Environmental Classification: This is a category III project according to the IIC's environmental review procedure because specific impacts may result which can be avoided or mitigated by adhering to generally recognized performance standards, guidelines and design criteria. The principal environmental and social issues related to this project include: liquid effluent and solid waste management, air emissions, fire safety, and worker health and safety.

Environmental Issues:
Environmental Compliance: Fanapel's plant in Juan Lacaze, Uruguay and CASA's plant in Rosario, Argentina are in compliance with local environmental regulations and guidelines, and both are implementing actions that go beyond local requirements. Environmental audits of both plants were conducted in May 2003 in order to determine whether they are in compliance with World Bank (WB) environmental standards. As a result of these audits, Fanapel and CASA have developed Environmental Action Plans in order to bring them into compliance with World Bank environmental requirements. During the site visit conducted by IIC in May 2004, it was observed that the companies are in compliance with the Environmental Action Plans and have achieved the milestones to date.

These environmental investments will not only have environmental benefits, but most will increase the efficiency of the plants, increasing production and reducing costs associated with energy, water consumption and chemicals, which translate into medium- and long-term savings.

Environmental Investments at Fanapel:

The environmental related investments at Fanapel's plant in Juan Lacaze are summarized in the table below.

Environmental Investments Impact Cost Digester project

- Reduces odor and dust emissions
- Reduces energy use
- Reduces waste generation
- Increases production/efficiency

$1,800,000 Washing Process

- Improves wastewater quality since essential for elimination of elementary chlorine
- Increases recycling of chemicals

$850,000 Extended delignification and elimination of use of elementary chlorine

- Improves wastewater quality
- Increases energy efficiency related to use of recovered organic waste to be burned in recovery boiler

$1,650,000 Evaporation retrofit

- Odor and dust emissions reduced due to stripper installation
- Improves wastewater quality

$2,200,000 Lime Kiln

- Reduces waste lime sludge since lime recycled
- Reduces air emissions

$1,700,000 Submarine wastewater discharge pipe

- Reduces impact on receiving water body

$415,000 Total **$8,615,000** A detailed description of the environmental improvements at Fanapel is included below:

i) Digester Project - This involves breaking the reaction process where the wood chips are mixed with the chemicals into two phases rather than one phase with very high temperature and pressure. The use of lower temperatures and pressure allows for a higher percentage of pulp to be recovered from the input (wood chips and chemicals), reduces odor (since the cold blow will capture the sulphur), reduces energy consumption, and reduces waste generation.

ii) Washing Project - The residual spent cooking liquor from chemical pulping is obtained from washing. This project will increase the efficiency of washing by installing larger filters, installation of a wash press and pressure washer. Efficient cleaning of the pulp is essential for hydrogen peroxide to be used in the bleaching sequence (replacing elementary chlorine), since the use of hydrogen peroxide requires that the pulp be very clean. Efficient washing is also critical to maximize the return of cooking liquor to the chemical recovery and to minimize carry over of cooking liquor into the bleach plant, because excess cooking liquor increases consumption of bleaching chemicals (since dissolved organic compounds - lignin) in liquor will react with bleaching chemicals and thus increase bleach chemical consumption.

iii) Elimination of Elementary Chlorine for Bleaching - This involves the substitution with hydrogen peroxide and other chemicals. Extended delignification will also be implemented in order to further reduce the lignin content of the pulp before it moves to the bleach plant. (Because the amount of bleaching chemicals required to achieve a certain paper brightness is proportional to the amount of lignin remaining in the pulp after the pulping process, extended delignification can reduce the amounts of bleaching chemicals needed.) In this case oxygen delignification is used, which involves the addition of an oxygen reactor before the kraft pulping stages and bleach plant.

iv) Evaporation Retrofit - This involves the installation of a stripper that will clean the contaminated condensate, thereby improving the wastewater quality. The evaporation will also occur in six stages rather than five, which will result in less steam consumption and less CO2 emissions.

