Westinghouse

Atomic Power Division
P. O. Box 355
Pittsburgh 30,

September 24, 1962

Mr. Richard Cunningham
Division of Licensing and Regulation
U. S. Atomic Energy Commission
Washington 25, D. C.

(formal)

Subject: Docket 50-22

Dear Mr. Cunningham:

In conjunction with Phase I of the retirement of the Westinghouse Testing Reactor as described in letter of May 8, 1962 (TR-2; Docket 50-22) to Mr. Robert Lowenstein from Mr. J. W. Simpson and letter of August 17, 1962 to Mr. J. M. Yadon from Mr. E. R. Price (Docket No. 50-22: DL&R: ERF), we are retiring the three basins which were used to contain water after the incident of April 3, 1960.

The attached Proposal presents our recommended plan.

Very truly yours,

J. M. Yadon

J. M. Yadon, Manager
Nuclear Power Service

/mms

attachment

A/66

WTR-171

WESTINGHOUSE TESTING REACTOR

RETIREMENT OF FACILITIES -
OPEN BASINS

WTR-171

September 24, 1962

PROPOSAL

RETIREMENT OF OPEN BASINS AT WTR

Subsequent to the fuel rod meltdown at the Westinghouse Testing Reactor on April 3, 1960, it suddenly became necessary to store large quantities of contaminated water to prevent its release into the stream adjacent to the plant site. Since it was impossible to obtain tanks having sufficient capacity within a short time, several excavations were made on the site property to create waste holding basins where this water could be retained. Subsequently, tanks were installed and used for retention of the contaminated water. Then, a liquid waste disposal facility, consisting of a 2,000 gal/hr evaporation plant was built and since then, all of the stored water has been removed from the basins and processed.

Three basins designated as No. 1, No. 2 and No. 3 were used for storage of this contaminated water. They were located on the site as shown on Drawing No. 1. Drawing Nos. 2, 3 and 4 show their approximate dimensions. The size, nature and characteristics of this site are described in documents previously submitted (the most recent one is WCAP-2031 "Post Irradiation Facility"). The property is owned in Fee Simple by Westinghouse Electric Corporation.

The elevation of the basins is a minimum of 10 feet above Calleys Run and there is no evidence of ground water at the elevation of the pits. The clay bed under these basins has very low permeability with no evidence of any subsurface leakage from the basins. There are no useable wells within one-half mile of the basins and the Westinghouse property line is approximately one-third mile from them. Surface drainage is into Calleys Run which in turn empties into Sewickley Creek.

Basins No. 1 and No. 2 were constructed first. Pits were excavated, with the excavated clay being piled around the edge to serve as a bank. The bottoms of these pits were leveled, covered with a layer of sand (6"-12" deep) to provide a flat, level surface and this surface was covered with polyethylene sheeting. The basins were then filled with the contaminated water. Basin No. 3 was the last one constructed. Its clay base was covered with a koroseal cover. This cover has withstood weathering much better than the polyethylene sheeting used in the first two basins. The polyethylene in Basins No. 1 and No. 2 has disintegrated to a considerable extent but the cover of Basin No. 3 is still in good condition.

These basins have all been drained and are of no further use to us. There is a small amount of residual radioactivity in the bottom of them. In our judgement, it would be preferable to back-fill these with the earth which was originally excavated rather than leaving them open.

A study of each basin was made during June, July and August 1962 by determining the amount of radioactivity and the type of radioactive material in soil samples taken from various locations in their bottoms. Radiation surveys were also made during this period to determine the beta-gamma radiation intensity above the surface of each one. Soil samples were collected in the general vicinity of these basins and were analyzed by the same techniques to establish the natural background. The data for the basins is presented on Drawing Nos. 2, 3 and 4.

