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INSPECTION AND ENFORCEMENT

release

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POWER SYSTEMS

June 3, 1977

Mr. L. C. Rouse
Chief, Fuel Processing and Fabrication Branch
Division of Fuel Cycle and Material Safety
U.S. Nuclear Regulatory Commission
Washington, D.C., 20555

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License No. SNM-33
Docket No. 70-36

Dear Mr. Rouse:

Enclosed is supplemental environmental information relating to operation of the wet scrap recovery process, as requested in Amendment No. 92 to SNM-33 and by members of your staff.

We believe that the environmental information shows that the new process does not have a significant potential to adversely affect the plant site or its environs, and that the incremental effects are negligible.

We will gladly furnish any additional information you may require to support our conclusion that no significant environmental effect will result from the requested licensing action.

Very truly yours,

COMBUSTION ENGINEERING, INC.

H. E. Eskridge

H. E. Eskridge
Supervisor, Nuclear Licensing,
Safety and Accountability

/wg
Enclosure

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SUPPLEMENTAL ENVIRONMENTAL IMPACT INFORMATION RELATED TO INSTALLATION AND OPERATION OF A WET SCRAP RECOVERY PROCESS

COMBUSTION ENGINEERING, INC.
HEMATITE, MISSOURI

License No. SNM-33
Docket No. 70-36

June, 1977

1. Projected Operational Rate

The projected operational rate for the wet scrap recovery process, based on current production schedules and scrap materials backlog, is as follows:

Year	MTU
1977	2.4
1978	4.6
1979	2.1
1980	3.0
1981	3.6
1982	4.4

The maximum capacity of the wet recovery process, assuming continuous operation, is 255 lbs. U/day. The above production schedule, however, calls for a maximum operating rate of only 28 lbs. U/day on an annual average basis.

2. Non-radiological Gaseous Effluents

Nitrogen oxides (NO_X) is the only significant non-radiological gaseous effluent resulting from the wet scrap recovery process. NO_X is produced during the dissolution of U_3O_8 in nitric acid:

$$2U_3O_8 + 14HNO_3 \rightarrow 6UO_2(NO_3)_2 + 7H_2O + NO_2 + NO$$

NO_X emissions from the dissolvers are routed through a wet scrubber as previously discussed. An NO_X analyzer was obtained to monitor the scrubber exhaust during the pilot campaign.

U_3O_8 is fed to the dissolvers in 9.6 Kg U batches. Graphical integration of the NO_X emission curve for a typical dissolution batch yielded a total output of 56.03 liters of NO_X during a 172 minute period. The total exhaust from the "wet-side" stack for the same period was 3.897×10^7 liters, giving an NO_X

2. Non-radiological Gaseous Effluents (continued)

concentration of only 1.4 ppm. The maximum concentration reached was only 6.1 ppm.

At the maximum projected operating rate, the annual average NO_x concentration will be less than 0.3 ppm. Using a conservative aeolian dilution factor of 10^{-3}, the annual average concentration will be 0.3 ppb at the nearest site boundary. This is well below the EPA secondary air-quality standard of 50 ppb.

HNO_3 concentrations measured in the NO_x scrubber liquor indicate a scrubber efficiency of about 75%. Thus, even if the scrubber were inoperable, it is unlikely that a peak concentration of 25 ppb would be exceeded at the nearest site boundary. Therefore, routine monitoring of NO_x emissions is not planned.

Fluoride sampling was conducted on the recycle furnace exhaust during eleven 24-hour periods involving heavy use of the furnaces. Fluoride emissions varied from 0.02 to 0.43 lbs./hr., with an average of 0.14 lbs./hr. This level represents only about 1.0 lbs./day on an annual average basis, and is less than a 3% increment to the projected annual fluoride release from the oxide conversion process.

The recycle furnaces are used primarily in support of the oxide conversion process. Materials such as back-up filter fines, having a relatively "high" fluoride content, are recycled through the furnaces and returned to the process. The sampling discussed above was for "high" fluoride material runs and thus represents the "worst case".

2. Non-radiological Gaseous Effluents (continued)

Use of the recycle furnaces in support of wet scrap recovery will involve oxidation of UO_2 to U_3O_8 feed and reduction of UO_4 back to UO_2. These operations do not produce significant fluoride emissions.

Routine monitoring of fluoride in the furnace exhaust is not planned, as this is not a significant source compared to the oxide conversion dry scrubbers. Continuous monitoring of the dry scrubbers plus vegetation sampling constitute an adequate environmental program for fluoride releases.

