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PUSRI's STRATEGY TO MEET INDONESIAN ENVIRONMENT STANDARDS

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RESUME

PT PUPUK SRIWIDJAJA (PUSRI), société d'état, premier producteur d'engrais en Indonésie qui dispose de quatre unités d'ammoniac-urée s'occupe activement des problèmes d'environnement et de pollution. La préoccupation de la direction de PUSRI pour la protection de l'environnement s'est traduite dans des efforts qui visent à adopter une approche systématique dans la gestion globale de l'environnement, y compris une approche technologique, une approche institutionnelle et une approche sociale.

Le choix de la technologie s'oriente vers la diminution des déchets par l'emploi d'une technologie de procédé de production plus propre, une technologie de recyclage et une technologie de mise en valeur des déchets qui ne sont pas seulement inévitables mais également nécessaires. Pusri-IB, nouvelle unité d'ammoniac-urée de PUSRI, a adopté une nouvelle technologie de procédé plus efficace par rapport aux trois autres unités construites auparavant dans les années 1970 (Pusri-II, Pusri-III et Pusri-IV). La consommation d'énergie de Pusri-IB est inférieure de 30 % à celle de Pusri-IV. La technologie la plus récente de contrôle de la pollution choisie au stade de conception a été l'installation d'un laveur-hydrolyseur dans l'unité d'urée. Cet équipement, en dehors de la conservation de l'eau, récupère aussi de l'ammoniac et de l'urée des effluents, qui autrement se trouveraient perdus par le rejet d'eau résiduaire de l'unité.

Cet exposé examinera avec soin l'effort de Pusri pour réduire les polluants partout où c'est possible dans l'unité existante pour assurer un impact minimum sur l'environnement ainsi que le projet Effluent Treatment Improvement de Pusri (PET) qui a été entrepris pour améliorer la qualité des effluents afin d'obtenir une récupération maximum de produits valables comme l'ammoniac et l'urée à partir des trois anciennes unités.



I. INTRODUCTION

PT Pupuk Sriwidjaja (PUSRI) was established by the Government of the Republic of Indonesia on December 24, 1959. The commissioning of the first Pusri fertilizer plant at Palembang city, South Sumatera in 1963 was a significant step towards Indonesia's self reliance in fertilizers.

Starting from a small plant with a capacity of 100,000 metric tons urea per year, PUSRI has since then expanded and within approximately 14 years another three (3) urea plants had been built, i.e. PUSRI II, PUSRI III and PUSRI IV respectively, with a total capacity of 1.52 million metric tons of urea per year.

In 1993, after 30 years of operation the first plant (PUSRI I) was closed down and at the same time the new ammonia-urea plant, namely PUSRI IB was commissioned to increase further the capacity of PUSRI to 2.28 million metric tons of urea per year.

Pusri-IB plant adopted the new production process technology which is more efficient compared with the other three plants built before 1980. Energy consumption is designed at approximately 30% lower than Pusri-IV. The latest technology for pollution control was also adopted during the design stage such as installation of hydrolyzer-stripper in urea plant. The hydrolyzer-stripper unit, in addition to conserving water also recovers ammonia and urea from the effluent. This equipment was not incorporated in the previous plants, which causes ammoniacal nitrogen concentration in liquid effluent of the old plants to be very much higher than the latest plant.

With regard to environmental protection, Pusri have implemented a number of measures to improve the effluent quality and environment. Pusri effluent treatment improvement project or PET project has been undertaken with the goal to improve effluent quality of the three old plants to achieve the set effluent standards and to enhance maximum recovery of valuable products such as ammonia and urea from the effluents.

II. ENVIRONMENT ACT AND REGULATIONS IN INDONESIA

Environment is a global concern and its protection is one of the challenging tasks facing the mankind today. Utilization of resources has environment implications. Consequently, in an effort to regulate the use of resources and control pollution, a series of legislations were enacted by the Government. Laying down standards for various pollutants formed the critical aspect of these legislations.

