UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

2061/4102

OCT 1 1981

PRINCIPAL STAFF			
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MEMORANDUM FOR: J. A. Hind, Director
Division of Emergency Preparedness and Operational Support, RIII

FROM: H. D. Thornburg, Director
Division of Safeguards and Radiological Safety Inspection, IE

SUBJECT: SURVEYS OF RESIDENTIAL SECTIONS AROUND KERR-McGEE, WEST CHICAGO, ILLINOIS (AITS F03039881)

The subject report was well done and adequately covers the purpose, i.e., although the contamination on the Kerr-McGee property is undesirable, it does not appear to be contributing a dose to the public which exceeds maximum permissible limits.

It is our opinion that Region III has taken all necessary actions (under our jurisdiction) with respect to the off site contamination.

As mentioned in your memorandum, Environmental Protection Agency (EPA) - Region V and the State of Illinois, Department of Nuclear Safety (DNS) DNS are the appropriate agencies to perform further studies if they decide they are needed. We should continue to cooperate with these agencies and provide them access to our data and support where possible.

Harold D. Thornburg

Harold D. Thornburg, Director
Division of Safeguards and Radiological
Safety Inspection, IE

CONTACT: D. K. Sly
49-29896

OCT 5 1981

Gas Sampler Log Notes
8/11 - 8/12

Note: $\alpha_{40} = 0.2847$, $\beta_{40} = 0.3389$

1-204 8/3/81 - 8/10/81

1.4 cpm - 1.4 cpm / 0.2847 = 4.92 dpm
= 2.2E-6 μCi

25 lpm 8/3-10/81 7:46a 8/3/81, 7:45 am 8/11

(10080 min)(25 l/m) = 2.52 E5 ml
= 2.52 E8 ml
= 8.73 E-15 μCi/ml

11.3 cpm 11.3 / 0.3389 = 33.34 dpm
= 1.5 E-5 μCi
= 5.95 E-14 μCi/ml

9 Jr high 8/3-10/81

1.0 cpm / α_2 = 3.51 dpm
= 1.6 E-6 μCi
= 4.53 E-15 μCi/ml

(35 l/m)(10082 min) = 3.53 E5
= 3.53 E8 ml

~~1.3 cpm / β_2 = 27.4 dpm~~
~~= 1.24 E-5 μCi~~
~~= 3.50 E-14 μCi/ml~~

6.5 cpm / β_2 = 30.98 dpm
= 1.4 E-5 μCi
= 3.95 E-14 μCi/ml

High School 8/10/81 0723 - 8/17/81 0738
Volume not record
β_{40} / α_2 = 2.46 dpm
= 1.1 E-6 μCi
β_{40} / β_2 = 22.43 dpm
= 1.01 E-5 μCi

Jr. High 8/10/81 0709 - 8/17/81 0718 Volume not record
β_{40} / α_2 = 5.47 dpm
= 2.4 E-6 μCi
β_{40} / β_2 = 23.62 dpm
= 1.27 E-5 μCi

High School 8/17/81 0738 - 8/24/81 0722
l/m)(10084 min) = 2.516 E5 l
= 2.516 E8 ml
= 1.45 cpm = 1.4 E-6 μCi

141

β: 11.9 cpm x / 2 = 35.11 dpm
= 1.55E-5 μCi
= 6.29E-14 μCi/ml

81-208 gr High 8/17/81 0718 - 8/24/81 0711
Volume: No record - sampler turned off @ time of change.

α: 0.5 cpm x / 2 = 1.76 dpm
= 8E-7 μCi

β: 7.7 cpm x / 2 = 2272 dpm
= 1.02E-5 μCi

81-408 Senior High 8/31/81 - 9/3/81 1305
Volume* 9/31/81 on time not recorded

α: 0.7 cpm x / 2 = 2.48 dpm
= 1.11E-6 μCi

β: 5.9 cpm x / 2 = 17.41 dpm
= 7.8E-6 μCi

81-409 gr High 8/31/81 0722 - 9/8/81 1322
Volume: (42 l/m)(13320 m) = 5.5944E5 l
= 5.5944E8 ml

α: 1.6 cpm x / 2 = 5.62 dpm
= 2.5E-6 μCi
= 4.47E-15 μCi/ml

β: 9.1 cpm x / 2 = 26.9 dpm
= 1.21E-5 μCi
= 2.16E-14 μCi/ml

81-434 High School 9/5/81 1305 - 9/14/81 1400
Volume: (30 l/m)(8695 m) = 2.6085E5 l
= 2.6085E8 ml

α: 1.4 cpm x / 2 = 4.92 dpm
= 2.22E-6 μCi
= 8.49E-15 μCi/ml

β: 9.2 cpm x / 2 = 27.13 dpm
= 1.22E-5 μCi
= 4.69E-14 μCi/ml

SI-435 Gr. Hi 9/8/81 1323 - 9/14/81 1335
Volume: (50 l/m)(8652 m) = 432600 l
= 4.326E8 ml

α: 1.9 cpm/ϵ_2 = 5.97 dpm
= 2.7E-6 μCi
= 6.22E-15 μCi/ml

β: 13.4 cpm/ϵ_2 = 39.5 dpm
= 1.78E-5 μCi
= 4.12E-14 μCi/ml

SI-452 High School 9/14/81 1400 - 9/21/81 0727
(25 l/m)(9687 m) = 2.42175E5 l
= 2.42175E3 ml

α: 0.7 cpm/ϵ_2 = 2.46 dpm
= 1.1E-6 μCi
= 4.57E-15 μCi/ml

β: 5.1 cpm/ϵ_2 = 15.05 dpm
= 6.8E-6 μCi
= 2.8E-14 μCi/ml

SI-451 Junior High 9/14/81 1340 - 9/21/81 0711
Volume: (45 l/m)(9691) = 436095 E5 l
= 4.36095 E8 ml

α: 0.6 cpm/ϵ_2 = 2.11 dpm
= 9E-7 μCi
= 2.06E-15 μCi/ml

β: 8.9 cpm/ϵ_2 = 25.9 dpm
= 1.17E-5 μCi
= 2.68E-14 μCi/ml

SI-466 Hi School 9/28/81 0727 - 9/28/81 0732
Volume: (30 l/m)(10055 m) = 302400 E5 l
= 3.024 E8 ml

α: 1.0 cpm/ϵ_2 = 3.5 dpm
= 1.6E-6 μCi
= 5.23E-15 μCi/ml

β: 6.2 cpm/ϵ_2 = 18.6 dpm
= 8.4E-6 μCi
= 2.77E-14 μCi/ml

81-465 Jr High 9/21/81 0711 – 9/28/81 0722
Volume. (50 l/m)(10091 m) = 5.0455E5 l
= 5.0455E8 ml

α: 1.7 cpm/α_e = 5.97 dpm
= 2.7E-6 μCi
= 5.33E-15 μCi/ml

β: 10.9 cpm/β_e = 32.14 dpm
= 1.45E-5 μCi
= 2.87E-14 μCi/ml

81-471 High School 9/28/81 – 10/5/81 0731
Volume. Time turned on not recorded

α: 0.8 cpm/α_e = 2.81 dpm
= 1.3E-6 μCi

β: 6.3 cpm/β_e = 18.59 dpm = 8.37E-6 μCi

81-472 Junior High School 9/28/81 0722 – 10/5/81 0719
Volume: (50 l/m)(10077 min) = 5.0385E5 l
= 5.0385E8 ml

α: 0.9/α_e = 3.16 dpm
= 1.4E-6 μCi
= 2.83E-15 μCi/ml

β: 10.2 cpm/β_e = 30.1 dpm
= 1.36E-5 μCi
= 2.69E-14 μCi/ml

81-492 High School 10/5/81 07? – 10/19/81 0736
Volume. Time on not recorded

α: 0.8 cpm/α_e = 2.81 dpm
= 1.3E-6 μCi

β: 9.3 cpm/β_e = 27.47 dpm
= 1.24E-5 μCi

81-491 Junior High 10/5/81 0719 – 10/19/81 0717
Volume: (35 l/m)(20160 m) = 7.056E5 l
= 7.056 E8 ml

α: 1.6 cpm/α_e = 3.5 dpm
= 1.6E-6 μCi
= 2.27E-15 μCi/ml

β: 13.2 cpm / β_e = 38.95 dpm
= 1.75E-5 μCi
= 2.47E-14 μCi/ml

S1-494 High School 10/19/87 0736 – 10/20/87 0831
Volume: (25 l/m)(1013 m) = 2.53375E5 l
= 2.53375E8 ml

α: 1.0 cpm / α_e = 3.51 cpm
= 1.6E-6 μCi
= 0.24E-15 μCi/ml
β: 7.4 cpm / β_e = 21.84 dpm
= 9.8E-6 μCi
= 3.88E-14 μCi/ml

495 Jr High 10/19/87 0719 – 10/26/87 0816
Damaged filter
Volume: (5 l/m)(10137 m) = 5.57535E5 l
= 5.57535E8 ml
α: 0.9 cpm / α_e = 3.16 dpm
= 1.4E-6 μCi
= 2.55E-15 μCi/ml
7.5 cpm / β_e = 22.13 dpm
= 1E-5 μCi
= 1.79E-14 μCi/ml

[illegible] 10/26/87 0731 – 11/16/87 1258
(23 l/m)(30567 min) = 7.64175E5 l
= 7.64175E8 ml
1 cpm / α_e = 5.77 dpm
= 2.7E-6 μCi
= 3.52E-15 μCi/ml
[illegible] / β_e = 55.27 dpm
= 2.51E-5 μCi
3.29E-14 μCi/ml

[illegible] 10/26/87 0710 – 11/16/87 1245
(35 l/m)(30601 m) = 1.071E6 l
= 1.071E9 ml
[illegible] / β_e 7.03 cpm
= 2E-6 μCi
= 2.95E-15 μCi/l