From these data and calculations as shown in Appendix A, the following information is summarized:

	Avg. pico curies per gram (above background)	Total mc. (above background) in basins	mr/hr one foot above surface
Basin No. 1	740	132	.05 - 7
Basin No. 2	30	4	.05 - 1
Basin No. 3	1400	400	.05 - 20

As shown in Appendix B, an analysis of several combined soil samples indicates that the radioactivity is primarily mixed fission products with 9% to 15% of the radioactivity from Sr^{90}. The mixed fission products are approximately 2-1/2 years old and theoretically 7% of the radioactivity in them would be from Sr^{90}.

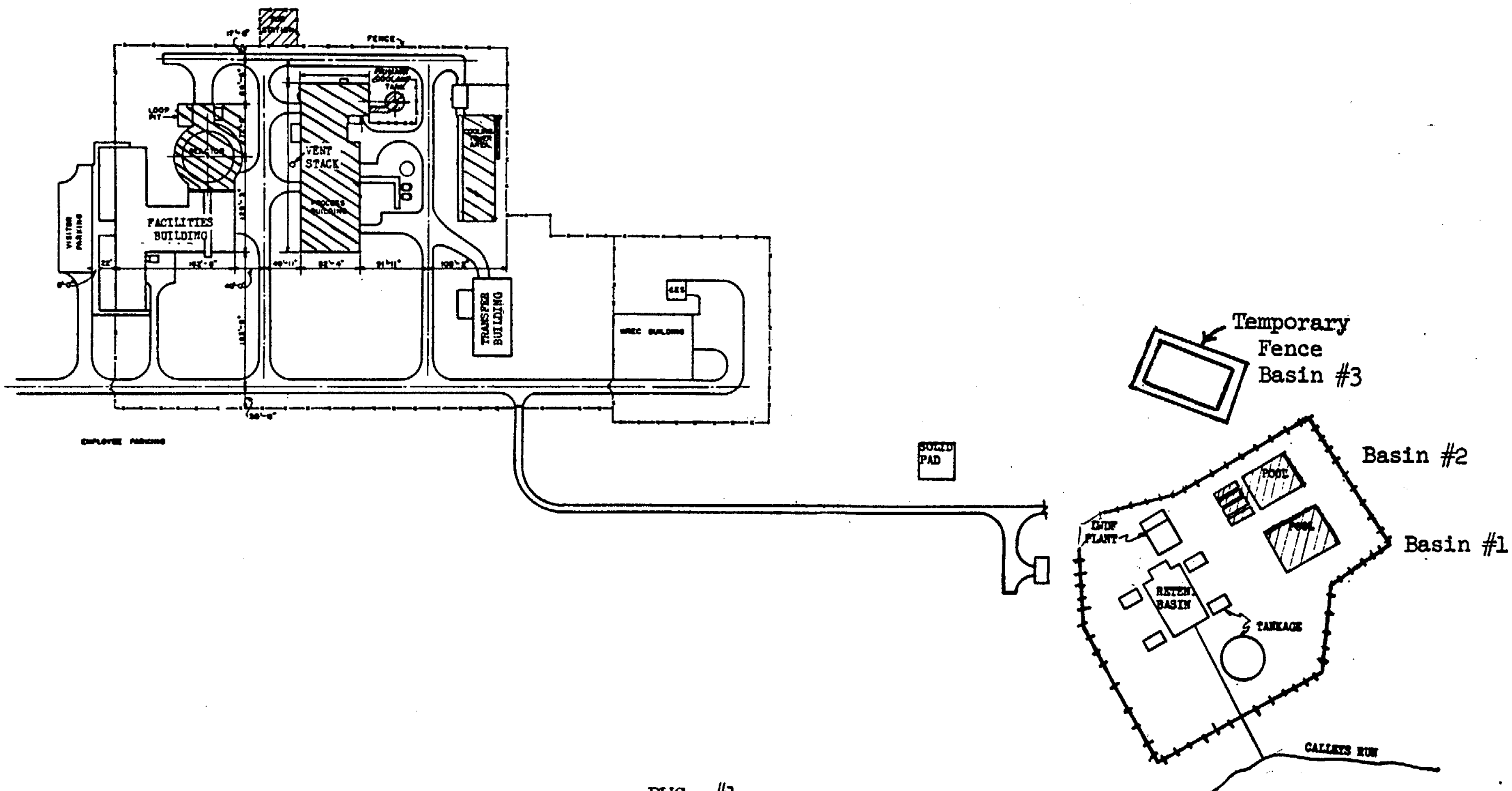
In 10CFR20, certain limits are specified for burial of radioactive materials in soil. Assuming that the materials are mixed fission products containing not over 10% Sr^{90}, the permissible yearly burial would be 600 μc (1000 x 0.1/2 x 10 x 12). The area required for burial would be 432 sq.ft. and the permissible average radioactivity at the four foot depth would be 14 $\mu c/ft^2$.

