ABSTRACTS FORMANDOS 1998

GOBBO, Luciano de Andrade

Raw Material Evaluation for Portland Cement Manufacture in Apiaí, SP

Orientadora: Profª. Drª. Lília M. Sant'Agostino - GSA - Depto de Geologia Sedimentar e Ambiental

Abstract

The study sought to determine the optimum use of different raw materials in the manufacture of Portland Cement from four deposits belonging to the Açungui Group: Pirizal limestone, Vieira mica schist and quarzite, Coga clay and Taquarussu limestone; Pirizal phyllite was also examined.

The work comprised field sampling (hand, trench, well, auger drill and volumetric samples), petrographic, mineralogical and technological characterization of raw materials, and burnability tests for raw meals with different blending of the raw materials.

Field activities were developed with the support of two companies: Produtiva Geologia e Engenharia Mineral e Camargo Corrêa Industrial SA. Raw material characterization was carried out in the laboratories of the University of São Paulo (petrographic description and technological characterization of mineral grain size and distribution). Burnability tests and petrographic description of clinker were conducted in the Associação Brasileira de Cimento Portland.

The Pirizal limestone deposit consists of alternating calcitic and dolomitic siliceous layers in a frequency that would demand selective mining to be profitable. The Goca clay neighbors a village so that any mining activity should interfere in urban life.

Clinkerization tests utilizing the calcitic limestone presently being mined and different mixtures of quartzite and mica schist, indicated that the addition of small amounts of the Pirizal phyllite can improve raw meal burnability.

MARTINS, Lucelene

Mafic and opaque minerals as indicators of conditions of magmatic crystallization and late recrystallizations: the example of some basement calc-alkaline granitoids from São Paulo, Brazil

Orientador: Prof. Dr. Horstpeter H.G.J. Ulbrich - GMG -Depto de Mineralogia e Geotectônica

Abstract

Petrographic studies, with susceptibility measurements and mineral chemistry, contribute in the characterization of processes of crustal contamination in the calc-alkaline granitoids located between the cities of Piedade and Ibiúna (SP).

The main petrographic types are: calc-alkaline metaluminous hornblende-biotite granites (Hbg), calc-alkaline metaluminous biotite granites (with and without sphene) and peraluminous muscovite-biotite granites (Mbg).

The magnetic susceptibility values are: Hbg with sphene + magnetite ± ilmenite, k ~ 9.9 (x10-3 SI); types with biotite-sphene, k ~ 8.4 (x10-3 SI) and biotite, about 4.8 (x10-3 SI), both with magnetite and ilmenite; Mbg, with ilmenite ± magnetite, k ~ 4.7 (x10-3 SI).

The opaque phases are usually enriched in end-member components, thus indicating post-magmatic recrystallization-exsolution. The biotites show progressive enrichment in Fe, Ti and Al, from the calc-alkaline Hbg (less "contaminated") to the peraluminous and more "differentiated" (probably more "contaminated") granites, similar to the contaminated granites of the Sierra Nevada, California (Ague & Brimhall, 1988).

MATTOS, Ivandra Cristina Silva de

A methodological proposal for geological-geotechnical description of borehole logs

Orientadores: Fábio Taioli e Wilson Shoji Iyomasa - GSA - Depto de Geologia Sedimentar e Ambiental

Abstract

Borehole core logging is widely used during investigation of rock masses. Appropriate core description allows evaluation of both the quality of the rock mass and the location of eventual unstable portions. Common sense dictates that a homogeneous and standardized description of rock cores will facilitate communication in Engineering Geology and, additionally, may allow the application of geomechanical classifications in such studies.

This paper suggests a procedure to describe rock cores, aimed at standardizing such descriptions in Engineering Geology. This procedure is based on a compilation of technical literature available on the main geological-geotechnical parameters and geomechanical classifications. Several rock core descriptions are presented as examples, using Maclog software developed by the Instituto de Pesquisas Tecnológicas do Estado de São Paulo - IPT. São Paulo, Brazil.

SILVA, Alexandre Carnier Nunes da

TF-01 "Análise de dados geológicos por geoprocessamento...folha Iporanga (SG22-X-B-V-2) a 1:50.000"

Orientador: Arlei B. Macedo - GSA - Depto. de Geoloogia Sedimentar e Ambiental

Abstract

This monograph presents the application of a methodology of Geographic Information Systems to mineral prospecting, mineral resources administration and environmental management. The area comprised by the Iporanga Quadrangle (1:50.000, SG.22-X-B-V-2) was selected for this study for having high mineral potential (limestone, lead, silver, copper, zinc), which has been the object of a great number of geologic surveys in the region.