β: 30.6 cpm / β_c = 90.27 dpm
= 4.07 E-5 μCi
= 3.8 E-14 μCi/ml

Unnumbered High School 5/11/87 - 5/18/87 0742
Volume: Pump on not recorded
α: 1.9 / α_c = 6.67 dpm
= 3 E-6 μCi
β: 24.8 cpm / β_c = 73.18 dpm
= 3.3 E-5 μCi

Unnumbered Gr Hi 5/11/87 0743 - 5/18/87 0705 Unit had been turned off
Volume: Unit off @ time of change 5/18/87
α: 2.3 cpm / α_c = 12.29 dpm
= 5.5 E-6 μCi
β: 31.4 cpm / β_c = 92.65 dpm
= 4.17 E-5 μCi

Unnumbered High School 5/18/87 0743 - ~~Off~~ 5/26/87 0736
~~Vol: ( )(1151 min)~~ No flow rate recorded
α: 3.1 cpm / α_c = 10.89 dpm
= 4.9 E-6 μCi
β: 33.2 cpm / β_c = 97.96 dpm
= 4.41 E-5 μCi

Unnumbered Gr High 5/18/87 0705 - 5/26/87 0711
Volume - flow rate not recorded
α: 1.8 cpm / α_c = 5.27 dpm
= 2.4 E-6 μCi
β: 29.2 cpm / β_c = 86.16 dpm
= 3.88 E-5 μCi

Unnumbered High School 5/26/87 0736 - 6/8/87 0756
Volume - Flow rate not recorded
α: 2.9 cpm / α_c = 10.19 dpm
= 4.6 E-6 μCi
β: 38.6 cpm / β_c = 113.9 dpm
= 5.13 E-5 μCi

Unnumbered Jr. Hi 5/26/87 0711 – 6/5/87 0709
Volume – flow rate not recorded
α: 2.3 cpm/ε_α = 8.08 dpm
= 2.6E-6 μCi
β: 25.1 cpm/ε_β = 74.06 dpm
= 3.34E-5 μCi

Unnumbered High School 6/8/87 0750 – 6/15/87 0740
Volume – flow rate not recorded
α: 0.7 cpm/ε_α = 2.46 dpm
= 1.1E-6 μCi
β: 8.1 cpm/ε_β = 23.9 dpm
= 1.08E-5 μCi

Unnumbered Jr. High 6/8/87 0709 – 6/15/87 0719
Volume – flow rate not recorded
α: 1.4 cpm/ε_α = 4.92 dpm
= 2.2E-6 μCi
β: 9.7 cpm/ε_β = 28.62 dpm
= 1.29E-5 μCi

S1-165 High School 6/15/87 0740 – 7/13/87 0744
Volume – flow rate not recorded
α: 5.4 cpm/ε_α = 18.96 dpm
= 8.5E-6 μCi
β: 62.7 cpm/ε_β = 185.0 dpm
= 8.33E-5 μCi

S1-166 Jr. High 6/15/87 0719 – 7/13/87 0721 – power off & time change
Volume – flow rate not recorded
α: 3.7 cpm/ε_α = 12.99 dpm
= 5.9E-6 μCi
β: 33.7 cpm/ε_β = 154.6 dpm
= 6.96E-5 μCi

S1-170 High School 7/13/87 0744 – 7/22/87 0742
Volume: flow rate not recorded
α: 2.1 cpm/ε_α = 7.35 dpm
= 3.3E-6 μCi

β 13.4 cpm/β_c = 45.44 dpm
= 2.05E-5 μCi

81-169 Junior High 7/13/81 0721 - 7/20/81 0730
Volume: Flow rate not recorded
α: 2.1 cpm/α_c = 7.38 dpm
= 3.3E-6 μCi
β: 16.7 cpm/β_c = 49.27 dpm
= 2.22E-5 μCi

Soil Type

SI-535 Jessica High 11/16/87 1343 – 11/24/87 0913

Volume = (4C l/m)(11190 min) = 4.476E5 l
= 4.476E8 ml

α: 209 d/m = 9.4E-5 μCi
= 2.10E-13 uCi/ml

β: 510 dpm = 2.3E-4 μCi
= 5.14E-13 μCi/ml

SI-536 Senior High School 11/16/87 1258 – 11/24/87 0732

Volume 25 l/m)(11194 min) = 2.7985E5 l
= 2.7985 E8 ml

α 57 d/m
2.92E-5 μCi
1.4E-13 uCi/ml

β: 183 d/m
8.24E-5
2.95E-13 uCi/ml

Tape

SI-535

α 0.3 cpm/0.282 = 0.71 dpm
= 3E-7 μCi
= 6.7E-16 μCi/ml

β: 9.9 cpm/2.3710 = 29.03 dpm
= 1.31E-5 μCi
= 2.92E-14 uCi/ml

SI-536

α: 0.8 cpm/α = 2.84 dpm
= 1.3E-6 μCi
= 4.57E-15 uCi/ml

β 7.5 cpm = 21.97 dpm
= 9.9E-6 μCi
= 3.54E-14 uCi/ml

Mid Lapse

S1-611 High School 11/24/87 0732 - 11/25/87 0746

Volume: (25 l/m)(5652 m) = 2.163E5 l

= 2.163E8 ml

α: 163.9 cpm = 581.9 dpm @ 0.281 eff

= 2.618E-4 μCi

= 1.21E-12 μCi/ml

β: 345.7 cpm / 0.3416 = 1013.98 dpm

= 4.567E-4 μCi

= 2.11E-12 μCi/ml

S1-612 Junior High School 11/24/87 0915 - 11/25/87 0710

α: 179.8 cpm / α_e = 637.59 dpm

= 2.872E-4 μCi

= 5.54E-13 μCi/ml

Volume = (60 l/m)(863 m)

= 5.1830E5 l

= 5.1830E8 ml

β: 426.5 cpm / β_e = 1250.73 dpm

= 5.634E-4 μCi

= 1.09E-12 μCi/ml

Mid Lapse S1-611 12/7/87

α: 0.355 dpm

2E-7 μCi / 2.163E8 ml

7.4E-14 μCi/ml

β: 13.26 dpm

6E-6 μCi / 2.163E8 ml

2.76E-14 μCi/ml

S1-612

α: 2.13 dpm

9.60E-7 μCi / 5.181E8 ml

1.85E-15 μCi/ml

β: 26.51 dpm

1.2E-5 μCi / 5.181E8 ml

2.31E-14 μCi/ml

Sheet Layer 81-615

Volume: (25 l/m)(1007 m) = 2.5175E5 l
= 2.5175E8 ml

α: 1178.35 dpm
5.31E-4 μCi / 2.5175E8
2.11E-12 μCi/ml

β: 795.2 dpm
3.552E-4 μCi / 2.5175E8 ml
1.42E-12 μCi/ml

81-616

Volume (60 l/m)(6005 m) = 6.0516E5
= 6.0516E8 ml

α: 1096.63 dpm
4.94E-4 μCi / 6.0516E8 ml
8.16E-13 μCi/ml

β: 2060.52 dpm
9.282E-4 μCi / 6.0516E8 ml
1.53E-12 μCi/ml

~~dpm~~

81-615 α_c = 0.279 β_c = 0.3459

α: 2.717 dpm / 0.2 cpm / 0.279
3E-7 μCi 0.717 dpm / 2.226 dpm/nCi
1.19E-15 μCi/ml 3E-7 μCi / 2.5175E8 ml

β: 6.8 cpm 6.8 cpm / β_c
19.65 dpm
8.9E-6 μCi 19.65 dpm / 2.226 nCi/dpm
3.52E-14 8.9E-6 μCi / 2.5175E8 ml

81-615 (.167)

α: 0.7 cpm / α_c = 2.51 dpm
1.1E-6 μCi 2.51 dpm / 2.226 dpm/μCi
4.37E-15 μCi/ml 1.1E-6 μCi / 6.0516E8 ml

β 14.7 cpm / β_c = 51.95 dpm
2.34E-5 ml 51.95 dpm / 2.226 dpm/nCi
3.57E-14 Ci/ml

Well Logan 12/14/81

S1-621 Senior High School 12/7/81 0737 - 12/14/81 0727

Volume $(25\ l/m)[(7\ d)(24\ hr/d)(60\ m/hr) - 10] = (25)(10070)$

$= 2.5175E5\ l$

$= 2.5175E8\ ml$

$\alpha = 0.279$ $\beta = 0.3439$

~~α: 231.3 cpm / α_e~~

~~829.03 dpm~~

~~37.~~

~~α: 23.13 cpm / α_e~~

α: 231.3 cpm / α_e

529.03 dpm / 2.226 dpm/μCi

3.734E-4 μCi / 2.5175E8 ml

1.48E-12 μCi/ml

β: 534.4 cpm / β_e

1344.95 dpm / 2.226 dpm/μCi

6.959E-4 μCi / 2.5175E8 ml

2.76E-12 μCi/ml

S1-622 Garner High School

$(30\ l/m)[(24\ hr/d)(7\ d)(60\ m/hr) - 2] = (5.)(10078)$

$= 5.039E5\ l$

$= 5.039E8\ ml$

α: 2810 cpm / α_e

1007.17 dpm / 2.226 dpm/μCi

4.531E-4 μCi / 5.039E8 ml

9.00E-13 μCi/ml

β: 784.2 cpm / β_e

2810.75 dpm / 2.226 dpm/μCi

1.264E-3 μCi

2.51E-12 μCi/ml

12/17-21/81

Short Lapse

Senior High school 12/14/81 0727 – 12/21/81 0739

Volume: 60' recorded – machine inoperative @ time of change

Long lapse Senior High

α: 0.1 cpm / 0.282 (α eff)

0.355 dpm / 2.22E6 dpm/uCi

1.59E-7 uCi

β: 3.4 cpm / 0.345 (β eff) =

6.96 dpm / 2.22E6

3.13 E-6 uCi

Senior High School

Volume: 60 lpm 12/14/81 0714 – 12/21/81 0747

(7d)(24hr/d)(60m/hr) = 10080 + 40 = 10120 min

(60 l/m)(10120) = 6.072E5 l

= 6.072E8 ml

Short lapse

Long lapse

α = 1.0 cpm / 0.282 (α efficiency)

