Department of Energy

Environmental Management
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March 15, 2007

Mr. James Saric, Remedial Project Manager
United States Environmental Protection Agency
Region V-SRF-5J
77 West Jackson Boulevard
Chicago, Illinois 60604-3590

EMCBC-00374-07

Mr. Thomas Schneider, Project Manager
Ohio Environmental Protection Agency
Southwest District Office
401 East Fifth Street
Dayton, Ohio 45402-2911

Dear Mr. Saric and Mr. Schneider:

LETTER REPORT PRESENTING RESULTS OF THE LEACHABILITY STUDY ON SOIL WEST OF FORMER WASTE PIT 3

This letter report summarizes the purpose and process of the Leachability Study for Low Level Uranium in Soil West of Former Waste Pit 3, dated February 2007. It also presents results from this study as well as monitoring data of surface water in the area west of former Waste Pit 3. Lastly, this report presents the conclusions and an interim path forward.

The driver for this study was the elevated uranium level found in ponded water that lies in the flood plain/old Paddy's Run channel west of former Waste Pit 3 and east of the current Paddy's Run. During the course of site-wide surface water sampling to support the residual risk assessment and subsequent routine sampling of several surface-water locations showed elevated uranium results ranging from several hundred ppb to eighteen hundred ppb. The area of impact at peak water retention is approximately one-half acre. To determine the cause or source of elevated uranium in this surface water, a leachability study was conducted on the soil in and around the ponded water areas acknowledging that the area had already undergone a rigorous certification effort. This study was a follow-up to the Leachability Study performed as a part of the Operability Unit 5 Feasibility Study (DOE 1994, Appendix F), which is documented in the Operable Unit 5 K_L Sampling and Analysis Results Report (DOE 1995). As such, this new study followed the same analytical protocols and calculations as described in the referenced documents.

For this recent leachability study, a known mass of soil from each of four samples was exposed to a known volume of water and monitored over time for both pH and uranium concentration in the aqueous phase to simulate the ponded water exposure to the surrounding soil west of former Waste

Pit 3. Once the uranium concentration in the aqueous phase was at a steady state, final calculations were performed as described in the Leachability Study For Low Level Uranium In Soil West Of Former Waste Pit 3. These calculations produced a uranium leachability constant K_L for the associated soil. For reference, the leachability constant used for remediation of the majority of the Fernald site was 300 L/kg, which had a corresponding soil FRL of 82 mg/kg for uranium, whereas the leachability constant used for the 'high-leach' areas mainly in the former production area was 15 L/kg, which had a corresponding soil FRL of 20 mg/kg for uranium.

The data from this leachability study, which was transmitted to United States Environmental Protection Agency (USEPA) and Ohio Environmental Protection Agency (OEPA) on March 5, 2007 for discussion during the weekly conference call, is presented in Table 1 and demonstrates that uranium readily leached into the aqueous phase and within approximately 20 days reached a steady-state value between 339ppb and 625ppb. This is consistent with the average uranium concentration recently determined in the surface water in the area west of former Waste Pit 3 (Table 2). These steady-state values, when calculated with the total uranium available in the source soil, produced a leachability constant from each of the four samples of 63.6 L/kg, 51.0 L/kg, 70.2 L/kg, and 96.0 L/kg with an average of 70.2 L/kg.

The conclusion reached from these leachability constants is that the residual surface uranium in this isolated area (approximately 30-foot by 30-foot) is the source of the elevated uranium in the surface water. The K_L values demonstrate that the uranium chemistry in this area is about 4-times more leachable in water than the majority of the Fernald site, however, the uranium in this area is about 5-times less leachable than the areas in the former production area that were considered 'high-leach' areas. The area underwent a rigorous certification effort to show that the soil FRL of 82 mg/kg was attained in this area and the total uranium results determined on the four soil samples collected for this leachability study corroborated this certification process (Table 1, Figure 1 and Figure 2). However, this study demonstrated that certified soil samples with uranium concentrations as low as 48 mg/kg can produce water concentrations that are above one of the surface water FRLs. The area immediately to the west where a 6" excavation was conducted shows very low residual uranium concentrations (i.e., near background range) in soil (see Figure 1). Based on this information, there is unlikely to be any other unknown source of uranium contamination in the area.

This area does not readily drain directly to Paddy's Run; therefore, DOE believes that there is not an immediate impact to the environment. It appears this condition does not warrant immediate action. As this area is a low-lying area with consistently wet conditions (Figures 3 through 8), any immediate attempt to address this situation by use of heavy equipment may cause a more extensive impact to the environment.

The interim path forward is to continue to monitor the surface water uranium concentration for the next few months and assess whether a trend can be established after the spring rainy season. This assessment phase will allow sufficient data to be collected to make a defensible evaluation of a path forward. This also allows for the area to be addressed, if necessary, in a drier part of the year when other maintenance work will be conducted in the waste pits area.

Please contact me at (513) 648-3139, if you have any questions regarding these conclusions and the interim path forward.

