UNITED NATIONS

ECONOMIC AND SOCIAL COUNCIL

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UNITED NATIONS CHILDREN'S FUND

Programme Committee

Recommendation of the Executive Director for an Apportionment
YUGOSLAVIA
Penicillin Production Plant

1. The Administration recommends an apportionment to Yugoslavia of $100,000 for supplementary equipment to permit an increase in production of the UNICEF-aided penicillin production plant from its present capacity of 1200 billion units of crystalline penicillin per year to 3000 billion units, an amount which would provide for the most essential national health requirements and ensure the 1,600 billion units required annually for free distribution to children and mothers. Government matching in relation to the expanded production recommended in this paper would amount to an additional capital investment of $338,000. In addition the estimated dollar value of the penicillin to be distributed free to children and mothers each year is $200,000, which during the five years of plant operation during the plan of operations would amount to $1,000,000.

2. An earlier request for aid in the development of this plant was acted on by the Executive Board in May 1951. The Board report states, inter alia:

> " In 1946 Yugoslavia received from UNRRA a small penicillin production plant, an experimental model, with a stated capacity of producing 50 billion units of penicillin per month. A survey by Dr. Macpherson, WHO consultant, in December 1950, concluded that this plant if expanded and modernized could produce a minimum of 360 billion units of crystalline penicillin per year. While Yugoslavia will eventually need a plant of larger capacity because of the development of the health services and the size of the population, a smaller plant can be operated to produce a significant amount of penicillin if additional equipment were made available. The plant can also be used to train personnel meanwhile as a pre-condition to the eventual provision of a plant of more adequate size. With the additional equipment recommended by Dr. Macpherson at a cost of $90,000 (E/ICEF/R.164, Annex 2) the cost of production should not exceed the current wholesale prices in international markets."
> (E/ICEF/178, Rev.1, para. 25)

/UNICEF expenditure

UNICEF expenditure under the allocation has been $92,400 and capital expenditure by the Government has totaled the equivalent of $537,000 up to the end of 1954.

3. While technical developments made this equipment capable of producing 1,200 billion units of penicillin annually instead of the 360 billion foreseen in 1951, the provision of additional capacity, foreseen in 1951 as a second step (though the Board took no commitment to contribute to it), is still necessary to provide for the basic health needs of the country. In all countries with developing health services, the consumption increases rapidly. In Yugoslavia 600 billion units of penicillin were consumed in 1950, and by 1954 this had increased to 3,100 billion units. The Government is now requesting assistance to expand the plant capacity to 3,000 billion units. By the time the expanded capacity comes into production early in 1957, the country's consumption can be expected to be considerably higher again, but local production would provide for basic health services. The 3,000 billion units would represent 25 per cent of North American consumption per doctor, and 10 per cent of North American consumption per head of population.

4. The factory is government-operated through the pharmaceutical production authority "Galenika". The Government will operate the plant to capacity, and the penicillin will be used exclusively for health purposes.

Development of the Present Plant

5. In 1951 the Board approved an allocation to Yugoslavia for the provision of supplies and equipment to re-organize and expand a small plant for the production of penicillin (E/ICEF/178, Rev.1, paras. 94-98). The plant was given to Yugoslavia by UNRRA in 1947 and started production on an experimental basis at the end of 1948. As the plant was incomplete and did not incorporate up-to-date features its capacity was understandably very low and the penicillin produced was of poor quality. Moreover, the national personnel in charge of the plant were handicapped in their work in that they had no contact with other technical people in the same field.

./6. In December 1950,

6. In December 1950, a WHO expert (later transferred to United Nations TAA) visited the plant and surveyed the situation with particular reference to modernizing the installation and recommending improvements in methods of production. It was established then that such improvements could be achieved through the provision of certain items of equipment, of expert personnel to supervise the installation of the new equipment and guide and train national personnel, and through the award of fellowships for training Yugoslav technicians.

7. Following this visit, UNICEF was requested to assist in providing the necessary equipment, and it was to this end that the Board authorized an allocation in 1951. Specifications for equipment were then worked out and, while procurement was underway, plans were made for the redesigning of the plant layout. By 1953, Yugoslav personnel had been trained, and it was possible to proceed with installation of the new equipment and the training of the local staff under the guidance of a United Nations TAA expert. A full description of the proposed expansion of the plant and a discussion of the technical process followed is contained in document E/ICEF/R.164.

8. The Plan of Operations, concluded in June 1953, between UNICEF, WHO and Yugoslavia envisaged the annual capacity of this remodelled plant as 360 billion units of crystalline penicillin. A year later, in June 1954, the United Nations TAA expert reported to UNICEF that from a technological viewpoint the Yugoslav factory was coming along in a most satisfactory way. In a short fermentation cycle, using a low cost medium, production figures were comparable with the best anywhere. The new medium introduced gave an easily extractable penicillin broth. This meant higher percentage yields in addition to the higher number of units of penicillin. All this meant that, technologically and from the qualitative point of view, the Yugoslav project was well up to the best expectations.