3.55 dpm / 2.22E6 dpm/uCi

1.59 E-6 uCi / 6.072E8 ml

2.63E-15 uCi/ml

β = 10.1 cpm / 0.345 (β eff)

29.28 dpm / 2.22E6 dpm/uCi

1.32E-5 uCi / 6.072E8 ml

2.17E-14 uCi/ml

12/21-29/81

22-62

Long Term

Junior Hyf. 12/21/81 0747 - 12/29/81 0721

flow = 60 lpm

Volume: (8 days) (24 hr/day) (60 min/hr) (~~60 l/m~~) = 11520 min

(11494 min) (60 l/m) = 689640 l

= 6.8964 E8 ml

d. 2335 cpm / 8220 m = 0.2841 eff

1.1 cpm / 0.2841 = 3.87 dpm

3.87 dpm / 2.22E6 = 1.74E-6 μCi

1.74E-6 μCi / 6.8964E8 ml = 2.53E-15 μCi/ml

β. 187.5 cpm / 2.7E4 dpm = 0.2958

17.1 cpm / 0.2958 = 57.64 dpm

57.64 dpm / 2.22E6 = 2.6E-5 μCi

2.6E-5 μCi / 6.8964E8 ml = 3.77E-14 μCi/ml

~~12/29/81 - 1/4/82~~ 12/29/81 - 1/4/82

~~Sheet Lapse~~

~~Senior High School~~ ~~81-629~~

~~Volume 12/29/81 - 1/4/82~~

~~(6d)(24hr/d)(60 min/hr) = 10080 - 10 = 10070 min~~

~~(10070 min)(60 l/m) = 604,200 l~~

~~= 6.042E8 ml~~

~~Sheet Lapse~~

~~α: 1.7 cpm / 0.282 (+ eff)~~

~~6.03 dpm / 2.22E6 dpm/μCi~~

~~2.72E-6 μCi / 6.042E8 ml~~

~~4.5E-15 μCi/ml~~

~~β: 14.6 dpm / 0.345 (β eff)~~

~~40.87 dpm / 2.22E6 dpm/μCi~~

~~1.84E-5 μCi / 6.042E8 ml~~

~~3.03E-14 μCi/ml~~

Junior high school 81-629

Volume 12/29/81 0721 - 1/4/82 0711 60 lpm

(6d)(24hr/d)(60 min/hr) = 10080 - 10 = 10070 min

(10070 min)(60 l/m) = 604,200 l

= 6.042E8 ml

Sheet Lapse

α: 1.7 cpm / 0.282 (+ eff)

6.03 dpm / 2.22E6 dpm/μCi

2.72E-6 μCi / 6.042E8 ml

4.5E-15 μCi/ml

β: 14.6 dpm / 0.345 (β eff)

40.87 dpm / 2.22E6 dpm/μCi

1.84E-5 μCi / 6.042E8 ml

3.03E-14 μCi/ml

1/4-11/52

Sheet Expan 1/13/52 1745

of Li

Volume Bx 1/4/52 0911 → 1/11/52 0912

(7d)(24hr/day)(60 min/hr) = 10080 min +/- 1 = 10081 min

(60 l/m)(10081 min) = 604800 l

= 6.0438E8 ml

α: 0.3/0.2795 - eff

1.07 dpm / 2.2266 = 4.83E-7 μCi

8.00E-16 μCi/ml

β: 12.5 cpm / 0.3349

37.32 dpm / 2.2266 = 1.68E-5 μCi

2.78E-14 μCi/ml

Night 1/11/82 - 2/10/82

0712 0709

flow: off @ time of filter changeout

α: 23350 cpm / 8220 dpm = 0.2841 eff 2/16/82

1 2.3 cpm / 0.2841 = 8.1 dpm

8.1 dpm / 2.226 dpm/μCi = 3.65E-6 μCi

β: 7787.5 cpm / 2.764 dpm = 0.2758

29.6 cpm / 0.2758 = 100.07 dpm

100.7 dpm / 2.226 dpm/μCi = 4.51E-5 μCi

Long Lapse dated 3/8/82

α: 1.4 cpm (Bkgd compensated)

4.98 dpm / 2.22E6 dpm/μCi = 2.24E-6 μCi

β: 31.7 cpm (Bkgd compensated)

92.83 dpm / 2.226 dpm/μCi = 4.18E-05 μCi

3/8/82

82-094   W.C. Sr. High School

2/17/82 1216 → 3/8/82 0801   25 lpm

Volume: $(19.82\ d)(24\ hr/d)(60\ min/hr)(25\ l/m) = 713520\ l$
$= 7.13520E5\ l$
$= 7.13520E8\ ml$

Short lapse – 3/8/82 count

α: 110.0 cpm (bkgd compensated)

391.46 dpm / 2.22E6 dpm/μCi = 1.76E-4 μCi

1.76E-4 / 7.1352E8 ml = 2.47E-13 μCi/ml

β: 281.8 cpm (bkgd comp)

281.8 cpm / 0.3415 = 825.18 dpm

825.18 dpm / 2.22E6 dpm/μCi = 3.72E-4 μCi

3.72E-4 μCi / 7.13520E8 ml = 5.21E-13 μCi/ml

Long lapse   3/15/82

α: 0.9 cpm

2.53 dpm / 2.22E6 dpm/μCi = 1.14E-06 μCi

1.14E-06 μC / 7.13520E8 ml = 1.59E-15 μCi/ml

β: 14.1 cpm

47.56 dpm / 2.22E6 dpm/μCi = 2.14E-5 μCi

2.14E-5 μCi / 7.1352E8 ml = 3.00E-14 μC/ml

82-095   WC Jr Hi

2/16/82 0909 → 3/8/82 0735   flow: 40 lpm

Volume: $(20.018\ days)(24\ hr/d)(60\ min/hr)(40\ l/m) = 1153036.8\ l$
$= 1.1530368E6$
$= 1.1530368E9\ ml$

Short lapse. Counted 3/8/82

~~α: 83.7 cpm / 0.2810~~
~~297.86 dpm / 2.22E6 dpm/μC = ... μCi~~
~~1.34E-04 μC / 1.1530368E9 ml = ...~~

α: 83.7 cpm / 0.2810

297.86 dpm / 2.22E6 dpm/μC = 1.34E-04 μCi

1.34E-04 μCi / 1.1530368E9 ml = 1.169E-13 μC/ml

β: 225.7 cpm / 0.3415 =

660.69 dpm / 2.22E6 dpm/μC = 3.02E-04 μCi

Long Lapse

α: 1.5 cpm / 0.2783

5.39 dpm / 2.226 dpm/μCi = 2.43 E-6 μCi

2.43 E-6 μCi / 1.153036 8 E9 ml = 2.11 E-15 μCi/ml

β: 21.2 cpm / 0.3385 =

92.17 dpm / 2.226 dpm/μCi = 4.15 E-5 μCi

4.15 E-5 μCi / 1.153036 8 E9 ml = 3.6 E-14 μCi/ml

82-135 WC Sr High School

3/8/82 0803 → 3/15/82 0746 @ 25 lpm

Volume: (6.988d)(24 hr/d)(60 min/hr)(25 l/m) = 2515681

= 2.515681 E5

= 2.515681 E8 ml

Short Lapse - counted 3/25/82

α: 41.6 cpm (Hyd comp)

41.6 cpm / 0.2783 = 149.48 dpm

149.48 dpm / 2.22E6 dpm/μCi = 6.733E-5 μCi

6.733E-5 μCi / 2.515681E8 ml = 2.68 E-13 μCi/ml

β: 98.45 cpm (Hyd comp)

98.45 cpm / .3385 = 290.84 dpm

290.84 dpm / 2.22E6 dpm/μCi = 1.31E-4 μCi

1.31E-4 μCi / 2.5168E8 ml = 5.21E-13 μCi/ml

Long Lapse - counted 3/25/82

α: 0.2 cpm / 0.2817 eff = 0.709975 = 0.71 dpm

0.71 dpm / 2.22E6 dpm/μCi = 3.198E-7 μCi = 3.2E-7 μCi

3.2E-7 μCi / 2.515681E8 ml = 1.2713E-15 μCi/ml = 1.27E-15 μCi/ml

β: 8.2 cpm / 0.3438 eff = 23.85 dpm

23.85 dpm / 2.22E6 dpm/μCi = 1.07E-5 μCi

1.07E-5 μCi / 2.515681E8 ml = 4.27E-14 μCi/ml

82-136 WC Jr Hi

3/5/82 0739 → 3/15/82 0716 60 lpm = 1/low

Volume (6.984d)(24 hr/d)(60 min/hr)(60 l/m) = 6030720 l

= 6.030720 E5 l

= 6.030720 E8 ml

α: 71.2 cpm (Hyd comp)

