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CATALOGUE OF THERMAL MANIFESTATIONS OF ARGENTINA

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ABSTRACT

Increasing interest in exploitation and development of geothermal resources has led the Argentine Mining-Geological Survey (SEGEMAR) to elaborate the Catalogue of Thermal Manifestations of the Argentina Republic. The objectives were to generate a systematic and complete data base gathering all the available information of the country geothermal resources and to create a friendly source of consultation in order to contribute to the diffusion of the knowledge on the resources in Argentina. The catalogue itself constitutes a compilation of the bibliography from published and unpublished research, conducted by governmental organizations, scientific institutions, private companies and studies performed in-house. Arranged in order to allow any interested person to find the information easily, all data for each manifestation is provided in tables that include location, general characteristics (temperature, flow rates, etc.) chemical analyses, geothermometry and bibliography. Design, examples and implications of the catalogue are presented in this paper.

INTRODUCTION

The increasing interest in the exploitation and development of geothermal resources, both at local and international level, has led the Geothermal Department of Institute of Geology and Mineral Resources (IGRM) of the Argentine Mining-Geological Survey (SEGEMAR) to elaborate the Catalogue of Thermal Manifestations of Argentina (Pesce and Miranda, 1998). Two main objectives were considered for this task: first, to generate a systematic and complete data base gathering all the available information of the geothermal resources of the country from the beginning of the century until present, and second, to create a friendly source of consultation contributing to the diffusion of our resources and their possible economical exploitation.

The catalogue itself constitutes a compilation of the bibliography found both in published and unpublished researches, conducted by governmental organizations, scientific institutions, private companies and studies performed by the Geothermal Department. Particularly, the information used for this work is derived from geothermal reconnaissance studies covering most of the argentine territory, pre-feasibility studies and scarce feasibility studies in selected areas.

The existence and use of thermal waters in Argentina is mentioned by several authors since the 18th century. Most of the early researchers focused on the subject in a descriptive way aimed at the therapeutic-medical use. In the seventies, the systematic study of the Andean geothermal areas was undertaken, extending later to other areas of interest. These analyses, carried out both by the State and private companies aimed at power generation, allowed a detailed knowledge of some of the main geothermal fields and the reconnaissance of numerous thermal manifestations (Pesce 1994, 1995, Miranda and Pesce, 1997).

THE ORGANIZATION OF THE CATALOGUE

The catalogue provides information about location and characteristics of springs and wells above an absolute temperature of 22°C. It has a general introduction -addressed to the general public- briefly explaining the origin of thermal resources, its uses, benefits, as well as the content and managing of the information included in the tables. Data is presented in spreadsheets divided according to the province boundaries of the country. Figure 1 shows the general design for one of the provinces (San Juan). It begins with a schematic map showing the thermal manifestations, followed by tables bearing information for each area and spring. Following is the general structure and the content of the tables (figure1):
A) Sketch Maps: shows the relative location of the manifestations or thermal areas.
B) Location: this table contains information defined as zone-area, references, sample ID, name, geographic coordinates, altitude, location and access to the area.
B1) General Features: shows type of manifestation, surface temperatures, temperature classification, flow rates and uses.
C) Chemical features: Includes field and laboratory determinations of the thermal manifestations, their major, minor and trace constituents, all expressed in common units, as well as chemical classification according to original reports.
D and D1) Geothermometry: Silica and cationic geothermometry, gas geothermometry and reservoir temperature suggested in the reports.
E) Isotopes and gas chemistry: Stable and radiogenic isotopic analyses were included as well as gas analysis when available.
F) References: Contains a list of the bibliography used in the making of the tables.

There are a few variations to the general structure for cases of provinces where specific information has been included regarding wells drilled in order to reach thermal waters or steam. Here, well depth, depth of the producing horizons, production features, and other data are presented.

The information included in the catalogue was obtained from diverse sources having different aims and objectives. The great amount, disparity and in some cases the age of the data, made necessary a careful analysis and standardisation of the data as well as the units included. During the development of this work many difficulties arose, the superposition of data from different studies, the different denomination -by different authors- of a single manifestation and even the varying degree of detail of the studies are among them. All the information available on the same thermal manifestation or area was included. Taking into account its nature as a compilation, names and opinions provided by the different

authors have been respected. The inclusion of geochemical data has been emphasized, since it allows to make an evaluation of the physical-chemical factors that are relevant in planning and operating the geothermal developments, and very often gives conclusive answer to the feasibility of further investment in a particular area.