The concern of the industry for the protection of environment was translated into reality with pollution control and waste minimization through use of cleaner production process technology, recycle technology and waste utilization technology which are not only inevitable but also necessary. Pollution control and waste minimization are not only a matter of technology, but involve sound management practices as well, like planning, organization, innovative attitude, good housekeeping, etc.

Indonesia enacted the Environmental Management Act No. 4 of 1982, and the Government Regulation No.29 of 1986 on Environmental Impact Analysis (EIA) as a fundamental effort to continue development with environmental outlook. EIA systems (including plans for environmental management and environmental monitoring) in general were, considering the responsibility of development agencies and their proponents, to predict the impact of any activity in development that may seriously affect the quality of the environmental supporting systems.

At the central level various departments and non-department institutions and at the provincial levels EIA commissions to evaluate EIA studies of various project proposals as a basis for the decision makers to issue permits for development projects.

There are many regulations and decrees related to environmental management and EIA systems in Indonesia. Some of these are standards or criteria of environmental quality such as the criteria of water (stream standards and effluent standards), criteria of air (ambient and emission standards), and criteria of sea water. The water quality, effluent, ambient and emission standards in Indonesia are stipulated by the Government Regulation No. 20 of 1990 and the Ministerial Decree (of the Minister of State for Population and Environment No. Kep-02/MENKLH/1/1988). The threshold level and maximum load of pollutants of 14 on-going industries including urea fertilizer industry are to comply with the Decree No. Kep-03/MENKLH/2/1991.

The objective of environmental management is to achieve national development in its totality through harmonious relations between man and the environment. The act also stipulates that the Government has the obligation to cultivate and develop the public's awareness and responsibility in the management of the environment by means of information, guidance, education, and research in the field of the environment.

Effluent standards for fertilizer industry

In the Ministerial Decree No. Kep-03/MNKLH/2/1991 on February 1, 1991, standards have been laid down for discharge of pollutants from urea (nitrogenous) fertilizer industry. The threshold level and maximum load of pollutants are as follows :

Parameter	Concentration (mg/l)	Max. load (kg/ton product)
pH	6 - 9	-
N-NH ₃	50	0.75
BOD ₅	100	1.50
COD	250	3.75
TSS	100	1.50
Oil and grease	25	0.375

III. STRATEGY FOR IMPROVING THE EFFLUENT QUALITY TO ACHIEVE THE SET STANDARD

Pusri as a fertilizer industry, is very much aware of the environmental issues and pollution problems, and the management of PT PUSRI has adopted a systematic approach towards total environmental management. This comprises of technological, institutional and socio-economic approaches as well.

Technological approach

Environmental control measures were incorporated during design stage was adopted by PT Pusri; including selection of production process technology which has a high efficiency with a minimum effluent, environmental assessment studies, etc.

Improvement of environmental control for the existing plants and industrial complex was carried out through process modifications and installation of additional equipment incorporating "best practicable technology". Besides, "4R" principle in pollution abatement of a chemical plant is also applied, i.e. reduce, recovery, recycle and reuse.

These improvement efforts on environmental control include among other things:

- pollution abatement at source
- maximized recycle process
- recovery of valuable product
- waste utilization
- adequate waste water treatment
- safe disposal of waste

Adequate measures and treatment systems to remove/reduce the pollutants wherever possible to ensure minimum impact on the environment are as follows:

PGRU: Purge Gas Recovery Unit was installed in 1982 to recover ammonia and hydrogen coming from the three ammonia plants of Pusri-II, III and IV. Recovered ammonia from cryogenic system is recycled back to the product stream. The hydrogen gas recovered from the system is led to the synthesis gas compressor 2nd stage section. Tail gas containing methane, argon are fired as fuel in primary reformer. Since the PGRU operation, 150 ton/day ammonia was recovered as additional product which otherwise would have been discharged from the plants.

Condensate stripper: Process condensate from ammonia plant front end separator and CO₂ (carbon dioxide) removal system overhead condenser separator is collected and stripped using low pressure steam, at atmospheric pressure in a process condensate stripper to obtain the condensate with less than 5 ppm ammonia which can be sent to water demineralization unit as a feeder.

