SYNTHESIS REPORT

FOR PUBLICATION

CONTRACT N°: BRE2-CT94-1555

PROJECT N°: CR-1800-91

TITLE: APPLICATIONS OF RECYCLED PAPER MILLS EFFLUENTS TO WOOD SUBSTITUTIVE PRODUCTS (RESPRO)

PROJECT COORDINATOR: GESTEP, S.L.

PARTNERS:

PROPOSERS
Bazurka, S.L. (BSL)
Reciclajes Celulósicos (RECINORSA)
Fábrica de papel de Azenha
Euop, Ltd.
Patricio Elorza
Revespan

RTD PERFORMERS
Gestep, S.L.
Kvaerner Eureka, a.s.
Est. Ingeniería Papelera
Cidemco

STARTING DATE: /5''-1-95

DURATION: 20 MONTHS

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DATE: 16/9/96

APPLICATIONS OF RECYCLED PAPER MILLS EFFLUENTS TO WOOD SUBSTITUTIVE PRODUCTS (RESPRO)

Proposal number: CR-1800-91

Contract number: BRE2-CT94-1 **555**

Duration: 20 months, from January 1995 to **August 1996**

Partnership:

- Bazurka, S.L. (E)
- Reciclajes Celulósicos, **S. L.,** RECINORSA, (P)
- Fabrica de **Papel de** Azenha (P)
- Euop, **Ltd. (P)**
- Patricio Elorza, S.A.
- **Revespan**
- Gestep, S.L.
- Kværner **Eureka as.** (N)
- **Est.** Ingeniería Papelera (E)
- CIDEMCO **(E)**

Technology:

Paper, board and wood technologies.

Drying technology

Objectives:

Upgrading, recycling and reuse of pulp and paper mill **sludges in the** paper, board **and wood industrial sectors**

Conclusion:

Results obtained at a laboratory level clearly shown that, **at ieast,** an **8 %** of the **European production of pulp and paper mill sludges, those with a high** fibre content, **can be reuse in the paper industry and/or board industry** to **produce products** where **the final appearance is** not **critical. Mechanical pulp mill sludges can** be **reuse in** the **wood industry.**

Keywords: Paper, Board, Wastes, Sludge, Medium **Density** Fibreboard, Drying **systems, reuse, recycling**

Applications/exploitation:

Results increase the amount of raw materials available to some paper and board enterprises. In order to exploit results, laboratory trials must be scale to an industrial level. Paper and board industry must solve first problems observed in machine runnability, build up of suspended solids, suspended particulate materials, microbial deposits, build up of dissolved solids and sheet properties. These problems have been previously solved in the paper and board industry during the optimization of old paper reuse.

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Technical description:

Pulp and paper mills use primary sedimentation clarifiers to remove suspended solids that are dewatered into a sludge that requires disposal. The primary way of disposal for this type of sludge has been land application and landfilling With landfill space becoming increasingly scarce, some **sludges are being burned** or incinerated to reduce the volume and to recover part of the energy. The most widely research area of nonconventional management alternatives has been the use of various solid wastes as feedstock in the manufacture of building materials such as cement, bricks, ceramics, and concrete.

There have been attempts to reduce sludge volume by reclaiming the fibre and/or filler in sludge to be reused within pulp and papermaking and in hardboard production. The equipment used to separate fibre or filler from sludge may be as conventional as screens and cleaners or more elaborate such as wet air oxidation. Some systems utilize sludges from the primary clarification of wastewaters which contain higher amounts of fibre. The most common technique for reclaiming fibre is to recycle primary sludge back into the fibre processing system of the mill. Effluents from paper machines, bleach plants, and various cleaning and screening operations are targets for fibre reclamation.

The reuse of sludges in pulp and papermaking processes is not always possible since sludge can decrease the quality of the final product. in an attempt to increase sludge management alternatives, we study the feasibility of reuse sludges in wood and paper industrial sectors where the sludge does not modify the quality of the final product. At the same time, the feasibility of other sludge management alternatives (construction, concrete, etc.) has been consider.

We have sampled 24 European pulp and/or paper mill sludges to study some physical and chemical properties as humidity, ash content, abrasivity, drainability and O_2 uptake. Sludges were fractionated to estimate fibre quality, content and length. A

group **of sludges, showing low-ash and** high-fibre contents, were selected to it reused **in the paper,** board and wood industries. Paper tests (calliper, breaking length, tear index, elongation, bursting strength, stiffness, opacity, whiteness and porosity}, board tests (ring crush test, concora medium test, corrugated crush test) and Medium Density Fibreboard Tests (bending strength, machinability test and formaldehyde emission) were carried out. Results indicated that primary sludges from chemical pulp mills can be used in the paper and board products were the appearance is not critical. Primary sludges from mechanical pulp mills can be used as a part or total component of Medium Density Fibreboards. Drying and dewatering systems were studied to upgrade the waste for further applications.

Results and conclusions:

Results indicated that primary sludges from chemical pulp mills can be used in the paper and board products were the appearance is not critical. Primary sludges from mechanical pulp mills can be used as a part or total component of Medium Density Fibreboards. After the drying study, a special prototype was designed and constructed to dry sludges.

Results on reuse of sludges in medium density fibreboard will be developed and exploited by Revespan (E) and Euop (P). Reutilization of sludges in the paper sector will be developed and exploted by Bazurka (E), Patricio Elorza (E), Euop (P) and Fabrica de Papel da Azenha (P), whereas applications in board will be developed and exploited by Bazurka (E), REPROCEL (E) and Euop (P}. Know-how acquired about other applications of pulp and paper mill sludges (i.e. hydraulic barriers, concrete, etc.) will be developed and exploited by Bazurka (P) and Gestep (E). Development and exploitation of the new drying system will be carried out by Kværner Eureka a.s. (N).