# APPENDIX B

# STANDARDS AND CONCENTRATION GUIDES

TABLE B-1
STANDARDS AND CONCENTRATION GUIDES
(DOE Order 5480.1, Chapter XI)

Radiation Protection Standards
Annual Whole-Body Dose Equivalent (mRem/year)

| | |
|---|---|
| Individuals at Points of Maximum Probable Exposure | 500 |
| Suitable Sample of the Exposed Population | 170 |

Concentration Guides for Effluent Releases to Uncontrolled Areas (μCi/ml)

| Radionuclide | In Air | In Water |
|---|---|---|
| Gross alpha | $2 \times 10^{-14}$ | $3 \times 10^{-8}$ |
| Gross beta[a] | $1 \times 10^{-12}$ | $3 \times 10^{-8}$ |
| Am-241 | $2 \times 10^{-13}$ | $4 \times 10^{-6}$ |
| Sb-125 | $9 \times 10^{-10}$ | $1 \times 10^{-4}$ |
| Ar-41 | $4 \times 10^{-8}$ | - |
| Ba-140 | $1 \times 10^{-9}$ | $2 \times 10^{-5}$ |
| Cs-134 | $4 \times 10^{-10}$ | $9 \times 10^{-6}$ |
| Cs-137 | $5 \times 10^{-10}$ | $2 \times 10^{-5}$ |
| H-3 | $2 \times 10^{-7}$ | $3 \times 10^{-3}$ |
| I-129 | $2 \times 10^{-11}$ | $6 \times 10^{-8}$ |
| I-131 | $1 \times 10^{-10}$ | $3 \times 10^{-7}$ |
| Kr-85 | $3 \times 10^{-7}$ | - |
| Kr-85m | $1 \times 10^{-7}$ | - |
| Kr-87 | $2 \times 10^{-8}$ | - |
| Kr-88 | $2 \times 10^{-8}$ | - |
| Pu-238 | $7 \times 10^{-14}$ | $5 \times 10^{-6}$ |
| Pu-239 | $6 \times 10^{-14}$ | $5 \times 10^{-6}$ |
| Pu-240 | $6 \times 10^{-14}$ | $5 \times 10^{-6}$ |
| Ru-106 | $2 \times 10^{-10}$ | $1 \times 10^{-5}$ |
| Sr-90 | $3 \times 10^{-11}$ | $3 \times 10^{-7}$ |
| Xe-133 | $3 \times 10^{-7}$ | - |
| Xe-135 | $1 \times 10^{-7}$ | - |
| Xe-138 | $3 \times 10^{-8}$ | - |

[a] Based on the most restrictive beta emitter (Ra-228)

# APPENDIX C-1

## SUMMARY OF WATER AND SEDIMENT MONITORING DATA

TABLE C - 1.1
TOTAL RADIOACTIVITY OF LIQUID EFFLUENTS RELEASED
FROM WVDP LAGOON 3 IN 1984* (CURIES)

| | ALPHA | BETA | H-3 | CS-137 | SR-90 | I-129 |
|---|---|---|---|---|---|---|
| 1ST QTR. | 5.11+/-5.2 E-4 | 3.91+/-0.1 E-2 | 1.36+/-.03 | 4.28+/-0.1 E-2 | 2.76+/-0.3 E-3 | 1.00+/-0.2 E-4 |
| 2ND QTR. | 1.32+/-1.9 E-4 | 1.53+/-0.2 E-2 | 7.85+/-0.2 E-1 | 8.12+/-0.3 E-3 | 7.85+/-0.9 E-4 | 4.72+/-1.2 E-5 |
| 3RD QTR. | 0.34+/-1.0 E-4 | 6.80+/-1.2 E-3 | 4.49+/-0.1 E-1 | 1.21+/-0.1 E-3 | 1.85+/-0.2 E-3 | 4.28+/-0.7 E-5 |
| 4TH QTR. | 1.10+/-0.2 E-2 | 1.98+/-0.3 E-2 | 4.65+/-0.1 | 1.08+/-0.2 E-2 | 3.06+/-0.2 E-3 | 8.71+/-1.5 E-4 |
| 1984 TOTALS | 1.17+/-0.3 E-2 | 8.10+/-0.7 E-2 | 7.24+/-0.2 | 6.29+/-0.3 E-2 | 8.46+/-0.8 E-3 | 1.06+/-0.2 E-3 |
| AVERAGE(uCi/ml) CONCENTRATION | 2.27 E-7 | 1.57 E-6 | 1.41 E-4 | 1.22 E-6 | 1.64 E-7 | 2.01 E-8 |
| PERCENT OF REG** | NOT APPLICABLE | ISOTOPES IDENTIFIED | 4.7% | 6.1% | 54.7% | 33.5% |

| | U-238 | U-234 | U-235 | PU-238 | PU-239 |
|---|---|---|---|---|---|
| 1ST QTR. | 3.03+/-0.3 E-5 | 4.59+/-0.4 E-5 | 1.43+/-0.7 E-6 | 1.81+/-0.7 E-6 | 8.36+/-4.9 E-7 |
| 2ND QTR. | 1.19+/-0.1 E-5 | 1.40+/-0.1 E-5 | 5.21+/-2.2 E-7 | 7.66+/-3.3 E-7 | 4.12+/-2.3 E-7 |
| 3RD QTR. | 6.98+/-1.0 E-6 | 9.98+/-1.2 E-6 | 1.84+/-3.60 E-7 | 6.19+/-4.1 E-7 | 4.64+/-3.1 E-7 |
| 4TH QTR. | 1.84+/-0.8 E-3 | 7.22+/-1.3 E-4 | 1.41+/-0.3 E-4 | 1.32+/-0.2 E-5 | 9.20+/-1.7 E-6 |
| 1984 TOTALS | 1.89+/-0.8 E-3 | 7.92+/-1.4 E-4 | 1.43+/-0.3 E-4 | 1.64+/-0.3 E-5 | 1.09+/-0.3 E-5 |
| AVERAGE(uCi/ml) CONCENTRATION | 3.7 E-8 | 1.54 E-8 | 2.78 E-9 | 3.18 E-10 | 2.12 E-10 |
| PERCENT OF REG** | 6.1% | 0.4% | 0.06% | < 0.01% | < 0.01% |

*Includes radioactivity from New York State low level waste burial area (Table C - 1.11)
Total volume released as treated effluent - 5.15 E7 litres (1)

**Recommended Concentration Guides per DOE Order 5480.1, Attachment XI-1, for uncontrolled releases at site boundary. Concentrations listed above for Lagoon 3 effluents are substantially higher than concentrations at boundary where RCGs actually apply.

WPC0016

TABLE C - 1.2
RADIOACTIVITY CONCENTRATIONS
IN SURFACE WATER UPSTREAM OF WVDP
AT FOX VALLEY (WFBCBKG) uCi/ml

| | ALPHA | BETA | H-3 | SR-90 | CS-137 |
|---|---|---|---|---|---|
| JAN | 7.12+/-4.1 E-10 | 5.63+/-1.1 E-09 | < 1.74 E-07 | | |
| FEB | 6.38+/-4.0 E-10 | 6.93+/-1.2 E-09 | < 1.71 E-07 | | |
| MAR | 5.22+/-3.6 E-10 | 5.56+/-1.1 E-09 | < 1.86 E-07 | | |
| 1ST QTR. | | | | __ __* | __ __* |
| APR | 4.26+/-3.2 E-10 | 6.23+/-1.2 E-09 | < 1.73 E-07 | | |
| MAY | 3.48+/-2.6 E-10 | 4.86+/-1.1 E-09 | < 1.68 E-07 | | |
| JUN | < 1.68 E-10 | 3.36+/-1.0 E-09 | < 1.68 E-07 | | |
| 2ND QTR. | | | | 7.00+/-3.0 E-10 | < 7.0 E-08 |
| JUL | < 2.33 E-10 | 4.53+/-1.1 E-09 | 2.95+/-1.7 E-07 | | |
| AUG | < 1.64 E-10 | 2.54+/-1.0 E-09 | < 1.68 E-07 | | |
| SEP | 4.49+/-3.3 E-10 | 6.50+/-1.3 E-09 | < 1.67 E-07 | | |
| 3RD QTR. | | | | 6.56+/-2.7 E-09 | < 7.0 E-08 |
| OCT | < 1.23 E-10 | 2.80+/-1.0 E-09 | < 1.76 E-07 | | |
| NOV | < 2.53 E-10 | 7.24+/-1.4 E-09 | 2.42+/-1.9 E-07 | | |
| DEC | < 2.30 E-10 | 2.86+/-1.0 E-09 | < 1.63 E-07 | | |
| 4TH QTR. | | | | 4.75+/-1.9 E-09 | < 7.0 E-08 |

*Not available this quarter

WPC0016

TABLE C - 1.3
RADIOACTIVITY CONCENTRATIONS
IN SURFACE WATER DOWNSTREAM OF
WVDP AT THOMAS CORNERS (WFBCTCB) uCi/ml

| | ALPHA | BETA | H-3 | SR-90 | CS-137 |
|---|---|---|---|---|---|
| JAN | 8.27+/-4.4 E-10 | 1.36+/-0.2 E-08 | 7.75+/-1.8 E-07 | | |
| FEB | < 2.60 E-10 | 9.42+/-1.4 E-09 | < 1.72 E-07 | | |
| MAR | 1.33+/-0.6 E-09 | 1.92+/-0.2 E-08 | 3.22+/-1.9 E-07 | | |
| 1ST QTR. | | | | ___ ___* | ___ ___* |
| APR | 4.83+/-3.4 E-10 | 9.18+/-1.4 E-09 | < 1.70 E-07 | | |
| MAY | 5.82+/-3.3 E-10 | 7.25+/-1.3 E-09 | < 1.68 E-07 | | |
| JUN | 7.21+/-4.1 E-10 | 5.94+/-1.2 E-09 | < 1.65 E-07 | | |
| 2ND QTR. | | | | 1.81+/-0.2 E-08 | < 7.0 E-08 |
| JUL | 4.89+/-3.4 E-10 | 8.29+/-1.4 E-09 | 3.36+/-1.7 E-07 | | |
| AUG | 4.49+/-3.3 E-10 | 9.73+/-1.5 E-09 | < 1.65 E-07 | | |
| SEP | 8.56+/-4.5 E-10 | 2.14+/-0.2 E-08 | < 1.73 E-07 | | |
| 3RD QTR. | | | | 4.81+/-2.5 E-09 | < 7.0 E-08 |
| OCT | 9.55+/-4.7 E-10 | 1.48+/-0.2 E-08 | 4.49+/-0.3 E-06 | | |
| NOV | 4.67+/-3.4 E-10 | 1.12+/-0.2 E-08 | 1.64+/-0.2 E-06 | | |
| DEC | 8.39+/-4.5 E-10 | 1.16+/-0.2 E-08 | 3.33+/-1.7 E-07 | | |
| 4TH QTR. | | | | 2.34+/-0.4 E-08 | < 7.0 E-08 |

*Not available this quarter

TABLE C - 1.4
RADIOACTIVITY CONCENTRATIONS
IN SURFACE WATER
DOWNSTREAM OF WVDP
AT FRANKS CREEK (WNSP006) uCi/ml

| | ALPHA | BETA | H-3 | SR-90 | CS-137 |
|---|---|---|---|---|---|
| JAN | < 1.99 E-10 | 1.03+/-0.1 E-07 | 1.15+/-0.1 E-05 | | |
| FEB | 4.08+/-3.2 E-10 | 1.07+/-0.1 E-07 | 3.56+/-0.2 E-06 | | |
| MAR | 6.38+/-4.0 E-10 | 6.64+/-0.4 E-08 | 5.54+/-1.9 E-07 | | |
| 1ST QTR. | | | | * | * |
| APR | 1.46+/-0.6 E-09 | 1.85+/-0.1 E-07 | 7.92+/-1.8 E-07 | | |
| MAY | 3.48+/-2.6 E-10 | 4.70+/-0.3 E-08 | 3.24+/-0.2 E-06 | | |
| JUN | < 1.98 E-10 | 5.95+/-0.3 E-08 | 3.77+/-0.8 E-06 | | |
| 2ND QTR. | | | | 4.54+/-0.7 E-09 | 2.04+/-0.9 E-07 |
| JUL | 6.60+/-3.8 E-10 | 6.28+/-0.4 E-08 | 1.14+/-0.2 E-06 | | |
| AUG | < 1.98 E-10 | 1.13+/-0.1 E-07 | 7.47+/-0.3 E-06 | | |
| SEP | 4.49+/-3.3 E-10 | 4.50+/-0.3 E-08 | 1.26+/-0.2 E-06 | | |
| 3RD QTR. | | | | 5.65+/-0.6 E-08 | < 7.0 E-08 |
| OCT | 3.63+/-0.9 E-09 | 1.21+/-0.1 E-07 | 2.40+/-0.1 E-05 | | |
| NOV | 4.67+/-3.4 E-10 | 1.06+/-0.1 E-07 | 5.10+-/1.7 E-07 | | |
| DEC | 1.52+/-0.2 E-08 | 1.05+/-0.1 E-07 | 5.31+/-0.1 E-05 | | |
| 4TH QTR. | | | | 3.11+/-0.4 E-08 | 1.56+/-1.4 E-07 |

*Not available this quarter

WPC0016

TABLE C - 1.5
RADIOACTIVITY CONCENTRATIONS
IN SURFACE WATER UPSTREAM OF BUTTERMILK
CREEK AT BIGELOW BRIDGE (WFBIGBR) uCi/ml

| | ALPHA | BETA | H-3 |
|---|---|---|---|
| JAN | < 2.33 E-10 | 5.20+/-1.1 E-09 | < 1.72 E-07 |
| FEB | 5.39+/-3.6 E-10 | 7.61+/-1.3 E-09 | 2.46+/-1.9 E-07 |
| MAR | 2.93+/-2.8 E-10 | 5.76+/-1.2 E-09 | < 1.86 E-07 |
| APR | 4.83+/-3.4 E-10 | 5.76+/-1.1 E-09 | < 1.59 E-07 |
| MAY | 9.43+/-4.7 E-10 | 1.29+/-0.2 E-08 | 3.97+/-1.8 E-07 |
| JUN | < 2.57 E-10 | 4.01+/-1.0 E-09 | < 1.64 E-07 |
| JUL | 6.63+/-3.4 E-10 | 1.00+/-0.2 E-08 | < 1.71 E-07 |
| AUG | 3.72+/-3.1 E-10 | 1.30+/-0.2 E-08 | < 1.86 E-07 |
| SEP | < 1.20 E-10 | 1.47+/-0.9 E-09 | < 1.65 E.07 |
| OCT | < 1.59 E-10 | 2.54+/-1.0 E-09 | < 1.76 E-07 |
| NOV | 4.27+/-3.2 E-10 | 3.57+/-1.1 E-09 | < 1.72 E-07 |
| DEC | 7.43+/-4.2 E-10 | 6.87+/-1.3 E-09 | < 1.70 E-07 |

WPC0016

TABLE C - 1.6
RADIOACTIVITY CONCENTRATIONS
IN SURFACE WATER DOWNSTREAM OF
BUTTERMILK CREEK AT FELTON BRIDGE (WFFELBR) uCi/ml

| | ALPHA | BETA | H-3 | SR-90 | CS-137 |
|---|---|---|---|---|---|
| JAN | < 1.22 E-10 | 4.73+/-1.1 E-09 | 4.60+/-1.8 E-07 | 3.96+/-3.8 E-09 | < 3.14 E-08 |
| FEB | 1.04+/-0.5 E-09 | 1.84+/-0.2 E-08 | < 1.87 E-07 | < 3.67 E-09 | < 5.88 E-08 |
| MAR | 4.65+/-3.4 E-10 | 7.73+/-1.3 E-09 | < 1.75 E-07 | 3.33+/-3.3 E-09 | < 4.0 E-08 |
| APR | 9.43+/-4.7 E-10 | 8.16+/-1.3 E-09 | 2.28+/-1.7 E-07 | < 3.21 E-09 | < 5.88 E-08 |
| MAY | 7.12+/-4.1 E-10 | 1.47+/-0.2 E-08 | 3.37+/-1.6 E-07 | < 3.92 E-09 | < 7.84 E-08 |
| JUN | < 1.68 E-10 | 3.95+/-1.0 E-09 | < 1.68 E-07 | < 3.92 E-09 | < 5.68 E-08 |
| JUL | < 1.68 E-10 | 5.71+/-1.2 E-09 | < 1.65 E-07 | < 3.92 E-09 | < 5.88 E-08 |
| AUG | < 1.64 E-10 | 2.93+/-1.0 E-09 | 3.22+/-1.8 E-07 | 4.0+/-3.9 E-09 | < 5.88 E-08 |
| SEP | 3.32+/-2.8 E-10 | 8.51+/-1.4 E-09 | < 1.60 E-07 | 3.81+/-1.9 E-09 | < 5.88 E-08 |
| OCT | 3.14+/-2.8 E-10 | 4.02+/-1.0 E-09 | 3.14+/-1.7 E-07 | 2.31+/-1.5 E-09 | < 7.84 E-08 |
| NOV | < 2.61 E-10 | 7.09+/-1.4 E-09 | < 1.59 E-07 | 5.91+/-2.3 E-09 | < 7.84 E-08 |
| DEC | 1.07+/-0.5 E-09 | 2.24+/-0.2 E-08 | 1.34+/-0.2 E-06 | 5.40+/-2.2 E-09 | < 7.0 E-08 |