71.2 cpm / 0.2783 = 255.84 dpm

255.84 dpm / 2.22E6 dpm/μCi = 1.15E-04 μCi

1.15E-04 μCi / 6.030720E8 ml = 1.91E-13 μCi/ml

β: 182.7 cpm

182.7 cpm / 0.3385 = 540.47 dpm

540.47 dpm / 2.22E6 dpm/μCi = 2.44E-04 μCi

2.44E-04 μCi / 6.030720E8 ml = 4.04E-13 μCi/ml

82-136 Long Lupron

α: 1.4 cpm / 0.2817 = 4.97 dpm

4.97 dpm / 2.22E6 dpm/μCi = 2.24E-6 μCi

~~5.41~~ 2.24E-6 μCi / 6.03E8 ml = 3.71E-15 μCi/ml

β: 12.9 cpm / 0.3438 = 37.52 dpm

37.52 dpm / 2.22E6 dpm/μCi = 1.69E-5 μCi

1.69E-5 μCi / 6.03E8 = 2.80E-14 μCi/ml

March 15-22, 1982

High School - 82-158

Run time: 3/15/82 0746 – 3/22/82 0731 = 25 lpm

(7 days)(24 hrs/day)(60 min/hr) – 15 min = 10065 min

(10065 min)(25 l/m) = 251625 l

= 2.51625E5 l

= 2.51625E8 ml

Short Paper counted 3/22/82 ~ 0900

α: efficiency = 0.2871

7.7 cpm / 0.2871 = 26.82 dpm

26.82 dpm / 2.22E6 dpm/μCi = 1.21E-5 μCi

1.21E-5 μCi / 2.51625E8 ml = 4.8E-14 μCi/ml

β: efficiency = 0.3351

17.9 cpm / 0.3351 = 53.42 dpm

53.42 dpm / 2.22E6 dpm/μCi = 2.41E-5 μCi

2.41E-5 μCi / 2.51625E8 ml = 9.58E-14 μCi/ml

Long paper - Counted 8/20/82 ~ 1000

α: 0 cpm

β: 2.3 cpm / 0.2795 = 8.23 dpm

8.23 dpm / 2.22E6 dpm/μCi = 3.71E-6 μCi

3.71E-8 μCi / 2.51625E8 ml = 1.47E-14 μCi/ml

Junior High School 82-159

Runtime: 3/15/82 0716 → 3/22/82 0717 ~ 60 lpm

(7 days)(24 hr/d)(60 m/hr) + 1 min = 10081 min

(10081 min)(60 l/m) = 6.0486E5 l

= 6.0486E8 ml

α: 347.2 cpm / 0.2871 = 1209.34 dpm

1209.34 dpm / 2.22E6 dpm/μCi = 5.45E-4 μCi

5.45E-4 μCi / 6.0486E8 ml = 9.0E-13 μCi/ml

β: 831.9 cpm / 0.3351 = 2482.54 dpm

2482.54 dpm / 2.22E6 dpm/μCi = 1.12E-3 μCi

1.12E-3 μCi / 6.0486E8 ml = 1.85E-12 μCi/ml

Long Lupsii Counted 3/e-/12 - 1000

α: 0.6 cpm / 0.2795 = 2.15 dpm

2.15 dpm / 2.22E6 dpm/μCi = 9.67E-7 μCi

9.67E-7 μCi / 6.04866 8 ml = 1.6E-15 μCi/ml

β: 6.6 cpm / 0.3443 = 19.17 dpm

19.17 dpm / 2.220 dpm/μCi = 8.63E-6 μCi

8.63E-6 μCi / 6.04868 ml = 1.43E-14 μCi/ml

March 22-29, 1982

Jeanes High School = 82-160

Volume 0n 3/22/82 0717 → 3/29/82 0714 60 lpm

$[(7\text{days})(24\text{hr/d})(60\text{ min/hr})] - 1 = 10079\text{ min}$

$(10079\text{ min})(60\text{ l/m}) = 604740\text{ l}$

$= 6.04740E8\text{ ml}$

Short Lapse - counted 3/29/82 ~1000

α: 107.6 cpm / 0.2795 = 374.24 dpm

374.24 dpm / 2.22E6 dpm/μCi = 1.69E-4 μCi

1.69E-4 μCi / 6.0474E8 ml = 2.79E-13 μCi/ml

β: ~~888~~

304.0 cpm / 0.3443 = 882.95 dpm

882.95 dpm / 2.22E6 dpm/μCi = 3.98E-4 μCi

3.98E-4 μCi / 6.0474E8 ml = 6.58E-13 μCi/ml

Long Lapse - counted 4/5/82 ~0900

α: 7.7 cpm / 0.2799 = 2.5 dpm

2.5 dpm / 2.226E6 dpm/μCi = 1.13E-6 μCi

1.13E-6 μCi / 6.0474E8 ml = 1.86E-15 μCi/ml

β 11.3 cpm / 0.3423 = 33.01 dpm

33.01 dpm / 2.22E6 dpm/μCi = 1.49E-5 μCi

1.49E-5 μCi / 6.0474E8 ml = 2.46E-14 μCi/ml

Jeanes School March 22, 1982 0731 → March 30, 1982 0926

82-181 flow = 25 lpm

$[(8\text{ days})(24\text{ hr/d})(60\text{ min/hr})] + 115\text{ min} = 11635$

$(25\text{ l/m})(11635\text{ min}) = 290875\text{ l}$

$= 2.90875E8\text{ ml}$

Short Lapse - counted 3/30/82 ~1430

α: 26.4 cpm / 0.2875 = 98.78 dpm

98.78 dpm / 2.22E6 dpm/μCi = 4.45E-9 μCi

4.45E-9 μCi / 2.90875E8 ml = 1.53E-13 μCi/ml

β 72.4 cpm / 0.3407 = 212.50 dpm

212.50 dpm / 2.22E6 dpm/μCi = 9.57E-5 μCi

9.57E-5 μCi / 2.90875E8 ml = 3.29E-13 μCi/ml

Long lapse - counted 4/5/82 ~0900

α: 0.5 cpm / 0.2779 = 1.79 dpm

1.79 dpm / 2.22E6 dpm/μCi = 8.05E-7 μCi

8.05E-7 μCi / 2.9057E8 ml = 2.77E-15

β: 4.7 cpm / 0.3423 = 13.73 dpm

13.73 dpm / 2.2206 dpm/μCi = 6.19E-6 μCi

6.19E-6 μCi / 2.9087E8 ml = 2.13E-14 μCi/ml

Jenison High School 3/30/82 ~0730 → 4/5/82 0746 25 dpm

82-182 Volume [(6 days)(24 hr/d)(60 min/hr)] − (105 min) = 8535 m

(25 l/m)(8535 min) = 2.13375E5 l

= 2.13375E8 ml

Short Lapse – counted 4/5/82

α: 14.4 cpm / 0.2799 = 51.45 dpm

51.45 dpm / 2.22E6 dpm/μCi = 2.32E-5 μCi

2.32E-5 μCi / 2.13375E8 ml = 1.09E-13 μCi/ml

β: 35.8 cpm / 0.3423 = 104.59 dpm

104.59 dpm / 2.22E6 dpm/μCi = 4.71E-5 μCi

4.71E-8 μCi / 2.13375E8 ml = 2.21E-13 μCi/ml

Long Lapse count – counted

α: 0.3 cpm / 0.2854 = 1.05 dpm

1.05 dpm / 2.22E6 dpm/μCi = 4.74E-7 μCi

4.74E-7 μCi / 2.13375E8 ml = 2.22E-15 μCi/ml

β: 2.1 cpm / 0.3374 = 9.19 dpm

9.19 dpm / 2.22E6 dpm/μCi = 4.14E-6 μCi

4.14E-6 μCi / 2.13375E8 ml = 1.94E-14 μCi/ml

Jenison High School

82-183 Volume 3/29/82 0716 → 4/5/82 0717

flow 60 lpm [(7 d)(24 hr/d)(60 min/hr)] + 1 min = 10081 m

(10081 min)(60 l/min) = 604860 l

= 6.0486E8 ml

Short Lapse – count 4/5/82 ~0900

α: 22.0 / 0.2799 = 78.6 dpm

78.6 dpm / 2.22E6 dpm/μCi = 3.54E-5 μCi

3.54E-5 μCi / 6.0486E8 ml = 5.85E-14 μCi/ml

β: 60.7 ~~dpm~~ cpm / 0.3423 = 177.32 dpm

177.32 dpm / 2.22E6 dpm/μCi = 7.99E-5 μCi

7.99E-5 μCi / 6.0486E8 ml = 1.32E-13 μCi/ml

Long Lapse Cal 5/28/82

α 1.1 cpm / 0.283 = 3.89 dpm

3.89 dpm / 2.22E6 dpm/uC = 1.75E-6 μCi

1.75E-6 μC / 2.13375E8 ml = 8.21E-15 μC/ml

β 8.7 / c.349 = 24.93 dpm

24.93 dpm / 2 22E6 dpm/μCi = 1.12E-5 μC

1.12E-5 μC / 2.13375E8 ml = 5.26E-14 μC/ml

5/27/82

1 54
3
1 2 100
3 3
4 22

1 55
4
1 2 100 82-594
3 23
4 174

1 56
5
1 2 100 82-182
3 8
4 80

1 57
6
1 2 100 82-246
3 17
4 100

1 58
7
1 2 100
3 4
4 33

1 59
7
1 2 100
3 1
4 26

...ill High School
52-266

4/5/82 0750 – 4/15/82 0919

Volume: [(10 d)(24 h/d)(60 min/hr)] + 89 min = ~~[illegible]~~ 14489 min

(30 l/min)(14289 min) = ~~[illegible]~~ 434670 l

= ~~[illegible]~~ 4.3467 E8 ml

Short lapse: counted 4/15/82 1500

α: 26.0 cpm / 0.2854 = 91.10 dpm

91.10 dpm / 2.22E6 dpm/μCi = 4.10E-5 μCi

4.10E-5 μCi / 4.34670E8 ml = ~~9.~~ 9.43E-14 μCi/ml

β: 66.2 cpm / 0.3374 = 196.21 dpm

196.21 dpm / 2.22E6 dpm/μCi = 8.84E-5 μCi

8.84E-5 μCi / ~~[illegible]~~ 4.3467E8 ml = ~~[illegible]~~ 2.03E-13 μCi/ml