Sincerely,

Johnny Reising

Johnny W. Reising
Director, Fernald Closure Project

Enclosures:

cc w/enclosures:
T. Schneider, OEPA-Dayton (three copies of enclosures)
M. Cullerton, Tetra Tech
M. Shupe, HSI GeoTrans
S. Helmer, ODH
Jack Craig, EMCBC
Robert Everson, EMCBC
AR Coordinator, Fluor Fernald, Inc

cc w/o enclosures:
F. Johnston, Stoller
P. Mohr, Fluor Fernald, Inc.
T. Terry, Fluor Fernald, Inc.

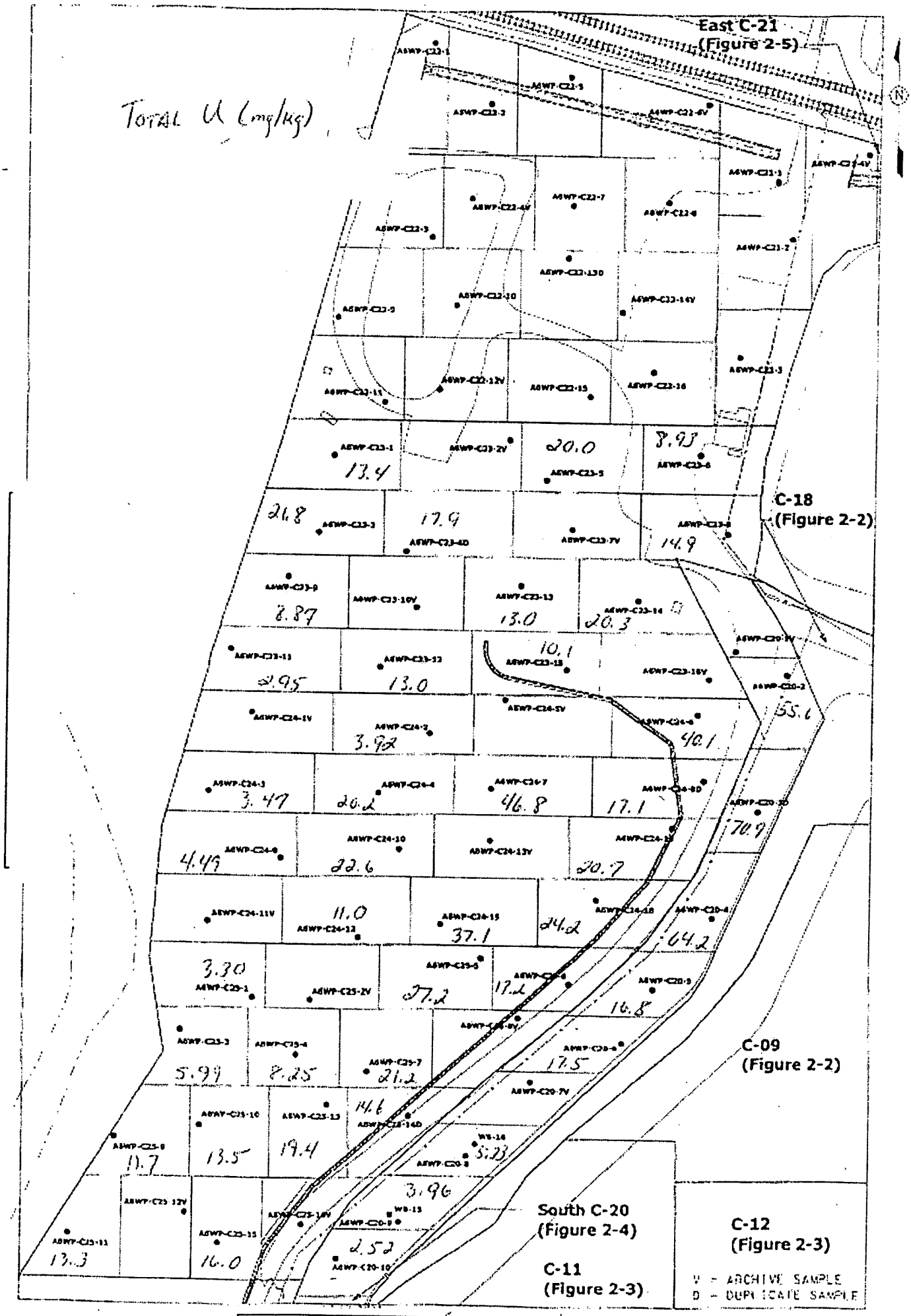
Total U (mg/kg)
East C-21
(Figure 2-5)
C-18
(Figure 2-2)
C-09
(Figure 2-2)
South C-20
(Figure 2-4)
C-11
(Figure 2-3)
C-12
(Figure 2-3)
V = ARCHIVE SAMPLE
D = DUPLICATE SAMPLE
SCALE
80 FEET