TABLE C - 1.7
RADIOACTIVITY CONCENTRATIONS IN SHALLOW WELLS
NEAR SITE FACILTIIES

| LOCATION CODE | SPRING 1984 (uCi/ml) ALPHA | BETA | TRITIUM | FALL 1984 (uCi/ml) ALPHA | BETA | TRITIUM |
|---|---|---|---|---|---|---|
| WNWNFSB | NOT ACCESSIBLE | | | 9.64+/-1.5 E-09 | 5.49+/-0.0 E-06 | 4.40+/-0.3 E-06 |
| WNWNFSD | NOT ACCESSIBLE | | | 3.08+/-0.8 E-09 | 1.01+/-0.0 E-06 | 4.39+/-0.1 E-05 |
| WNWNFSG | NOT ACCESSIBLE | | | 1.87+/-0.7 E-09 | 3.16+/-0.0 E-06 | 1.6+/-0.0 E-05 |
| WNWNFSH | NOT ACCESSIBLE | | | WELL REMOVED | LAGOON 1 | CLEAN-UP |
| WNWNFL2 | 5.39+/-3.6 E-10 | 2.68+/-0.2 E-08 | 4.97+/-0.2 E-06 | < 1.22 E-10 | 2.27+/-0.2 E-08 | 3.39+/-0.2 E-06 |
| WNWNFM5 | WELL REMOVED | SPRING 1984 | | | | |
| WNWNFJ2 | < 2.57 E-10 | 1.98+/-0.2 E-08 | < 1.68 E-07 | < 1.18 E-10 | 1.10+/-0.2 E-08 | < 1.66 E-07 |
| WNWNFJ5 | 1.12+/-0.5 E-09 | 2.14+/-0.2 E-08 | 2.12+/-1.7 E-07 | 3.11+/-2.8 E-10 | 8.20+/-1.4 E-09 | 5.58+/-1.8 E-07 |
| WNWNFJ8 | 1.52+/-0.6 E-09 | 1.62+/-0.2 E-08 | 1.79+/-0.1 E-05 | < 2.00 E-10 | 2.47+/-1.0 E-09 | 1.79+/-0.1 E-05 |
| WNW80 2 | 5.98+/-3.8 E-10 | 7.73+/-1.3 E-09 | < 1.66 E-07 | < 2.00 E-10 | 3.23+/-1.0 E-09 | < 1.63 E-07 |
| WNW80 3 | 1.98+/-1.4 E-09 | 2.32+/-0.1 E-07 | < 1.74 E-07 | 1.98+/-1.4 E-09 | 2.32+/-0.1 E-07 | < 1.66 E-07 |
| WNW80 4 | 3.67+/-3.0 E-10 | 5.10+/-1.1 E-09 | 3.92+/-1.7 E-07 | < 1.94 E-10 | 2.62+/-1.0 E-09 | < 1.62 E-07 |
| WNW80 5 | 1.12+/-0.5 E-09 | 6.08+/-1.2 E-09 | < 1.76 E-07 | < 1.61 E-10 | 7.69+/-7.7 E-09 | 9.59+/-1.7 E-07 |
| WNW80 6 | 3.67+/-3.0 E-10 | 3.55+/-1.0 E-09 | 5.02+/-0.3 E-06 | DRY | | |
| WNW80 7 | 8.84+/-4.5 E-10 | 1.00+/-0.2 E-08 | < 1.75 E-07 | < 1.94 E-10 | 4.58+/-1.2 E-09 | 1.97+/-1.6 E-07 |

TABLE C - 1.8
RADIOACTIVITY CONCENTRATIONS IN SHALLOW WELLS
NEAR THE NRC DISPOSAL AREA

| LOCATION CODE | SPRING 1984 (uCi/ml) ALPHA | BETA | TRITIUM | FALL 1984 (uCi/ml) ALPHA | BETA | TRITIUM |
|---|---|---|---|---|---|---|
| WNW821A | 1.69+/-0.6 E-09 | 2.25+/-0.2 E-08 | < 1.62 E-07 | 3.11+/-2.7 E-10 | 6.09+/-1.3 E-09 | < 1.56 E-07 |
| WNW821B | 1.89+/-0.9 E-09 | 2.08+/-0.3 E-08 | < 1.61 E-07 | 2.54+/-2.5 E-09 | 1.52+/-0.9 E-08 | < 1.59 E-07 |
| WNW821C | 1.49+/-0.7 E-08 | 8.36+/-1.6 E-08 | < 1.59 E-07 | 1.05+/-0.5 E-08 | 1.05+/-0.2 E-07 | < 1.70 E-07 |
| WNW821D | NO CASING | | | NO CASING | | |
| WNW822A | 3.23+/-1.8 E-09 | 3.85+/-0.7 E-07 | < 1.63 E-07 | 3.76+/-2.2 E-09 | 1.40+/-0.7 E-08 | < 1.63 E-07 |
| WNW822B | 1.12+/-0.5 E-08 | 1.58+/-0.2 E-07 | 2.72+/-1.6 E-07 | < 2.85 E-09 | 3.47+/-1.1 E-08 | < 1.63 E-07 |
| WNW822C | DRY | | | DRY | | |
| WNW823A | 2.38+/-0.8 E-09 | 8.33+/-1.4 E-09 | < 1.73 E-07 | 8.86+/-4.4 E-10 | 6.59+/-1.3 E-09 | < 1.63 E-07 |
| WNW823B | DRY | | | DRY | | |
| WNW823C | DRY | | | DRY | | |
| WNW823D | DRY | | | DRY | | |
| WNW824A1 | 9.43+/-4.7 E-10 | 2.04+/-0.2 E-08 | 2.21+/-1.7 E-07 | < 2.23 E-10 | 4.48+/-1.1 E-09 | 2.22+/-0.2 E-06 |
| WNW824A2 | 8.73+/-5.2 E-10 | 1.99+/-0.2 E-08 | 4.36+/-1.7 E-07 | < 1.78 E-10 | 1.03+/-0.2 E-08 | 2.75+/-1.6 E-07 |
| WNW824A3 | 1.17+/-0.6 E-09 | 2.19+/-0.2 E-08 | 3.38+/-1.7 E-07 | 4.60+/-3.8 E-10 | 6.29+/-1.5 E-09 | 2.72+/-1.7 E-07 |
| WNW824B | 2.39+/-1.5 E-09 | 4.03+/-0.6 E-08 | < 1.68 E-07 | NO CASING - SAMPLE | NOT ACCESSIBLE | |
| WNW824C | DRY | | | DRY | | |
| WNW825A | NOT ACCESSIBLE | | | NOT ACCESSIBLE | | |
| WNW825B | NOT ACCESSIBLE | | | NOT ACCESSIBLE | | |
| WNW825C | NOT ACCESSIBLE | | | NOT ACCESSIBLE | | |

TABLE C - 1.9

Radioactivity Concentrations in Potable Well Water Around the WVDP Site - 1984

(μCi/mℓ)

| SAMPLE I.D. | ALPHA | BETA | TRITIUM |
|---|---|---|---|
| WFWEL01 | <2.00 E-10 | 1.76 ± 0.9 E-09 | <1.55 E-07 |
| WFWEL02 | <1.87 E-10 | 1.59 ± 0.8 E-09 | 1.23 ±1.0 E-07 |
| WFWEL03 | <1.67 E-10 | 2.19 ± 0.9 E-09 | <1.39 E-07 |
| WFWEL04 | <2.00 E-10 | 2.10 ± 0.9 E-09 | <1.51 E-07 |
| WFWEL05 | <1.23 E-10 | 2.29 ± 0.9 E-09 | <1.64 E-07 |
| WFWEL06 | <1.23 E-10 | 1.48 ± 0.8 E-09 | <1.38 E-07 |
| WFWEL07 | <2.00 E-10 | <7.25 E-10 | <1.53 E-07 |
| WFWEL08 | <2.30 E-10 | 4.61 ± 1.1 E-09 | <1.58 E-07 |
| WFWEL09 | <1.67 E-10 | 2.39 ± 0.9 E-09 | <1.31 E-07 |
| WFWEL10 | <1.67 E-10 | 9.67 ± 7.6 E-10 | <1.48 E-07 |

NOTE: All samples were analyzed for gamma-emitting isotopes. Nuclides other than those naturally occurring were not found (Cs-137 was all < 7.0 E-08 μCi/mℓ)

TABLE C - 1.10

Radioactivity of Stream Sediment Around WVDP Site in 1984

Stream Sediment 1984 (upper 6 inches)

| | |
|---|---|
| Buttermilk Creek @ Thomas Corners | |
| 1st Qtr, 1984 (SFTCSED) | $^{137}Cs$ & $^{40}K$ identified* |
| Buttermilk Creek @ Thomas Corners | |
| 3rd Qtr, 1984 (SFTCSED) | $^{137}Cs$ & $^{40}K$ identified* |

| | Concentration (μCi/g)wet | |
|---|---|---|
| 4th Qtr, 1984 | $^{40}K$** | $^{137}Cs$ |
| Buttermilk Creek @ Fox Valley (SFBCSED) | 7.78 ± 0.4 E-06 | 6.72 ± 3.7 E-08 |
| Buttermilk Creek @ Thomas Corners (SFTCSED) | 1.04 ± 0.1 E-05 | 6.40 ± 0.3 E-06 |
| Cattaraugus Creek @ Bigelow Bridge (SFBISED) | 8.21 ± 0.4 E-06 | 4.19 ± 3.6 E-08 |
| Cattaraugus Creek @ Felton Bridge (SFCCSED) | 7.84 ± 1.0 E-06 | 9.40 ± 1.7 E-07 |
| Cattaraugus Creek @ Springville Dam (SFSDSED) | 8.25 ± 1.3 E-06 | 4.36 ± 1.3 E-07 |

*Not quantified, 1st 3 quarters of 1984
**Naturally occurring gamma emitting isotope

NOTE: Sediment was counted at normal moisture of 18%. Moisture determination is an average of measurements made on air-dried sediments from the same locations.

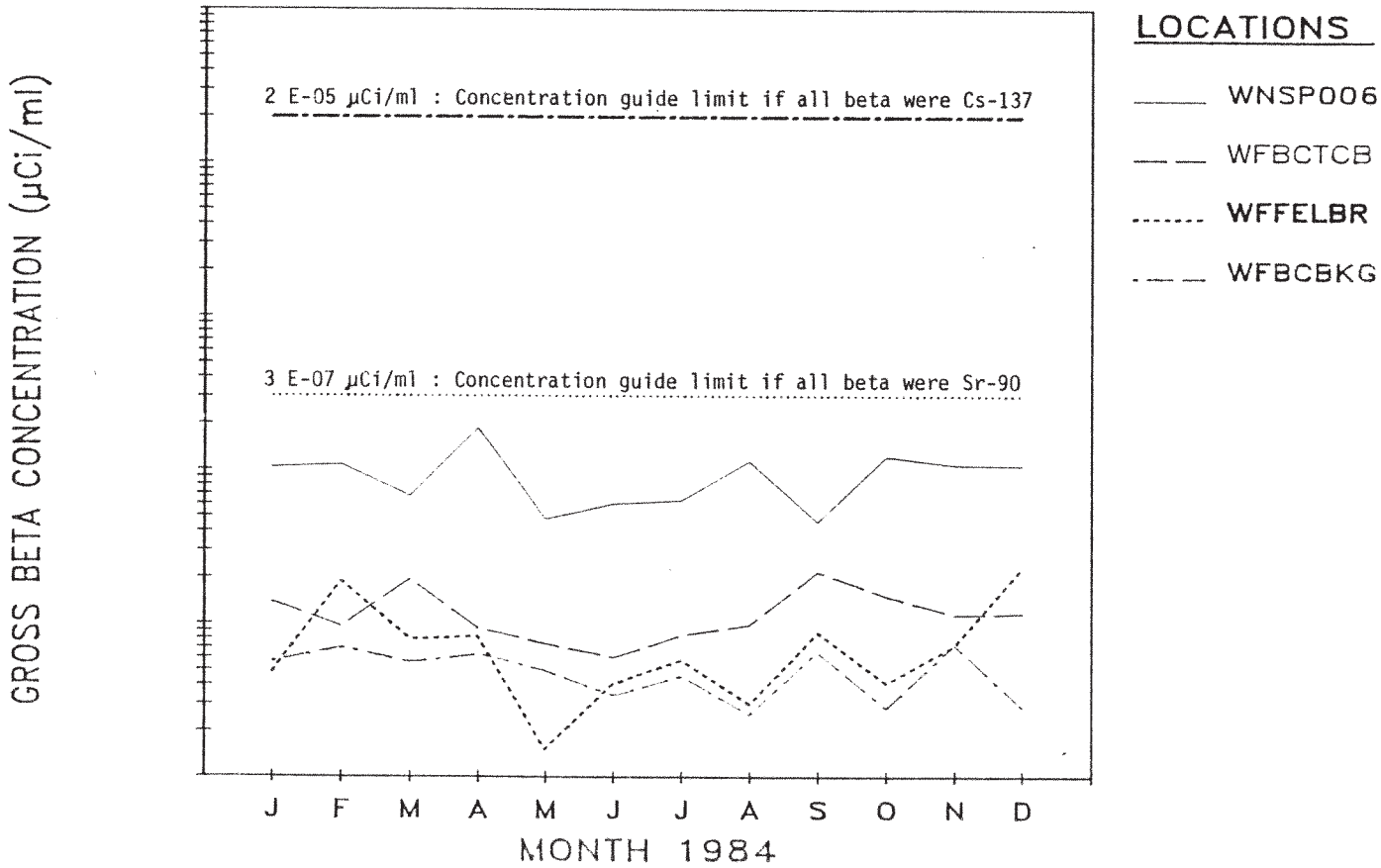
---

TABLE C - 1.11

Contribution by New York Low Level Waste Burial Area to Radioactivity in 1984 WVDP Liquid Effluents (Ci)

| | Gross Alpha | Gross Beta | Tritium |
|---|---|---|---|
| 1984 Totals | <7.6 E-06 | 7.07 ± 0.4 E-03 | 2.68 ± 0.1 E-01 |
| | Sr-90 | I-129 | Cs-137 |
| | 3.47 ± 0.3 E-03 | 2.13 ± 0.5 E-06 | 3.08 ± 1.4 E-05 |

FIGURE C-1.1
GROSS BETA CONCENTRATION IN SURFACE WATER DOWNSTREAM OF WVDP-1984



# APPENDIX C-2

## SUMMARY OF AIR MONITORING DATA

TABLE C - 2.1
1984 AIRBORNE RADIOACTIVE EFFLUENT ACTIVITY TOTALS
FROM MAIN VENTILATION STACK (ANSTACK) CURIES

| | ALPHA | BETA | SR-90 | I-129 | CS-134 | CS-137 |
|---|---|---|---|---|---|---|
| JAN | 1.91+/-0.0 E-06 | 1.07+/-0.0 E-04 | | | | |
| FEB | 4.43+/-0.0 E-07 | 1.21+/-0.0 E-04 | | | | |
| MAR | 8.19+/-0.0 E-07 | 6.52+/-0.0 E-05 | | | | |
| 1ST QTR. | | | 3.71+/-0.4 E-05 | 5.89+/-0.9 E-06 | 1.58+/-0.3 E-06 | 3.20+/-.02 E-04 |
| APR | 4.78+/-0.0 E-07 | 2.82+/-0.0 E-05 | | | | |
| MAY | 1.75+/-0.0 E-06 | 2.51+/-0.0 E-05 | | | | |
| JUN | 1.50+/-0.0 E-06 | 2.38+/-0.0 E-04 | | | | |
| 2ND QTR. | | | 1.04+/-0.1 E-04 | 3.38+/-0.3 E-05 | 5.60+/-1.3 E-07 | 1.07+/-0.1 E.04 |
| JUL | 6.15+/-0.0 E-07 | 1.64+/-0.0 E-05 | | | | |
| AUG | 9.21+/-0.0 E-07 | 4.80+/-0.0 E-05 | | | | |
| SEP | 1.53+/-0.0 E-06 | 3.42+/-0.0 E-05 | | | | |
| 3RD QTR. | | | 1.45+/-0.4 E-05 | 7.93+/-1.9 E-06 | 1.57+/-1.0 E-07 | 2.99+/-.05 E-05 |
| OCT | 3.18+/-0.0 E-07 | 9.37+/-0.0 E-05 | | | | |
| NOV | 5.10+/-0.0 E-07 | 2.02+/-0.0 E-05 | | | | |
| DEC | 2.67+/-0.0 E-07 | 1.31+/-0.0 E-05 | | | | |
| 4TH QTR. | | | 8.46+/-2.0 E-06 | 4.58+/-0.5 E-05 | 2.97+/-1.0 E-07 | 7.69+/-.06 E-05 |
| TOTAL FOR 1984 | 1.11 E-05 | 8.10 E-04 | 1.64 E-04 | 9.35 E-05 | 2.59 E-06 | 5.14 E-04 |
| MAXIMUM PERMISSIBLE* | 4.38 E-02 | 3.11 E-00 | | | | |
| PERCENT OF MAXIMUM PERMISSIBLE | 0.025 | 0.026 | | | | |