Long Lapse: counted 4/22/82

α: 0.9 cpm / 0.2832 = 3.18 dpm

3.18 dpm / 2.22E6 dpm/μCi = 1.43E-6 μCi

1.43E-6 μCi / 4.3467E8 ml = 3.29E-~~16~~15 μCi/ml

β: 10 cpm / 0.3429 = 29.16 dpm

29.16 dpm / 2.22E6 dpm/μCi = 1.31E-5 μCi

1.31E-5 μCi / 4.3467E8 = 3.02E-14 μCi/ml

52-267 4/5/82 0717 → 4/15/82 0845

Volume: [(10 days)(24 hr/day)(60 min/hr)] + 88 min = 14488 min

(14488 min)(55 l/min) = 796840 l

= 7.96840 E8 ml

Short lapse: counted 4/15/82 1500

α: 44.8 cpm / 0.2854 = 156.97 dpm

156.97 dpm / 2.22E6 dpm/μCi = 7.07E-~~6~~5 μCi

7.07E-5 μCi / 7.9684E8 ml = 8.87E-14 μCi/ml

β: 141.8 cpm / 0.3374 = 420.27 dpm

420.27 dpm / 2.22E6 dpm/μCi = 1.89E-4 μCi

1.89E-4 μCi / 7.9684E8 ml = 2.38E-13 μCi/ml

Long lapse: counted 4/22/82

α: 0.6 cpm / 0.2832 = 2.12 dpm

2.12 dpm / 2.22E6 dpm/μCi = 9.54E-7 μCi

9.54E-7 μCi / 7.9684E8 ml = 1.19E-15 μCi/ml

counted 6/1/82

β: 17.1 cpm / 0.3489 = 49.0 dpm

49.0 dpm / 2.22E6 dpm/μCi = 2.01E-5 μCi

2.01E-5 μCi / 4.3467E8 ml = 5.09E-14 μC/ml

6/1/82

82-267

1 142
1 25
2 100
3 10
4 201

1 143
1 26
2 100
3 8
4 27

1 144
1 26
2 100
3 1
4 27

4/19/82
~0900

82-
268

82-
269

0.2855

α - 23472/82495

β - 79239/2.3096E4

0.3344

Lincoln High School 4/15/82 0920 → 4/19/82 0736 = 20 hrs
82-268 [(4 d)(24 h/d)(60 min/h)] - 44 min = 532 min
(532 min)(30 l/m) = 15960 l
= 1.5960E7 ml

Short Lapse - counted 4/19/82
α 270.9/0.2855 = 969.88 dpm
969.88 dpm / 2.22E6 dpm/μCi = 4.37E-4 μCi
4.37E-4 μCi / 1.5960E7 ml = 2.74E-11 μCi/ml

β: 635.4 cpm / 0.3344 = 1900.72 dpm
1900.72 dpm / 2.22E6 dpm/μCi = 8.56E-4 μCi
8.56E-4 μCi / 1.596E7 ml = 5.37E-11 μCi/ml

Long Lapse - counted 6/1/82
α 0.2 cpm / 0.2824 = 0.705 dpm
0.705 dpm / 2.22E6 dpm/μCi = 3.18E-7 μC
3.18E-7 μCi / 1.596E7 ml = 1.99E-14 μC/ml
β: 3 cpm / 0.3489 = 12.56 dpm
12.56 dpm / 2.22E6 dpm/μCi = 5.66E-6 μC
5.66E-6 μCi / 1.596E7 ml = 3.55E-13 μCi/ml

Lincoln High School 4/15/82 0556 → 4/19/82 0711 flow = 60 lpm
82-269
Volume = [(Hours)(24 h/d)(60 m/h)] - 99 min = 5661 min
(60 l/m)(5661 min) = 3.39660E5 l
= 3.39660E3 ml

α: 358.3 cpm / 0.2855 = 1254.99 dpm
1254.99 dpm / 2.22E6 dpm/μCi = 5.65E-4 μCi
5.65E-4 μCi / 3.3966E8 ml = 1.66E-12 μCi/ml

β: 3285 cpm / 0.3344 = 2478.47 dpm
2478.47 dpm / 2.22E6 dpm/μCi = 1.12E-3 μCi
1.12E-3 μCi / 3.3966E8 ml = 3E-12 μCi/ml

Long Lapse cnt 6/1/82
α 6.6 cpm / 0.2834 = 212 dpm
212 dpm / 2.22E6 dpm/μCi = 9.54E-7 μCi
9.54E-7 μCi / 3.3966E5 ml = 2.81E-15 μCi/ml

β: 6.8 cpm / 0.3489 = 19.49 dpm

19.49 dpm / 2.22E6 dpm/μCi = 8.78E-6 μCi

8.78E-6 μCi / 3.3966E8 = 2.59E-14 μCi/ml

Hi-Vol Sitron 4/19/82 0736 ⇒ 4/26/82 0740 flow ~ 25 lpm

82-275 Volume [(7 d)(24 hrs/d)(60 min/hr)] + 4 min = 10084 min

(10084 min)(25 l/m) = 252100 l

= 2.52100E8 ml

counted 5/2/82 - long lapse

α: 0.55/0.2825 = 1.95 dpm

1.95 dpm / 2.22E6 dpm/μCi = 8.77E-7 μCi

8.77E-7 μCi / 2.521E8 ml = 3.48E-15 μCi/ml

β: 5.4 cpm / 0.344 = 15.7 dpm

15.7 dpm / 2.22E6 dpm/μCi = 7.07E-6 μCi

7.01E-6 μCi / 2.521E8 ml = 2.81E-14 μCi/ml

long lapse: exited 5/28/82

α: 0.5/0.283 = 1.77 dpm

1.77/2.22E6 dpm/μCi = 7.96E-7 μCi

7.96E-7 / 2.521E8 ml = 3.16E-15 μCi/ml

β: /0.349 = 19.48 dpm

19.48 dpm / 2.22E6 dpm/μCi = 8.77E-6 μCi

8.77E-6 / 2.521E8 = 3.48E-14 μCi/ml

general high 4/19/82 0911 ⇒ 4/26/82 0919 ~60 lpm

82-276 Volume [(7 days)(24 hrs/d)(60 min/hr)] + 8 min = 10089 min

(10089 min)(60 l/min) = 605340 l

= 6.0534E8 ml

counted 5/3/82 - long lapse count

α: 0.75 cpm / 0.2825 = 2.65 dpm

2.65 dpm / 2.22E6 dpm/μCi = 1.2E-6 μCi

1.2E-6 μCi / 6.0534E8 ml = 1.98E-15 μCi/ml

β: 12.4 cpm / [illegible] = 43.89 dpm

43.89 dpm / 2.[illegible]E6 dpm/μCi = 1.98E-5 μCi

1.98E-5 μCi / 6.0534E8 ml =

β: 12.4 cpm / 0.344 = 36.05 dpm

36.05 dpm / 2.22E6 dpm/μCi = 1.62E-5 μCi

1.62E-5 μCi / 6.0534E8 ml = 2.68E-14 μCi/ml

long lapse

α: 0.5 cpm / 0.253 = 2.83 dpm

2.83 dpm / 2.22E6 dpm/μCi = 1.27E-6 μCi

1.27E-6 / 6.0534E8 ml = [illegible] μCi/ml

Long Lapse β

12.1 cpm / 0.349 = 34.67 dpm

34.67 dpm / 2.22E6 dpm/μCi = 1.56E-5 μCi

1.5625 μCi / volume = 2.58E-14 μCi/ml

Long School 4/2/82 @ 740 - 5/3/82 0736 ~25 lpm = flow

Volume [(7 days)(24 hr/d)(60 min/hr)] - 4 min = 10076

(10076 min)(25 l/m) = 2.5190 E5 l

82-277 = 2.5190 E8 ml

Short Lapse - counted 5/3/82

α: 667.2/0.2825 = 2362 dpm

2362 dpm / 2.226 dpm/pCi = 1.06 E-3 μCi

1.06 E-3 μCi / 2.5190 E8 ml = 4.23 E-12 μCi/ml

β: 109.8 cpm / 0.344 = 4629.65 dpm

4629.65 dpm / 2.226 dpm/pCi = 2.11 E-3 μCi

2.11 E-3 μCi / 2.5190 E8 ml = 8.376 E-12 μCi/ml

Long Lapse: cnt 5/28/82

α: 0.3 cpm / 0.283 = 1.06 dpm

1.06 dpm / 2.226 dpm/pCi = 4.78 E-7 μCi

4.78 E-7 μCi / 2.5190 E8 ml = 1.9 E-15

β: 6.7 cpm / 0.349 = 19.20 dpm

19.2 dpm / 2.226 = 8.65 E-6 μCi

8.65 E-6 μCi / ml = 3.4 E-14 μCi/ml

Junior High 4/26/82 0719 → 5/3/82 0702 flow ~ 55 lpm

[(7d)(24 hr/d)(60 min/hr)] - 19 min = 10063 min

82-278 (10063 min)(55 l/m) = 553465 E5 l

= 5.53465 E8 ml

α: 558.1 cpm / 0.2825 = 2051.69 dpm

2051.69 dpm / 2.226 dpm/pCi = 9.38 E-4 μCi

9.38 E-4 μCi / 5.53465 E8 ml = 1.69 E-12 μCi/ml

β: 1569.7 cpm / 0.344 = 4563.08 dpm

4563.08 dpm / 2.226 dpm/pCi = 2.06 E-3 μCi

2.06 E-3 μCi / 5.53465 E8 ml = 3.71 E-12 μCi/ml

Long Lapse - cnt 5/28/82

α: 1.3 cpm / 0.283 = 4.59 dpm

4.59 dpm / 2.226 dpm/pCi = 2.07 E-6 μCi

2.07 E-6 μCi / 5.53465 E8 ml = 3.74 E-15 μCi/ml

β: 11.1 cpm / 0.349 = 31.81 dpm

31.81 dpm / 2.226 dpm/pCi = 1.4 E-5 μCi

1.4 E-5 C / 5.53465 E8 ml = 2.53 E-14 μCi/ml

High School 5/3-10/82

82-328 Volume 5/3/82 0736 → 5/10/82 0730

flow = 25 lpm

~~Short Lapse~~

~~St~~ [(7 days)(24 hr/d)(60 min/hr)] - 6 min = 10074 min

(10074 min)(25 lpm) = 251850 l

= 2.5185 E 8 ml

Short lapse:

51.3 cpm / 0.2823 =

α: 181.7 dpm

181.7 dpm / 2.22E6 dpm/uCi = 8.19E-5 μCi

8.19E-5 μCi / 2.5185E8 ml = 3.16E-13 μCi/ml

β: 120.1 cpm / 0.3457 = 347.41 dpm

347.41 dpm / 2.22E6 dpm/uCi = 1.57E-4 μCi

1.57E-4 μCi / 2.5185E8 ml = 6.21E-13 μCi/ml

Long lapse

α: 2.6 / 0.2823 = 2.13 dpm

2.13 dpm / 2.22E6 dpm/uCi = 9.57E-7 μCi

9.57E-7 μCi / 2.5185E8 ml = 3.80E-15 μCi/ml

β: 7.2 cpm / 0.3457 = 20.83 dpm

20.83 dpm / 2.22E6 dpm/uCi = 9.38E-6 μCi

9.38E-6 μCi / 2.5185E8 ml = 3.73E-14 μCi/ml

Junior High 5/3/82 0702 → 5/10/82 0710 flow ~ 55 lpm

82-329 Volume [(7 days)(24 hr/d)(60 min/hr)] + 8 min = 10088

(10088 min)(55 lpm) = 554840 l

= 5.5484E8 ml

Short lapse

α 48.4 cpm / 0.2823 = 171.45 dpm

171.45 dpm / 2.22E6 dpm/uCi = 7.72E-5 μCi

7.72E-5 μCi / 5.5484E8 ml = 1.39E-13 μCi/ml

β 142 cpm / 0.3457 = 410.76 dpm

410.76 dpm / 2.22E6 dpm/uCi = 1.85E-4 uCi

1.85E-4 μCi / 5.5484E8 ml = 3.33E-13 μCi/ml

Lenz Lapis:

α: 0.2 / 0.2868 = 0.70 dpm

0.7 dpm / 2.22E6 dpm/μCi = 3.14E-7 μCi

3.14E-7 μCi / 2.5135E+8 ml = 1.25E-15 μCi/ml

β: 11 dpm / 0.3547 = 31.01 dpm

31.01 dpm / 2.22E6 dpm/μCi = 1.4E-5 μCi

1.4E-5 μCi / 2.5185E8 ml = 5.55E-14 μCi/ml

5/15/84

5/11/82

5/17/82

@ 1000

1 1
1 17
2 100 328
3 7
4 98

1 2
1 18
2 100 329
3 3
4 136

1 3
1 19
2 100 330
3 1270
4 3176

1 4
1 20
2 100 331
3 1775
4 6729

82-328

82-329

Blank

α - 2320.5/5219.8
0 0.2823

β - 7975.6/2.3164
2.8

1 99
1 21
2 100 82-19
3 10
4 119

1 99
1 22
2 100 82-275
3 6
4 96

1 100 √ 82-27
1 23
2 100
3 9
4 149

1 101 √ 82-27
1 24
2 100
3 4
4 98

1 102 √ 82-278
1 25
2 100
3 14
4 139

1 103 82-328
1 26
2 100
3 5
4 98

1 104 82-32
1 27
2 100
3 10
4 129

1 105 82-330
1 28
2 100
3 6
4 87

1 106 82-331
1 29
2 100
3 4
4 157

1 107 Blank
1 30
2 100
3 2
4 28

α - 0.283

β - 0.349

Senior High School 5/10/82 0730 → 5/17/82 0738
82-330 flow = 25 lpm
Volume [(7d)(24h/d)(60m/hr)] + 8 = 10088 min
(10088 min)(25 l/m) = 2.522E5 l
= 2.522E8 ml

Short Lapse:
α: 126.9 cpm / 0.286 = 442.47 dpm
442.47 dpm / 2.22E6 dpm/μCi = 1.99E-4 μCi
1.99E-4 μCi / 2.522E8 ml = 7.90E-13 μCi/ml

β: 315 cpm / 0.354 = 888.07 dpm
888.07 dpm / 2.22E6 dpm/μCi = 4E-4 μCi
4E-4 μCi / 2.522E8 ml = 1.59E-12 μCi/ml

Long Lapse
α: 0.5 / 0.283 = 1.77 dpm
1.77 dpm / 2.22E6 dpm/μCi = 7.95E-7 μCi
7.95E-7 μCi / 2.522E8 ml = 3.16E-15 μCi/ml

β: / 0.349 = 17.48 dpm
17.48 / 2.22E6 dpm/μCi = 7.87E-6 μCi
7.876E6 / 2.522E8 ml = 3.12E-14 μCi/ml

Senior High 5/10/82 0710 55 lpm → 5/17/82 0720 60 lpm
82-331 Volume [(7d)(24h/d)(60 min/hr)] + 10 = 10090 min
(10090 min)(55 lpm) = 5.5522E-51
= 5.8522E8 ml

α: 177.4 cpm / 0.286 = 618.55 dpm
618.55 dpm / 2.22E6 dpm/μCi = 2.79E-4 μCi
2.79E-4 μCi / 5.8522E8 ml = 4.76E-13 μCi/ml

β: 630.3 cpm / 0.3547 = 1776.99 dpm

1776.99 dpm / 2.22E6 dpm/μCi = 8.01 E-4 μCi

8.01E-4 / 5.8522E8 ml = 1.37E-12 μCi/ml

Long Lapse ext 5/23/82

α: 0.3 cpm / 0.283 = 1.06 dpm

1.06 dpm / 2.22E6 dpm/μCi = 4.78E-7 μCi

4.78E-7 μCi / 5.8522E8 ml = 8.16E-16 μCi/ml

β: 12.9 cpm / 0.349 = 36.96 dpm

36.96 dpm / 2.22E6 dpm/μCi = 1.67E-5 μCi

1.67E-5 μCi / 5.8522E8 ml = 2.85E-14

6/1/82

1 138
1 25
2 198
3 854
4 2078

82-301

1 139
1 26
2 100
3 878
4 2521

82-302

1 140
1 27
2 100
3 0
4 38

1 141
1 27
2 100
3 1
4 33

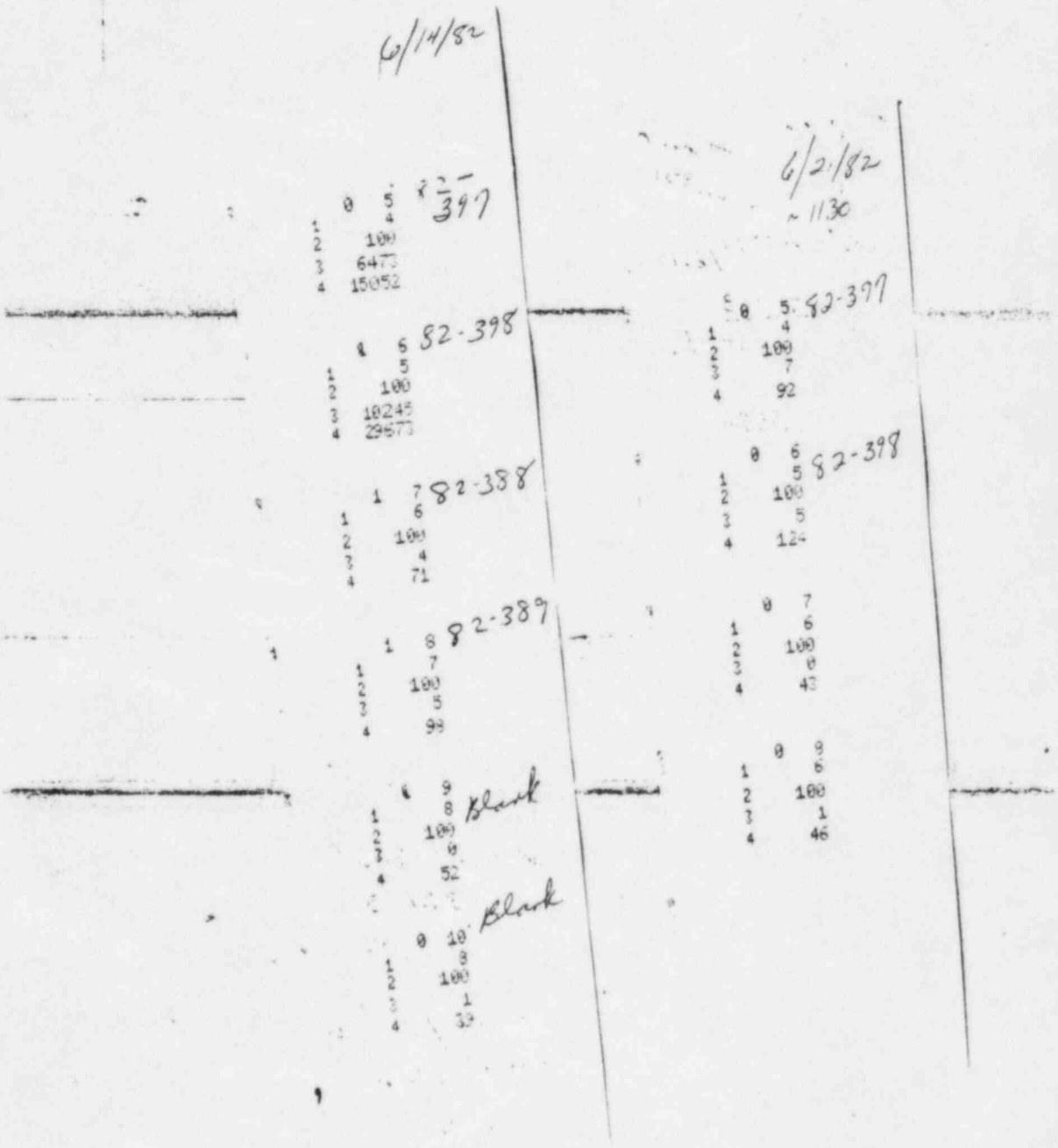
Summer High 6/17/82 0738 → 6/1/82 0747
82-369
flow = 25 lpm
Volume = (15 d)(24 hr/d)(60 min/hr) = 21600 min
(2.16E4 min)(25 l/m) = 5.4E5 l
= 5.4E8 ml