FIGURE 1

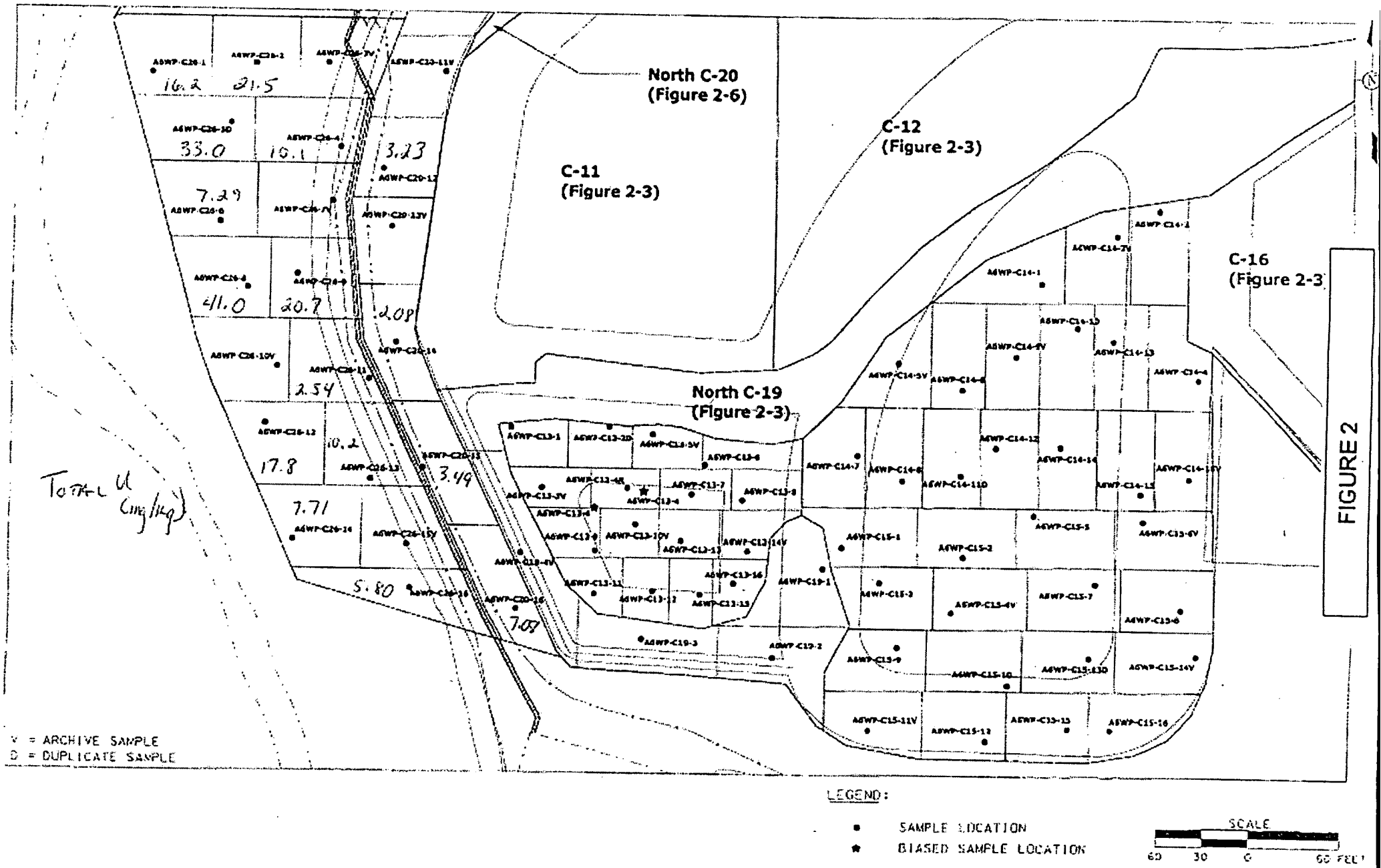
North C-20
(Figure 2-6)
C-11
(Figure 2-3)
C-12
(Figure 2-3)
C-16
(Figure 2-3)
North C-19
(Figure 2-3)
16.2
21.5
33.0
10.1
3.23
7.29
41.0
20.7
2.08
2.54
17.8
10.2
3.49
7.71
5.80
7.07
Total U (mg/kg)
V = ARCHIVE SAMPLE
D = DUPLICATE SAMPLE
LEGEND:
SAMPLE LOCATION
BIASED SAMPLE LOCATION
SCALE
60 30 0 60 FEET