*Based on 0.1 mCi/sec alpha plus beta limit from Technical Specifications total volume released - 8.1 E9 cubic metres

WPC0016

TABLE C - 2.2
RADIOACTIVITY CONCENTRATIONS IN AIRBORNE PARTICULATE
AROUND WVDP ENVIRONS-1984

AIR SAMPLER AT THOMAS CORNERS (AFTCORD)

| | UCI/ML ALPHA | UCI/ML BETA |
|---|---|---|
| JAN | 1.21+/-0.8 E-15 | 2.51+/-0.3 E-14 |
| FEB | 7.04+/-5.9 E-16 | 2.07+/-0.3 E-14 |
| MAR | 9.54+/-9.3 E-16 | 1.89+/-0.3 E-14 |
| APR | 6.82+/-6.6 E-16 | 1.41+/-0.3 E-14 |
| MAY | 8.23+/-6.7 E-16 | 1.27+/-0.3 E-14 |
| JUN | 7.17+/-6.0 E-16 | 1.49+/-0.3 E-14 |
| JUL | 6.88+/-6.0 E-16 | 1.77+/-0.3 E-14 |
| AUG | 9.56+/-7.2 E-16 | 1.79+/-0.3 E-14 |
| SEP | 7.69+/-6.3 E-16 | 2.07+/-0.3 E-14 |
| OCT | 1.30+/-0.9 E-15 | 2.82+/-0.3 E-14 |
| NOV | 7.71+/-6.9 E-16 | 2.00+/-0.3 E-14 |
| DEC | 8.56+/-8.3 E-16 | 2.38+/-0.3 E-14 |

AIR SAMPLER AT ROUTE 240 (AFRT240)

| | UCI/ML ALPHA | UCI/ML BETA |
|---|---|---|
| JAN | 1.40+/-1.1 E-15 | 2.82+/-0.5 E-14 |
| FEB | 1.04+/-0.9 E-15 | 2.20+/-0.4 E-14 |
| MAR | 1.68+/-1.1 E-15 | 1.74+/-0.4 E-14 |
| APR | 1.10+/-1.0 E-15 | 1.44+/-0.4 E-14 |
| MAY | 1.00+/-1.0 E-15 | 1.49+/-0.4 E-14 |
| JUN | 8.31+/-7.8 E-16 | 1.78+/-0.4 E-14 |
| JUL | 6.50+/-7.0 E-16 | 1.73+/-0.4 E-14 |
| AUG | 7.83+/-9.9 E-16 | 2.27+/-0.4 E-14 |
| SEP | 1.27+/-1.0 E-15 | 2.19+/-0.4 E-14 |
| OCT | 1.63+/-1.1 E-15 | 2.91+/-0.5 E-14 |
| NOV | 7.80+/-7.4 E-16 | 1.96+/-0.4 E-14 |
| DEC | 1.35+/-1.1 E-15 | 2.34+/-0.4 E-14 |

AIR SAMPLER AT FOX VALLEY (AFFXVAL)

| | UCI/ML ALPHA | UCI/ML BETA |
|---|---|---|
| JAN | 1.21+/-0.7 E-15 | 2.27+/-0.3 E-14 |
| FEB | 8.87+/-6.2 E-16 | 1.74+/-0.3 E-14 |
| MAR | 8.50+/-6.1 E-16 | 1.65+/-0.3 E-14 |
| APR | 9.50+/-7.6 E-16 | 1.22+/-0.3 E-14 |
| MAY | 8.39+/-5.0 E-16 | 1.37+/-0.2 E-14 |
| JUN | 6.34+/-5.0 E-16 | 1.44+/-0.2 E-14 |
| JUL | 6.08+/-6.4 E-16 | 1.70+/-0.3 E-14 |
| AUG | 8.70+/-5.3 E-16 | 2.04+/-0.3 E-14 |
| SEP | 6.99+/-6.2 E-16 | 1.79+/-0.3 E-14 |
| OCT | 8.74+/-6.6 E-16 | 2.44+/-0.3 E-14 |
| NOV | 1.15+/-0.7 E-15 | 1.62+/-0.3 E-14 |
| DEC | 8.60+/-6.3 E-16 | 2.11+/-0.3 E-14 |

AIR SAMPLER AT SPRINGVILLE (AFSPRVL)*

| | UCI/ML ALPHA | UCI/ML BETA |
|---|---|---|
| JUL | 9.97+/-9.9 E-16 | 1.68+/-0.3 E-14 |
| AUG | 1.22+/-0.7 E-15 | 2.21+/-0.3 E-14 |
| SEP | 1.01+/-0.6 E-15 | 1.94+/-0.3 E-14 |
| OCT | 1.01+/-0.6 E-15 | 2.37+/-0.3 E-14 |
| NOV | 7.98+/-5.9 E-16 | 1.96+/-0.3 E-14 |
| DEC | 1.25+/-0.7 E-15 | 2.56+/-0.3 E-14 |

AIR SAMPLER AT ROCK SPRINGS ROAD (AFRSPRD)*

| | UCI/ML ALPHA | UCI/ML BETA |
|---|---|---|
| MAY | 7.31+/-6.4 E-16 | 1.82+/-0.4 E-14 |
| JUN | 7.01+/-5.9 E-16 | 1.57+/-0.3 E-14 |
| DEC | 6.75+/-5.8 E-16 | 1.47+/-0.3 E-14 |

*Sampler operated for only those months reported

TABLE C - 2.3
RADIOACTIVITY IN FALLOUT (nCi/m$^2$/mo)

| MONTH - 1984 | DUTCH HILL (AFDHFOP) GROSS ALPHA | GROSS BETA | H-3 (uCi/ml) | FOX VALLEY ROAD (AFFXFOP) GROSS ALPHA | GROSS BETA | H-3 (uCi/ml) |
|---|---|---|---|---|---|---|
| January | 2.21 E-02 | 0.20+/-0.03 | 2.77+/-1.76 E-07 | 3.23 E-02 | 0.32+/-0.03 | < 1.79 E-07 |
| February | 1.66 E-02 | 0.21+/-0.03 | < 1.85 E-07 | 1.97 E-02 | 0.28+/-0.03 | < 1.72 E-07 |
| March | 1.27 E-02 | 0.14+/-0.02 | < 1.64 E-07 | 1.42 E-02 | 0.22+/-0.02 | < 1.72 E-07 |
| April | SAMPLE | CONTAINER | MISSING | 1.60 E-02 | 0.28+/-0.03 | 5.87+/-1.74 E-07 |
| May | 3.26 E-02 | 0.62+/-0.04 | 7.25+/-1.64 E-07 | 1.77 E-02 | 0.52+/-0.04 | 4.59+/-1.68 E-07 |
| June | 1.38 E-02 | 0.38+/-0.03 | 2.38+/-1.69 E-07 | 1.47 E-02 | 0.33+/-0.03 | < 1.68 E-07 |
| July | 1.23 E-02 | 0.11+/-0.02 | < 1.94 E-07 | 9.08 E-03 | 0.12+/-0.02 | < 1.89 E-07 |
| August | 1.41 E-02 | 0.33+/-0.03 | 1.71+/-1.66 E-07 | 1.41 E-02 | 0.38+/-0.03 | < 1.72 E-07 |
| September | 1.93 E-02 | 0.30+/-0.03 | < 1.67 E-07 | 7.73 E-03 | 0.24+/-0.03 | < 1.67 E-07 |
| October | 1.31 E-02 | 0.23+/-0.03 | < 1.76 E-07 | 8.30 E-03 | 0.23+/-0.03 | < 1.81 E-07 |
| November | 1.74 E-02 | 0.24+/-0.03 | < 1.54 E-07) | 2.30 E-02 | 0.33+/-0.03 | < 1.82 E-07 |
| December | 1.38 E-02 | 0.19+/-0.02 | 2.46+/-1.60 E-07 | 1.38 E-02 | 0.28+/-0.03 | < 1.52 E-07 |

| MONTH - 1984 | ROUTE 240 (AF24FOP) GROSS ALPHA | GROSS BETA | H-3 (uCi/ml) | THOMAS CORNERS ROAD (AFTCFOP) GROSS ALPHA | GROSS BETA | H-3 (uCi/ml) |
|---|---|---|---|---|---|---|
| January | 3.16 E-02 | 0.26+/-0.03 | < 1.70 E-07 | 2.52 E-02 | 0.38+/-0.03 | < 1.73 E-07 |
| February | 2.45 E-02 | 0.26+/-0.03 | < 1.73 E-07 | 3.32 E-02 | 0.34+/-0.03 | < 1.73 E-07 |
| March | 1.03 E-02 | 0.14+/-0.02 | < 1.80 E-07 | 1.51 E-02 | 0.20+/-0.02 | < 1.75 E-07 |
| April | 1.37 E-02 | 0.18+/-0.02 | 2.42+/-1.63 E-07 | 2.08 E-02 | 0.28+/-0.03 | 2.35+/-1.49 E-07 |
| May | 1.92 E-02 | 0.66+/-0.05 | 4.27+/-1.51 E-07 | 2.15 E-02 | 1.07+/-0.06 | 4.66+/-1.58 E-07 |
| June | 1.55 E-02 | 0.31+/-0.03 | < 1.70 E-07 | 1.07 E-02 | 0.28+/-0.03 | 2.22+/-1.64 E-07 |
| July | 9.08 E-03 | 0.14+/-0.02 | < 1.85 E-07 | 1.63 E-02 | 0.13+/-0.02 | < 1.81 E-07 |
| August | 1.64 E-02 | 0.36+/-0.03 | < 1.81 E-07 | 2.06 E-02 | 0.65+/-0.04 | < 1.72 E-07 |
| September | 5.33 E-02 | 0.22+/-0.03 | < 1.76 E-07 | 1.49 E-02 | 0.35+/-0.03 | < 1.66 E-07 |
| October | 1.31 E-02 | 0.25+/-0.03 | < 1.90 E-07 | 2.18 E-02 | 0.25+/-0.03 | < 1.65 E-07 |
| November | 1.82 E-02 | 0.31+/-0.03 | < 1.62 E-07 | 1.35 E-02 | 0.33+/-0.03 | 2.74+/-1.66 E-07 |
| December | 8.38 E-03 | 0.27+/-0.03 | < 1.58 E-07 | 1.15 E-02 | 0.32+/-0.03 | < 1.60 E-07 |

WPC0016

TABLE C - 2.4

TOTAL PRECIPITATION AT WEST VALLEY DEMONSTRATION PROJECT - 1984

| WEEK OF | RAINFALL* | CUM TOTAL FOR 1984 | |
|---|---|---|---|
| JAN 1-4 | 0.23 inches | 0.23 inches | |
| JAN 4-10 | 0.55 inches | 0.78 inches | |
| JAN 10-23 | 0.06 inches | 0.84 inches | |
| JAN 23-30 | 0.23 inches | 1.07 inches | |
| JAN 30-6 | 0.34 inches | 1.41 inches | |
| FEB 6-14 | 0.75 inches | 2.16 inches | |
| FEB 14-20 | 0.55 inches | 2.71 inches | |
| FEB 20-27 | 0.19 inches | 2.90 inches | |
| FEB 27-4 | 1.24 inches | 4.14 inches | |
| MAR 4-12 | 0.30 inches | 4.44 inches | |
| MAR 12-18 | 0.55 inches | 4.99 inches | 1st Quarter Total: 6.01 inches |
| MAR 18-25 | 0.37 inches | 5.36 inches | |
| MAR 25-2 | 0.65 inches | 6.01 inches | |
| APR 2-9 | 1.26 inches | 7.27 inches | |
| APR 9-16 | 0.71 inches | 7.98 inches | |
| APR 16-22 | 0.30 inches | 8.28 inches | |
| APR 22-29 | 1.35 inches | 9.63 inches | |
| APR 29-6 | 1.09 inches | 10.72 inches | |
| MAY 6-13 | 2.59 inches | 13.31 inches | |
| MAY 13-20 | 1.27 inches | 14.58 inches | |
| MAY 20-28 | 2.92 inches | 17.50 inches | |
| MAY 28-3 | 0.30 inches | 17.80 inches | |
| JUN 3-10 | 0.03 inches | 17.83 inches | |
| JUN 10-18 | 5.76 inches | 23.59 inches | 2nd Quarter Total: 18.60 inches |
| JUN 18-24 | 0.87 inches | 24.46 inches | |
| JUN 24-1 | 0.15 inches | 24.61 inches | |

| WEEK OF | RAINFALL* | CUM TOTAL FOR 1984 | |
|---|---|---|---|
| JULY 1-8 | 1.37 inches | 25.98 inches | |
| JULY 8-15 | 0.61 inches | 26.59 inches | |
| JULY 15-22 | 0.37 inches | 26.96 inches | |
| JULY 22-31 | 0.84 inches | 27.80 inches | |
| AUG 1-5 | 0.06 inches | 27.86 inches | |
| AUG 5-12 | 2.43 inches | 30.29 inches | |
| AUG 12-19 | 0.91 inches | 31.20 inches | |
| AUG 19-26 | 0.47 inches | 31.67 inches | |
| AUG 26-3 | 1.73 inches | 33.40 inches | |
| SEPT 3-10 | 0.30 inches | 33.70 inches | |
| SEPT 10-17 | 2.03 inches | 35.73 inches | 3rd Quarter Total: 12.26 inches |
| SEPT 17-24 | 0.04 inches | 35.77 inches | |
| SEPT 24-1 | 1.10 inches | 36.87 inches | |
| OCT 1-8 | 0.19 inches | 37.06 inches | |
| OCT 8-15 | 0.28 inches | 37.34 inches | |
| OCT 15-22 | 0.70 inches | 38.04 inches | |
| OCT 22-29 | 1.02 inches | 39.06 inches | |
| OCT 29-5 | 0.85 inches | 39.91 inches | |
| NOV 5-12 | 1.25 inches | 41.16 inches | |
| NOV 12-19 | 0.65 inches | 41.81 inches | |
| NOV 19-27 | 0.05 inches | 41.86 inches | |
| NOV 27-3 | 1.10 inches | 42.96 inches | |
| DEC 3-10 | 0.85 inches | 43.81 inches | |
| DEC 10-17 | 0.55 inches | 44.36 inches | 4th Quarter Total: 9.74 inches |
| DEC 17-26 | 0.55 inches | 44.91 inches | |
| DEC 26-31 | 1.70 inches | 46.61 inches | |

*Includes snow as equivalent rainfall

# APPENDIX C-3

## SUMMARY OF BIOLOGICAL SAMPLE DATA

TABLE C - 3.1
RADIOACTIVITY CONCENTRATION IN MILK - 1984
(uCi/ml)

| | SR-90 | I-129 | CS-134 | CS-137 |
|---|---|---|---|---|
| Control (BFMCTRL) 2nd QTR. 1984 | 2.88+/-0.4 E-9 | < 6.3 E-10 | < 1.27 E-8 | < 1.24 E-8 |
| NNW Farm (BFMREED) 2nd QTR. 1984 | 1.05+/-0.3 E-9 | < 1.1 E-8* | < 7.54 E-9 | < 6.78 E-9 |
| NNW FARM (BFMREED) 3rd QTR. 1984 | 2.78+/-0.4 E-9 | < 4.2 E-10 | < 9.45 E-9 | < 1.03 E-8 |
| WNW Farm (BFMCOBO) August 1984 | 4.72+/-0.6 E-9 | < 1.3 E-9 | < 1.25 E-8 | < 1.29 E-8 |
| NNW Farm (BFMREED) 4th Qtr. 1984 | 1.53+/-0.3 E-9 | < 3.1 E-10 | < 8.89 E-9 | < 1.01 E-8 |
| ENE Farm (BFMZIMM) September 1984 | 3.93+/-0.8 E-9 | < 2.7 E-9 | _____** | _____** |

*Low sample volume reduced analytical sensitivity.
** This analysis not available

WPC0016

TABLE C - 3.2
RADIOACTIVITY CONCENTRATIONS IN MEAT
(uCi/kg)

| | CS-134 | CS-137 |
|---|---|---|
| Deer Flesh - Near site (BFDNEAR) December 1984 | < 4.66 E-5 | 4.80+/-0.4 E-4 |
| Deer Flesh - Background (BFDCTRL) August 1984 | < 4.76 E-5 | < 5.91 E-5 |
| Beef Flesh - Near site (BFBNEAR) December 1984 | < 3.97 E-5 | < 5.32 E-5 |
| Beef Flesh - Background (BFBCTRL) December 1984 | < 3.16 E-5 | < 4.26 E-5 |

