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WILMINGTON, DELAWARE 19898

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AR226 1570

POLYMER PRODUCTS DEPARTMENT  
EXPERIMENTAL STATION

PERSONAL AND CONFIDENTIAL

May 14, 1981

TO: DR. Y. L. POWER - PPD, Washington Works

FROM: S. S. STAFFORD *S.S. Stafford*

ANALYSIS OF BLOOD SAMPLES FOR PERFLUOROOCTANOATE  
(Job No. 810-190; PRAL Nos. 81-1420-81-1467; Notebook Nos. E22514, E26238)

As requested in your letter of 4/8/81 to L. J. Papa, the 48 blood samples submitted then have been analyzed for perfluorooctanoate ( $C_8$ ). Results and sample identification are given in the attached table.

As noted there, the analysis was done using a gas chromatographic method specific for  $C_8$  (Lab Method Number ES-567) but results have been reported as ppm F for comparison with total organic fluorine analyses. Precision is  $\pm 10\%$  relative standard deviation over most of the concentration range, somewhat less at the lowest values. The lower limit for quantitation is 0.007 ppm F (0.01 ppm perfluorooctanoic acid), with a detection limit of  $\sim 0.004$  ppm which can be distinguished from the reagent background but not well quantitated.

Please contact me (772-4440) or L. J. Papa (772-2745) if you have any questions regarding the analyses. General questions on blood sampling can be directed to J. W. Raines or L. F. Percival.

Attachment  
jah

KeyWords:  
Perfluorooctanoic Acid  
Perfluorooctanoate  
Blood Analysis  
GC

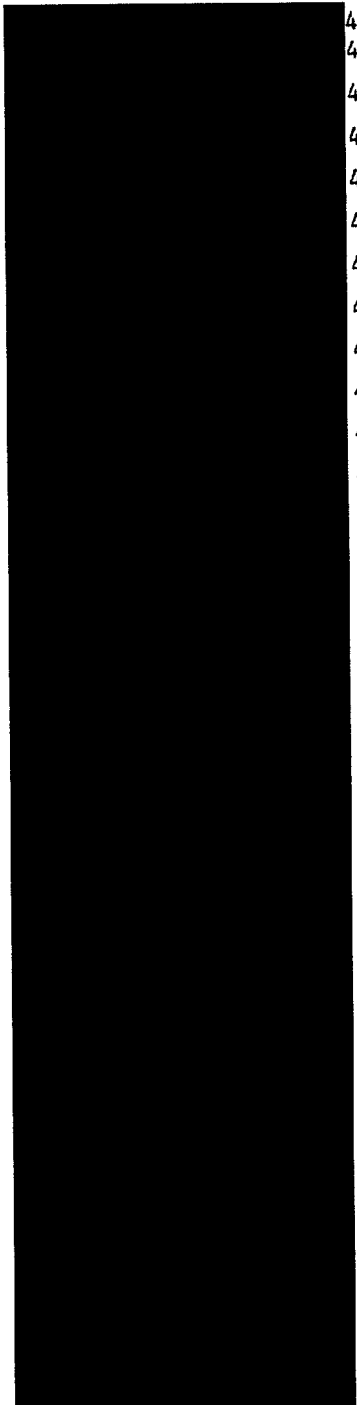
There's a world of things we're doing something about

EXP000003  
EID713817

000064

TABLE I

CONCENTRATION OF PERFLUOROOCTANOATE IN BLOOD (a)

