
- Hidrology - flow, type and physic-chemical properties of superficial and underground waters related to the geologic means.

DISCUSSION

The CNEN norm [9, 10] suggests an ample spectrum of analysis due to the diversified ecological factors or regional socio-economical specific characteristics.
Figure 1 presents the geographic map of the region under study and the regions initially selected as possible places for installation of repositories.
This previous selection was carried out analyzing the characteristics of the region in agreement with the established norms and technological aspects.

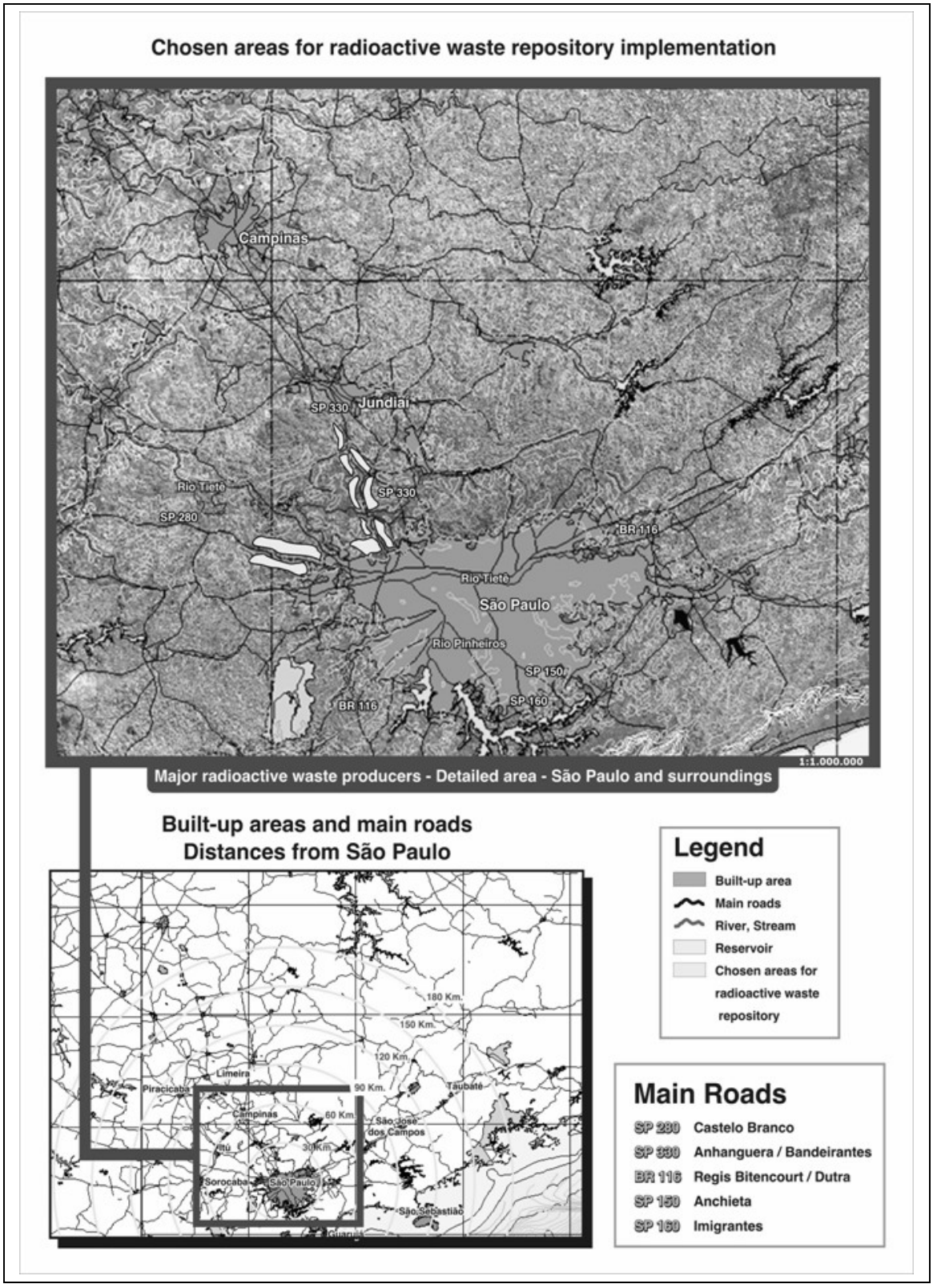

Figure 1. Region in study and localization of the areas initially selected for repository

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