IMPLICATIONS

The knowledge of the geothermal manifestations constitutes a starting point for the exploration and quantification of the geothermal systems capable to sustain power generating projects or direct uses. Thus, the catalogue of geothermal manifestations of Argentina becomes the first publication covering the whole of the country focusing particularly on the geothermal resources. It constitutes a comprehensive database that is very useful in geothermal research and consultancy. Also allows to undertake future endeavours on R&D, and has made it possible to gather exhaustive information, enabling the reader to obtain an important bibliographic data to gain more knowledge on any specific manifestation.

CONCLUSIONS

The catalogue realization is undertaken as growing activity and interest on geothermal resources, particularly for direct use of heat, increases in Argentina. The experience in the last few years indicates a lack of knowledge about the possibilities of application of the geothermal resources in many activities. The catalogue intends to be an up-to-date data source filling the void, both in the academic world as well as in general public information. No doubt it constitutes a dynamic work that shall be up-dated as new geothermal manifestations are discovered or new data becomes available.

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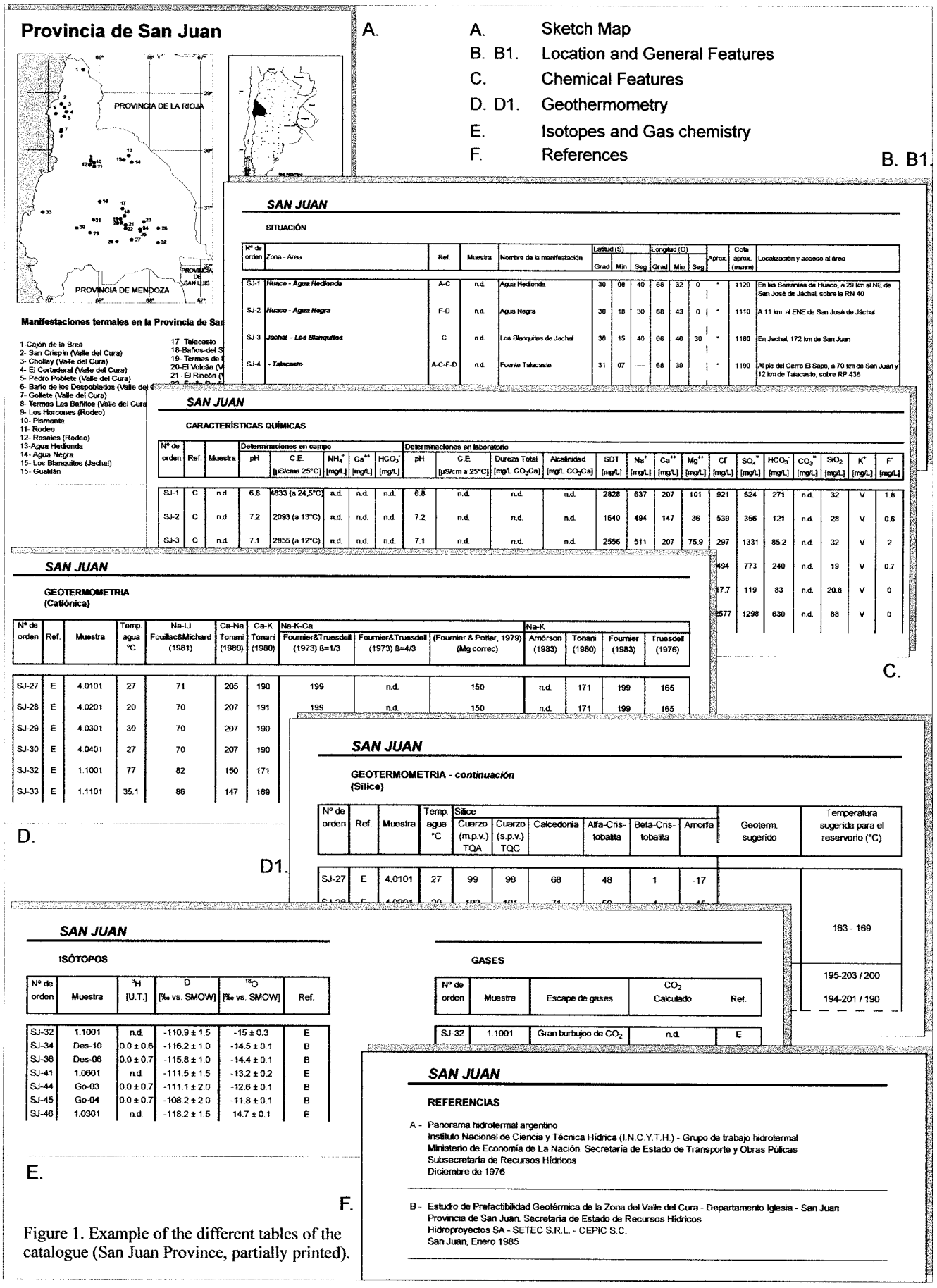

Figure 1. Example of the different tables of the catalogue (San Juan Province, partially printed).