/9. At that time

9. At that time there were many problems ahead from the point of view of the quantitative production. The greatest difficulty was to install into the plant personnel an appreciation of the tempo necessary to bring the routine production up to a high level. The equipment was satisfactory; the process could produce efficiently; but plant organization was required. Measures introduced to overcome the limited production were so effective that soon production reached 60 billion units per month. An estimate of a figure possibly twice that much was then given on the basis of harvesting the maximum possible number of fermenter tankfuls.

10. The plant is now manufacturing comfortably 720 billion units and, with experienced and efficient scheduling, is capable of increasing its output up to 1200 billion units. This advance was made in the face of constant handicaps such as the lack of experience, shortage of materials(e.g. pipes and fittings), high cost of importation of essential supplies, intermittent shortage of electricity and time lost in strengthening and completing existing units.

Expenditure involved

11. The expenditure incurred by the Yugoslav authorities in the period 1951-54 in achieving this output involved the following:

	Dinars
a) Adaptation to existing building(the building itself is valued at 18 million dinars)	4,941,000
b) Machinery, overhauls and repairs	127,000,000
c) Lesser supplies (laboratory, furniture)	5,000,000
d) Installation and transport costs	23,329,000
e) Allowances for international experts	806,000
	161,076,000
	(Equivalent to $537,000)

/Use of Penicillin

Use of Penicillin

12. In 1954, over $270,000 was spent on importing penicillin crystals, which were processed into clinical preparations to complement the plant's own output. This allowed the factory to distribute 3,100 billion units. All penicillin is distributed directly to the Republics' pharmaceutical warehouses. These in turn issue it to the health institutions, public health and MCW centres, social insurance institutions, dispensaries, and pharmacies. The penicillin is itself administered to patients in institutions or dispensed by the pharmacy on the basis of a doctor's prescription. All persons entitled to free medical care for economic reasons, or who are afflicted with an infectious disease treatable with penicillin, and all those covered by social insurance (45% of the population) receive penicillin free. These categories constitute four fifths of the persons needing it. All children up to three years old (whether their parents are covered by social insurance or not) are automatically insured and thus receive the product free. In the course of a recent 2,000 kilometre visit to health centres in four Republics, a UNICEF representative saw that penicillin distributed by the plant was in wide use at all MCW key points visited.

UNICEF Commitment

13. In view of the fact that the Government has already purchased four supplementary fermenters from abroad which would allow sufficient fermentation to produce the 3,000 billion units, UNICEF's contribution is requested in the form of complementary equipment to allow these fermenters to be put into use, including equipment for filling and packaging, items which were not included in the original allocation. The equipment is listed in Annex I. The total estimated cost of equipment is $92,000 which includes $10,300 for contingencies. Adding $8,000 for freight, the total UNICEF commitment would be $100,000.

Government matching

14. The matching commitment by the Government insofar as this expansion is concerned includes:

	Dinars
a) Fermenters purchased abroad (equiv. of $4,800) plus freight	1,600,000
b) Building modifications, purchase of two 15,000 litre tanks and fittings of Yugoslav manufacture, increased working capital and related expenses	50,000,000
c) Investment by plant for increasing boiler capacity	50,000,000
	101,600,000

The total capital investment would thus be equivalent to approximately $338,000.

Approval and participation of UNTAA

15. The project has the technical approval of the U.N. TAA Industrial Development Section. The use of technical assistance funds by countries now depends on the priority ratings for proposed projects by the governments concerned. Subject to formal confirmation still awaited from the Government, TAA has made the necessary budgetary provision for a technologist for a period not exceeding six months to supervise the final erection of equipment and initial operation.

Annex I - List of Equipment

		U.S. $
1.	1 extractor, capacity 35-4000 litres per hour.	$ 25,000
2.	2 tanks with conical bottom with agitators and buffles, stainless steel, volume 3000 litres each for rich amyl-acetate extract.	3,000
3.	1 basket centrifuge for centrifugation of crystalline penicillin.	6,600
4.	2 vacuum ovens from 1m.^{3} with automatic thermo-regulator from 40-110°C with electrical heating, with 1 vacuum pump giving 3 mm. vacuum and the capacity for these 2 ovens.	5,000
5.	1 air-compressor for 25 m.^{3}/min. up to 3 atm. pressure with automatic regulation.	15,000
6.	1 microniser for final penicillin.	6,000
7.	4 rotameters to measure air flow - capacity from 5 to 10 m.^{3}/min. Spare glass tubes for above rotameters, 4 pcs.	1,600
8.	1 twin shell dry blender with direct drive, for a capacity up to 1 foot^3 made from stainless steel.	2,000
9.	1 stainless steel mixer for washing penicillin's crystals, for a capacity of 25 litres.	600
10.	Stainless steel tubings, elbow tees, unions, bushings, valve resistance to diluted sulfuric acid for extraction department.	3,000
11.	4 temperature recorders for new fermentors	2,000
12.	1 automatic weighing and filling machine for powdered substances with the capacity of 50 - 60 vials per minute.	10,000
13.	1 rubber stoppers washing machine	300
14.	1 labelling machine with the capacity of 3500-4000 labels per hour.	1,600
15.	Contingencies	10,300
Total for supplies and equipment		$ 92,000
	Freight	8,000
	Total UNICEF Commitment	$100,000