TABLE C - 3.3
RADIOACTIVITY CONCENTRATIONS IN FOOD CROP SEPTEMBER 1984
(uCi/g) DRY

| | SR-90 | K-40 | CO-60 | CS-137 |
|---|---|---|---|---|
| Potatoes (BFVNEAR) | 7.08+/-0.8 E-7 | 1.66+/-0.2 E-5 | < 6.98 E-8 | < 1.67 E-7 |
| Squash (BFVNEAR) | 3.53+/-0.4 E-8 | 1.64+/-0.2 E-5 | < 1.63 E-7 | < 1.34 E-7 |
| Beets (BFVNEAR) | 8.44+/-3.3 E-9 | 3.27+/-0.2 E-5 | < 1.95 E-7 | < 1.71 E-7 |

WPC0016

TABLE C - 3.4
RADIOACTIVITY CONCENTRATIONS IN FISH FROM STREAMS AROUND WVDP

Cattaraugus Creek Fish - 2nd Quarter 1984 (BFFCATC)
Concentration (uCi/kg) Dry

| | SR-90 | Flesh CS-134 | CS-137 | Skeleton SR-90 |
|---|---|---|---|---|
| MEDIAN | 4.60 E-5 | 5.70 E-4 | 5.15 E-4 | 3.20 E-4 |
| AVERAGE GEOMETRIC DEVIATION | 1.60 | 1.88 | 1.75 | 1.44 |
| MAXIMUM | 6.21+/-1.7 E-5 | < 1.23 E-3 | < 1.04 E-3 | 5.04+/-1.0 E-4 |
| MINIMUM | 1.61+/-0.7 E-5 | < 2.96 E-4 | < 3.02 E-4 | 1.99+/-0.9 E-4 |

Cattaraugus Creek Fish - 3rd Quarter 1984
Concentration (uCi/kg) Dry

| | SR-90 | Flesh CS-134 | CS-137 | Skeleton SR-90 |
|---|---|---|---|---|
| MEDIAN | 6.60 E-5 | 5.10 E-4 | 4.05 E-4 | 3.50 E-4 |
| AVERAGE GEOMETRIC DEVIATION | 1.63 | 1.34 | 1.28 | 1.58 |
| MAXIMUM | 8.47 +/-1.5 E-5 | < 6.37 E-4 | < 6.06 E-4 | 5.94+/-0.9 E-4 |
| MINIMUM | < 2.74 E-5 | < 3.10 E-4 | < 3.27 E-4 | < 1.53 E-4 |

Background Fish - 2nd Quarter 1984 (BFFCTRL)
Concentration (uCi/kg) Dry

| | SR-90 | Flesh CS-134 | CS-137 |
|---|---|---|---|
| MEDIAN | 7.50 E-6 | 2.70 E-4 | 2.75 E-4 |
| AVERAGE GEOMETRIC DEVIATION | 2.38 | 1.46 | 1.46 |
| MAXIMUM | 1.95+/-1.2 E-5 | < 3.57 E-4 | < 3.76 E-4 |
| MINIMUM | 2.69+/-2.5 E-6 | < 1.47 E-4 | < 1.51 E-4 |

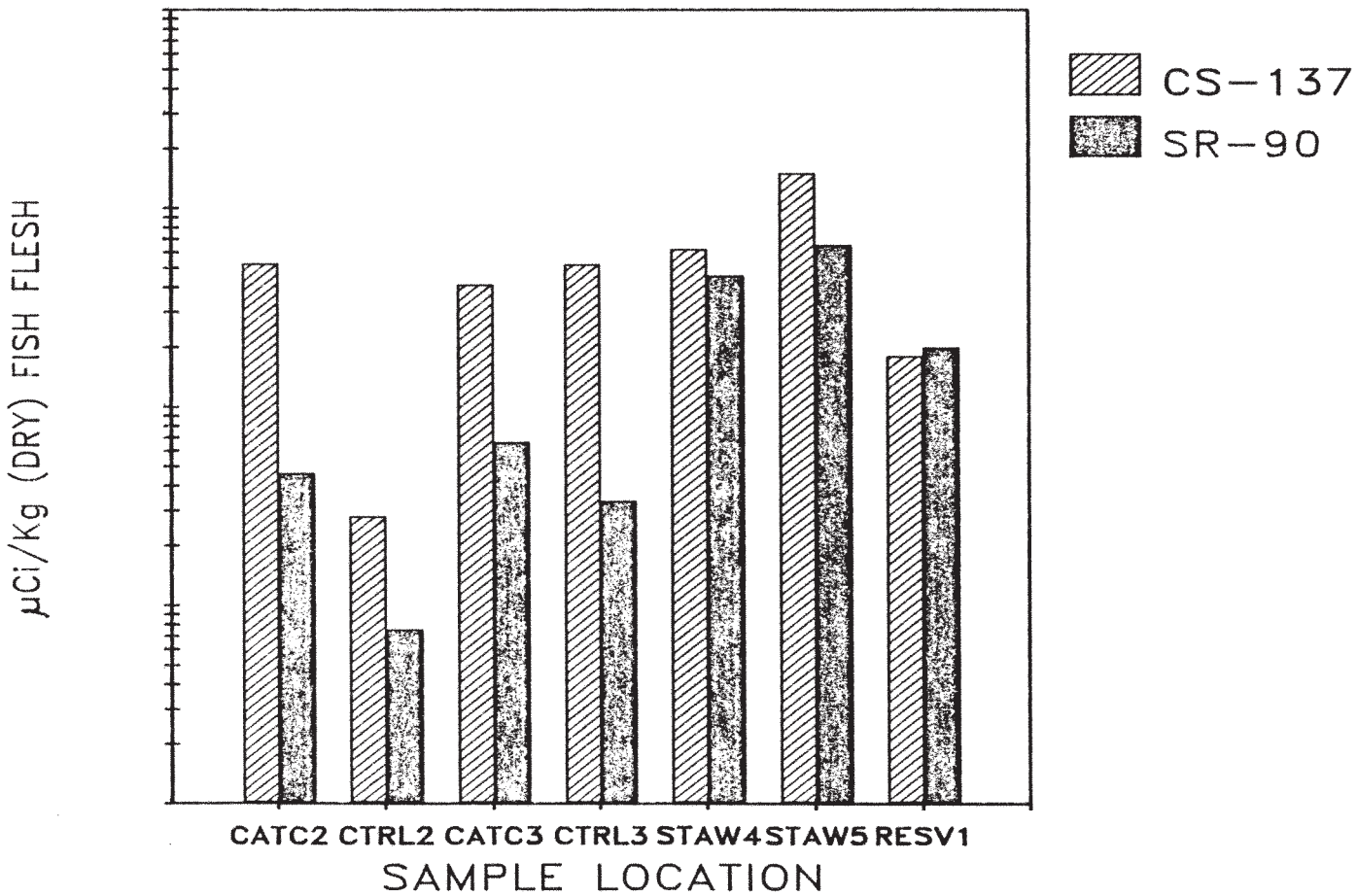
Background Fish - 3rd Quarter 1984
Concentration (uCi/kg) Dry

| | SR-90 | Flesh CS-134 | CS-137 |
|---|---|---|---|
| MEDIAN | 3.33 E-5 | 5.90 E-4 | 5.12 E-4 |
| AVERAGE GEOMETRIC DEVIATION | 1.59 | 1.45 | 1.38 |
| MAXIMUM | 5.22+/-2.0 E-5 | < 8.53 E-4 | < 8.06 E-4 |
| MINIMUM | < 1.88 E-5 | < 3.06 E-4 | < 2.88 E-4 |

TABLE C - 3.5
RADIOACTIVITY CONCENTRATIONS IN FISH
FROM PONDS ON WNYNSC RESTRICTED AREA

| | Background Fish - August 1984 Pond west of site (BNSTAW5) Concentration (uCi/kg) Dry | | | Background Fish August 1984 Reservoir south of site (BNRESV1) Concentration (uCi/kg) Dry | | | Background Fish August 1984 Pond east of site (BNSTAW4) Concentration (uCi/kg) Dry | | |
|---|---|---|---|---|---|---|---|---|---|
| | SR-90 | Flesh CS-134 | CS-137 | SR-90 | Flesh CS-134 | CS-137 | SR-90 | Flesh CS-134 | CS-137 |
| MEDIAN | 6.5 E-4 | 1.67 E-03 | 1.47 E-03 | 1.98 E-04 | 1.62 E-04 | 1.77 E-04 | 4.55 E-04 | 5.60 E-04 | 6.10 E-04 |
| AVERAGE GEOMETRIC DEVIATION | 3.53 | 1.37 | 1.47 | 1.74 | 1.46 | 1.35 | 1.64 | 1.25 | 1.27 |
| MAXIMUM | 1.91+/-0.4 E-03 | < 3.13 E-03 | < 3.49 E-03 | 4.44+/-0.8 E-04 | < 2.53 E-04 | < 2.31 E-04 | 6.68+/-0.9 E-04 | < 7.25 E-04 | < 8.36 E-04 |
| MINIMUM | 1.26+/-0.4 E-04 | < 1.35 E-03 | 1.14 E-03 | 1.06+/-0.2 E-04 | < 9.88 E-05 | < 1.21 E-04 | 1.73+/-0.3 E-04 | < 4.16 E-04 | < 4.54 E-04 |

FIGURE C-3.1
COMPARISON OF RADIOACTIVITY IN FISH
SAMPLES FROM AROUND WVDP-1984



# APPENDIX C-4

## SUMMARY OF DIRECT RADIATION MONITORING

TABLE C-4.1

TLD SUMMARY - 1984

(Roentgen +/- 3SD)

| Location ‡ | 1st Qtr | 2nd Qtr | 3rd Qtr | 4th Qtr | Location Average |
|---|---|---|---|---|---|
| 1 | 0.0079 +/- 0.002 | 0.0104 +/- 0.001 | 0.0172 +/- 0.007 | 0.0144 +/- 0.003 | 0.0125 +/- 0.0041 |
| 2 | 0.0112 +/- 0.002 | 0.0099 +/- 0.002 | 0.0144 +/- 0.006 | 0.0123 +/- 0.003 | 0.0120 +/- 0.0019 |
| 3 | 0.0100 +/- 0.004 | 0.0092 +/- 0.001 | 0.0150 +/- 0.005 | 0.0120 +/- 0.003 | 0.0116 +/- 0.0026 |
| 4 | 0.0105 +/- 0.004 | * | 0.0164 +/- 0.005 | 0.0135 +/- 0.003 | 0.0135 +/- 0.0030 |
| 5 | 0.0117 +/- 0.002 | 0.0082 +/- 0.002 | 0.0148 +/- 0.007 | 0.0132 +/- 0.002 | 0.0120 +/- 0.0028 |
| 6 | 0.0108 +/- 0.006 | 0.0095 +/- 0.003 | 0.0163 +/- 0.011 | 0.0118 +/- 0.003 | 0.0121 +/- 0.0030 |
| 7 | 0.0113 +/- 0.004 | 0.0108 +/- 0.001 | 0.0098 +/- 0.021 | 0.0127 +/- 0.003 | 0.0112 +/- 0.0012 |
| 8 | 0.0116 +/- 0.006 | 0.0088 +/- 0.003 | 0.0140 +/- 0.004 | 0.0120 +/- 0.002 | 0.0116 +/- 0.0021 |
| 9 | 0.0113 +/- 0.003 | 0.0096 +/- 0.006 | 0.0145 +/- 0.007 | 0.0112 +/- 0.004 | 0.0117 +/- 0.0021 |
| 10 | 0.0104 +/- 0.005 | 0.0102 +/- 0.002 | 0.0152 +/- 0.007 | 0.0130 +/- 0.005 | 0.0122 +/- 0.0024 |
| 11 | 0.0145 +/- 0.005 | 0.0115 +/- 0.001 | 0.0178 +/- 0.012 | 0.0132 +/- 0.004 | 0.0143 +/- 0.0027 |
| 12 | 0.0115 +/- 0.003 | 0.0107 +/- 0.001 | 0.0148 +/- 0.011 | 0.0117 +/- 0.004 | 0.0122 +/- 0.0018 |
| 13 | 0.0140 +/- 0.005 | 0.0123 +/- 0.002 | 0.0180 +/- 0.005 | 0.0140 +/- 0.004 | 0.0146 +/- 0.0024 |
| 14 | 0.0134 +/- 0.005 | 0.0123 +/- 0.003 | 0.0155 +/- 0.007 | 0.0132 +/- 0.004 | 0.0136 +/- 0.0014 |
| 15 | 0.0133 +/- 0.002 | 0.0125 +/- 0.002 | 0.0151 +/- 0.007 | 0.0130 +/- 0.004 | 0.0135 +/- 0.0011 |
| 16 | 0.0120 +/- 0.005 | 0.0128 +/- 0.002 | 0.0175 +/- 0.011 | 0.0147 +/- 0.004 | 0.0143 +/- 0.0024 |
| 17 | 0.0118 +/- 0.004 | 0.0129 +/- 0.002 | 0.0192 +/- 0.011 | 0.0138 +/- 0.004 | 0.0144 +/- 0.0033 |
| 18 | 0.0147 +/- 0.004 | 0.0133 +/- 0.002 | 0.0229 +/- 0.003 | 0.0176 +/- 0.004 | 0.0171 +/- 0.0042 |
| 19 | 0.0143 +/- 0.004 | 0.0138 +/- 0.003 | 0.0193 +/- 0.005 | 0.0139 +/- 0.004 | 0.0153 +/- 0.0027 |
| 20 | ** | 0.0125 +/- 0.003 | 0.0161 +/- 0.010 | 0.0119 +/- 0.002 | 0.0135 +/- 0.0023 |
| Quarterly Average | 0.0119 +/- 0.0018 | 0.0111 +/- 0.0017 | 0.0162 +/- 0.0026 | 0.0132 +/- 0.0014 | 0.0131 +/- 0.0015 |

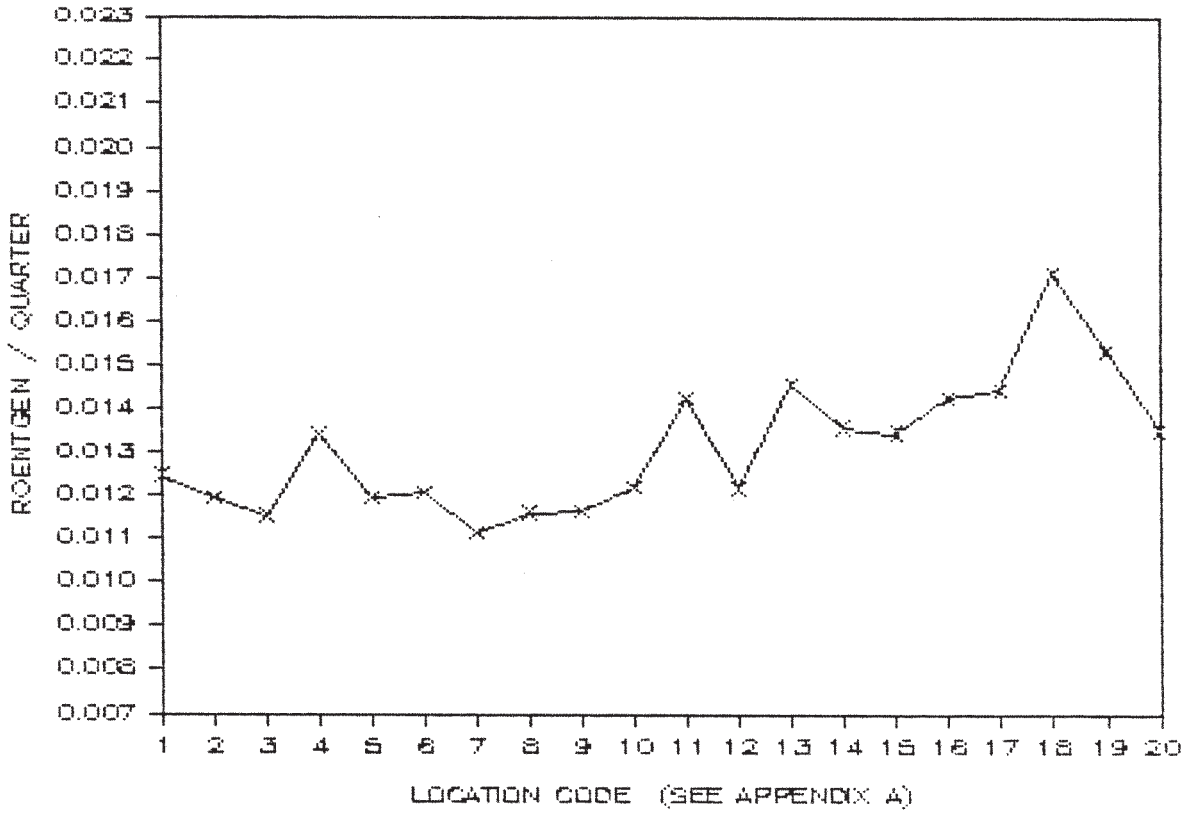
* - TLD Package Destroyed By Animals

** - TLD Package Not Placed Until Second Quarter

‡ - See Figure A-1 for locations

FIGURE C-4.1

SUMMARY OF AVERAGE GAMMA RADIATION AROUND WVDP - 1984



# APPENDIX C-5

# SUMMARY OF NONRADIOLOGICAL MONITORING

## APPENDIX C-5 - SUMMARY OF NONRADIOLOGICAL MONITORING

Nonradiological emissions and plant effluents are controlled and permitted under the New York State and USEPA pollution discharge elimination system. Airborne emissions arise from two natural gas-fired boilers, two nitric acid tank vents, an office paper waste incinerator, and a glass melter off gas scrubber - all of which are covered under New York State permits. Plant liquid effluents controlled by the National Pollution Discharge Elimination System (NPDES) include two points in the LLWT process stream (points 001 and 002), the sewage treatment plant effluent (004), the steam system condensate and water treatment filter drain (005), and the combined plant effluent discharge point (006). The locations of these points are shown in Figure C-5.1 and described in Table C-5.1. Environmental permits for WVDP are identified and described in Table C-5.2.

