Letters to the Editor

1. Letter by **M.R. Roberts**, *Stewart, Sviridov and Oliver, Consulting Engineers, P.O. Box 846, Pietermaritzburg 3200* in connection with:

Scum formation in a nutrient removing activated sludge plant
by Margaret A Hart published in *Water SA* 11(4) 171 – 178 (1985)

and

The identification of heterotrophic bacteria in an activated sludge plant with particular reference to polyphosphate accumulation
by Laurraine H Lötter and Margaret Murphy published in *Water SA* 11(4) 179 – 184 (1985).

Questions answered by the authors:

Q1 Assuming that both papers refer to the Johannesburg Northern Works Activated Sludge Plant, is there an explanation for the difference in phosphorus removal reported in Table 2 (Hart) and Table 4 (Lötter and Murphy)?

A1 The surveys described in Lötter and Murphy's paper were undertaken approximately six months before the survey reported by Hart, at which time the plant was exhibiting poor removal.

Q2 Referring to Hart's Table 2, it is not clear how the soluble P concentration in the treated effluent (1,0 mg/ℓ) could have been less than the soluble P concentration in the secondary aerobic zone (1,4 mg/ℓ). Is there some explanation for this apparently anomalous reduction of soluble P in the secondary clarifiers?

A2 In our experience no reduction in soluble phosphorus occurs in the secondary clarifiers. These apparently anomalous results are probably due to the time necessary for the mixed liquor to be filtered prior to analysis.

Q3 Were the values reported in Table 2 (Hart) average steady state values and was the MLVSS, iron, aluminium and polyphosphate concentration determined?

A3 The values are not average steady state figures, but typical values prevailing at the time of the survey. The MLVSS concentration was 3 375 mg/ℓ. The other parameters are not determined routinely and are not available for the period of this survey.

Q4 Table 2 (Hart) indicates that 16,5% of the total MLSS was phosphate (as PO_4). This must be a record for a full-scale municipal process operating at 20 days solids retention time without addition of chemicals. Has Johannesburg ever measured a higher phosphate percentage of MLSS?

A4 Yes, recently as much as 20% has been measured.

Q5 The abstract of Hart's paper contains the statement that "introduction of sludge recycling in the primary clarifiers caused scum to consist almost entirely of *Microthrix parvicella*". How was it proved that other variables, such as temperature, aeration conditions and solids retention time were not the cause of the predominance of *Microthrix parvicella* in the scum?

A5 This statement was based only on the findings after the introduction of sludge recycling and did not take other variables into account.

Q6 Should scum reduction by elimination of air entrainment be an overriding consideration in design of new plants?

A6 Every attempt should be made to prevent the growth of scum biologically and designers should not be restricted in their choice of equipment by the possibility of nuisance organisms proliferating.

Q7 Are scum production data available for Johannesburg's Northern Works?

A7 These figures are not available.

2. Letter by **S.P. Ligthelm**, *Department of Water Affairs, Private Bag X313, Pretoria, 0001*, in connection with:

Scum formation in a nutrient removing activated sludge plant
by Margaret A Hart published in *Water SA* 11(4) 171 – 178 (1985).

Margaret A. Hart must be complimented on her investigation and especially her finding that *Nocardia* is not the main source of the problem in activated sludge plants.

Two other aspects which could also be included in an investigation of this nature are the role of chicken fat and the question whether the presence of scum is an indication that the works is overloaded and in the process of choking itself.

South Africans consume more than $278{,}6 \times 10^6$ chickens annually (F.J.M. Abel (1985) Poultry Bulletin, March, p. 116). If it is assumed that the urban population is of the order of 12×10^6 people, the per capita consumption is 23,22 chickens per year.

Annually $23{,}22 \times 10^6$ chickens are consumed per million people and if it is assumed that 10 g of fat per chicken arrives at sewage works, these works have to cope with 232 200 kg fat per million people. However, the average chicken of 1,3 kg contains more than 10 g of fat and could easily be of the order of 100 g. This increases the total chicken fat to be handled by the works tenfold to 2 322 tonnes per annum per million people.