FIGURE 2

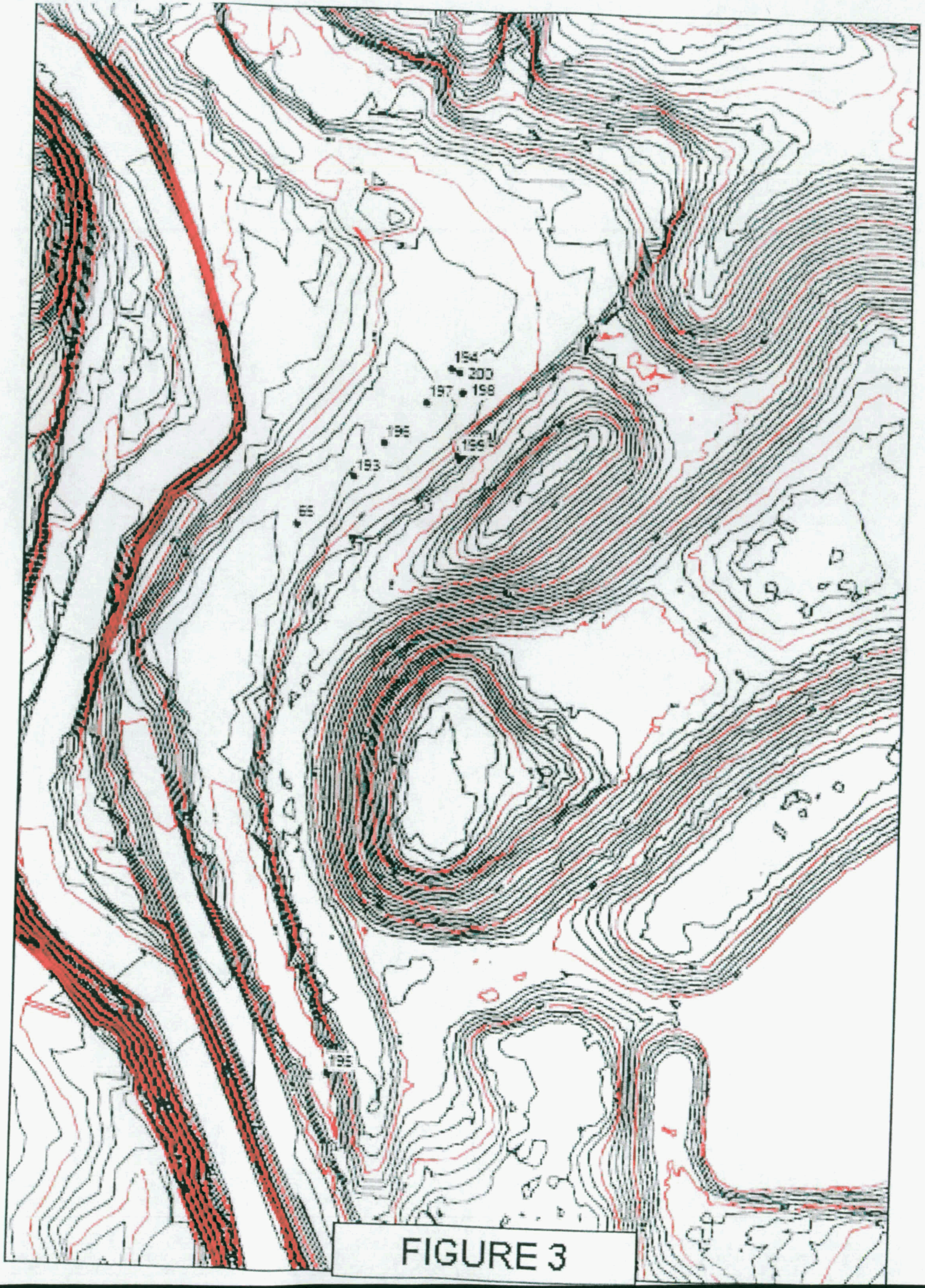

FIGURE 3