In these three basins, the average radioactivity, as shown in Appendix B, is about 15 $\mu c/ft^2$. Thus, the average amount of radioactivity per unit area in these basins would be about the same as that permitted by 10CFR20, although the total area involved would be greater.

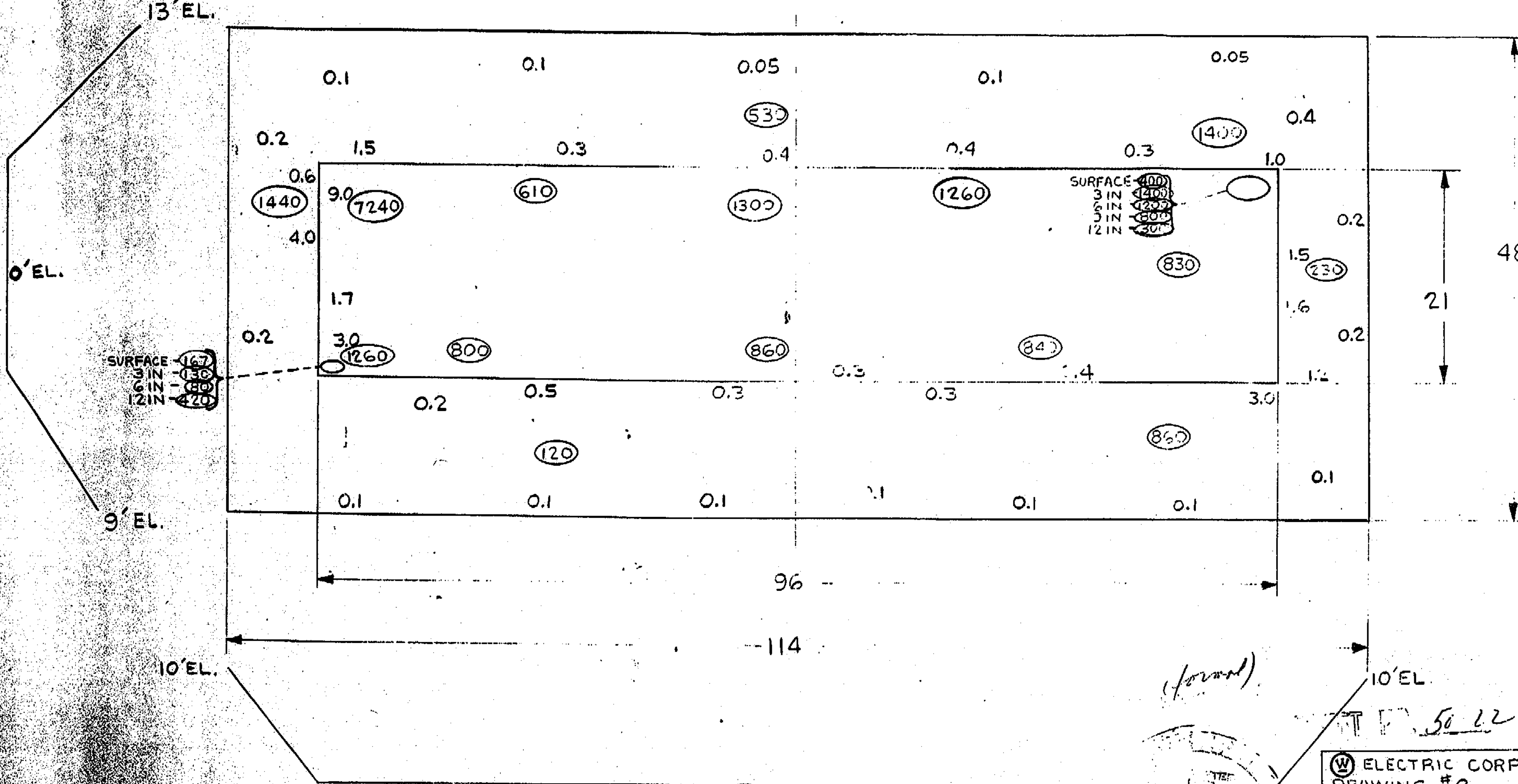
The backfilling would be done in a manner such that the earth cover of Basin No. 3 would be four feet deep and the others would be covered to a depth of at least three feet. The soil surface of the area would have a gradual slope from North to South which would provide good surface drainage from this area.