v) Lime Kiln - The lime sludge, which is removed from the white liquor will be burned in the new kiln to regenerate lime to be used in the lime mixing step. This will resolve the problem of where and how to dispose of the lime sludge, and will result in savings given that the lime can be reused in the recausticizating process, where smelt (inorganic process chemicals) is mixed with "weak"(green) liquor and contaminant solids (dregs) are removed from the green liquor and mixed with lime (from the lime kiln) to produce white liquor (the chemicals used in the pulp cooking process)

Wastewater: Considerable investments are being made to improve the quality of the wastewater discharge at Fanapel's plant in Juan Lacaze and Celulosa Argentina's plant in Rosario. Currently wastewater discharge does not meet IIC's environmental requirements for discharge to surface waters. However, significant investments are currently being made to ensure compliance in the short term. Both paper mills currently use elementary chlorine for bleaching of pulp, which poses a problem due to the elevated levels of AOX, dioxins and furan byproducts generated in the process. In order to mitigate this problem both plants are implementing a series of actions including the substitution of elementary chlorine with an alternative, more environmentally friendly bleaching sequence. At Juan Lacaze a stripper machine will be purchased to strip the effluent of contaminated condensates. In addition, the use of an alternative bleaching sequence will allow effective counter current washing, since the use of hydrogen peroxide and oxygen requires less water to be

consumed. A submarine outfall that extends further away from the shoreline (900 m in length) and 4.5 m deep will be installed to allow for increased dilution of liquid waste.

Solid Waste: At the Fanapel plant, the calcium carbonate sludge, which was being disposed of at an off-site waste disposal area will now be burned in a kiln in order to recycle it into the process as a raw material (lime). At CASA's plant there is currently a lime kiln, and waste wood from logs being debarked is sold to a brick mill to be used as fuel. All scrap metal as a result of rebuilding/closing some areas of CASA's mills is sold outside. Waste oils are burned in the boiler with fuel. At both Fanapel and CASA's plants a program to collect quantitative information on the solid waste generated is underway, which will allow them to further develop a solid waste management plan.

Air Emissions: The air emissions from dust and nitrogen oxide at Fanapel and CASA's plants currently exceed the World Bank guidelines, however significant investments are being made to control air emissions and ensure compliance with World Bank standards. At Fanapel and CASA's plant the main sources of air emission include the pulp cooking area, which release odorous sulphur compounds; the boilers, which release nitrogen oxides; the recovery boiler that is a major source of dust emissions; and the lime kiln that releases odorous gases. The present digester and blow tanks do not have emission control systems. However, the recovery boiler recently had a more efficient electrostatic precipitator (ESP) put in place, which has significantly reduced to acceptable levels the dust emissions. An electrostatic precipitator to control air emissions has recently been purchased and will be installed shortly in the lime kiln at CASA.

Fire Safety/Spill Control: The plants are equipped with a network of fire hydrants, extinguishers and alarm systems.

Occupational Health and Safety: Workers are provided with the appropriate personal protective equipment (PPE), health insurance, and training on safety and the use of PPE. Noise levels, indoor air quality in certain areas, and the health of workers (i.e. hearing) are monitored. The plants also have emergency response plans for fires and chlorine gas releases. *Labor*: Fanapel and CASA both have a policy that persons under 18 years of age are not permitted to work. Workers at both plants are unionized and have signed collective work agreements with the companies.

Monitoring and Annual Reporting: A monitoring program has been implemented as part of the Environmental Action Plans (EAP) prepared for Fanapel and CASA. The company will be required to submit on a quarterly basis a report indicating the status of the implementation of the EAP. Subsequent to the completion of the EAP, the IIC will request annual reports summarizing the monitoring data related to wastewater discharge, solid waste disposal, air emissions, fire safety, occupational health and safety, accident reports, and labor related issues.