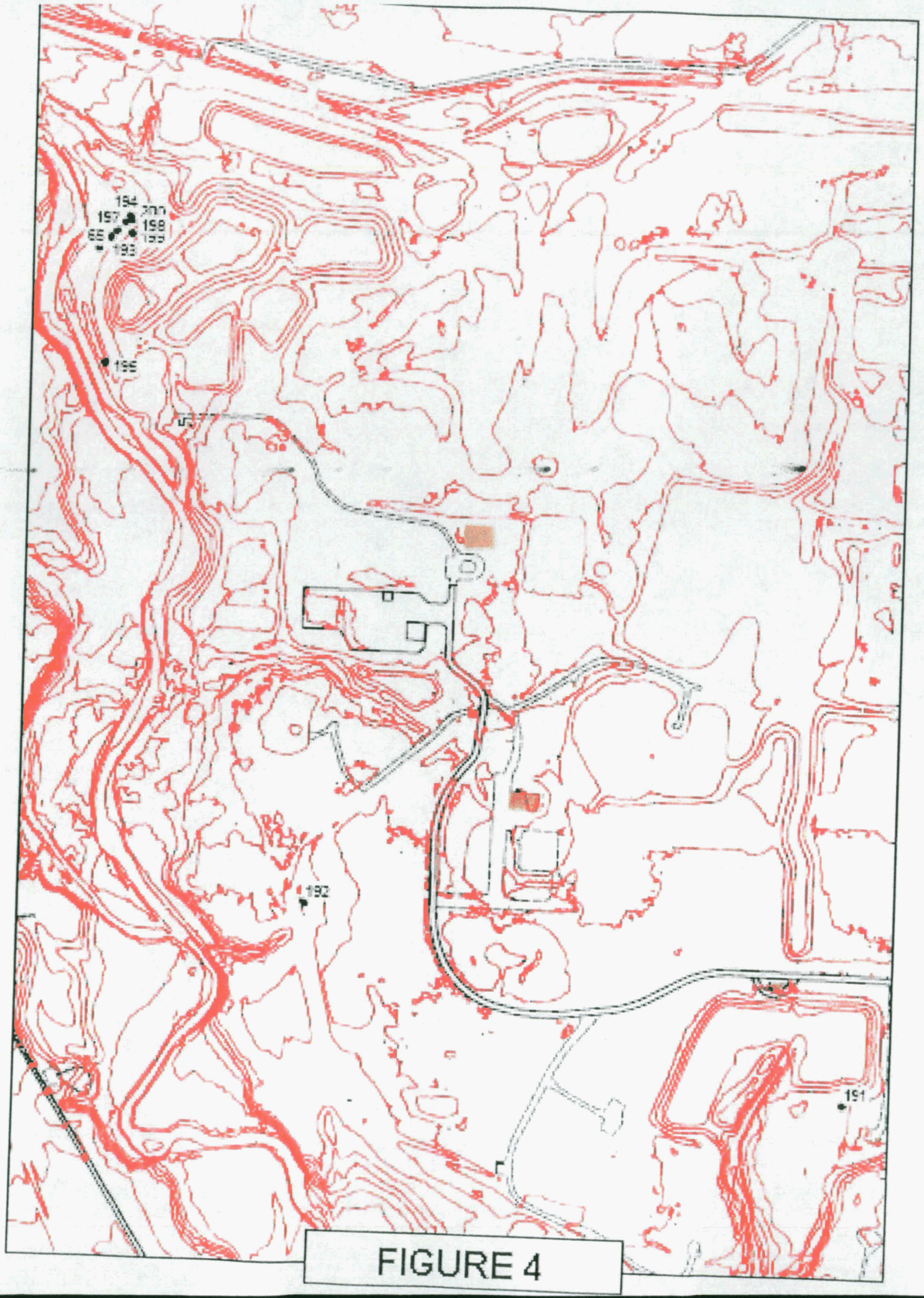

FIGURE 4

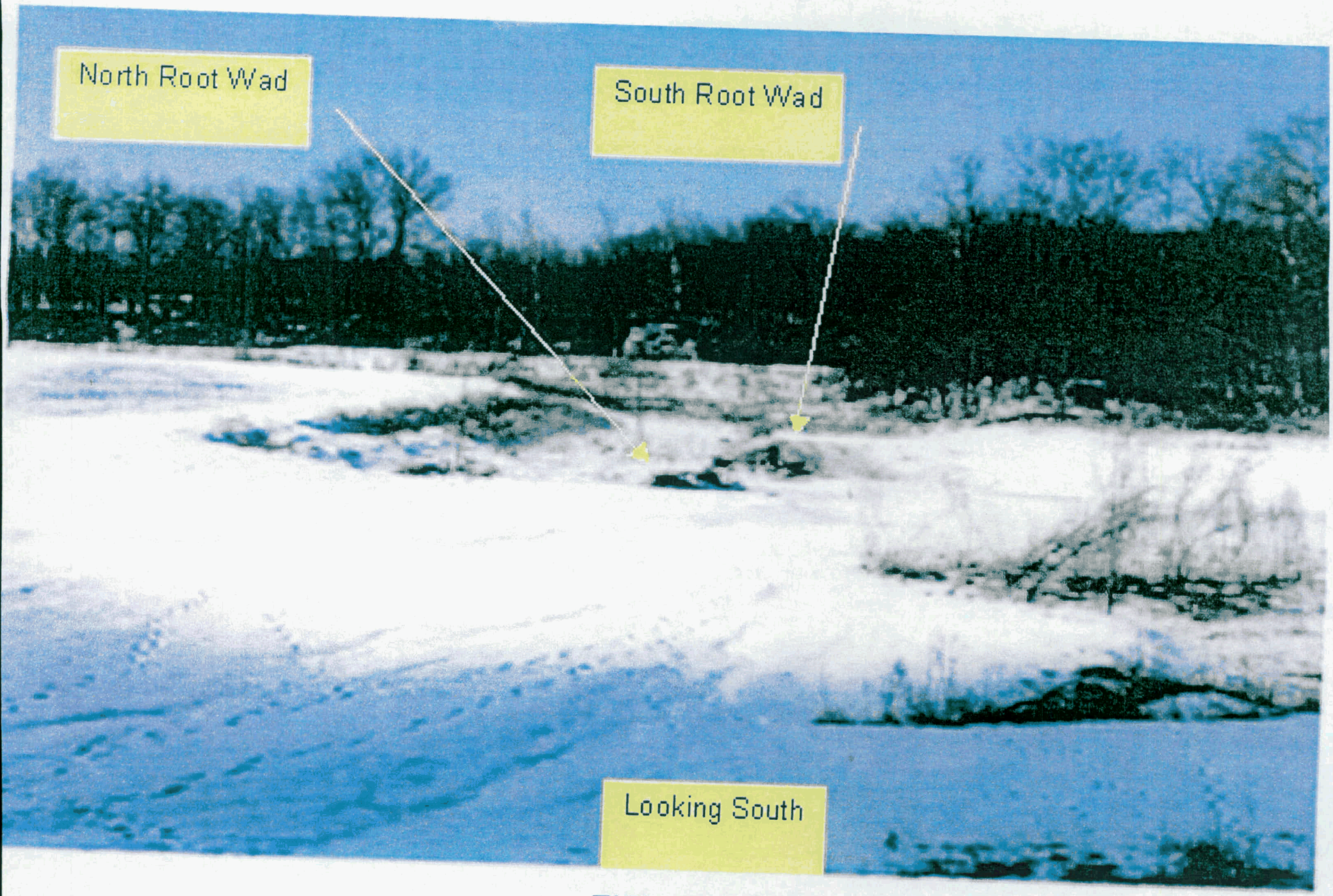

FIGURE 5