A third point in the LLWT stream, effluent from the New York State burial ground lagoon, is included in the permit as SPDES 003. This point is monitored only for radioactivity and volume but upper limits are not imposed because this stream is regulated after treatment at points 001, 002 and 006.

Although there are periodic New York State inspections of the air emission points, routine sampling and analysis of Nonradiological emissions from these points are not required. Discharges from these points are well below the levels requiring monitoring under the state permit system.

The water effluent points are sampled for specific chemical parameters depending on the effluent stream characteristics. During discharges, liquid effluents are monitored at point 001 for heavy metals (Ba, Cr, Cu, Pb, Mn, Ni and Zn), unionized ammonia, suspended solids, pH and temperature. Suspended solids are also measured in the LLWT plant (002) during plant operations, monthly at the Utility Room discharge (005), and quarterly at the sewage

treatment plant outfall (004). BOD-5 is also measured quarterly at point 004. Samples are collected twice a month at point 006 for iron, ammonia, pH and temperature; the latter three values are used to calculate unionized ammonia. Measurements of pH are made monthly at point 005 and weekly at point 004. Settleable solids are also measured weekly at point 004.

Radioactivity is also reported for points 001, 003, and 004 under the SPDES reporting system, but radionuclide discharge limits are not imposed by the state permits.

The results of the SPDES Nonradiological monitoring and reporting program for all six outfalls are presented in Figures C-5.2 through C-5.26. The SPDES sampling and analysis program is summarized in Table C-5.4.

Noncompliance Episodes

In 1984 a total of 18 WVDP discharges exceeded the maximum permitted limits. These noncompliance episodes are summarized in Table C-5.3.

Six noncompliances were related to operation of the sewage treatment plant, an extended aeration system capable of treating 5,000 gallons of raw sewage per day. The expansion of the WVDP work force over the past year has resulted in increased sewage volumes which now exceed the capacity of the treatment plant. Hence, BOD-5 levels have been inadequate and pH is more difficult to control. These problems are expected to be solved when a new 10,000 gpd extended aeration plant is brought on-line.

Seven noncompliance episodes were for iron concentrations in Erdman Brook at SPDES 006. This has been a continuing problem at the WVDP because of the naturally high (with respect to the permit limits) iron in the raw water supply. This iron, primarily of the particulate form, is collected on the raw water clarifier. When the clarifier is backflushed, the iron particulates are released as a concentrated slug via SPDES outfall 005 to Erdman Brook. The SPDES permit requires that outfall 005 be sampled during filter backwash.

This problem is expected to be solved when all Project nonradioactive contaminated outfalls are combined into a single discharge point. As part of a Project-wide effort to reduce volumes of noncontaminated water that are processed through the Low-Level Waste Treatment System, several process streams will be routed to a flow equalization basin which will also contain effluents from outfalls 004 and 005. Combination of these streams will integrate the effects of slug discharges over a larger volume of water and will make monitoring and discharge control easier.

Two specific noncompliances, unionized ammonia at SPDES 001 (1/84) and pH at SPDES 005 (11/84), are the result of analytical and sample control errors. During 1984, WVDP on-site analytical capabilities have been expanded to allow all SPDES sample analysis to be performed on-site. This will provide timely analysis and allow suspect streams to be resampled within the required sampling time frame.

The sole pH excursion at SPDES 001 was the result of the accidental addition of a small amount of caustic to the LLWTF effluent. Because this effluent had been previously treated by ion exchange, its buffering ability was greatly reduced and the caustic caused a rapid change in pH for a brief period.

The two remaining permit excursions are for slightly elevated lead concentrations at SPDES 001. The cause of these excursions at this outfall is being investigated but is unknown at present.

TABLE C-5.1

West Valley Demonstration Project

State Pollution Discharge Elimination System

Monitoring Locations

| Location # | Name | Description |
|---|---|---|
| 001 | Lagoon 3 | o Batch Discharge of Treated Process Water to Erdman Brook |
| | | o Monitored for: pH, flow, temperature, total suspended solids, unionized ammonia, and heavy metals |
| | | o Approximately 52,000 $m^3$ discharged in 1984 |
| 002 | Low Level Waste Treatment Facility (LLWTF) | o Effluent from flocculation/ clarifier ion exchange treatment system for process liquid effluents |
| | | o Batch operated; discharged to Lagoon 3 |
| | | o Monitored for: total suspended solids |
| 003 | New York State Commercial Low-Level Waste Burial Trench Leachate Collection Lagoon | o Lagoon used infrequently (approximately every 3-4 years) to collect infiltration/leachate from trench in NYS Commercial LLW Burial Ground for processing in LLWTF |
| | | o Precipitation collected in lagoon is transferred to LLWTF 2-3 times per year |
| | | o DOE required to accept this stream per cooperative agreement with New York State |

TABLE C-5.1 (continued)

| Location # | Name | Description |
|---|---|---|
| | | o Monitored for: flow |
| | | o Approximately 700 $m^3$ transferred in 1984 |
| 004 | Sewage Treatment Plant | o Extended aeration plant |
| | | o Continuous discharge to Erdman Brook |
| | | o Monitored for: BOD-5, pH, total suspended solids, and settleable solids |
| 005 | Utility Room Discharge | o Continuous overflow of raw water clarifier |
| | | o Intermittent backflush of clarifier |
| | | o Discharges to Erdman Brook |
| | | o Monitored for: pH, total suspended solids |
| 006 | Erdman Brook | o Receiving stream for all Project liquid effluents |
| | | o Located downstream from outfalls 001, 004, and 005 |
| | | o Monitored for: temperature, pH, ammonia, unionized ammonia, and iron |

Table C-5.2

West Valley Demonstration Project

Environmental Permits

| Permit # | Issued by | Expiration Date | Type of Permit |
|---|---|---|---|
| 042200-0114-00002 WC | NYSDEC | 6/89 | Certificate to operate air contamination source - boiler |
| 042200-0114-00003 WC | NYSDEC | 6/89 | Certificate to operate air contamination source - boiler |
| 042200-0114-00004 WR | NYSDEC | 6/89 | Certificate to operate air contamination source - incinerator |
| 042200-0114-00010 WI | NYSDEC | 6/89 | Certificate to operate air contamination source - Low Level Waste Treatment Facility Nitric Acid Storage Tank |
| 042200-0114-01401 WI | NYSDEC | 6/89 | Certificate to operate air contamination source - Nitric Acid Bulk Storage Tank |
| 042200-0114-08401-I | NYSDEC | 12/85 | Certificate to operate air contamination source - Glass Melter Off-Gas System |
| NY-0000973 | NYSDEC | 7/83 * | State Pollution Discharge Elimination System (SPDES permit) |

*Permit is presently undergoing renewal review by NYSDEC.

Table C-5.3
West Valley Demonstration Project
1984 SPDES Noncompliance Episodes

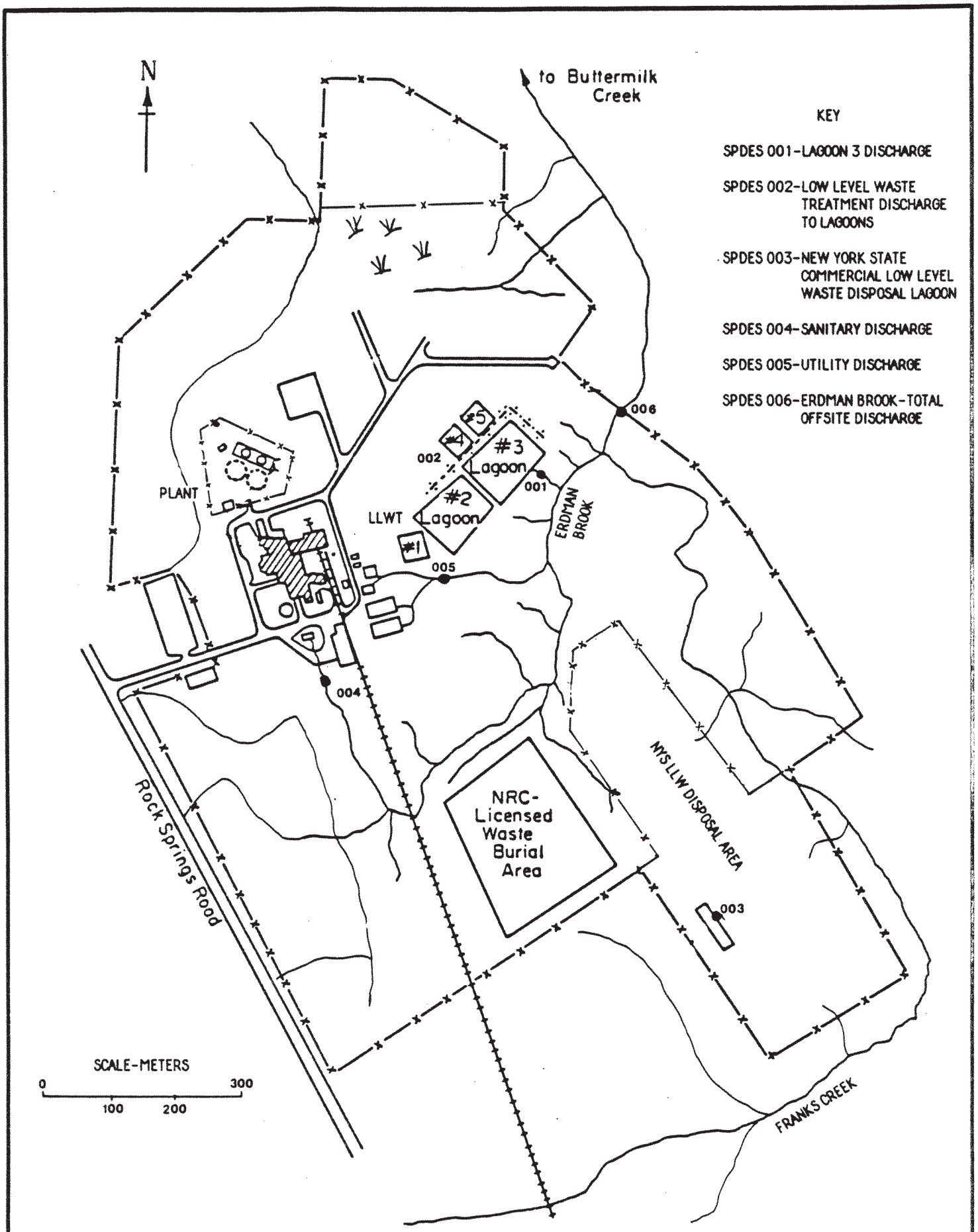
| Date | Outfall | Parameter | Limit | Value |
|---|---|---|---|---|
| 1/84 | 001 | Unionized Ammonia | 0.15 mg/l | < 0.2 mg/l |
| | 004 | BOD-5 | 45 mg/l | 51 mg/l |
| 2/84 | 006 | Iron | 1.00 mg/l | 2.4; 1.8 mg/l |
| 4/84 | 004 | BOD-5 | 45 mg/l | 79 mg/l |
| | 006 | Iron | 1.00 mg/l | 1.4 mg/l |
| 5/84 | 001 | Lead | 0.03 mg/l | 0.06 mg/l |
| | 006 | Iron | 1.00 mg/l | 1.1 mg/l |
| 6/84 | 004 | Settleable Solids | 0.3 ml/l | 1.76/5.0 ml/l |
| 7/84 | 004 | pH | 6.0 - 9.0 | 5.6 |
| | 004 | BOD-5 | 45 mg/l | 130 mg/l |
| 8/84 | 001 | Lead | 0.03 mg/l | 0.04 mg/l |
| | 001 | pH | 6.0 - 9.0 | 9.8 |
| | 006 | Iron | 1.0 mg/l | 2.8 mg/l |
| 9/84 | 004 | pH | 6.0 - 9.0 | 5.9 |
| 10/84 | 006 | Iron | 1.0 mg/l | 1.2 mg/l |
| 11/84 | 005 | pH | 6.0 - 9.0 | Data unavailable |
| | 006 | Iron | 1.0 mg/l | 4.5 mg/l |
| 12/84 | 005 | Iron | 1.0 mg/l | 2.53 mg/l |

Table C-5.4

West Valley Demonstration Project

SPDES Sampling Program

| Outfall # | Parameter | Limit | Sampling Frequency |
|---|---|---|---|
| 001 | Barium | 1.0 mg/l | Monthly during discharge |
| | Chromium | 0.05 mg/l | Monthly during discharge |
| | Copper | 0.2 mg/l | Monthly during discharge |
| | Lead | 0.03 mg/l | Monthly during discharge |
| | Manganese | 1.0 mg/l | Monthly during discharge |
| | Nickel | 0.3 mg/l | Monthly during discharge |
| | Zinc | 0.3 mg/l | Monthly during discharge |
| | Unionized Ammonia | 0.15 mg/l | Monthly during discharge |
| | Total Suspended Solids | No limit | Monthly during discharge |
| | Temperature | 90° F | Monthly during discharge |
| | pH | 6.0 - 9.0 | Monthly during discharge |
| 002 | Total Suspended Solids | 100 mg/l | Monthly |
| 003 | Flow volume | No limit | Per discharge |
| 004 | pH | 6.0 - 9.0 | Weekly |
| | BOD-5 | 45.0 mg/l | Quarterly |
| | Total Suspended Solids | 45.0 mg/l | Quarterly |
| | Settleable Solids | 0.3 ml/l | Weekly |
| 005 | pH | 6.0 - 9.0 | Monthly |
| | Total Suspended Solids | 100.0 mg/l | Monthly |
| 006 | Iron | 1.0 mg/l | Twice per month |
| | Ammonia | 2.0 mg/l | Twice per month |
| | Unionized Ammonia | 0.15 mg/l | Twice per month |
| | pH | 6.0 - 9.0 | Twice per month |
| | Temperature | 32° C | Twice per month |