The soil cover resulting from backfilling these basins would provide sufficient attenuation of the existing beta-gamma radiation intensities so that at the ground surface there would be no significant increase in the normal background. For Basin No. 3 the radiation intensity from the buried residue would be about .002 mr/hr compared to natural background of about .02 mr/hr. In Basin No. 1 this intensity would be about .004 mr/hr and in Basin No. 2, less than .001 mr/hr.

It is our conclusion that back-filling these basins would leave this area in the most desirable state.



DWG. #1
WALTZ MILL SITE LAYOUT

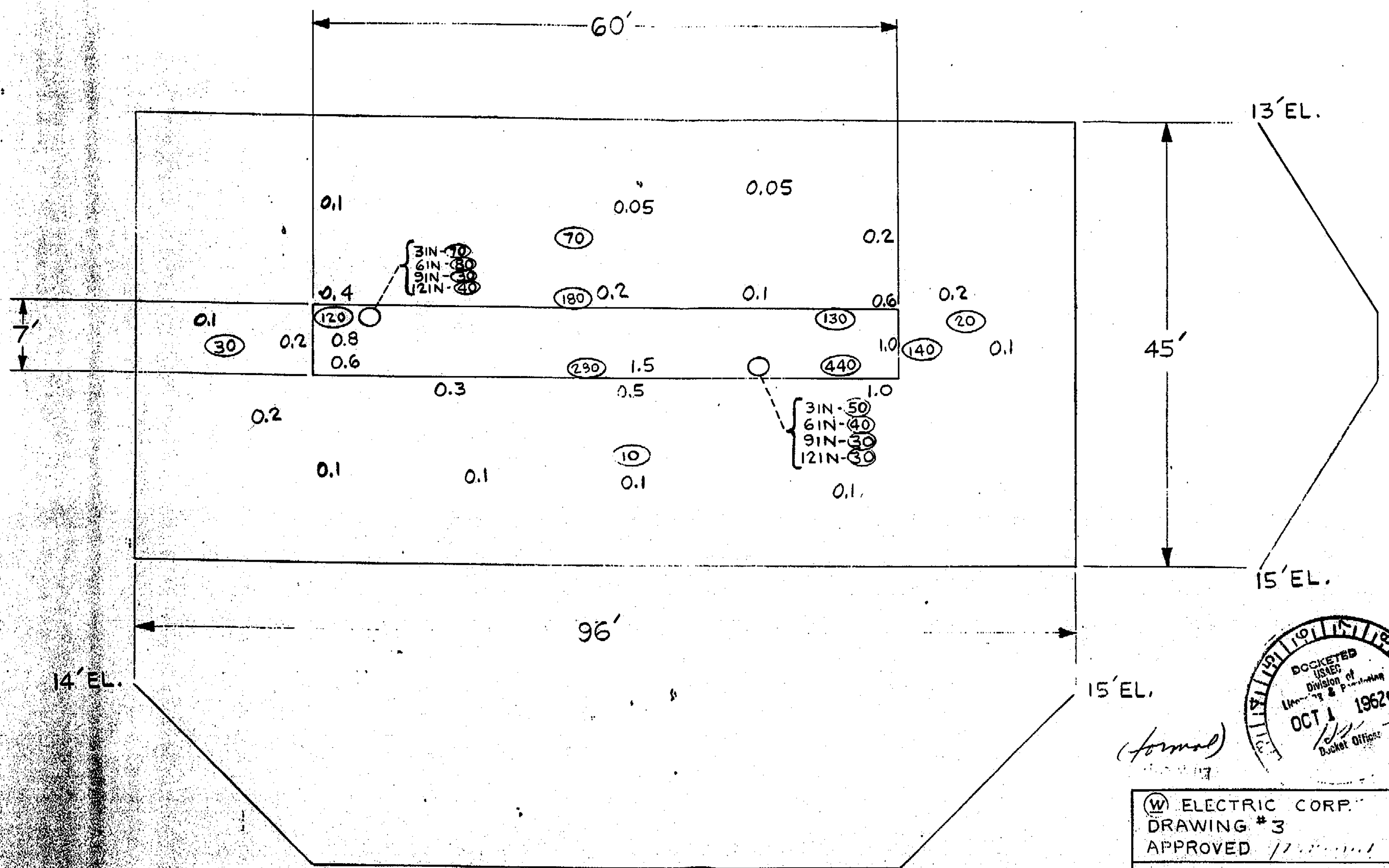


RADIATION READINGS IN MR/HR AT HT. OF 1' ARE NOT ENCIRCLED

ACTIVITY LEVELS IN PICOCURIES PER GM ARE ENCIRCLED

(W) ELECTRIC CORP.
DRAWING #2
APPROVED

BASIN #1
WALTZ MILL SITE
SCALE 1:120



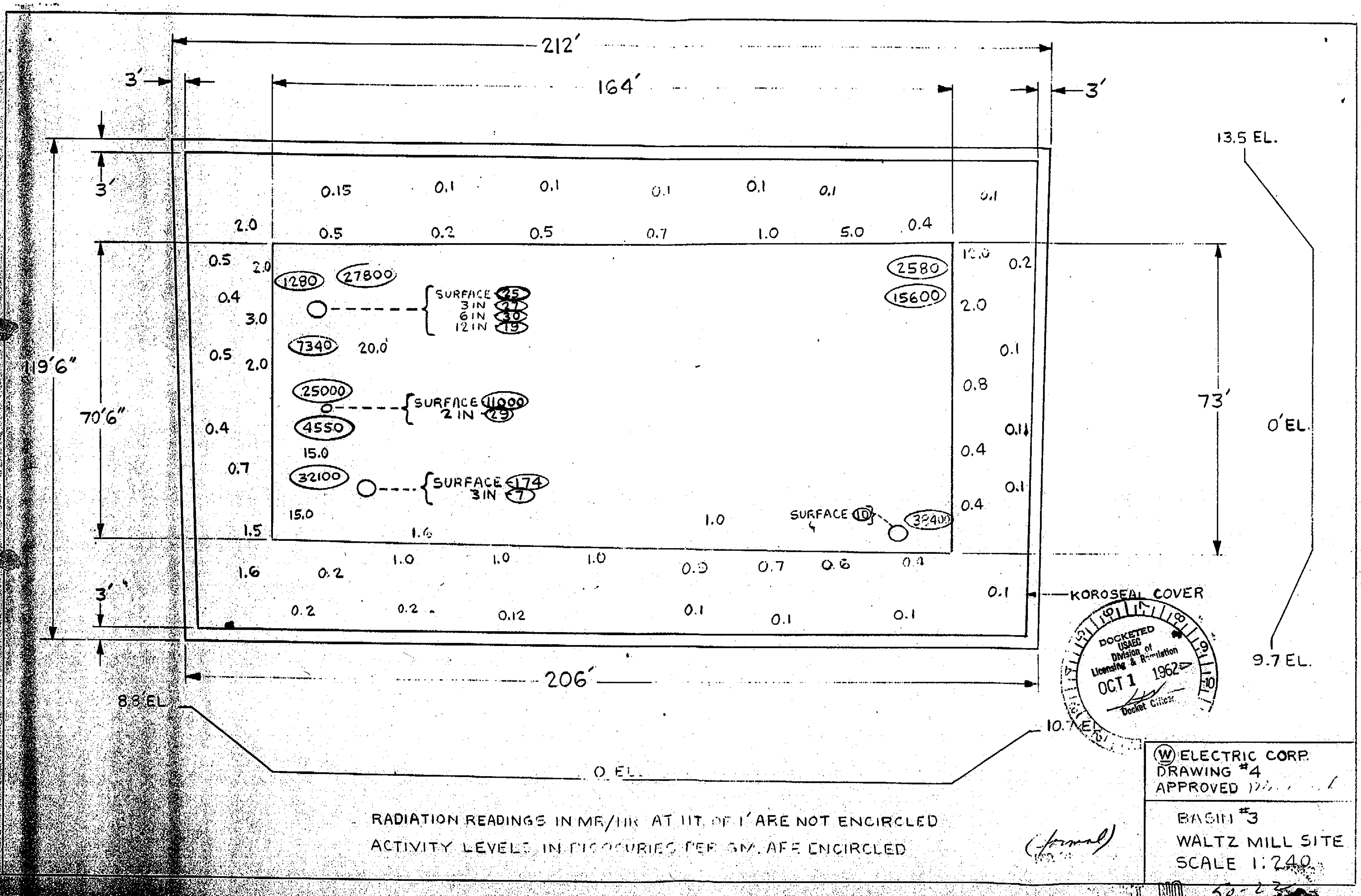
RADIATION READINGS IN MR/HR. AT HT. OF 1' ARE NOT ENCIRCLED
ACTIVITY LEVELS IN PICOCURIES PER GM. ARE ENCIRCLED