The data were compiled and converted to digital format, and a Geo-referenced Information System (GIS) was constructed. Topographic, geologic, geochemical, geophysical, geomorphologic and environmental conservation unit maps came from published data, whereas the situation of the area relating to mineral titles in the National Department of Mineral Production, vegetation cover, and permanent preservation areas were determined in the present project.

The software systems Mapping Office (Intergraph) and Idrisi (Clarklabs) were used, the first being considered efficient, although difficult to operate, for making and printing maps, and the second presenting excellent analytical performance.

Analytical techniques applied on a single map (DEM calculation, reclassification, remote sensing image classication, NDVI calculation) and map combination, by overlay, with boolean criteria and summative indexes were used.

GIS analysis made it possible to combine geologic favorability with information on availability of areas for mineral exploration and environmental constraints, resulting in a map depicting favorable areas free of environmental or legal constraints.

TROSDTORF, Jr. Ivo

Análise estratigráfica, faciológica e hidrogeológica do Arenito Lapa, Subgrupo Itararé (P-C), norte do Estado de Santa Catarina e sul do Estado do Paraná

Orientadores: Canuto, J.R.; Santos, P.R. dos & Duarte, U. - GSA - Depto. de Geologia Sedimentar e Ambiental

Abstract

The Lapa sandstone forms an almost continuous, broadly sinuous, linear ridge that extends for about 180 Km, with a general NNW - SSE trend, from south of Rio Negrinho (SC) to north of Palmeira (PR). At its northern end, north of Lapa (PR), the ridge is dismembered into several smaller, elongated sandstone crests that seem to merge with the Vila Velha Sandstone.

Recent mapping showed that the ridge comprises several lithofacies that seem to make up the exhumed fill of a subglacial tunnel - valley deeply carved into Itararé Subgroup sediments and reaching bedrock of the Furnas Formation at its northern extremity. The valley profile is irregular both transversely, as well as along its axis.

The preliminary depositional model interpreted for the Lapa Sandstone involves formation of a subglacial drainage way or tunnel - valley below the glacier through headward erosion by confined meltwater with possible contribution of glacial abrasion. Erosion may have started by piping at the margin of the glacier. Eroded sediments were transported and deposited as an extensive apron or delta in front of the marine margin of the lobe. Retreat of the glacier margin and subsequent rise in sea level resulted in exposure of the subglacially cut topography and its recurrent infilling by fluvial, deltaic, glacial- marine and marine sediments, and by marine reworking of these. These processes ended with post - glacial isostatic upwarping.

In this monograph, the Lapa Sandstone was subdivided into three main lithofacies (A, B and C) and one secondary lithofacies (Rc). Two other lithofacies indirectly related to the rock body were also recognized: facies Dm (regional substratum), and Cg situated between the substratum and the Lapa Sandstone.

Data derived from well drilling and seismic reflection carried out by Paulipetro and Petrobrás indicate other similar bodies in subsurface, which may be potential reservoirs for oil/gas and water.

In addition to the lithofacies analysis, studies of sedimentary petrography, grain size analysis and geophysical analysis confirmed the potentiality of the Lapa Sandstone as a water - bearing structure. However, although this property can be explored in practically all the extension of the body, the potentialities of the Lapa Sandstone have been ignored or very little explored.

(Apoio FAPESP, proc. 97/13.973-2).

RODRIGUES, Luciana Venosa

Geological-geotechnical studies for detailing the construction project for the fifth ("Largo Treze") subway line of the São Paulo Metrô, Brazil

Orientadores: Fábio Taioli e Armando de Oliveira Reis - GSA - Depto de Geologia Sedimentar e Ambiental

Abstract

The development of a civil engineering work in an urban area demands detailed study of the subsoil mainly due to the lack of outcrops and the intrinsic anthropogenic interferences. At the same time, the knowledge of the geological-geotechnical characteristics of the massive is fundamental to determine construction methods and foundation type. Therefore, this study covers the geological-geotechnical characterization of an intensely urbanized area in the city of São Paulo, for which the fifth line of the São Paulo subway (Metrô), the "Largo Treze" portion is planned.

The geological-geotechnical characterization was based on direct methods of investigation (percussion and rotary drilling) and local mapping (after the beginning of excavation). The data collected was condensed in longitudinal and transverse geological-geotechnical sections, which were used to define construction methods and design alternatives in pace with the construction.

SAITO, Márcia Mika

Evaluation of Feldspar occurrences in the Três Córregos Granitic Complex, Castro (Pr), as raw material for ceramic

Orientadora: Profª. Dra. Lilia M. Sant'Agostino - GSA - Depto de Geologia Sedimentar e Ambiental

Abstract

This monograph focused on the evaluation of weathered porphyritic granite in two areas near Castro (PR), for possible exploitation as raw material for ceramics.