3. Radiological Gaseous Effluents

As discussed in previous reports, 3 recycle equipment exhaust stacks with single HEPA filters were replaced by a consolidated stack with double HEPA filters when the equipment was relocated to the new recycle/recovery area in Building 240. Monitoring results for the new "dry side" exhaust stack are shown below:

Month	Highest Daily Sample ($X10^{-12}$ µCi/cc)	Monthly Average Concentration ($X10^{-12}$ µCi/cc)
August 1976	0.54	0.21
September	0.91	0.23
October	1.77	0.29
November	3.43	0.84
December	0.15	0.09
January 1977	0.19	0.04
February	3.55	0.22
March	0.13	0.05
April	0.35	0.07
May	0.29	0.06

No daily sample exceeded MPC (4×10^{-12} µCi/cc). The average concentration was only 5.2% MPC.

3. Radiological Gaseous Effluents (continued)

A new exhaust stack was added for the wet recovery equipment, also with double HEPA filters. This stack was not operational until start-up testing with depleted material in January 1977, and was not in operation during February and March when no processing was conducted due to equipment problems. Monitoring results for the new "wet side" exhaust stack are shown below:

Month	Highest Daily Sample ($X10^{-12}$ µCi/cc)	Monthly Average Concentration ($X10^{-12}$ µCi/cc)
January 1977	0.08	0.03
February	-	-
March	-	-
April	0.18	0.02
May	2.16	0.50

Again, no daily sample exceeded MPC. The average concentration was only 8.5% MPC.

4. Liquid Wastes

Liquid wastes generated by the wet recovery process and the recycle furnaces are discussed in Section 5 of the Environmental Information dated August 1976. See also the attached process flow diagram (Figure 1).

Uranium concentrations in the process filtrate have been measured for the 3 pilot runs conducted to date:

Run	Uranium Input (Kg)	Filtrate Volume (liters)	Uranium Concentration (gm/l)	Uranium Discharged (gm)
F-01	48.1	1260	0.047	58.75
F-02	76.3	3512	0.069	243.53
F-03	95.6	4138	0.064	264.00
Totals	220.0	8910		566.28

4. Liquid Wastes (continued)

The average concentration of the 8910 liters of filtrate generated was 0.064 grams per liter. The total quantity of uranium discharged to the retention ponds was 0.25% of the input quantity. The total activity discharged was 817 μCi, or 9×10^{-5} μCi/cc.

Based on the above data, the projected discharges to the retention ponds are obtained by taking 0.25% of the projected operational rates shown in Section 1:

Year	Projected Kg U Discharge
1977	6.0
1978	11.5
1979	5.2
1980	7.5
1981	9.0
1982	11.0

It is anticipated that filtrate uranium concentrations will be reduced as operating experience is gained with the wet recovery system. Thus, the above estimates are biased high as they are based upon only 3 experimental runs.

The location of the retention ponds and sampling wells are shown on Figure 2. The wells were constructed and located in accordance with consultation provided by a geologist with the Missouri Department of Natural Resources.

The geologist visited and examined the site and core drilling data obtained when the Oxide Building was constructed (see answer to NRC Question 3, submitted March 23, 1976). Basically, the locations were based on all groundwater flow being towards

4. Liquid Wastes (continued)

Joachim Creek. The equilateral triangle configuration allows for detection of dispersion as the groundwater moves towards the creek.

The wells are constructed as shown by Figure 3. The depth of 19.5 feet was based on encountering groundwater at an average depth of 13 feet. The wells are protected from entrance of surface water as shown on the drawing.

The wells are sampled monthly and analyzed for gross alpha and beta activity and fluoride. Alpha and beta analyses are performed by an outside contractor laboratory. Sensitivities obtainable are 2 pCi/ℓ for alpha and 3 pCi/ℓ for beta activity. Fluoride analyses are performed by our laboratory using a specific ion electrode with a sensitivity of 1 ppm.

Results of analyses performed to date are shown below:

Month	Well Location	Gross Alpha (pCi/ℓ)	Gross Beta (pCi/ℓ)	Fluoride (ppm)
February 1977	North	33	105	<1
	East	41	24	<1
	West	*	*	*
March	North	12	13	**
	East	6	5	**
	West	*	*	*
April	North	<2	58	<1
	East	<2	<3	<1
	West	4	<3	<1
May	North	results not yet received		<1
	East	results not yet received		<1
	West	results not yet received		<1

* well dry at this time
** analysis not performed

4. Liquid Wastes (continued)

The proposed action level if contamination is found in the south or west (lower) wells is 10 MPC, in that a dilution of greater than 10 would certainly be achieved prior to the groundwater reaching Joachim Creek.

