Letter from the USSR

by Alex Yelshin

Filtration in the USSR — the Companies and the Technology

Our correspondent reports on the Soviet filtration market. He describes the types of equipment produced by specific manufacturers in the USSR and discusses the role played by Western firms and the need for collaboration between Soviet researchers, manufacturers and consumers of filtration equipment.

During 1990 the Industrial Association *Progress* (Berdichev, Ukraine) began manufacturing new types of membrane equipment which were designed by Niichimmash based in Moscow. These are are presented below:

Disc membrane filters M142 and M293 for microfiltration in the medical, biochemical, chemical and food industries.

technical features	M142	M293
Productivity (l/h) — water for membrane with pore size of 0.2 μm and filtration pressure of 0.15 MPa	30	200
Filtration area (m^2)	0.01	0.05
Membrane diameter (mm)	142	293
Working pressure (MPa)	0.5	0.5
Working temperature (°C)	2 — 50	2 — 50
Sterilisation temperature (°C)	120 — 125	120 — 125
Mass of filter (kg)	4.5	15

Membrane cartridge filters — MPGS and associated units — MPS.

The MPGS membrane filter is used for sterilisation filtration and is equipped with pleated cartridges and a vertical housing. Connecting pipes for liquid inlet and filtrate outlet are located on the bottom of the housing and the filter is supplied with manometer, safety and air valves.

Technical features of MPGS filters:

- ☐ cartridges number - 1, 3 or 7;
- ☐ filtration area - 0.4, 1.2 or 2.8 m^2;
- ☐ productivity - 350, 1 000, 5 000 l/h;
- ☐ working pressure - 0.6 MPa for all types;
- ☐ working temp.: 2 — 50°C;
- ☐ sterilisation temp.: 120-125°C;
- ☐ mass of filter - 5, 22 or 29 kg.

The MPS filter unit consists of two MPGS filters with 3 or 7 cartridges in each. The cartridge filter elements are manufactured by companies such as Millipore, Pall and Gelman, though similar home-produced elements can be also used in the filter units. The following equipment for membrane separation is also designed by and available from Niichimmash:

The *cross-flow microfiltration unit* MK-3-6-V-01 for the purification of waste water from galvanisation plants as well as other liquids.

The microfiltration unit consists of multichannel ceramic membrane filter elements that can be backwashed using the filtrate under manual or automatic control.

The initial productivity when applied to waste water at a filtration pressure of 0.15 MPa is 2.5 $m^3/(m^2h)$. Other specifications include: a filtration area of 3 m^2; a working pressure of 1 MPa; a mass of 660 kg and overall dimensions of 1 600 × 800 × 1 815 mm. Units of similar design with a filtration area of 5, 10 or 20 m^2 can be also manufactured should users require them.

The *membrane unit (holder type)* is manufactured in a horizontal (UFK5-10K-02) or vertical (UFK-10K-01) configuration. The unit can be used for the purification and concentration of biologically active or solutions possessing similar characteristics.

The membrane unit is placed on a movable basis. Besides the ultrafiltration module, the primary purification unit, tanks for the primary solution and permeate, the pump and control system can be incorporated into the membrane unit. With a working pressure of up to 1 MPa and a working temperature of 4 — 50°C, the productivity is said to be not less than 10 — 100 l/h.

The unit is supplied with membrane holders manufactured by firms such as Sartorius and Millipore and home-produced membranes are available for the unit.

A dynamic type membrane unit comprising membrane modules with a stirrer and applicable to the separation, purification and concentration of homogeneous liquids has been designed. The membrane unit uses either microfiltration or ultrafiltration elements and consist of pumps, a primary separation module and control system.

Either a horizontal or vertical type membrane module set with a filtration area up to 10 m^2 can be used. Productivity ranges from 100 — 500 l/h for a working pressure 0.6 MPa and a temperature 10 — 30°C.

It is supplied with home-produced membranes manufactured by Vladipore and the microfiltration and ultrafiltration units are available separately.

The Scientific Industrial Association *Penzamash* (Penza) has designed two models of multiprocess apparatus: the reactor-filter and reactor-filter-dryer.

The multiprocess apparatus is similar in construction and operation to the nutsche multiprocess Rosenmund filter or the Sparkler nutsche WD filter. Production of the equipment is planned for 1992-1993.

When constructed, the volume of the filtration chamber will be approximately 1.6 m^3 and will contain an impeller moving vertically for all operations.

The agitator uses specially designed blades, the rotational direction of which is reversible depending on the operation. During drying the agitator moves the cake from center of the unit to walls of the filter housing. After drying the direction of the agitator is reversed resulting in the dry cake being moved towards the discharge device located at the center of the unit base.

Growing interest in the Soviet market

Besides the new filters and membrane units that have appeared on the USSR market, a number of foreign firms that manufacture and design separation equipment are showing an interest in the Soviet filtration market.

The list of firms includes traditional suppliers of solid/liquid separation equipment such as Larox, Alfa-Laval, Kraus-Maffei, Cuno and domnick hunter. The stable growth in interest has also resulted in the formation of Engels Air-Maze, located in Engels on the Volga River — a company affiliated to the Air Maze Corp.