The physical constants of chicken fat are (Herman Pardin, (1976) *Analise der Nahrungsfette*, Paul Purney, p. 239):

Melting-point	30 – 32°C
SG	0,91
Iodine value	75 (ranging from 58 – 80)

Hilditch (T.P. Hilditch and P.N. Williams (1964) *The Chemical Constitution of Natural Fats*, Chapman and Hall, (Fourth Edition) p. 87) reports the following composition of fatty acids for chicken fat:

Myristic acid	0,1 per cent
Palmitic acid	25,6 per cent

Stearic acid	7,0 per cent
Hexadecenoic acid	7,0 per cent
Oleic acid	38,4 per cent
Linoleic acid	21,3 per cent
Unsaturated C20 – 22	0,6 per cent
Total	100 per cent

Unlike lard which has a higher melting-point, it can be assumed that chicken fat arrives at sewage works in a liquid state; it has a specific gravity lower than 1,0, and contains mostly unsaturated fatty acids so that it will not only float on the surface, but will also tend to attach itself to solid material which, in turn, assists scum formation by virtue of the flotation characteristics.

The authoress replies as follows:

The point is well taken, however, primary settling of the sewage would reduce fat levels. In addition, the concentrations of the acids referred to are currently being determined in sewage. The results will, hopefully, be the subject of a future publication.

GUIDE TO AUTHORS

AIMS AND SCOPE

This journal publishes refereed, original work in all branches of water science, technology and engineering. This includes water resources development; the hydrological cycle; surface hydrology; geohydrology and hydrometeorology; limnology; mineralisation; treatment and management of municipal and industrial water and wastewater; treatment and disposal of sewage sludge; environmental pollution control; water quality and treatment; aquaculture; agricultural water science; etc.

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The submission of a paper will be taken to indicate that it has not, and will not, without the consent of the Editor, be submitted for publication elsewhere. Manuscripts should be submitted to: **The Editor, WATER SA, P O Box 824, Pretoria, 0001, South Africa**

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One hundred free reprints of each paper will be provided. Any additional copies or reprints must be ordered from the printer (address available on request).

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An original typed script in double spacing together with three copies should be submitted. Words normally italicized should be typed in italics or underlined. The **title** should be concise and followed by authors' names and complete addresses. A paper may be organized under main headings such as **Introduction**, **Experimental**, **Results**, **Discussion** (or **Results** and **Discussion**), **Conclusions**, **Acknowledgements** and **References**.

Contents of manuscripts

The International System of Units (SI) applies. Technical and familiar abbreviations may be used, but must be defined if any doubt exists.

Tables

Tables are numbered in arabic numerals (Table 1) and should bear a short but adequate descriptive caption. Their appropriate position in the text should be indicated.

Illustrations and line drawings

One set of original figures and two sets of copies should accompany each submission. Photographs should be on glossy paper (half-tone illustrations should be kept to a minimum) and enlarged sufficiently to permit clear reproduction in half-tone. All illustrations, line-drawings and photographs must be fully identified on the back, numbered consecutively and be provided with descriptive captions typed on a separate sheet. Authors are requested to use proper drawing equipment for uniform lines and lettering of a size which will be clearly legible after reduction. Freehand or typewritten lettering and lines are not acceptable. The originals should be packed carefully, with cardboard backing, to avoid damage in transit.

References

Authors are responsible for the accuracy of references. References to published literature should be quoted in the text as follows: Smith (1982) or (Smith, 1982). Where more than three authors are involved, the first author's name followed by *et al.* and the date should be used.

All references are listed alphabetically at the end of each paper and not given as footnotes. The names of all authors should be given in the list of references. Titles of journals or periodicals are abbreviated according to **Chemical Abstracts Service Source Index** (Cassi).

Two examples of the presentation of references are the following:

Grabow, W.O.K., Coubrough, P., Nupen, E.M. and Bateman, B.W. (1984) Evaluation of coliphages as indicators of the virological quality of sewage-polluted water. *Water SA* **10**(1) 7-14.

Wetzel, R.G. (1975) *Limnology*. W.B. Saunders Company, Philadelphia, p 324..