(formal)

Ⓦ ELECTRIC CORP.
DRAWING #3
APPROVED

BASIN #2
WALTZ MILL SITE
SCALE 1:120

[redacted]


212'
164'
3'
3'
3'
3'
119'6"
70'6"
73'
206'
13.5 EL.
0' EL.
9.7 EL.
8.8 EL.
10.7 EL.
0 EL.
KOROSEAL COVER
SURFACE 25
3 IN 27
6 IN 30
12 IN 19
SURFACE 11000
2 IN 29
SURFACE 174
3 IN 7
SURFACE 10
1280
27800
7340
25000
4550
32100
2580
15600
32400
DOCKETED USAEC Division of Licensing & Regulation OCT 1 1962 Docket Clerk
RADIATION READINGS IN MR/HR AT HT. OF 1' ARE NOT ENCIRCLED
ACTIVITY LEVELS IN PICOCURIES PER GM. ARE ENCIRCLED
W ELECTRIC CORP.
DRAWING #4
APPROVED
BASIN #3
WALTZ MILL SITE
SCALE 1:240
NO. 50-22

[redacted]

APPENDIX A

1. Background

Soil samples were collected at six points on the Waltz Mill Site nearby the basins. The average beta-gamma radioactivity in these samples was 25 picocuries per gram of soil.

2. Basin No. 1

Because of the change in radioactivity levels at different depths in the soil, we have treated the top two inches and the next ten inches separately.

Estimated surface area = 5462 $ft.^2$

Volume of top 2 in. = 910 $ft.^3$

Since, 1 $ft.^3$ = 28.32 l

910 $ft.^3 \times 28.32\ l/ft.^3 = 2.57 \times 10^4\ l = 2.57 \times 10^7$ ml

Assuming soil density of 1.2,

2.57×10^7 ml $\times$ 1.2 g/ml = 3.08×10^7 g.

Average activity above background in top 2 in. is calculated as 1.22×10^{-9} c/g.