Improving trade

On the other hand there are factors that hamper trade — and these are not only of a political nature:

- ☐ unsatisfactory information about the volume of equipment manufactured and sold on the Soviet market and about the requirements of the users of this equipment;
- ☐ the lack of a wide network of specialised consulting and information firms that could serve both the user and the producer of separation equipment — some large organisa-

tions, like Niichimmash, for example, are physically unable to serve such a wide market;
- ☐ there is a shortage of information and magazines like Filtration and Separation (UK) or Filtration News (USA), and societies similar to The Filtration Society (UK) or The American Filtration Society (USA). There is an immediate need for Soviet experts, researchers, designers and manufacturers of separation equipment, and consumers to come together and share ideas. The establishment of such a framework is deemed to be the most favourable for all participants and will result in a close collaboration. — *'Information is the key to mutual success'*.

Source of information: The magazines *Chim. i Neft. Machinostroenie.* (1990), USSR and private information.

Letter from Australia

By Allan Waters

The 14th Biennial Convention of the Australian Water and Wastewater Association

The 14th Biennial Convention of the Australian Water and Wastewater Association was held in Perth during March 1991. It attracted 500 delegates, including a large contingent from Malaysia, and the Presidents of IAWPRC, IWSA, American WWA, and WPCF. Selected papers have been reviewed by E. A. Swinton, Editor of Water, Journal of the AWWA, and are given below.

Over 100 papers were presented, split into streams which covered the usual areas of water treatment and disposal, and sludge management, but with a large segment on economics, business management and strategies.

A special two day segment on Drinking Water Quality was organised in view of the forthcoming review of the Australian guidelines.

Wastewater treatment

Ocean Effluent Strategy for Sydney

by J. Noonan and I. Hammerton

The Sydney Water Board has just commissioned three major outfalls to dispose of primary treated effluents some kilometres out into the Pacific Ocean. A review in 1989 by consultants Camp Dresser & McKee indicated that these would almost totally eliminate beach pollution.

However, the public and political pressures have been such that the NSW Government has made a commitment to provide *effluent of secondary treatment standard* from the plants at some time in the future, and has announced a A$6.25B, 20 year Pollution Abatement Programme.

A five year Special Environment Programme costing A$440M is to be funded from an A$80 per household per year Environmental Levy. For the ocean outfalls, the Water Board's immediate strategy is to:

- ☐ improve reliability and performance of the existing primary treatment
- ☐ upgrade for increased solids capture
- ☐ consult with the community regarding long-term upgrade options.

The paper outlined the works in progress at North Head, Bondi and Malabar for upgrading the conventional systems. It then outlines the studies and investigations which have either been completed or are still in progress for *increasing solids capture.*

It should be appreciated that each of the plants is built on the cliffs overlooking the ocean and is severely constricted in available area, either by parks, sacrosanct golf courses, or intensive housing, so that the use of conventional secondary biological treatment is out of the question.

The processes which have been studied are: full primary with lamella plates, dissolved air flotation, chemically assisted sedimentation, the Sirofloc process, Biocarbone, deep shaft activated sludge, high-rate trickling filter, cross-flow microfiltration, and for comparison, conventional activated sludge and oxygen activated sludge. Research trials on pilot and plant scale have been carried out:

- ☐ Malabar: Pilot plants for Sirofloc, Biocarbone, DAF, CAS, Lamella, CMF
- ☐ North Head: Plant scale for Modified DAF
- ☐ Bondi: Plant scale for CAS
- ☐ Cronulla: Pilot plants for DAF, CAS, CMF

A comparison of the various processes was given, reporting effluent quality in terms of suspended solids, oil and grease, versus present worth of estimated costs, (which includes provision for chemical recovery where appropriate, and sludge disposal).

The conclusions were that at North Head, because of the particular conditions, a modified DAF with chemical dosing should be installed, using air injection at the lowest point of the incoming sewer (see report later). CAS is proposed for Bondi, which already has very deep sedimentation tanks into which lamella plates can be retrofitted. At Malabar, the Board proposes to install the Sirofloc process, in order to generate a better effluent. The capital cost of the first stream will be A$20M and should be installed by late 1992. Full implementation is estimated to cost A$70M. At Cronulla, a trial of the Memtec CMF system is being run, plus a permanent sludge dewatering plant and plans for an extended outfall.

The effects of stormwater pollution are being studied, with action proposed at various places, including gross pollutant traps, and control of sweer overflows.

Creating a Dissolved Air Flotation System with a Simple Retro-fit — North Head Sewage Treatment Plant

by P. Thomas, M. Laginestra and R. Pearson

The paper described the plant-scale trials designed to take advantage of the conditions available at the site. All sewage flows by gravity to a screening chamber underground, from which it is pumped 60 m up to the sedimentation tanks on the surface. Simply feeding compressed air into the pump outlet created a DAF situation in the existing sedimentation tanks, which greatly improved effluent quality, particularly for removal of oil and grease.

With chemical dosing, 86% of NFR was removed. The overall additional costs are a fraction of those for alternative processes. The additional grease concentration also reduces sludge inci-