Sheet Lapse - 6/1/82
α: 85.5 cpm / 0.2834 = 300.99 dpm
300.99 dpm / 2.22E6 dpm/μCi = 1.36E-4 μCi
1.36E-4 μCi / 5.4E8 ml = 2.51E-13 μCi/ml
β: 204.3 cpm / 0.3489 = 585.55 dpm
585.55 dpm / 2.22E6 dpm/μCi = 2.64E-4 μCi
2.64E-4 μCi / 5.4E8 ml = 4.89E-13 μCi/ml

Summer High 05/17/82 0720 → 6/1/82 0706
~~Volume~~ flow = 55 lpm
Volume = (15 d)(24 hr/d)(60 min/hr) = 21600 -14-
= 21586 min
(21586 min)(55 l/m) = 1.18723E6 l
= 1.18723E9 ml

α: 87.17 cpm / 0.2834 = 309.46 dpm
309.46 dpm / 2.22E6 dpm/μCi = 1.39E-4 μCi
1.39E-4 μCi / 1.18723E9 ml = 1.17E-13 μCi/ml

β: 248.6 cpm / 0.3489 = 712.53 dpm
712.53 dpm / 2.22E6 dpm/μCi = 3.21E-4 μCi
3.21E-4 μCi / 1.18723E9 ml = 2.70E-13 μCi/ml


6/14/82
82-397
82-398
82-388
82-389
Blank
Blank
6/2/82
~1130
82-397
82-398

S2-397 Sr High School 6/7/82 0734 → 6/14/82 0733 F ~ 25 lpm

Volume: (7 d)(24 hr/d)(60 min/hr) = 10080 min

(10080 min)(25 lpm) = 252 000 l

= 2.52E8 ml

Wet Lapse: exted 6/14/82

α: 646.34 / 0.2795 = 2312.34 dpm

2312.34 dpm / 2.22E6 dpm/μCi = 1.04E-3 μCi

1.04E-3 μCi / 2.52E8 ml = 4.13E-12 μCi/ml

β: 1500.6 cpm / 0.3382 = 44371.67 dpm

44371.67 dpm / 2.22E6 dpm/μCi = 1.99E-2 μCi

1.99E-2 μCi / 2.52E8 ml = 7.93E-11 μCi/ml

Long Lapse: exted 6/21/82

α: 0.6 cpm / 0.2859 = 2.10 dpm

2.10 dpm / 2.22E6 dpm/μCi = 9.46E-7 μCi

9.46E-7 μCi / 2.52E8 ml = 3.75E-14 μCi/ml

β: 48 cpm / 0.3472 = 136.9 dpm

136.9 dpm / 2.22E6 dpm/μCi = 6.16E-5 μCi

6.16E-5 μCi / 2.52E8 ml = 2.45E-13 μCi/ml

S2-398 Jr High School 6/7/82 0707 → 6/14/82 0714 F ~ 60 lpm

Volume [(7 d)(24 hr/d)(60 min/hr)] + 5 min = 10085 min

(10085 min)(60 lpm) = 605100 l

= 6.051E8 ml

Short Lapse: exted 6/14/82

α: 1024.4 cpm / 0.2795 = 3665.1 dpm

3665.1 dpm / 2.22E6 dpm/μCi = 1.65E-3 μCi

1.65E-3 μCi / 6.051E8 ml = 2.73E-12 μCi/ml

β: 2962.3 cpm / 0.3382 = 8760.35 dpm

8760.35 dpm / 2.22E6 dpm/μCi = 3.95E-3 μCi

3.95E-3 μCi / 6.051E8 ml = 6.52E-12 μCi/ml

Long lapse:

α 0.4 cpm / 0.2859 = 1.4 dpm

1.4 dpm / 2.22E6 dpm/μCi = 6.31E-7 μCi

6.31E-7 μCi / 6.051E8 mL = 1.04E-15 μCi/mL

β: 50 cpm / 0.3472 = 230.4 dpm

230.4 dpm / 2.22E6 dpm/μCi = 1.04E-4 μCi

1.04E-4 μCi / 6.051E8 mL = 1.72E-13 μCi/mL

6/22/82

82408

0	17
1	4
2	100
3	1400
4	3319

0	18
1	5
2	100
3	5232
4	12526

82-409

0	19
1	6
2	100
3	2
4	54

0	20
1	6
2	100
3	0
4	41

$\alpha - \frac{23701}{82195} = 0.2883$ d/m

0.1 µm

$\beta - \frac{80273}{230690} = 0.3478$

4.4 µm

Junior High School 6/14/82 0733 → 6/22 0731 F = 25 lpm
82-403

Volume: [(8 d)(24 hr/d)(60 min/hr)] - 2 min = 11518 min
~~3599~~ (11518 min)(25 lpm) = 287950 l
= 2.8795E8 ml

Short Lapse: counted 6/24/82
α - 140.2 cpm / 0.2823 = 496.63 dpm
496.63 dpm / 2.22E6 dpm/μCi = 2.23E-4 μCi
2.23E-4 μCi / 2.8795E8 ml = 7.77E-13 μCi/ml

β - 327.5 cpm / 0.3478 = 941.63 dpm
941.63 dpm / 2.22E6 dpm/μCi = 4.24E-4 μCi
4.24E-4 μCi / 2.8795E8 ml = 1.47E-12 μCi/ml

Long lapse Counted 5/5/82
α 0.2 cpm / 0.2850 = 0.7018 dpm
0.7018 dpm / 2.22E6 dpm/μCi = 3.16E-7 μCi
3.16E-7 μCi / 2.8795E8 ml = 1.1E-15 μCi/ml
β 6.5 cpm / 0.3407 = 19.08 dpm
19.08 dpm / 2.22E6 dpm/μCi = 8.59E-6 μCi
8.59E-6 μCi / 2.8795E8 ml = 2.98E-14 μCi/ml

Junior High School 6/14/82 0714 → 6/22/82 0715 F = 57 lpm
82-409 Volume [(8 days)(24 hr/d)(60 min/hr)] - 1 = 11521 min
(11521 min)(57 lpm) = 656697 l
= 6.566978 ml

Short Lapse - counted 6/22/82
α → 523.1 cpm / 0.2823 = 1852.99 dpm
1852.99 dpm / 2.22E6 dpm/μCi = 8.35E-4 μCi
8.35E-4 μCi / 6.566978 ml = 1.27E-12 μCi/ml

β - 1248.2 / 0.3478 = 3588.84 dpm
3588.84 dpm / [illegible] = 1.62E-3 μCi

Long tapes counted 8/3/82

α: 0.8 cpm / 0.235 = 2.81 dpm

2.81 dpm / 2.22E6 dpm/μCi = 1.26E-6 μCi

1.26E-6 μCi / 6.56677E2 ml = 1.92E-15 μCi/ml

β: 8.7 cpm / 0.3407 = 25.54 dpm

25.54 dpm / 2.22E6 dpm/μCi = 1.15E-5 μCi

1.15E-5 μCi / 6.56697E8 ml = 1.75E-14 μCi/ml

6/28/82

```
                 6  37
1                   1
2                 100
3               23127
4                3248   d.c 28/4

                 1  38
1                   2
2                 100
3                3723   b.c.3477
4               80245

                 0  39
1                   3
2                 100
3                   1
4                  32

A                0  40   82-4/15
1                   4
2                 100
3                2041
4                4180

                 0  41   82.4/16
1                   5
B                 100
3                2306
4                6152

                 0  42
1                   5
2                 100
3                2059
4                5479
```

L.C. Jr. High School 6/22/82 0731 - 6/28/82 0739

Volume [(6 days)(24 hr/d)(60 min/hr)] + 9 min = 8649 min

(8649 min)(25 l/m) = 216225 l

= 2.16225E8 ml

Short Lapse - counted 6/28/82

Alpha 204.2/0.2814 = 725.66 dpm

725.65 dpm / 2.22E6 dpm/μCi = 3.27E-4 μCi

3.27E-4 μCi / 2.16225E8 ml = 1.51E-12 μCi/ml

Beta: 435.1/0.3477 = 1251.37 dpm

1251.87 dpm / 2.22E6 dpm/μCi = 5.64E-4 μCi

5.64E-4 μCi / 2.16225E8 ml = 2.61E-12 μCi/ml

Long Lapse - counted 7/6/82 1030

Alpha: 1 C/10 min - Blkgd: 4 C/10 min → NAB

Beta: ~~2.7~~ 3.7 cpm / 0.3444 = 10.74 dpm

10.74 dpm / 2.22E6 dpm/μCi = 4.84E-6 μCi

4.84E-6 μCi / 2.16225E8 ml = 2.24E-14 μCi/ml

WC Jr High School 6/22 - 28/82 (715 - 0717) 60 dpm

Volume [(6 d)(24 hr/d)(60 min/hr)] + 2 min = 8642 min

(8642 min)(60 l/m) = 518520 l

= 5.18520E8 ml

Short Lapse - counted 6/28/82

alpha 236.5 / 0.2814 = 840.43 dpm

840.43 dpm / 2.22E6 dpm/μC = 3.78E-4 μCi

3.78E-4 μCi / 5.18520E8 ml = 7.29E-13 μCi/ml

beta 612 / 0.3477 = 1760.14 dpm

1760.14 dpm / 2.22E6 dpm/μCi = 7.93E-4 μCi

7.93E-4 μCi / 5.18520E8 ml = 1.53E-12 μCi/ml

Long Lapse - counted 7/6/82 1030

Alpha 0.5 - 0.28 = 0.22 cpm / 0.2834 = 0.78 dpm

0.78 dpm / 2.22E6 dpm/μC = 3.49E-7 μC

3.49E-7 μC / 5.1852E3 = 6.746-16 μC/ml

Beta: 5.7 cpm / 0.3444 = 16.55 dpm

16.55 dpm / 2.22E6 dpm/μC = 7.46E-6 μC

7.46E-6 μC / 5.1852E3 = 1.44E-14 μC/ml

7/6/82
1030

0	70	82-423
1	4	
2	100	
3	3625	
4	8162	
0	71	82-424
1	5	
2	100	
3	2679	
4	7122	
0	72	82-425
1	6	
2	100	
3	1	
4	73	
1	73	82-426
1	7	
2	100	
3	5	
4	93	
0	74	
1	8	
2	100	
3	4	
4	42	
0	75	
1	8	
2	100	
3	4	
4	42	