Boiler blowdown: There are two blowdown vessels for waste heat boiler i.e: intermittent blowdown and continuous blowdown. Water from both these is returned to cooling tower basin as a make up water.

Cooling water system: Chromate based cooling water treatment system is one of the most proven and cheapest treatment technology. In order to avoid blowdown hazard, a non chromate cooling water treatment has been incorporated. Treatment chemicals are biodegradable and the blowdown does not need any special treatment.

Demineralization plant: In order to minimize the regenerated wastes from Demin plant, the last 10 minutes alkali regenerant of anion resin regeneration is collected and sent to water treatment plant.

Jacket water cooling: Hot water overflow from jackets in ammonia plant is pumped to the crystallization cooling tower in urea plant as a make up water.

Oily water and oil separator: Oil contaminated water from pumps and compressor are collected in closed pipes and sent to oily water pit, where the belt oil separator is located. Belt oil separator removes the oil effectively. Oil is collected in the drums and is sold.

A significant reduction in pollution load and water consumption has also been achieved by several modifications and reuse in plants operations. All measures taken have contributed towards reduction in concentration and load of BOD₅, COD, TSS and oil in the effluent to below the national standards, except for the ammonia concentration and load in effluent which are still higher compared to the set standards.

PUSRI effluent treatment improvement (PET) project

As a commitment of the management to make continuous efforts at improving the environment quality, PET project has been undertaken to improve effluent quality and enhance maximum recovery of valuable products such as ammonia and urea from the three old plants (Pusri-II, III and IV). The project is planned to be commissioned by the end of 1994 and costs around US\$ 13.00 million, funded by PUSRI equity and loan from the World Bank.

Modification and additional equipment in the PET project include:

- Installation of two package units of hydrolyzer-stripper, to recover ammonia and urea from effluent as additional products
- Installation of three additional CPI oil separators, designed to remove oil effectively to an extent of 5 ppm. Clear water is planned to be collected in the collecting pit and sent to hydrolyzer-stripper as a feed
- Modification of the existing equalization pond to be biological wastewater treatment unit.
- Installation of sludge removal facility
- Pump seal improvement program, to minimize leakage of water containing urea and ammonia

After commissioning of the project, it is expected that the ammonia and all other parameters in the effluent will be kept below the national standards.

Monitoring

Every effort is made to monitor and control discharges at each point of the plant to improve the quality of final effluent and emission. Monitoring of ambient air quality and stream quality are also done by PUSRI. These are 10 locations in north southward direction of the plant for regular monitoring of pollutants, sulfur dioxide (SO₂), oxides of nitrogen (NO_x), ammonia (NH₃), suspended particulate matter (SPM) and carbon monoxide (CO).

Institutional approach

For effective environment management, **Environment Division** has been established in PUSRI as one of the management systems. Its main function is to control and monitor environmental quality with regard to plants and company activities including the geobiophysic-chemical aspects and socio-economic and cultural aspect as well.

Socio-economic and cultural approach

In complement with the mission of clean environment, Pusri has carried out development programs for various small scale and home industries. The aim of the program which is carried out through a mechanism called "Program Bapak Angkat" (foster parent) is to promote competitiveness of small business' added value of products, and to develop employment opportunity. There are many other activities carried out by Pusri to promote community development and to foster closer relations with the community such as training courses for younger generation, health services, sports, etc.

PUSRI is aware of its social responsibility and hence green area promotion and tree plantation is a continuous process. A large green belt surrounding the plant complex is planned to be developed by clearing of about 14 hectares from the community. The entire area will be planted with different species of plants. This green area will serve to attenuate any emissions from the factory and, segregate the factory complex from surrounding community.

In conclusion, it can be said that all measures taken at PUSRI, Palembang have contributed towards protection of environment. PUSRI considers environment preservation as its moral duty and is committed to preserve the environment inside and outside the factory.