LOCATIONS OF SPDES MONITORING POINTS ONSITE

FIGURE C-5.1

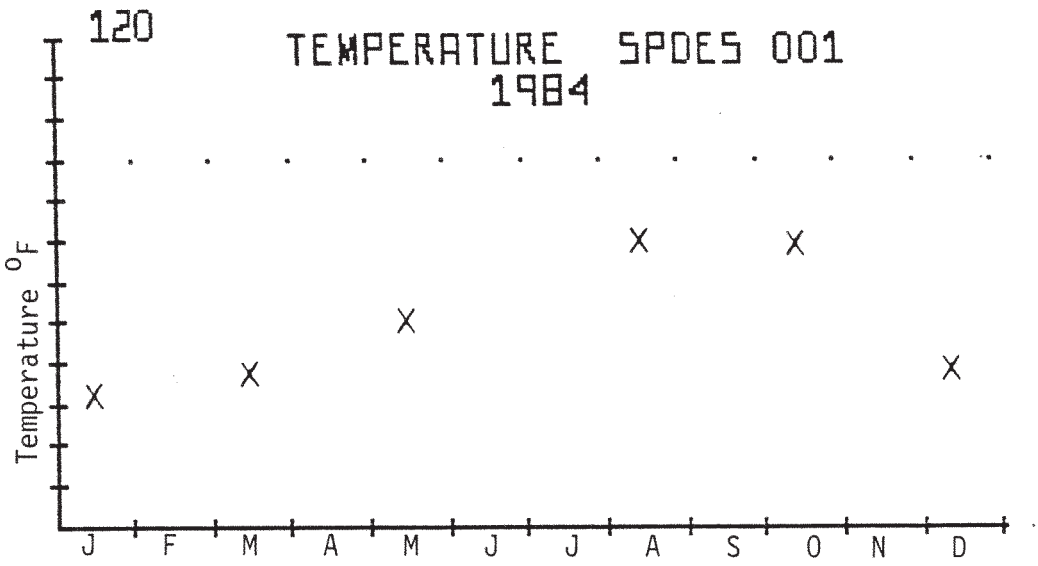



Figure C - 5.2

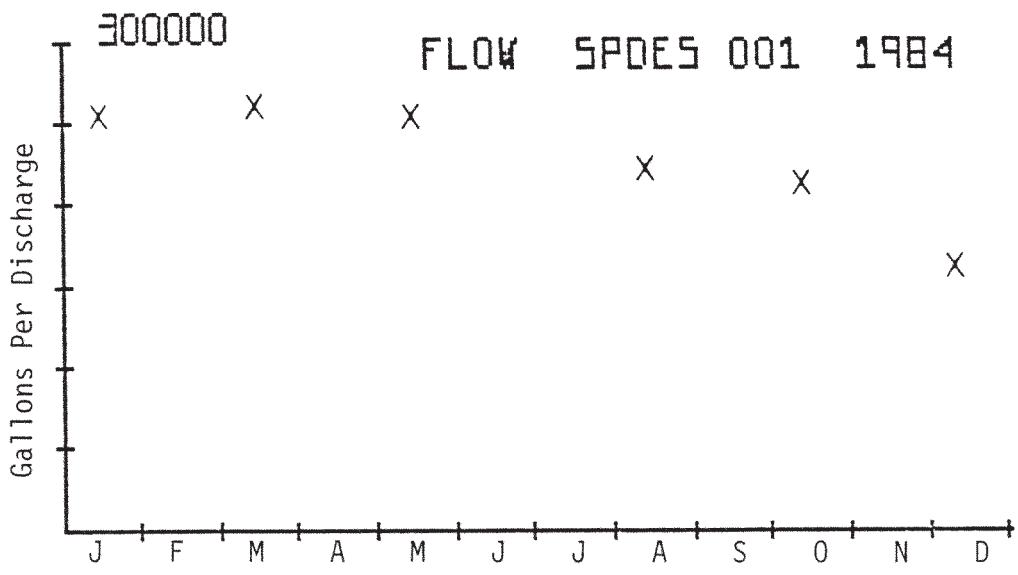



Figure C - 5.3

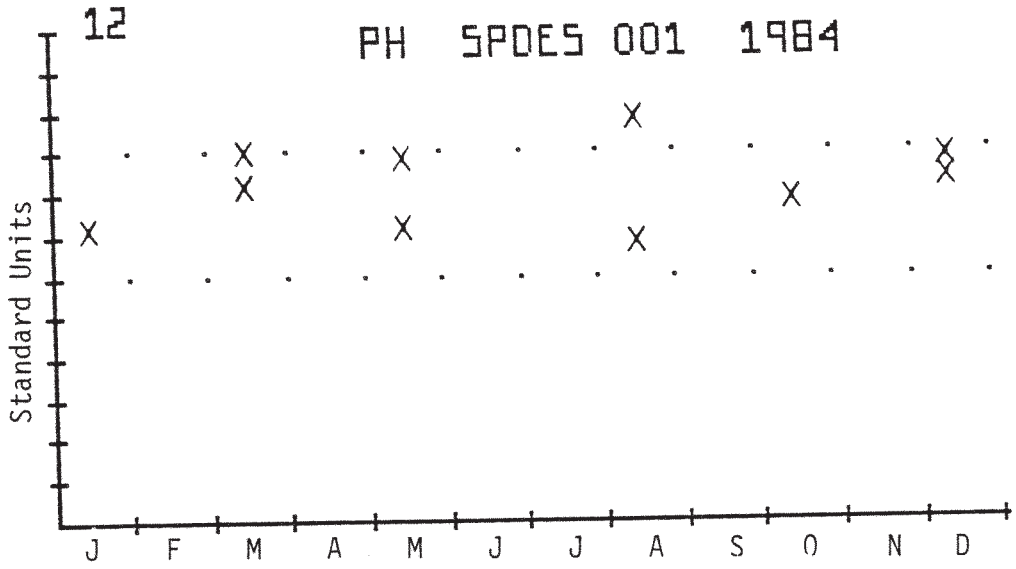



Figure C - 5.4

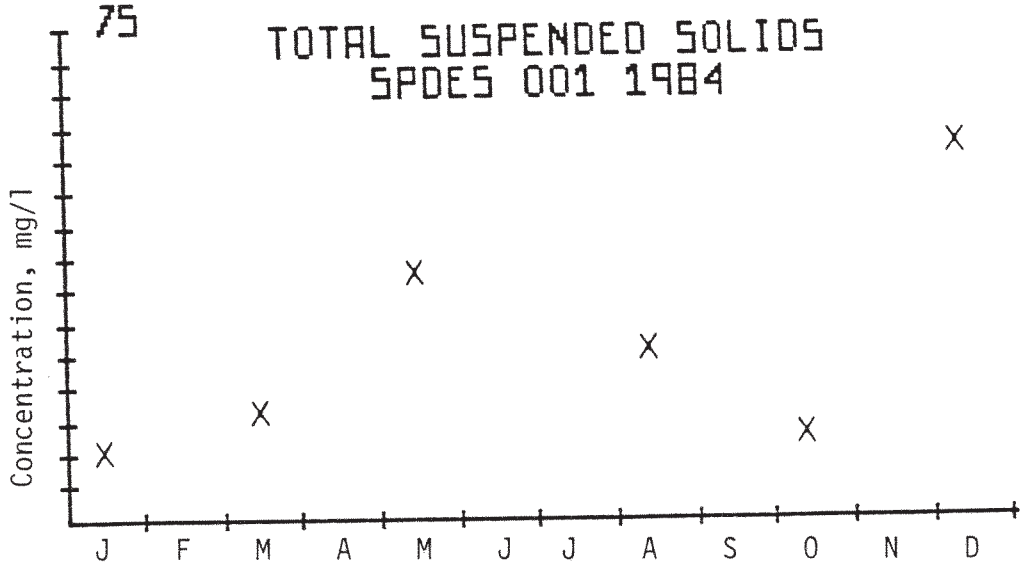



Figure C - 5.5

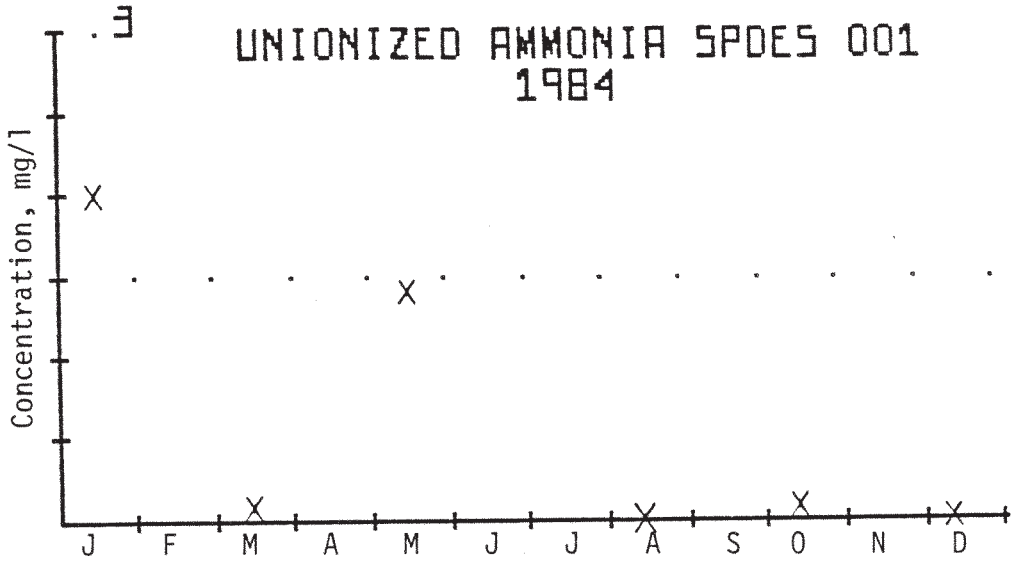



Figure C - 5.6

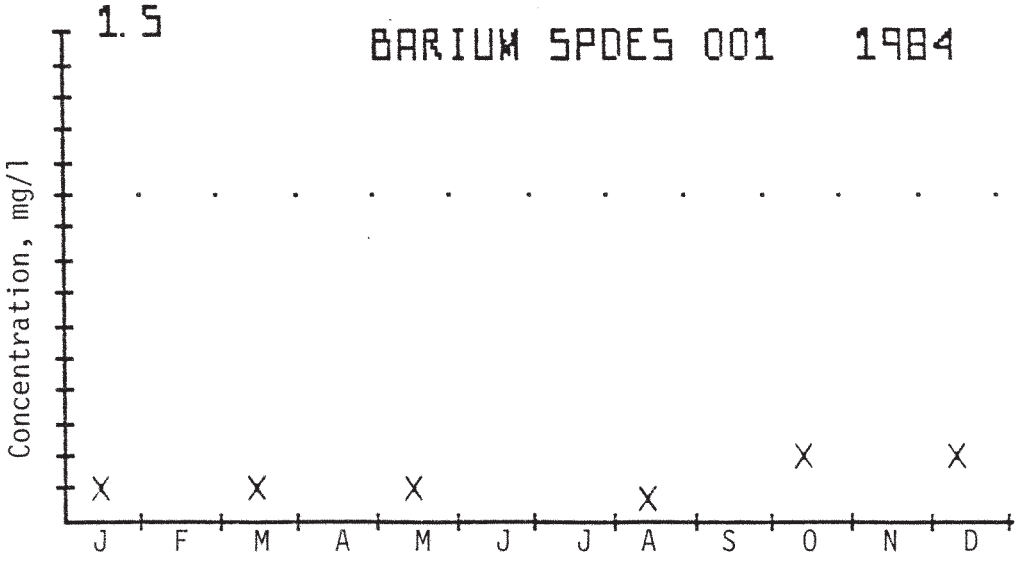



Figure C - 5.7

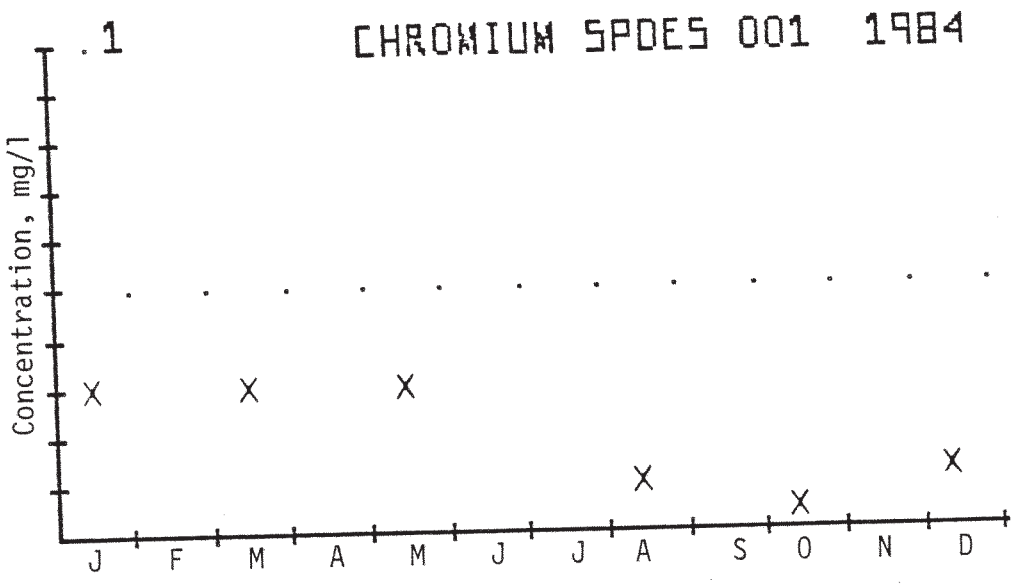



Figure C - 5.8

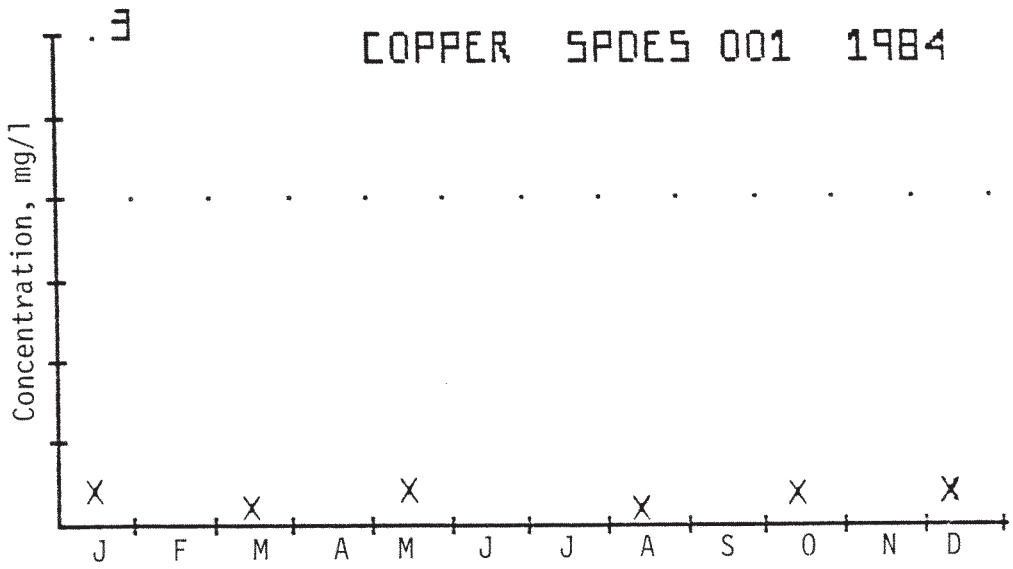



Figure C - 5.9

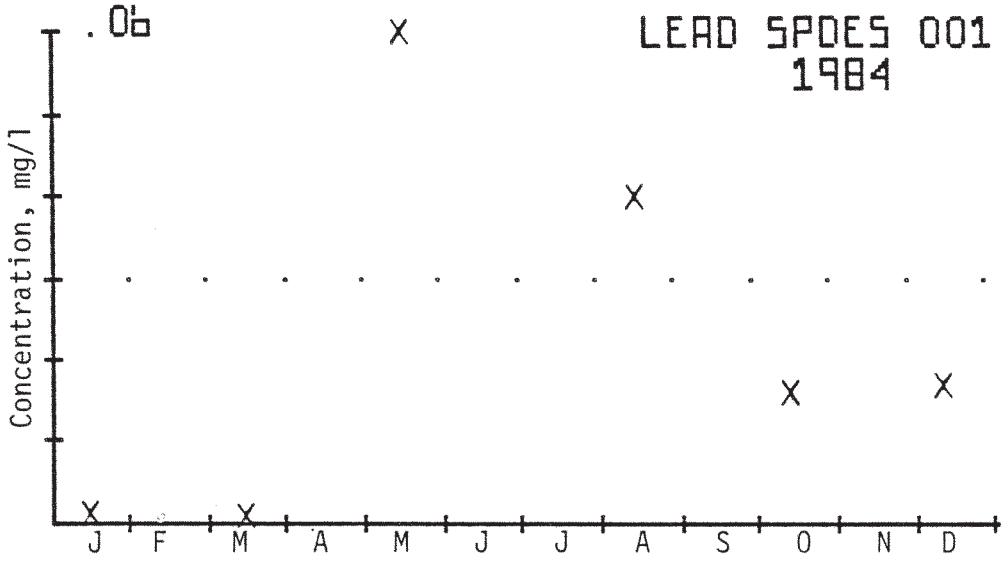



Figure C - 5.10

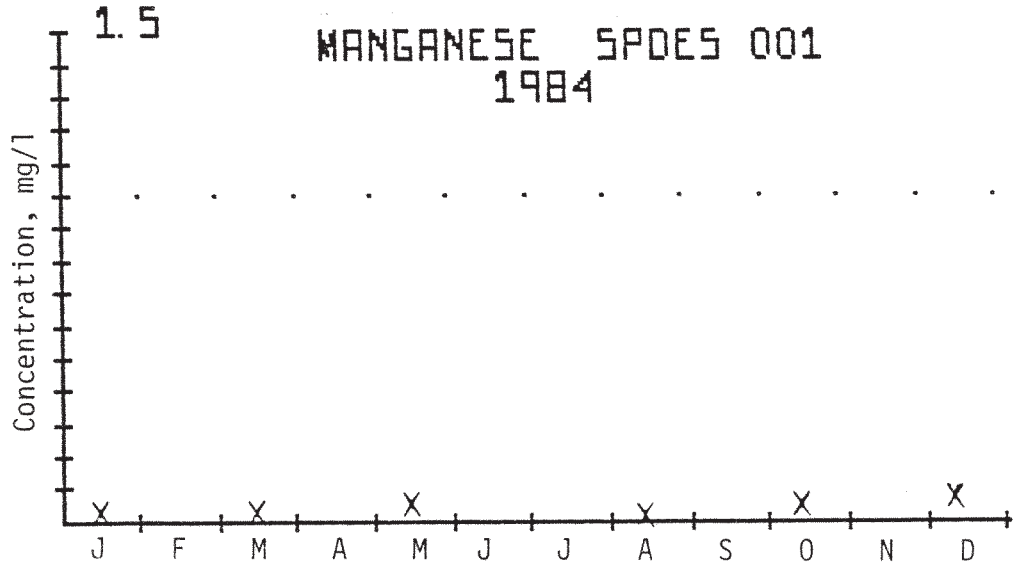



Figure C - 5.11

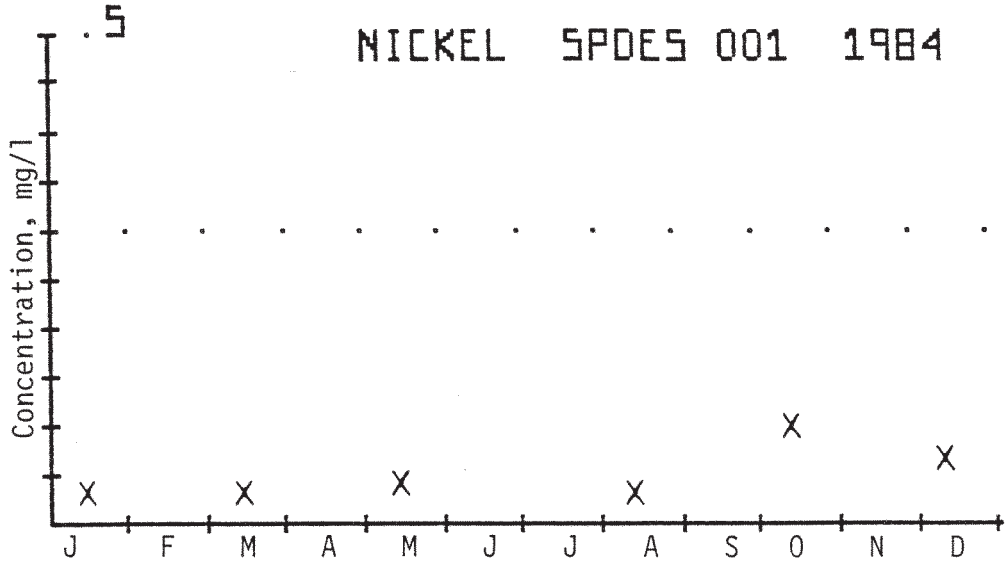



Figure C - 5.12

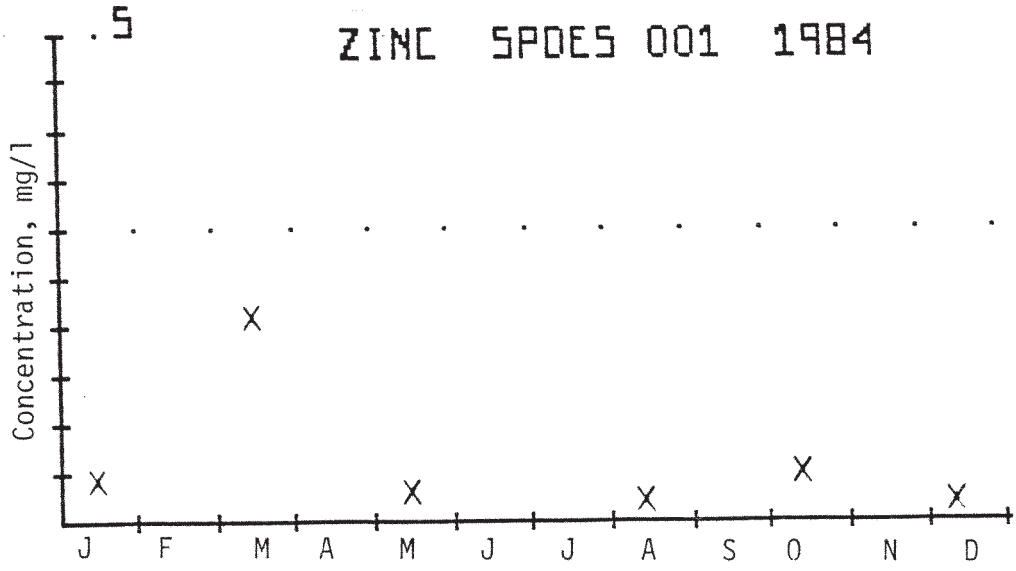



Figure C - 5.13

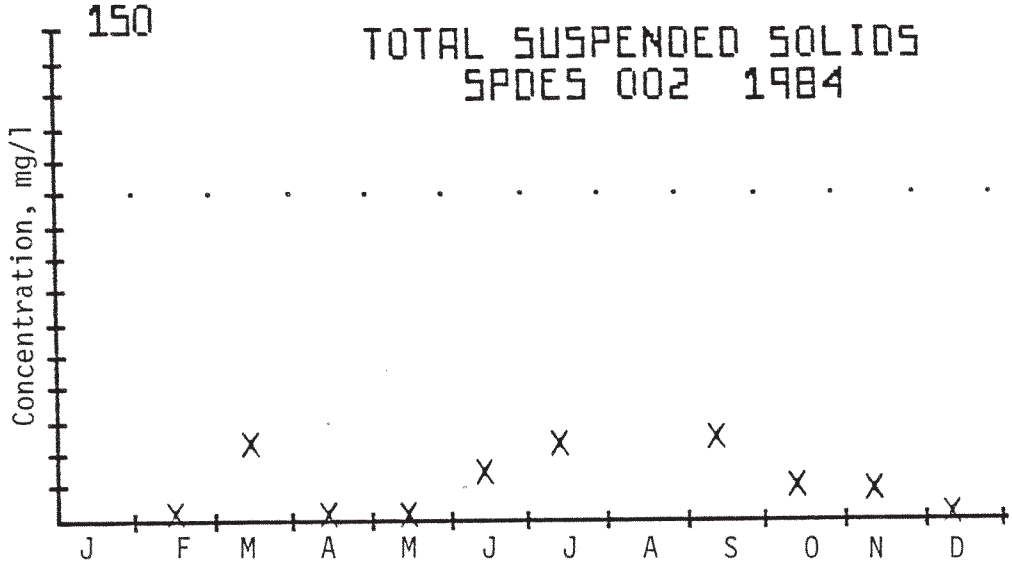



Figure C - 5.14

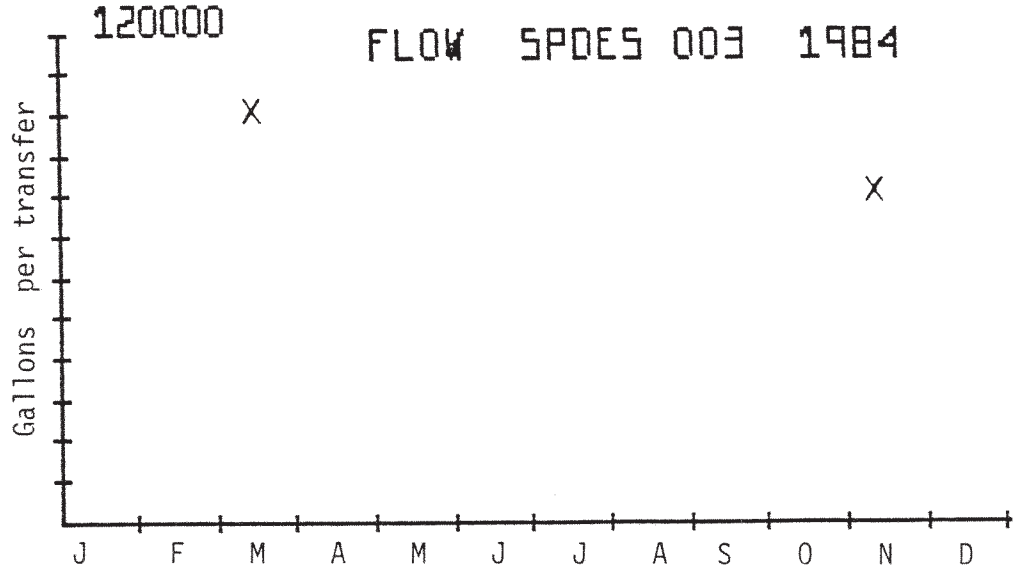



Figure C - 5.15

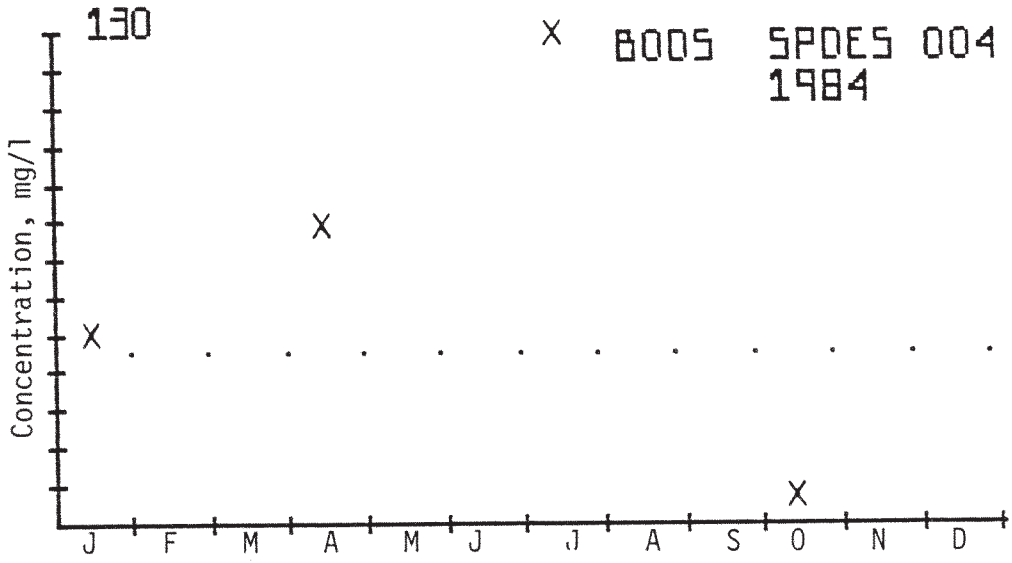



Figure C - 5.16

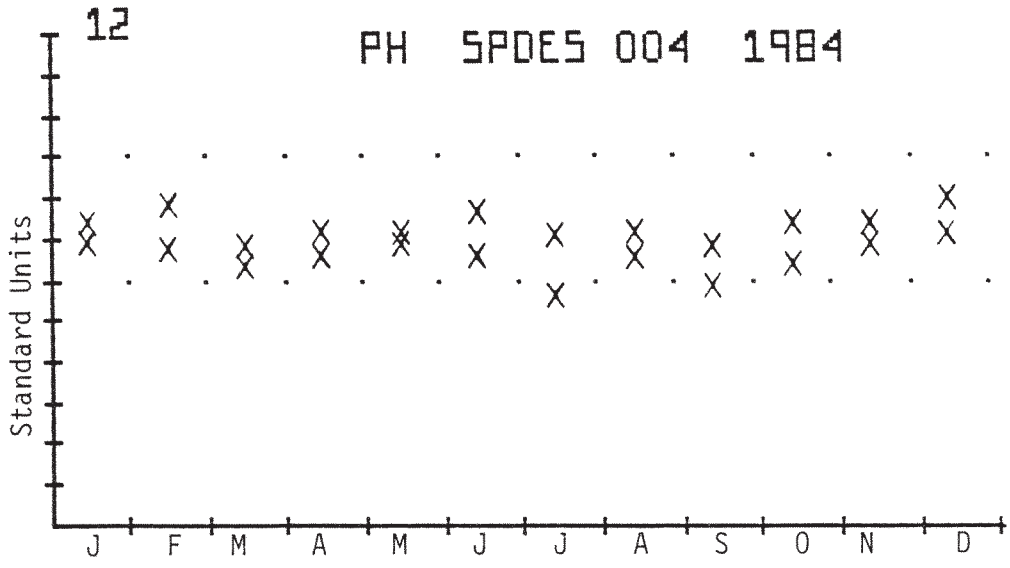



Figure C - 5.17

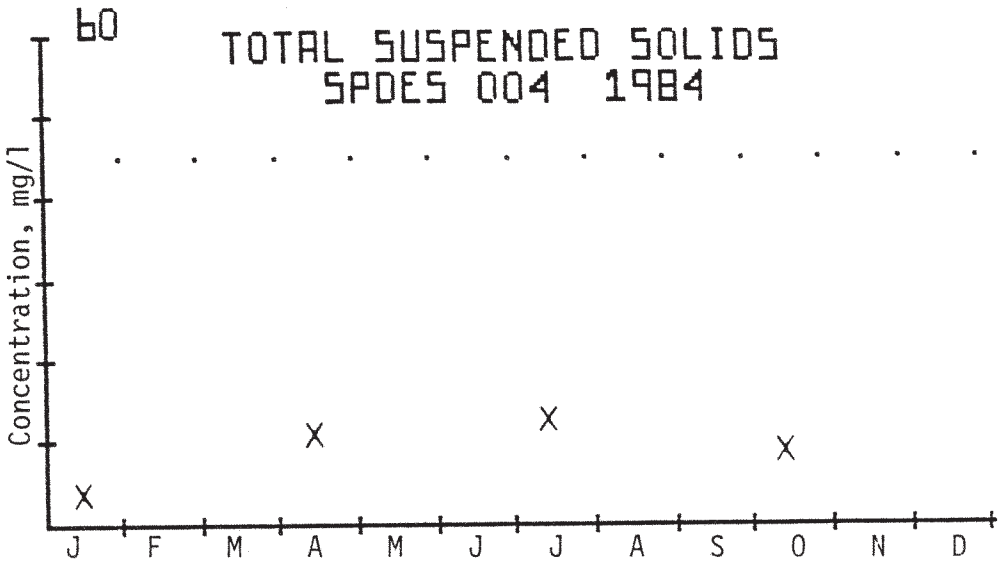



Figure C - 5.18

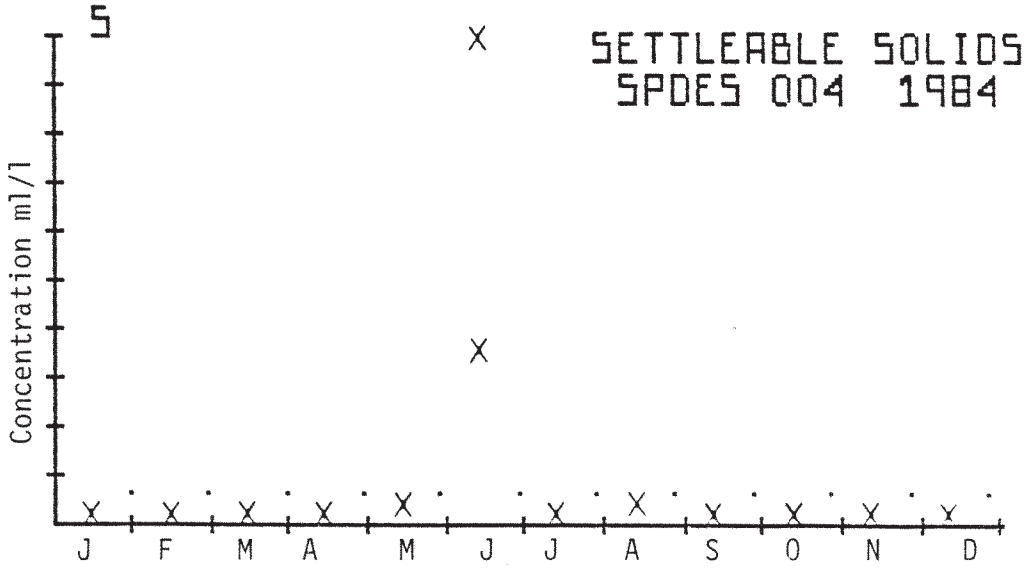



Figure C - 5.19

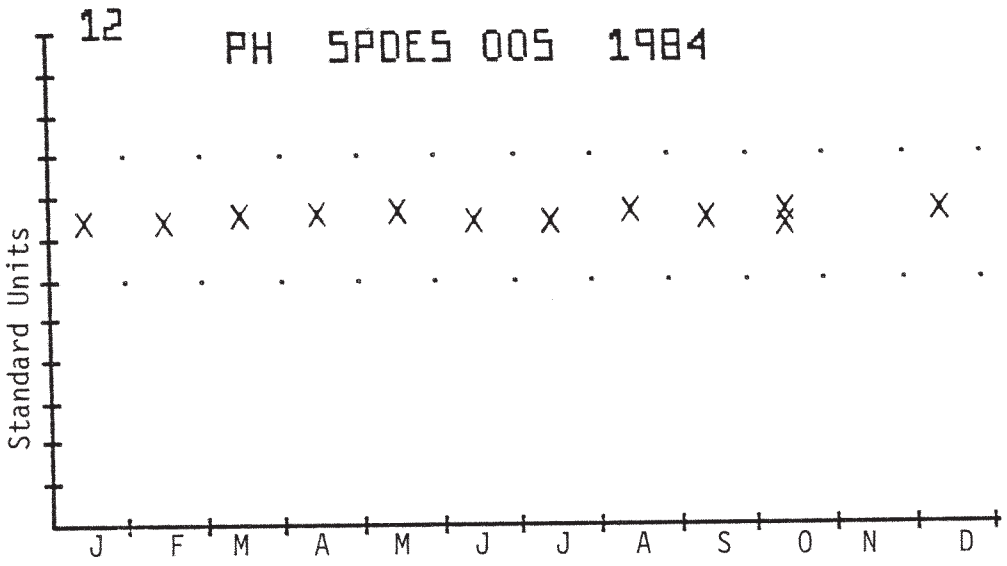



Figure C - 5.20

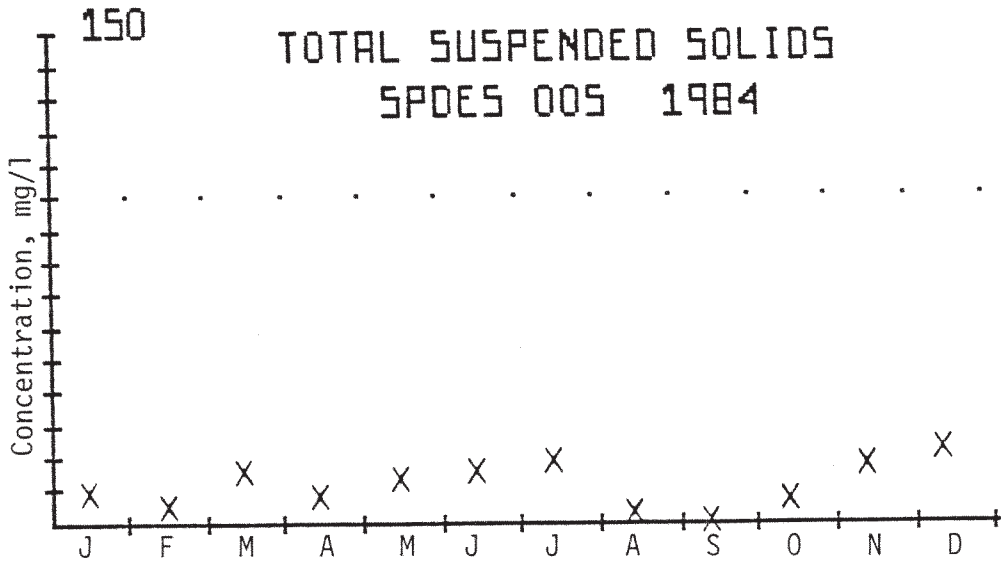



Figure C - 5.21

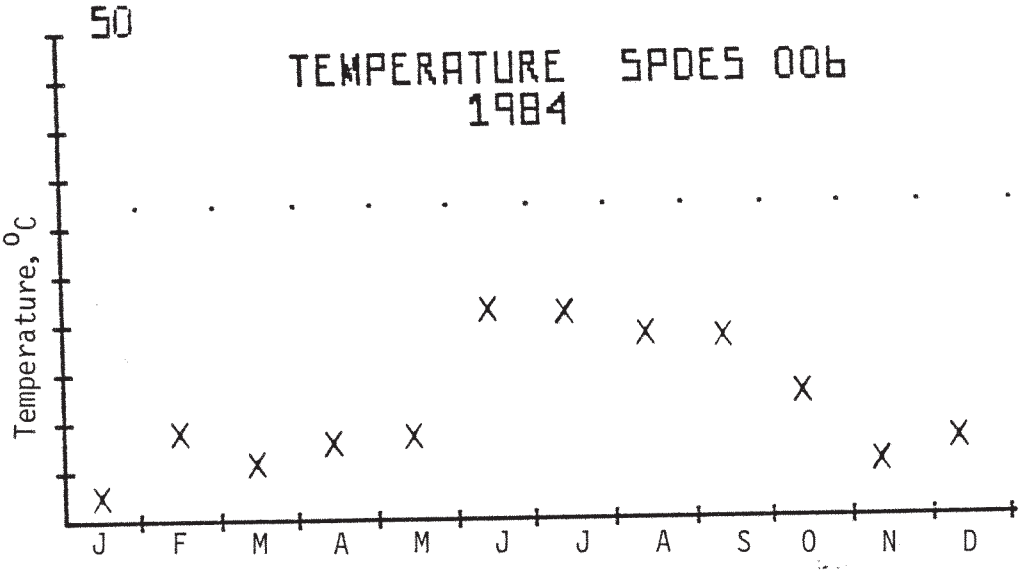



Figure C - 5.22

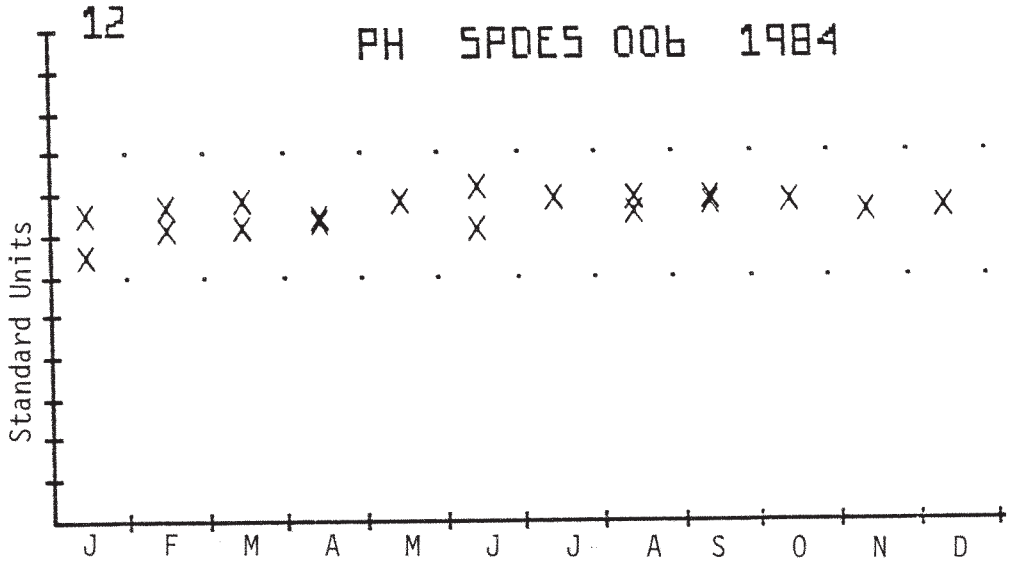