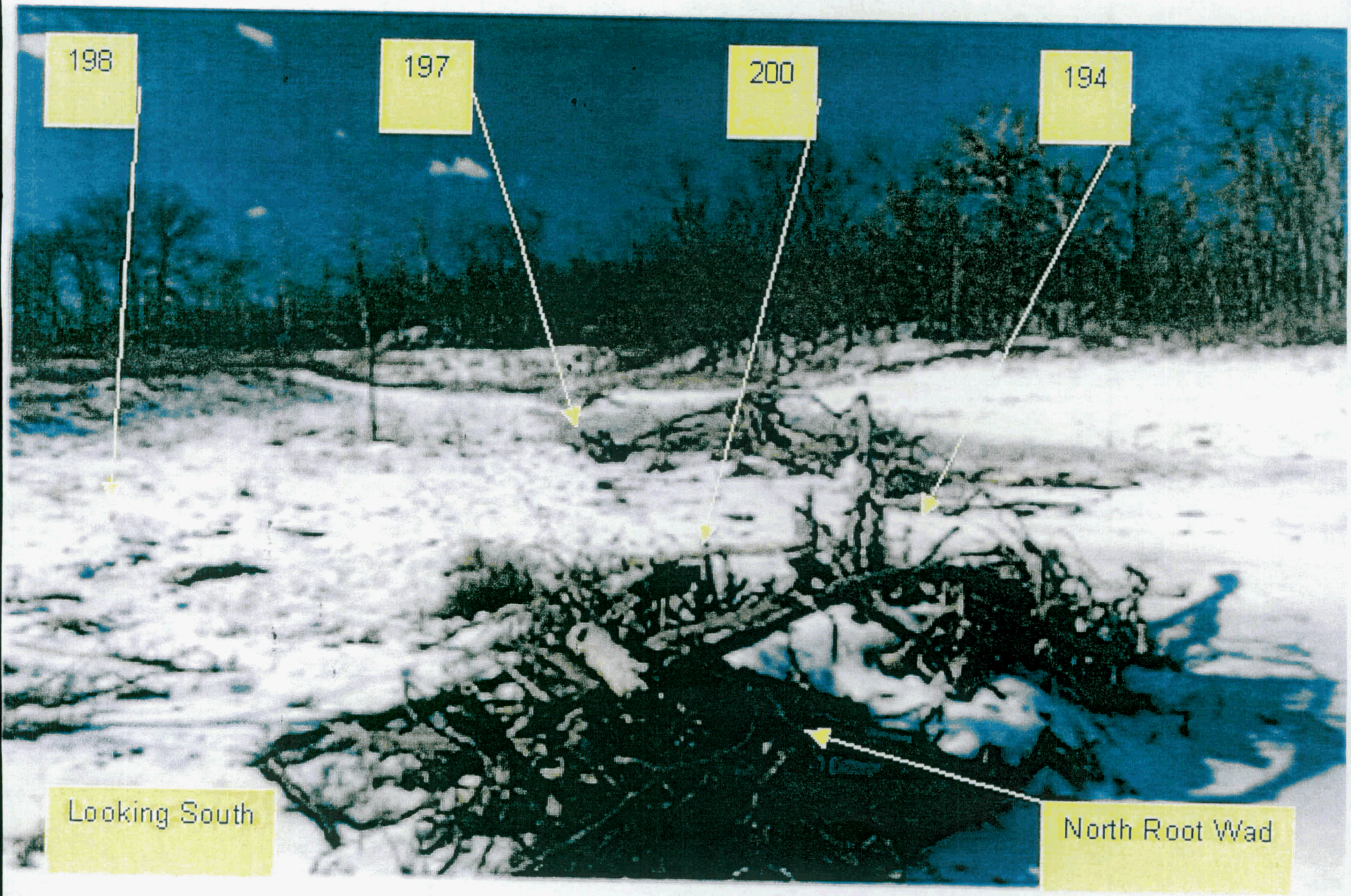

FIGURE 6

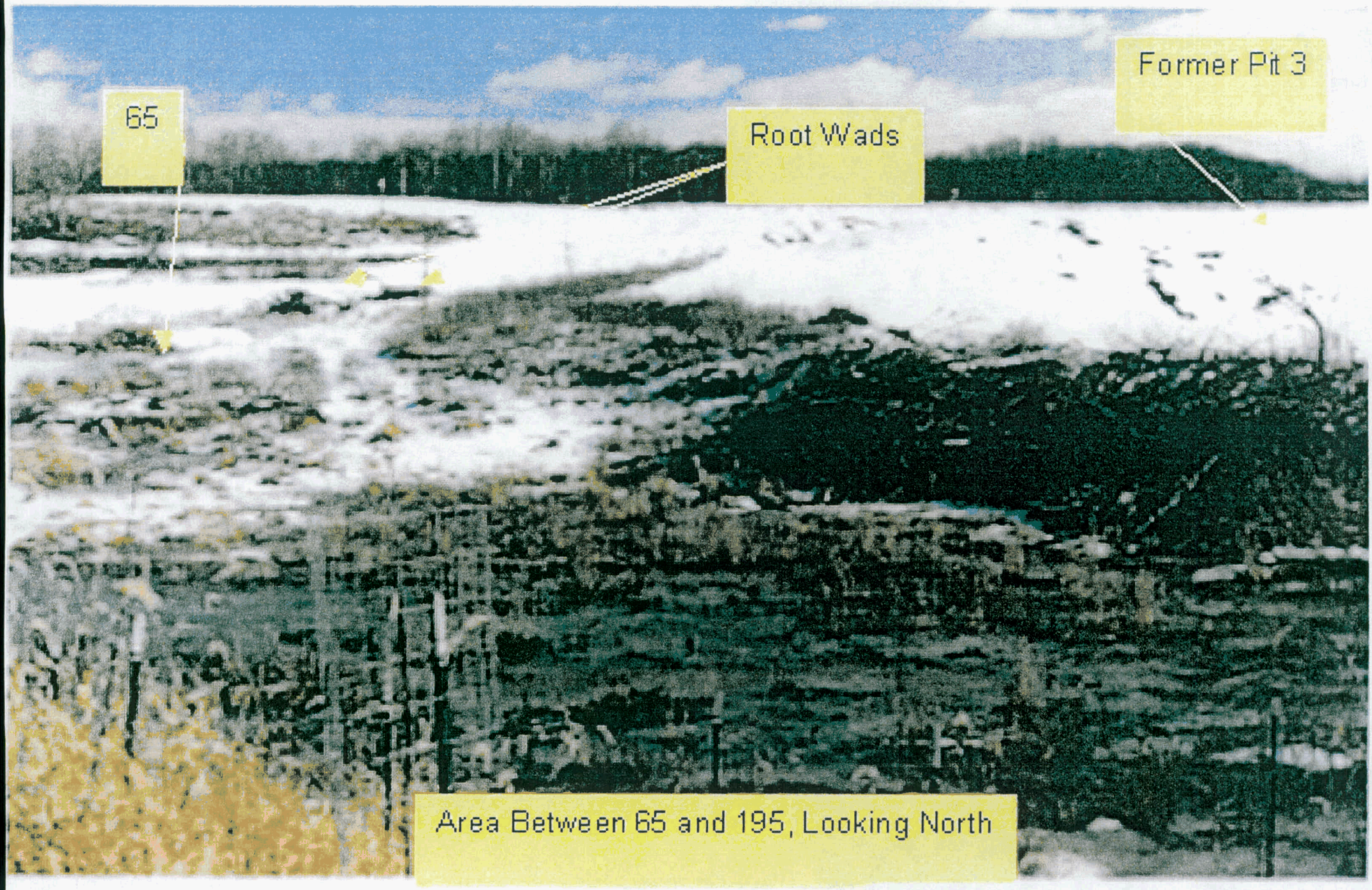
65
Root Wads
Former Pit 3
Area Between 65 and 195, Looking North