|          |              |         |                                                                                     | GC Analysis   |                                                |
|----------|--------------|---------|-------------------------------------------------------------------------------------|---------------|------------------------------------------------|
| Sample   |              |         |                                                                                     | Date Analyzed | [C <sub>8</sub> ], µg F/g blood <sup>(b)</sup> |
| PRAL No. | Date Sampled | P.R.No. | Name                                                                                |               |                                                |
| 81-1420  | 4/1/81       | 4443    |  | 4/11/81       | 0.078                                          |
|          |              |         |                                                                                     | 4/15/81       | 0.074                                          |
| 81-1421  | 4/1/81       | 4101    |                                                                                     | 4/11/81       | 1.5                                            |
| 81-1422  | 4/2/81       | 4226    |                                                                                     | 4/11/81       | 0.013                                          |
| 81-1423  | 4/2/81       | 4449    |                                                                                     | 4/11/81       | 0.048                                          |
| 81-1424  | 4/3/81       | 4530    |                                                                                     | 4/11/81       | 0.62                                           |
| 81-1425  | 4/3/81       | 4621    |                                                                                     | 4/13/81       | 0.13                                           |
| 81-1426  | 4/6/81       | 4490    |                                                                                     | 4/13/81       | 0.072                                          |
| 81-1427  | 4/6/81       | 4283    |                                                                                     | 4/13/81       | 0.051                                          |
| 81-1428  | 4/6/81       | WS      |                                                                                     | 4/13/81       | 0.11                                           |
| 81-1429  | 4/6/81       | WS      |                                                                                     | 4/13/81       | 0.061                                          |
| 81-1430  | 4/6/81       | 4109    |                                                                                     | 4/13/81       | 0.19                                           |
| 81-1431  | 4/6/81       | 4316    |                                                                                     | 4/13/81       | 1.0                                            |
| 81-1432  | 4/6/81       | 4282    |                                                                                     | 4/14/81       | 5.1                                            |
| 81-1433  | 4/6/81       | 4243    |                                                                                     | 4/15/81       | 0.44                                           |
| 81-1434  | 4/6/81       | 4520    |                                                                                     | 4/13/81       | 0.052                                          |
| 81-2435  | 4/6/81       | 4177    |                                                                                     | 4/14/81       | 0.23                                           |
| 81-1436  | 4/6/81       | WS      |                                                                                     | 4/14/81       | 0.11                                           |
| 81-1437  | 4/6/81       | 4293    |                                                                                     | 4/14/81       | 0.17                                           |
| 81-1438  | 4/6/81       | WS      |                                                                                     | 4/13/81       | 0.31                                           |
| 81-1439  | 4/6/81       | 4225    |                                                                                     | 4/14/81       | 0.054                                          |
| 81-1440  | 4/6/81       | 4182    |                                                                                     | 4/14/81       | 0.077                                          |
| 81-1441  | 4/6/81       | 4250    |                                                                                     | 4/15/81       | 0.31                                           |
| 81-1442  | 4/6/81       | 4547    |                                                                                     | 4/24/81       | 4.3                                            |
| 81-1443  | 4/6/81       | 4181    |                                                                                     | 4/14/81       | 0.64                                           |
| 81-1444  | 4/6/81       | 4551    |                                                                                     | 4/15/81       | 1.3                                            |
| 81-1445  | 4/6/81       | 4514    |                                                                                     | 4/15/81       | 0.14                                           |
| 81-1446  | 4/6/81       | 4624    |                                                                                     | 4/16/81       | 0.57                                           |
| 81-1447  | 4/6/81       | 4444    |                                                                                     | 4/16/81       | 0.18                                           |
| 81-1448  | 4/6/81       | 4251    |                                                                                     | 4/16/81       | 0.15                                           |
| 81-1449  | 4/6/81       | WS      |                                                                                     | 4/16/81       | 0.83                                           |
| 81-1450  | 4/6/81       | 4111    |                                                                                     | 4/18/81       | 3.8                                            |
| 81-1451  | 4/6/81       | WS      |                                                                                     | 4/16/81       | 0.22 (c)                                       |

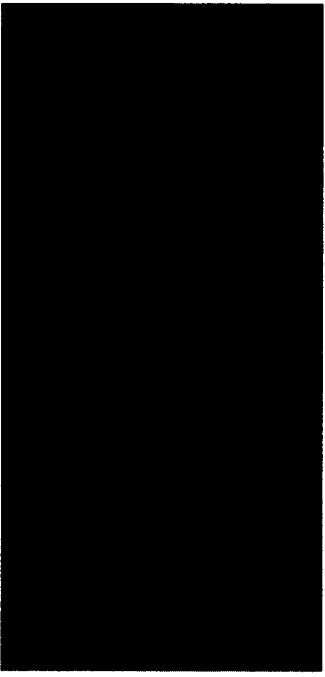
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EXP000004  
EID713818

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TABLE I (CONT'D)