Figure C - 5.23

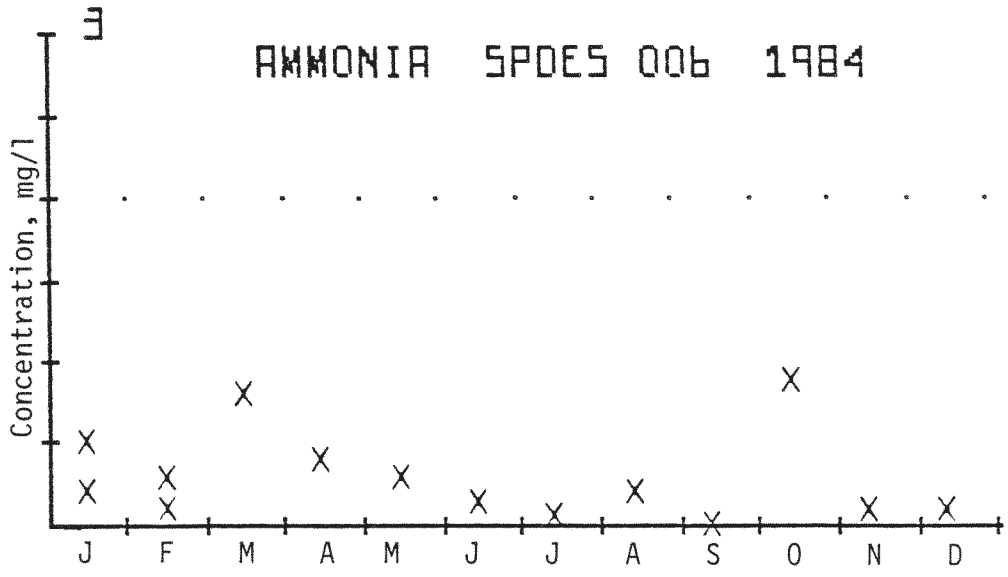



Figure C - 5.24

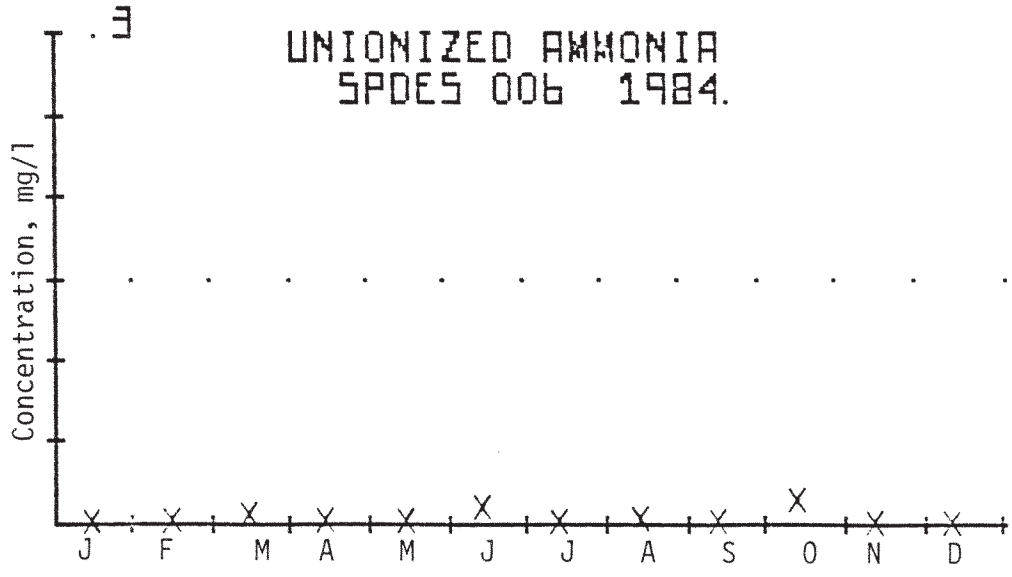



Table C - 5.25

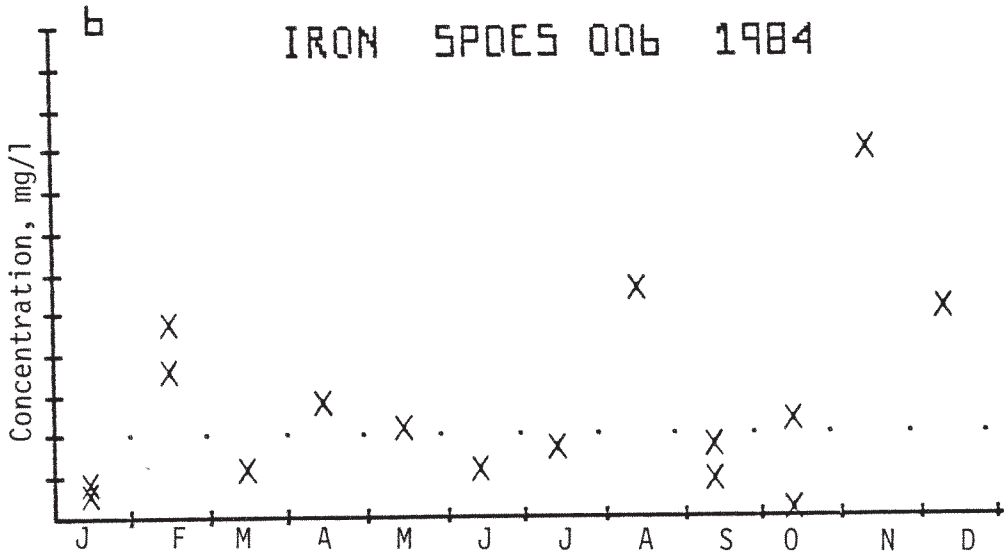



Figure C - 5.26

# APPENDIX D

## SUMMARY OF QUALITY ASSURANCE ANALYSES

TABLE D - 1.1

NON RADIOLOGICAL EPA CROSS-CHECK SUMMARY

| PARAMETER METALS | Report Value (ug/l) | EPA "TRUE VALUE" (ug/l) | LAB PERFORMING THE ANALYSIS |
|---|---|---|---|
| Cr | 134 | 124 | EAL |
| Cu | 274 | 260 | EAL |
| Fe | 979 | 926 | EAL |
| Pb | 364 | 341 | EAL |
| Mn | 614 | 590 | EAL |
| Ni | 365 | 372 | EAL |
| Zn | 337 | 349 | EAL |
| $NH_3$ - N | 6.3 | 5.68 | EAL |
| pH | 7.7 | 7.70 | SITE ENVIRONMENTAL LAB |
| Susp. Solids | 37.6 (mg/l) | 39.9 (mg/l) | SITE ENVIRONMENTAL LAB |
| BOD-5 | 27.0 (mg/l) | 31.1 (mg/l) | EAL |

TABLE D - 1.2

COMPARISON OF RADIOLOGICAL CONCENTRATIONS IN SPLIT SAMPLES - 1984

LABORATORY PERFORMING ANALYSES (Results in µCi/mℓ)

| SAMPLE I.D. | | Date | Parameter | WVDP Env. Lab | WVDP Anal. Lab | EAL | RESL |
|---|---|---|---|---|---|---|---|
| Cattaraugus Creek (WFFELBR) | | Jan., 1984 | Gross B | 4.73 ± 1.1 E-09 | | | <1.0 E-08 |
| | | Feb., 1984 | Gross B | 1.84 ± 0.2 E-08 | | | 1.8 ± 1.2 E-08 |
| | | Mar., 1984 | Gross B | 7.73 ± 1.3 E-09 | | | <1.2 E-08 |
| | | Apr., 1984 | Gross B | 8.16 ± 1.3 E-09 | | | <1.2 E-08 |
| | | May, 1984 | Gross B | 1.47 ± 0.2 E-08 | | | 1.8 ± 1.2 E-08 |