Thus, 3.08×10^7 g. $\times$ 1.22×10^{-9} c/g. = .037 c (top 2 in.)

Volume of remaining 10 in. = 4541 $ft.^3$

4541 $ft.^3 \times 28.32\ l/ft.^3$ $1.28 \times 10^5\ l = 1.28 \times 10^8$ ml

1.28×10^8 ml $\times$ 1.2 g/ml = 1.53×10^8 g.

Average activity above background at this depth is calculated as 6.20×10^{-10} c/g.

Thus, 1.53×10^8 g. $\times$ 6.20×10^{-10} c/g. = .095 c.(remaining 10 in.)

TOTAL .132 curies (in Basin No. 1)

APPENDIX A (Continued)

3. **Basin No. 2**

Estimated surface area = 4320 ft.^{2}

Estimate volume to depth of 12 in. - 4320 ft.^{3}

4320 ft.^{3} x 28.32 l/ft.^{3} = 1.22×10^5 l = 1.22×10^8 ml

1.22×10^8 ml x 1.2 g/ml = 1.46×10^8 g. soil

Average activity of top 12 in. above background = 3.0×10^{-11} c/g.

Thus, 3.0×10^{-11} c/g. x 1.46×10^8 g. soil = 4.38×10^{-3} c. = .0043 curies (in Basin No. 2)

4. **Basin No. 3**

Estimated sediment (primarily soil washed into basin) on koroseal cover = 621 ft.^{3}

621 ft.^{3} x 28.32 l/ft.^{3} = 1.75×10^4 l = 1.75×10^7 ml

1.75×10^7 ml x 1.2 g/ml. = 2.11×10^7 g. soil

Average activity of sediment on koroseal cover above background = 1.71×10^{-8} c/g.

Thus, activity in sediment on koroseal cover:

2.11×10^7 g. soil x 1.71×10^{-8} c/g. = 0.360 c. (above koroseal cover)

Estimated quantity of soil to a depth of 12 in. which is contaminated above background = 1.18×10^4 ft.^{3}

1.18×10^4 ft.^{3} x 28.32 l/ft.^{3} = 3.34×10^5 l = 3.34×10^8 ml

3.34×10^8 ml x 1.2 g./ml = 4.00×10^8 g. soil

Average estimated activity above background to a depth of 12. in = 1.0×10^{-10} c/g.

Thus, 4.00×10^8 g. soil x 1×10^{-10} c/g. = .04 curies (in 12 in. of soil beneath cover)

TOTAL 0.400 curies (in Basin No. 3)

APPENDIX B

1. Gamma Spectrum Determinations

A composite soil sample was analyzed and a gamma spectrum made indicating the presence of the following nuclides.

E	Nuclide
0.14 Mev	Ce^{144}
0.66 Mev	Cs^{137}
0.76 Mev	Zn^{95}-Nb^{95}
0.80 Mev	Cs^{134}
0.69 Mev, 1.48 Mev, 2.18 Mev	Ce^{144}-Pr^{144}
1.1 Mev, 1.3 Mev	Co^{60}

This represents a typical gamma spectrum for low levels of mixed fission products.

2. Sr^{90} Determinations

Area	Sr^{90} pc/gm soil	Total β-γ activity pc/gm soil	% Sr^{90}
Basin No. 1 - Depth composite	9	98	9
Basin No. 1 - Surface composite	14	93	15
Basin No. 2 - Depth and surface composite	13	127	10
Basin No. 3 - Composite	*	2600	-

* Sample spoiled during analysis

APPENDIX B (Continued)

3. Average Radioactivity

Total area of Basins

Basin No.	Dimensions ft	Area ft^2
1	48 x 114	5,500
2	45 x 96	4,300
3	212 x 120	25,400
Total		35,200

Total radioactivity = 536 mc or $5.36 \times 10^5\ \mu c$

Average radioactivity = $\frac{5.36 \times 10^5}{35,200} = 15\ \mu c/ft^2$