Field research involving geological mapping and surficial sampling led to ore reserve definition. Chemical and petrographic analyses verified ore variability while technological studies, including particle size classification, attrition and mineral separation, were performed on representative volumetric samples.

The profile of feldspar consumers and suppliers in S and SE Brazilian was elaborated that detected a growing tendency of integration between suppliers and consumers to adequate existing raw materials with the guarantee of product quality and supply.

The field activities were conducted under the facilities, time schedule and budget of a small mining company, Marc Minerais Industriais. Sample preparation and analysis were performed in the laboratories: Sample Preparation Laboratory of the Institute of Geosciences and Technological Characterisation Laboratory of Polytechnic School at the University of São Paulo, supported by the FAPESP - Fundação de Amparo à Pesquisa do Estado de São Paulo.

The homogeneity of feldspar along the ore bodies is remarkable, even with respect to minor contaminants. Due to rock natural differential grain size and its friability caused by weathering, the feldspars can be concentrated by a simple mineral treatment that led to a recovery in weight around 50%.

This type of rock yields a raw material similar in composition to commercial feldspar and feldspatic sand, that is suitable to the manufacture of glass storage vessels and also for ceramic mass, as indicated by specific technological tests carried out.

TSUGAWA, Juliana Keiko

Geologic Risk Charts: A Prevention Tool

Orientadores: Profºs Uriel Duarte, Fernando Campagnoli, José Luis Ridente Junior

Abstract

Interaction between man and environment has resulted in serious damage to nature and, as a consequence, to living populations. Intense degradation of natural resources is a result, among other factors, from inadequate occupation and use of land, when the fragility of soil is not taken into account. geological-geotechnical problems, such as erosion and siltation, are a dramatic consequence of said interaction.

As concerns the physical environment, it has been found that Guavirutuba Basin, a sub-basin of Guarapiranga Basin, located in São Paulo, presents a high degree of susceptibility to erosion, as a result of steep declivities and inadequate occupation and use of land, these being dynamic factors responding for the induction of erosion, sliding, and siltation processes.

This report propounds the use of "risk charts" expressing interactions between the physical environment (types of soil, declivities, geology) and man-made occupations and uses of land, such "risk charts" to be used as urban planning tools in order to identify, minimize and prevent environmental impaction.

This report comprises the following topics: detailed description and characterization of physical environment, map containing geological, topographical, declivity, isohyets, occupations and uses of land, and erosion risk information, morphological description of soils and Dispersion.

GUALDA, Guilherme Augusto Rosa

Chemical Variations in Mafic Minerals and the Evolution of Agpaitic Magmas from the anel Norte Lujavritic-Khibinitic body - Poços de Caldas Alkaline Massif, SE, Brazil

Orientador: Profº. Silvio Roberto Farias Vlach

Resumo

Texture, microstructure and chemical composition of mafic minerals were studied in order to access the crystallization history of agpaitic nepheline syenites from the Anel Norte Lujavritic-Khibinitic Lopolith.

Khibinites (coarse-grained rocks with poikilitic pyroxene, eudialyte and pectolite) form the basal unit; with medium-grained trachytoid rocks as an overlying border facies. Above these, two units of fine-grained foliated nepheline syenites surround the upper coarse-grained lujavrites, strongly foliated rocks presenting poikilitic eudialyte and acicular pyroxene.

Subhedral K-feldspar and nepheline were the first magmatic minerals to crystallize, followed by poikilitic eudialyte, and pyroxene and pectolite (khibinites). Pyroxenes grade from aegirine-augite (Na ~ 0.65 cpf) in the center through aegirine (> 0.90 cpf) at the border of the crystals. Eudialyte is rich in Fe and pectolite compositions change sharply from Mn-rich cores to Ca-rich rims.

Ti-Nb-Sr-Mn-volatile-rich fluids, exsolved from khibinitic magma, led to late- and post-magmatic crystallization of: oscillatory zoned pyroxene overgrowths in khibinites, and oscillatory zoned lamprophyllite and acicular pyroxene (Na ~0,65-0,70 cpf) in lujavrites. These fluids, passing through fractures and intergranular contacts, crystallize also eudialyte richer in Mn, Sr and Nb and pectolite with intermediate Ca and Mn contents.

GUIMARÃES, Valéria

Detection of Cadmium in Ferraliti

Orientador: Profº. Joel Barbujiani Sígolo - GSA - Depto. de Geologia Sedimentar e Ambiental

Resumo

This paper discusses the probable distribution of Cd in four samples of ferralitic soils of central Jamaica. These samples were submitted to analyses in Binocular Glass (BG), Optical Microscope (OM) and Scanning Electron Microscope with Energy Dispersive Spectrum (SEM/EDS).