FIGURE 7

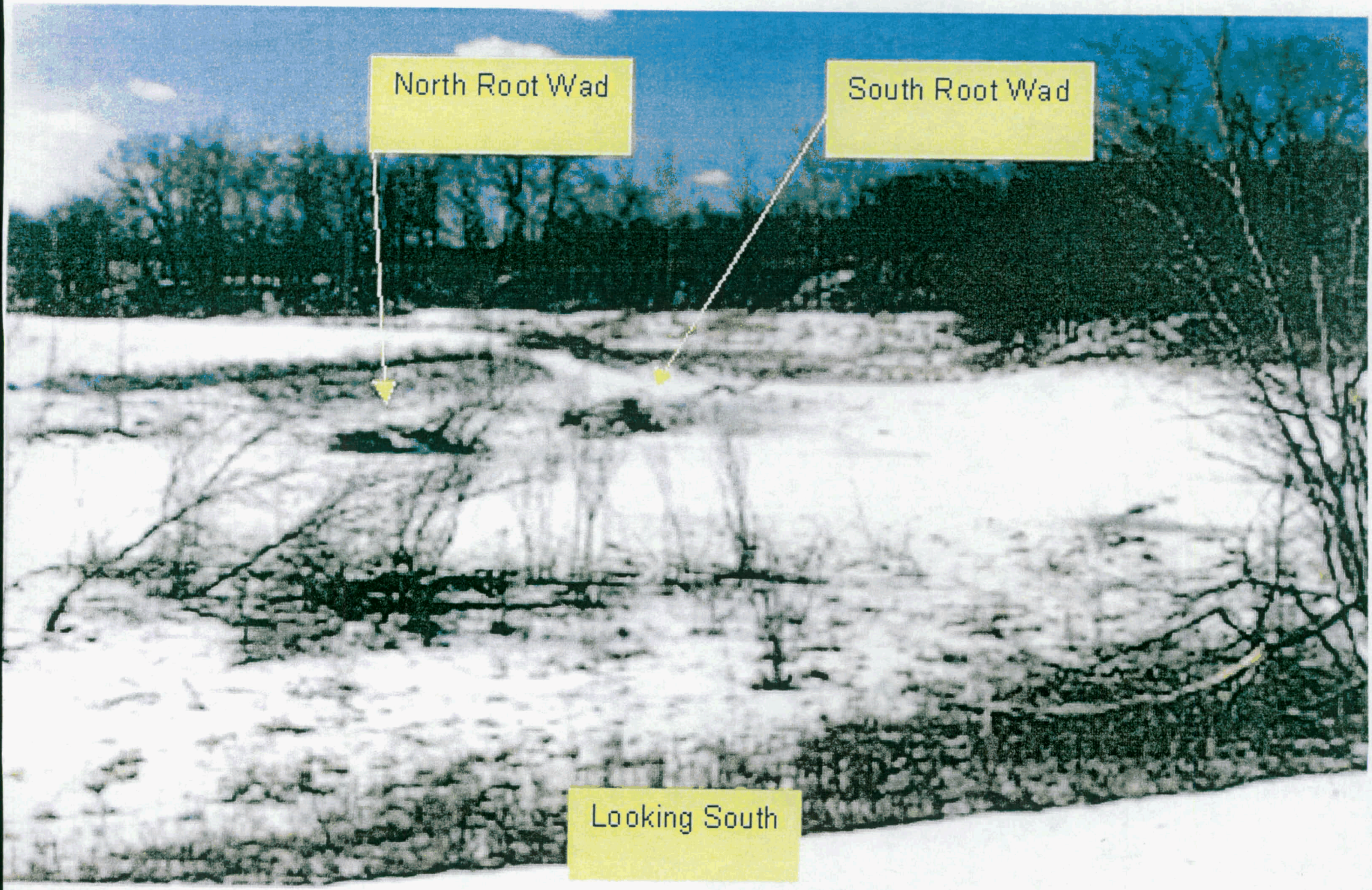

FIGURE 8

TABLE 2

Surface Water Uranium Concentration in Ponds West of Former Waste Pit 3

ID(s)	W-65-U	W-193-U	W-194-U	W-195-U	W-196-U	W-197-U	W-198-U	W-199-U	W-200-U
11/9/2006	372.9								
11/22/2006									
12/19/2006		650.9	856.2						
12/29/2006									
1/3/2007									
1/5/2007				155.1					
1/9/2007				244.6					
1/10/2007				790.1	877.1				
1/11/2007				554.7	740.8				
1/16/2007	166.2	832.3	771.2	127.6	837.7	454.8	460.3	379.6	
1/17/2007	199.2	466.1	832.2	134.9	669.3	411.5	503.1	662.5	639.1
1/18/2007	663	762.2	613.9	255.5	97.8	432.5	511.3	571.1	457.8
1/22/2007	438	606.6	752.6	427.8	395.1	300.6	470.6		557.3
1/23/2007	434.6	519.7	765.2	402.6	467	397.4	480.8		640.9
1/24/2007	448.4	628		492.6	476.1	475.5	509.7		663.8
1/25/2007	534.9	731.1		499.9	525.7	494.9	555.2		643.3
1/26/2007	413.1	709.5	1031.2	548.3	668.6	478.2	499.9		642
1/29/2007									
1/30/2007	543.1	1245.6	1523.1		1227.1				1328.9
1/31/2007	756.6		1401.4		1449.7				1575.8
2/1/2007	738.9	1818.9	1333.3		1877.7		842.1		1204.3
2/2/2007	726.1	1787.9	1172		1562.8		758.3		833.8
2/12/2007			1296.3				1209.2		1188.9
2/15/2007	273.9	158.5			309	584.5			1599.9
2/22/2007			234.5						
2/26/2007	59.8	461.5	394.9	27.8	89.5	297.9		233.1	
2/28/2007	83.2	390.4	495.5	24.8	94	488.9	392.8	309.3	630.3
3/1/2007	137.3	815.6	602.6	64.2	375.4	581.2	489.3	330.6	579.9
03/02/207	316.6	750.1	763.8	126.5	825.4	633	534.8	321.1	873
Average	**405.9**	**784.4**	**872.9**	**304.8**	**714.0**	**463.9**	**587.0**	**401.0**	**878.7**

Note: Blanks indicate that samples were not collected from that location on that day.

TABLE 1

Uranium in Soil Leachability Study (KI)

	Total U (ug/g)	Total AVG $[U_i]$	10-Day (ug/L)	14-Day (ug/L)	17-Day (ug/L)	20-Day (ug/L)	U_{avg} (ug/L) (17-day & 20-day)	U_r (ug) = U_{avg} ug/L * 3.5L	TDS (g)	U_f(ug/g) = $\frac{((U_i * 400g) - Ur(ug))}{400g - TDS(g)}$	KI (L/kg) = $\frac{(U_f(ug/g) - U_h(ug/g)) * 1000g/kg}{U_{avg}\ (ug/L)}$
KL-01-U1 KL-01-U2 KL-01-U3	48.5 43.5 51.9	48.0	478	636	595	625	610	2135.0	1.2	42.8	63.6
KL-02-U1 KL-02-U2 KL-02-U3	25.9 23.7 22.3	24.0	256	321	331	339	335	1172.5	1.5	21.0	51.0
KL-03-U1 KL-03-U2 KL-03-U3	46.6 45.6 50.7	47.6	433	667	541	566	553.5	1937.3	0.9	42.8	70.2
KL-04-U1 KL-04-U2 KL-04-U3	42.9 43.4 41.3	42.5	283	338	363	374	368.5	1289.8	1.1	39.3	96.0

Relative Percent Difference (RPD) between 17-day and 20-day :

KL-01	4.9%
KL-02	2.4%
KL-03	4.5%
KL-04	3.0%