| | | June, 1984 | Gross B | 3.95 ± 1.0 E-09 | | | <1.2 E-08 |
| | | July, 1984 | Gross B | 5.71 ± 1.2 E-09 | | | <1.2 E-08 |
| | | Aug., 1984 | Gross B | 2.93 ± 1.0 E-09 | | | <1.2 E-08 |
| | | Sep., 1984 | Sr-90 | 3.81 ± 1.9 E-09 | | | 3.7 ± 3.1 E-09 |
| | | Oct., 1984 | Sr-90 | 2.31 ± 1.5 E-09 | | | 5 ±4 E-09 |
| | | Nov., 1984 | Sr-90 | 5.91 ± 2.3 E-09 | | | <3.92 E-09 |
| | | Nov., 1984 | Cs-137 | <7.0 E-08 | | | <7.84 E-08 |
| Sewage Outfall Composite (WNSP004) | | Oct., 1984 | Sr-90 | 5.60 ± 1.8 E-09 | | | <3.92 E-09 |
| | | Nov., 1984 | Sr-90 | 1.43 ± 0.3 E-08 | | | 7.0 ± 5.9 E-09 |
| WNBCBKG | | 4th Qtr, 1984 | Sr-90 | 4.75 ± 1.9 E-09 | | 1.83 ± 0.4 E-09 | |
| WNBCTCB | | 4th Qtr, 1984 | Sr-90 | 2.34 ± 0.4 E-08 | | 4.59 ± 1.0 E-09 | |
| WNSP006 | | 4th Qtr, 1984 | Sr-90 | 3.11 ± 0.4 E-08 | | 2.76 ± 0.4 E-08 | |
| Lagoon 3 Effluent | WNSP001 | Oct., 1984 | Sr-90 | 2.37 ± 0.2 E-07 | 1.98 ± 0.2 E-07 | 2.28 ± 0.4 E-07 | |
| | WNSP001 | Dec., 1984 | Sr-90 | 1.85 ± 0.1 E-07 | | 1.69 ± 0.2 E-07 | |
| | WNLAG3B | 10/16/84 | Sr-90 | 2.25 ± 0.2 E-07 | 1.94 ± 0.2 E-07 | | |
| | WNSP001 Comp. | Oct., 1984 | Sr-90 | 2.21 ± 0.2 E-07 | 2.51 ± 0.2 E-07 | 2.34 ± 0.3 E-07 | |
| | WNSP001 Comp. | Dec., 1984 | Sr-90 | 2.09 ± 0.1 E-07 | | 1.76 ± 0.2 E-07 | |
| | WNLAG4D | 10/11/84 | Sr-90 | 2.10 ± 0.2 E-07 | 2.08 ± 0.2 E-07 | | |