Porosity, consistency and color of the grains of the analyzed soils were determined in BG. In OM were found the following micromorphologic characteristics: ironstone plasma; limestone plasma; carbonate nodule; iron concretions; manganiferous concretions; aluminous-iron concretions and detrital minerals. The micromorphologic features above mentioned were investigated in SEM/EDS, and presented the following compositions: ironstone plasma: Fe, Al, Si, Ti, P, K, Ca, Mn and Na; limestone plasma: Ca and Si; carbonate nodule: Ca and Si; iron concretions: Fe, Ti, Al, Si, P, Ca, Ba and Cr; manganiferous concretion: Fe, Ca, Al, Mn and Si and aluminous iron concretion: Al, Fe, Si and Ti.

In SEM/EDS analyses corriedont in the Laboratory of Eletronic Microscope of IGC-USP, it was not possible to detect Cd accurately. This can be explained by the type of applied chemical analysis, which did not include a representative area of the analyzed sample. Another factor that contributed to the not detection of the Cd was the calibration of the equipment programed to detect the second line of K and not Cd, probably inserting K in the spectrum while analysing Cd.

PASSOS, Raquel Fernanda

Quaternary Environmental Changes in the Region of Abrolhos, Bahia, Based on Foraminiferal Associations

Orientadores: Thomas R. Fairchild - IGc-USP (GSA - Depto. De Geologia Sedimentar e Ambiental) e Silvia Helena de Mello e Sousa - UFPR

Abstract

This paper presents the results of the study of the topmost 148 cm of a nearly 5 - meter long core recovered form the southern part of the Abrolhos Bank using a gravity corer. This study employed classical techniques of analysis of paleoclimatological variations, utilizing stable oxygen isotopes, micropaleontology and AMS 14C datings.

Information on paleoclimate was obtained by measuring abundances of various taxa of foraminifera: Globigerinoides ruber and Globigerinoides sacculifer as indicators of warm water masses; Angulogerina angulosa and Cassidulina crassa f. typica as well as Globigerina bulloides as indicators of cold water masses; Globorotalia menardii as an indicator of warm climate; and Globorotalia truncatulinoides as an indicator of cool climate. These data are in accordance with the results of isotopic analysis and other studies which have been carried out in this region.

Among the main conclusions of this paper one can emphasize the occurrence of periods of upwelling in the southern part of the Abrolhos Bank generated by lower sea-level, due to glaciations at higher latitudes during the later Pleistocene.

SANTOS, Claudia Nogueira dos

Mineralogical and Micromorphological Study of Apatites from the Tapira Mine (Minas Gerais, Brasil) - Correlation with Ore-processing Operations

Orientadores: Profª. Maria Cristina M. de Toledo & Profº. H. Kahn

Abstract

The main Brazilian phosphatic ores are exploited from lateritic mantles over alkaline-carbonatitic rocks, which have complex mineralogy, high heterogeneity, and low apatite content. Industrial processes for concentration are difficult and expensive, including difficult control of the ore and complex fragmentation and flotation operations. An important portion of phosphate is lost during industrial processes.

Technological characterization of the ore may contributes to higher profits, but such studies are generally carried out separately from more academic mineralogical and micromorphological studies of these lateritic materials. This work attempts to integrate these two different points of view: academic and practical.

The mineralogical, micromorphological and cathodoluminescence aspects were studied on natural ore samples, taken from the open pit, and representing several weathering stages. Samples from the concentration plant (feeding, several intermediate steps, and final concentrates) were also studied for the same aspects.

Several features related to concentration problems were recognized in the natural samples and samples from the concentration plant. It has been possible to recognize apatite varieties mainly concentrated or rejected in industrial processes and relate them to the degree of weathering of the natural material. Optical microscopy, scanning eletron microscopy with chemical evaluation (EDS), cathodoluminescence and microprobe were the most important analytical technics employed.

Results show that primary apatites not weathered are well concentrated; weathered primary apatites and secondary varieties of apatites showed concentration problems, with high losses of phosphate during industrial process. This is due to weathering features (ferruginization and occurence of other supergene products such as coatings and apatite reprecipitation), wich have negative effects to industrial concentration.

Magnetic separation and cathodoluminescence studies were very efficient in characterizing apatite varieties and their behavior in concentration processes.

Cathodoluminescence was very important in the quantification of primary and secondary varieties of apatite. None of the other analytical technics was as efficient in this role.