Corrective action will consist of confirming results and evaluating rate of increase (if any) of contamination levels. Upon confirmation of continuing increase above the 10 MPC level, accumulation of solids in the ponds will be removed and shipped to a licensed burial site. No filtrate will be discharged until the level falls below 10 MPC. MPCs to be used are 3×10^{-5} μCi/ml for alpha activity (based on U-234) and 2×10^{-5} μCi/ml for beta activity (based on Th-234).

It is considered very unlikely that these limits will be approached due to clay soil surrounding the ponds and the density of the pond bottom material. Sludge presently in the first (west) retention pond was analyzed and found to contain 1840 ppm uranium (wet).

WET SCRAP RECOVERY - FLOW DIAGRAM

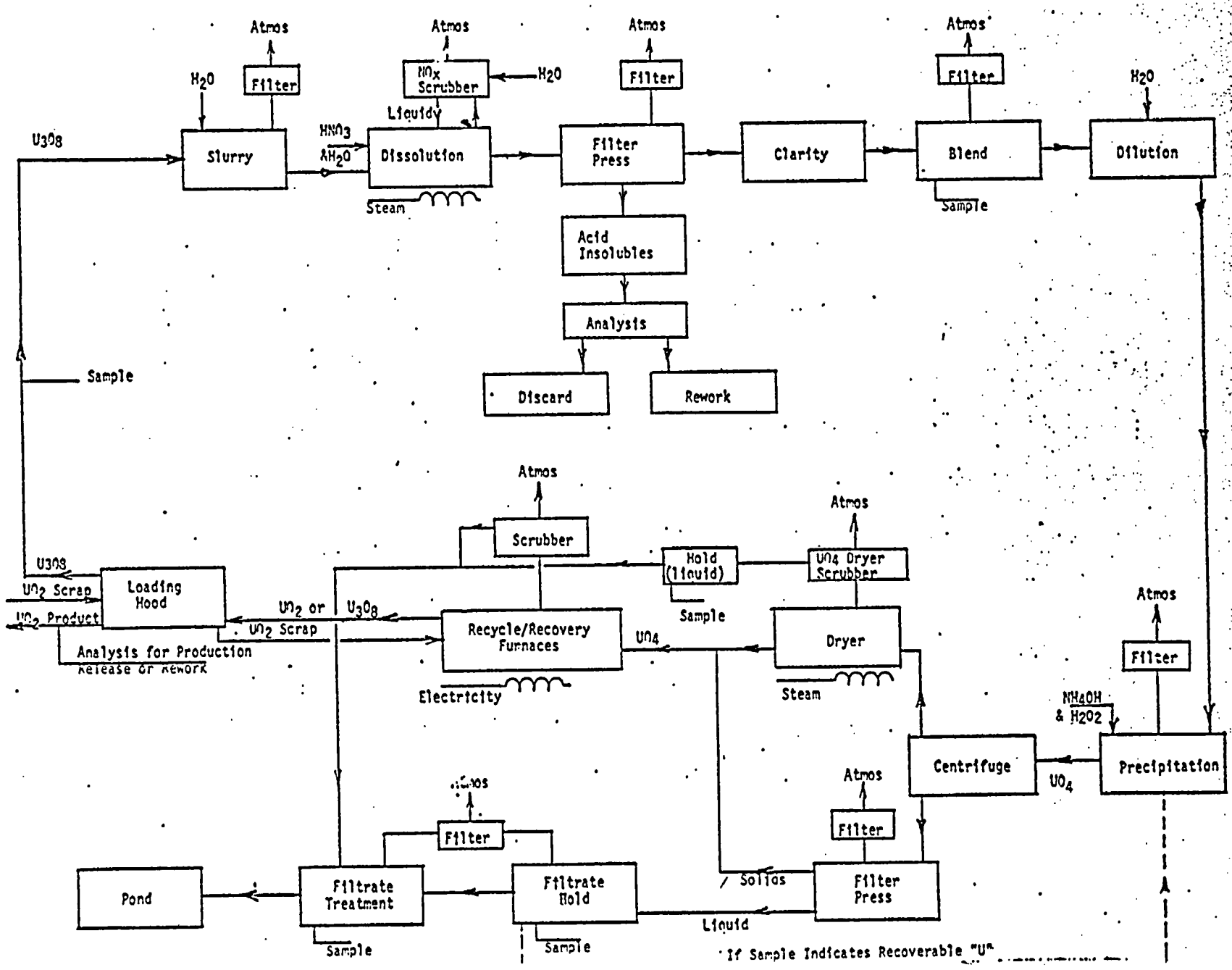

Figure 1

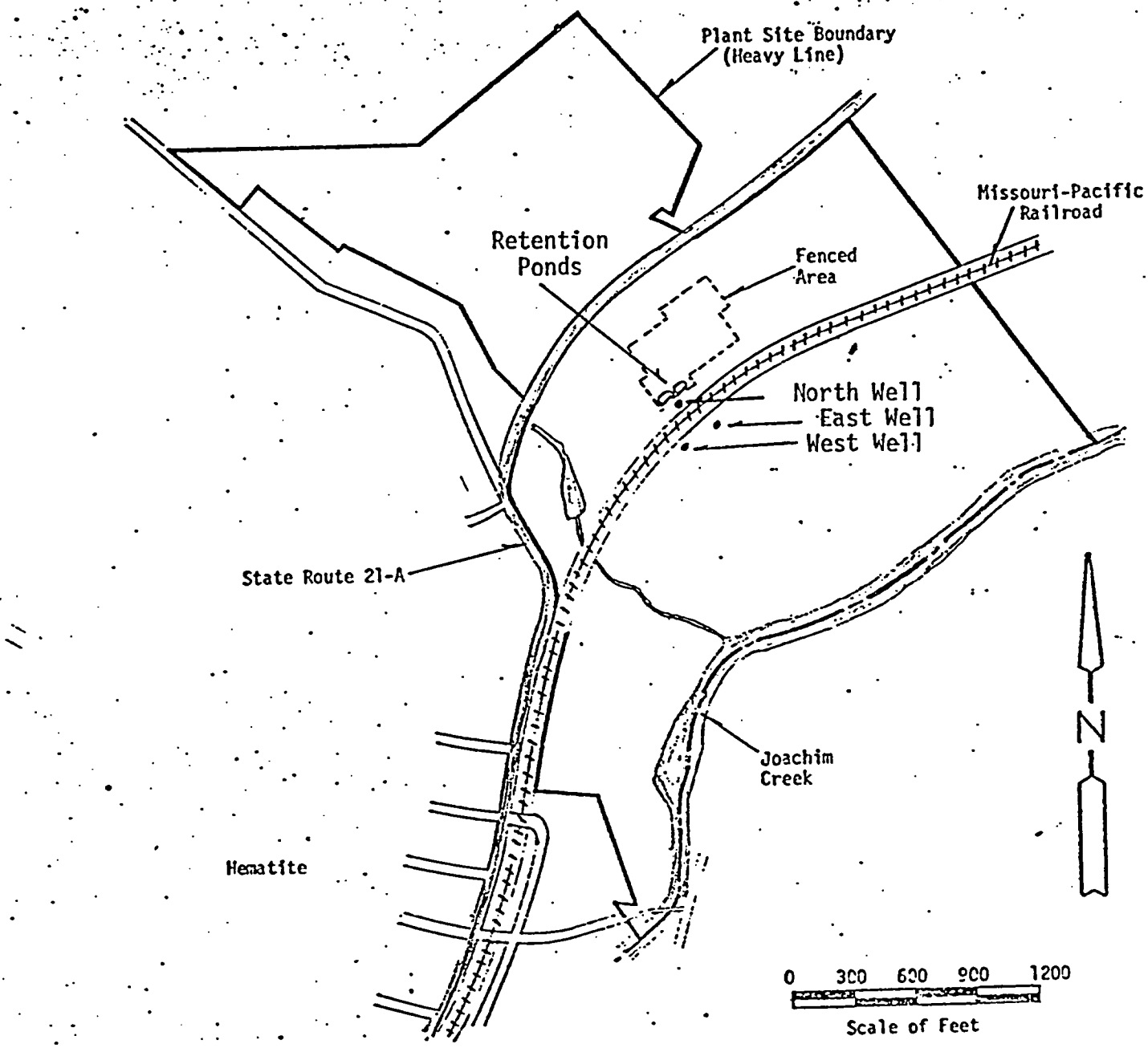

Figure 2

Location of Retention Ponds and Sample Wells

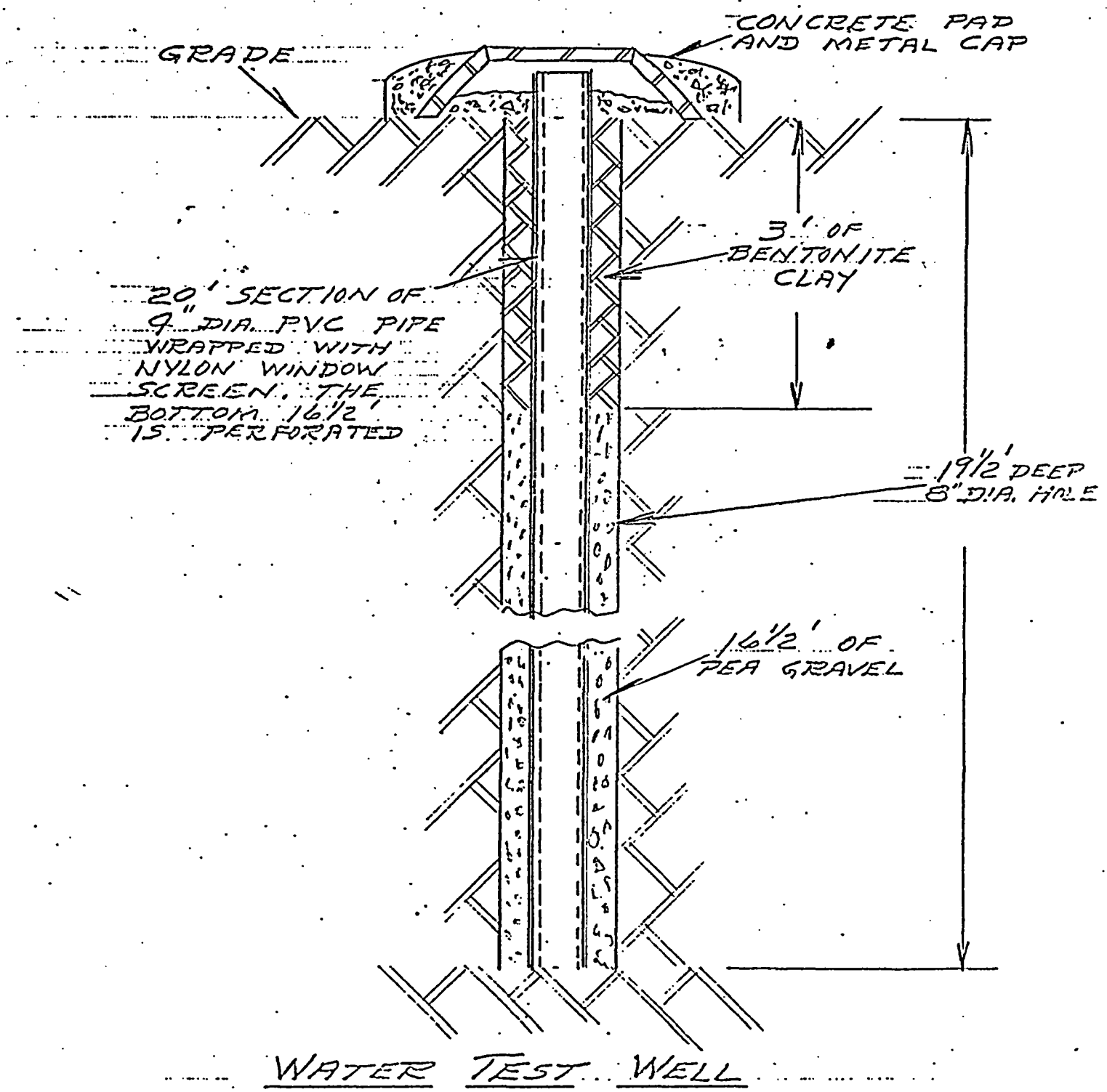
GRADE
CONCRETE PAD AND METAL CAP
3' OF BENTONITE CLAY
20' SECTION OF 4" DIA. PVC PIPE WRAPPED WITH NYLON WINDOW SCREEN. THE BOTTOM 16½' IS PERFORATED
19½' DEEP 8" DIA. HOLE
16½' OF PEA GRAVEL
WATER TEST WELL

Figure 3