$\alpha - \frac{23308}{82195} = 0.2836$

1.5/10 min

$\beta - \frac{79471}{230690} = 0.3444$

34 c/10 min

33 4/3.6 est Chicago to Ill 6/28/82 0739 - 7/6/82 0737 flow: 25 lpm

- Volume. [(8 days)(24 hr/day)(60 min/hr)] - 2 min = 11518 min

(11518 min)(25 lpm) = 287950 l

= 2.8795E8 ml

Short Lapse Counted 7/6/82 1030

Alpha 3623 cpm / 0.2836 = ~~12655~~ 12777.24 dpm

~~12655~~ 12777.24 dpm / 2.22E6 dpm/μCi = ~~5.7E-3~~ 5.75E-3 μCi

5.75E-3 μCi / 2.8795E8 ml = 1.99E-12 μCi/ml

Beta: 813 / 0.3444 = 2363.4 dpm

2363.4 dpm / 2.22E6 dpm/μCi = 1.07E-3 μCi

1.07E-3 μCi / 2.8795E8 ml = 3.7E-12 μCi/ml

Long Lapse; Counted 8/5/82

α: 0.5 cpm / 0.2836 = 1.73 dpm

1.73 dpm / 2.22E6 dpm/μCi = 7.90E-7 μCi

7.90E-7 μCi / 2.8795E8 ml = 2.74E-15 μCi/ml

β: 5.2 cpm / 0.3407 = 15.26 dpm

15.26 dpm / 2.22E6 dpm/μCi = 6.88E-6 μCi

6.88E-6 μCi / 2.8795E8 ml = 2.39E-14 μCi/ml

424 NC pk 6/28/82 0717 → 7/6/82 0711 flow = 60 lpm

Vol: [(8 days)(24 hr/d)(60 min/hr)] - 6 min = 11514 min

(11514 min)(60 lpm) = 6.9084E5 l

= 6.9084E8 ml

Short Lapse

Alpha 2673 cpm / 0.2836 = 943.67 dpm

943.67 dpm / 2.22E6 dpm/μCi = 4.25E-4 μCi

4.25E-4 μCi / 6.9084E8 ml = 6.15E-13 μCi/ml

Beta 708.6 cpm / 0.3444 = 2057.49 dpm

2057.49 dpm / 2.22E6 dpm/μCi = 9.27E-4 μCi

9.27E-4 μCi / 6.9084E8 ml = 1.34E-12 μCi/ml

Long Lapse. Counted 8/5/82

α: 1.8 cpm / 0.2836 = 5.26 dpm

5.26 dpm / 2.22E6 dpm/μCi = 2.37E-6 μCi

2.37E-6 μCi / 6.9084E8 ml = 3.43E-15 μCi/ml

β: 1.8 cpm / 0.3407 = 34.64 dpm

34.64 dpm / 2.22E6 dpm/μCi = 1.56E-5 μCi

1.56E-5 μCi / 6.9084E8 ml = 2.26E-14 μCi/ml

West Chicago Sr High School

82-426 7/6/82 0737 @ 25 lpm → 7/12/82 0730 25 lpm

Volume: [(6 days)(24 hr/day)(60 min/hr)] - 7 = 8633 min

(8633 min)(25 lpm) = 215825 l

= 0.215825E8 ml

Short Lapse: Not counted - Year out of office

Long Lapse: counted 7/19/82

α: 0.25 cpm / 0.2841 = 0.3799 dpm

0.8799 dpm / 2.22E6 dpm/μCi = 3.96E-7 μCi

3.96E-7 μCi / 2.15825E8 ml = 1.84E-15 μCi/ml

β: 4.6 cpm / 0.3482 = 13.21 dpm

13.21 dpm / 2.22E6 dpm/μCi = 5.95E-6 μCi

5.95E-6 μCi / 2.15825E8 ml = 2.76E-14 μCi/ml

West Chicago Jr High School

82-427 7/6/82 0711 @ 60 lpm → 7/12/82 0741 @ 60 lpm

Volume: [(6 days)(24 hrs/day)(60 min/hr)] - 10 = 5630 min

(8630 min)(60 lpm) = 517800 l

= 5.17800E8 ml

Short Lapse: not counted - Year out of office

Long Lapse:

α: 0.25 cpm / 0.2841 = 0.8799 dpm

0.8799 cpm / 2.22E6 dpm/μCi = 3.96E-7 μCi

3.97E-7 μCi / 5.178E8 ml = 7.66E-16 μCi/ml

β: 5.7 cpm / 0.348 = 16.37 dpm

16.37 dpm / 2.22E6 dpm/μCi = 7.37E-6 μCi

7.37E-6 μCi / 5.178E8 ml = 1.42E-14 μCi/ml

7/19/82

Sent Chicago to High

82-446 7/12/82 0730 @ 25 lpm → 0

Time [(7 days)(24 hr/day)(60 min/hr)]

(10095 min)(25 lpm) = 252375 L

= 2.52375

Short tape not counted - rack out of off

Long tape:

α: 0.4 cpm / 0.282 = 1.41 dpm

1.41 dpm / 2.22E6 dpm/μCi = 6.34E

6.34E-7 μCi / 2.52375E8 ml = 2.51

β: 5.9 cpm / .349 = 16.91 dpm

16.91 dpm / 2.22E6 dpm/μCi = 7.

7.61E-6 μC / 2.52375E8 ml = 3.02

WC to High

filter missing - debris clogging lines

	0	43	82-446
1		4	
2		100	
3		2079	
4		4570	

	0	44	82 4/26
1		5	
2		100	
3		3	
4		62	

	0	45	82-427
1		6	
2		100	
3		3	
4		74	

0	46	
1	6	
2	100	
3	3	
4	72	

Lot Change to High

82-446 7/12/82 0730 @ 25 lpm → 7/19/82 0745 @ 25 lpm

Sham [(7 days)(24 hr/day)(60 min/hr)] + 15 min = 10095 min

(10095 min)(25 lpm) = 252375 l

= 2.52375E8 ml

Short lapm not counted - was out of office

Long lapm:

α: 0.4 cpm / 0.2842 = 1.41 dpm

1.41 dpm / 2.22E6 dpm/μCi = 6.34E-7 μCi

6.34E-7 μCi / 2.52375E8 ml = 2.512E-15 μCi/ml

β: 5.9 cpm / 0.3477 = 16.97 dpm

16.97 dpm / 2.22E6 dpm/μCi = 7.64E-6 μCi

7.64E-6 μCi / 2.52375E8 ml = 3.02E-14 μCi/ml

WC of H.f.

filter missing - debris clogging lines

8/5/82

0	29	82-447
1	4	
2	100	
3	4	
4	76	

0	30	blank
1	5	
2	100	
3	2	
4	47	

0	31	
1	5	
2	100	
3	3	
4	29	

1/26/82

0	23	82-
1	8	
2	100	447
3	4564	
4	10229	

0	24	
1	6	82-
2	100	448
3	2972	
4	9506	

0	25	82-
1	7	
2	100	446
3	5	
4	77	

0	26	
1	8	
2	100	
3	0	
4	22	

... of Chicago: Air Flight

#147 7/1/82 0745 @ 25 lpm ⇒ 7/26/82 0731 @ 25 lpm

Volume [(7 days)(24 hrs/day)(60 min/hr)] − 7 min = 10073 min

(10073 min)(25 lpm) = 251825 l

= 2.518255E8 ml

Short Lapse Counted 7/26/82

α 450.3 cpm / 0.2842 = 1584.45 dpm

1584.45 dpm / 2.2226 dpm/μCi = 7.14E-4 μCi

7.14E-4 μCi / 2.518255E8 ml = 2.83E-12 μCi/ml

β 10210 cpm / 0.3477 = 2936.78 dpm

2936.78 dpm / 2.2226 dpm/μCi = 1.326 nCi

1.326E-3 μCi / 2.518255E8 ml = 5.25E-12 μCi/ml

Long Lapse Counted 8/3/82

α 0.2 cpm / 0.2817 = 0.7099 dpm

0.7099 dpm / 2.2226 = 3.2E-7 μCi

3.2E-7 μCi / 2.518255E8 ml = 1.27E-15 μCi/ml

β 4.1 cpm / 0.3359 = 12.1 dpm

12.1 dpm / 2.2226 dpm/μCi = 5.45E-6 μCi

5.45E-6 μCi / 2.518255E8 ml = 2.16E-14 μCi/ml

#148 7/19/82 0713 @ 32 lpm ⇒ 07/26/82 0710 @ 32 lpm

Volume: [(7 days)(24 hrs/day)(60 min/hr)] − 3 min = 10077 min

(10077 min)(40 lpm) = 403080 l

= 4.0308E8 ml

Short Lapse Counted 7/26/82

α 397.1 cpm / 0.2842 = 1397.26 dpm

1397.26 / 2.2226 dpm/μCi = 6.29E-4 μCi

6.29E-4 μCi / 4.0308E8 ml = 1.56E-12 μCi/ml

β 948.6 cpm / 0.3477 = 2728.2 dpm

2728.2 dpm / 2.2226 dpm/nCi = 1.233 nCi

1.23E-3 μCi / 4.0308E8 ml = 3.05E-12 μCi/ml

8/30/82
0830

1 18 82-529
1 4
2 100
3 4676
4 10357

1 19 82-530
1 5
2 100
3 2927
4 8924

1 20 82-488
1 6
2 100
3 7
4 74

1 21 82-489
1 7
2 100
3 2
4 87

1 22 Blank
1 8
2 100
3 3
4 48

1 23
1 8
2 100
3 2
4 47

α - 23166/82195
2.5

β - 79369/230690
33