CONCENTRATION OF PERFLUOROOCTANOATE IN BLOOD (a)

| Sample   |              |         |                                                                                     | GC Analysis    |                                                |
|----------|--------------|---------|-------------------------------------------------------------------------------------|----------------|------------------------------------------------|
| PRAL NO. | Date Sampled | P.R.No. | Name                                                                                | Date Analyzed  | [C <sub>8</sub> ], µg F/g blood <sup>(b)</sup> |
| 81-1452  | 4/6/81       | 4650    |  | 4/16/81        | 0.019                                          |
| 81-1453  | 4/6/81       | 4448    |                                                                                     | 4/18/81        | 0.11                                           |
| 81-1454  | 4/6/81       | 4409    |                                                                                     | 4/18/81        | 0.14                                           |
| 81-1455  | 4/6/81       | 4400    |                                                                                     | 4/18/81        | 2.1                                            |
| 81-1456  | 4/6/81       | 4631    |                                                                                     | 4/18/81        | 0.19                                           |
| 81-1457  | 4/6/81       | 4234    |                                                                                     | 4/18/81        | 4.3                                            |
| 81-1458  | 4/7/81       | 4172    |                                                                                     | 4/20/81        | 4.5                                            |
| 81-1459  | 4/7/81       | 4382    |                                                                                     | 4/20/81        | 0.81                                           |
| 81-1460  | 4/7/81       | 4518    |                                                                                     | 4/23/81        | 1.7                                            |
| 81-1461  | 4/7/81       | 4299    |                                                                                     | 4/20 & 4/24/81 | 4.5                                            |
| 81-1462  | 4/7/81       | 4249    |                                                                                     | 4/20/81        | 1.9                                            |
| 81-1463  | 4/7/81       | 4300    |                                                                                     | 4/23/81        | 2.4                                            |
| 81-1464  | 4/7/81       | 4290    |                                                                                     | 4/20/81        | 0.10                                           |
| 81-1465  | 4/7/81       | WS      |                                                                                     | 4/20/81        | 0.47                                           |
| 81-1466  | 4/7/81       | 4364    |                                                                                     | 4/24/81        | 3.6                                            |
| 81-1467  | 4/7/81       | WS      |                                                                                     | 4/20/81        | 0.092                                          |

(a) Analysis as described in Lab Method ES-567 ("Determination of Perfluorooctanoic Acid in Blood, Gas Chromatographic Method", S. Stafford, 4/3/81), using the packed column GC analysis with perfluoro-n-octanoic acid as calibration standard.

(b) Although the analysis is specifically for perfluorooctanoate (acid or salts), concentrations are given in ppm fluorine for comparison with the results of total organic fluorine analyses. (ppm F = 0.688 x ppm perfluorooctanoic acid) Estimated uncertainty is  $\pm 10\%$  relative standard deviation. The lower limit for quantitation is 0.007 µgF/g. The detection limit is  $\sim 0.004$  µgF/g, but concentrations in that range cannot be well quantitated and are reported as  $< 0.007$ . "None detected" is reported for samples with [C<sub>8</sub>]  $\lesssim 0.004$  ppm, which cannot be distinguished from reagent background.

(c) In GC analysis of this sample one unusual large peak was observed in the region of interest, but no interference with the C<sub>8</sub> peak was apparent.

EXP000005  
\*REDACTED\* EID713819

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Pral File  
I.C.

AR226-1571

PERSONAL AND CONFIDENTIAL

May 14, 1981

DR. W. E. NEELD  
CD&P  
CHAMBERS WORKS

ANALYSIS OF BLOOD SAMPLES FOR PERFLUOROOCTANOATE  
(Job No. 810-578; PRAL No. 81-1554; Notebook Nos. E22514, E26238)

As requested in your letter of 4/14/81, the blood sample submitted then has been analyzed for perfluorooctanoate (Cg). The result is as follows.

Sample Identification

GC Analysis\*

██████████ 4/13/81, age 24  
PRAL No. 81-1554

[Cg] = 0.26 µg F/g blood (ppm)

- \* Analysis as described in Lab Method ES-567 ("Determination of Perfluorooctanoic Acid in Blood, Gas Chromatographic Method", S. Stafford, 4/3/81), using the packed column GC analysis with perfluoro-n-octanoic acid calibration standard.

Although the GC analysis is specifically for perfluorooctanoate (acid or salts), the concentration is given in ppm F for comparison with results of total fluorine analyses used earlier. (ppm F = 0.688 x ppm perfluorooctanoic acid) The estimated uncertainty is  $\pm 10\%$  relative standard deviation, with a lower limit for quantitation of 0.007 ppm.

Please contact me (772-4440) or L. J. Papa (772-2745) if you have any questions regarding the analysis. General questions on blood sampling can be directed to J. W. Raines or L. F. Percival.

*S. S. Stafford*  
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KeyWords:

Perfluorooctanoic Acid  
Perfluorooctanoate  
Blood Analysis  
GC

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EXP000006  
EID713820

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