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REPORT ON HISTORY OF PADDY'S RUN AND SURROUNDING AREA

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HISTORY OF PADDY'S RUN AND SURROUNDING AREA

An investigation of the history of Paddy's Run and surrounding areas was recently initiated to increase understanding of the area's near surface geology. The initial focus of interest was the basin area between the present Paddy's Run streambed and the western boundary of the pit area. The study was undertaken to determine if the location of the streambed had changed in recent time.

The investigation was based on interviews with longtime NLO employes, aerial photographs of the region, and documents referring to the structure of the area. The method of investigation was such that information from one of the three above-mentioned sources was confirmed with that from the other two until a framework of verified information could be developed. Information which could not be verified from the other sources was disregarded. The purpose of this method was to test the correctness of information from interviews which relied on remembrances of, in some cases, thirty-five years past.

Eleven (11) individuals from NLO were interviewed for this report. Additionally, an individual from the U. S. Geological Society was questioned as were two former residents of the FMPC sites. Several other individuals questioned regarding the scope of this investigation either were not involved in a relevant area or did not recall events of that period. Dates of employment with NLO ranged from 1951 through the 1950's. The objective of the interviews was to obtain personal observations by individuals of the FMPC site before construction began and in the early years of development.

The aerial photographs used in the investigation were Department of Agriculture maps for use in Agricultural Stabilization and Conservation Committee (ASC) and Soil Conservation Service (SCS) programs and were taken in 1938, 1950, 1956, 1962, 1968, 1977, and 1983. These maps were developed to verify ground measurements and are, therefore, consistently accurate and of sufficient detail to reveal individual features of the landscape, such as a specific tree. The older maps (1938, 1950, and 1956) were obtained from the Geography Department of Miami University. Assistance was provided by Dr. Green of the Geography Department in interpretation of the photographs. The 1981 aerial maps developed by EG&G and the 1986 aerial Weston maps were the most recent used for this investigation.

The documents referring to the area were topographic maps of the FMPC site from 1951, 1959, and 1986 and engineering drawings of the pit area and of individual pits. The Groundwater Study of 1985, prepared by Dames and Moore, was useful in regard to cross sections of the site area. The 1960 reports of J. D. Eye were also referred to and the NLO Aquifer Contamination Control reports of 1965-1985. The Hamilton County SCS records were utilized to confirm a conservation plan for the Raymond Irwin farm, comprising 185 acres in the northwest area of the site (including Paddy's Run basin and most of the present waste pit area). Photographs of early construction on the site were useful to confirm conclusions derived from other sources.

Conclusions

It was determined that the streambed of Paddy's Run has been relocated on two occasions. The first relocation was done in 1961-62 to primarily direct the flow of Paddy's Run away from the pit area in a more southerly direction. A secondary effect of this redirection was to create a basin with the capability of retaining surface runoff from the waste pit area. This basin is located over the site of the original streambed and may effect the retentive capability of the basin. The new streambed is designated by points 1A-1B on the enclosed 1950 map (Attachment 1).

A portion of the Paddy's Run streambed below the silo area was also relocated in the early 1970's to prevent streambank erosion from continuing toward Paddy's Run Road. The stream was essentially straightened from point 2A to 2B on the enclosed 1956 map (Attachment 2). As a result of this relocation, the old streambed in this area may contain above-background uranium concentrations. Additionally, gravel has been removed on a sporadic basis over the years from the streambed in this portion of Paddy's Run. The volume of gravel removed is not precise but is estimated to have been approximately 700 cubic yards per year between the years 1952-1985.

Aerial photographs used to confirm the stream relocations also indicated that until 1956 there was a tributary to Paddy's Run located between what is now Pit 3 and Pits 1 & 2. This small stream, which traversed the pit area, was over 2,200 feet in length. At its junction with Paddy's Run it was about 25 feet below the level of its source. The streambed of this tributary was not very different in elevation from the area to the west. On the east side of the streambed the land rose more sharply than the area to the west. (The land on the west became Pit 3; Pits 1 & 2 were developed on the east side.) The course of the streambed away from Paddy's Run was generally east and north and essentially paralleled what became the east wall of Pit 3 (Attachment 1). At the point where this wall bent to the west, the streambed continued to parallel the Pit 3 wall for a short distance. It then bent northward to exit Pit 3. The tributary streambed again bent eastward to parallel the southern wall of what would become Pit 5. It crossed the Pit 5 area to exit at the northeast corner and continued eastward toward its source, near the northwest wall of Pit 6. The stream at this point was supplemented with the directed flow of an agricultural drainage tile system. Water was supplied by a 12 inch tile draining the fields to the east and north and flowed during most of the year.

Although this tributary was removed during construction of the pits and the railroad, information regarding this tributary is significant in regard to water encountered in the construction of Pits 3, 5, and 6. This water, referred to as springs, was a reflection of a perched water table which existed in the pit area and other areas on the FMPC site.

A spring is stated to have been encountered in constructing the north wall of Pit 3. There is some lack of agreement on details regarding this spring and therefore, some question about the absolute accuracy of such details; however,

the spring seems to have been located from four to eight feet below grade and was from six to eight inches in diameter. Disagreement lies in whether the spring was encased in field tile and in how its flow was terminated (clay vs. cement plugged). There is an agreement that the spring flowed for about two days before the flow ceased. The spring was located approximately where the tributary crossed what became the Pit 3 wall (Point A, Attachment 1).

Difficulties were encountered in construction of Pit 5 because of water. A spring or seep was encountered on the south wall of the pit. It was essentially an area of sand about 50 feet long and from 6-8 feet in height from which water seeped down the pit wall. There was concern with this water in placing the liner in Pit 5. This location is correlated with the Paddy's Run tributary bending to the east and paralleling Pit 5 (Point B, Attachment 1).

Water was also encountered in the construction of Pit 6, along the northwest side. This again borders the streambed of the above-mentioned tributary (Point C, Attachment 1).

The agricultural buildings on the 1950 photo are also important because of wells which were associated with them. The small building in the Pit 6 area (farrowing house) had a 90 foot cased well at its northeast corner (Point D, Attachment 1). This well and the building itself, were located on concrete slabs. The manual pump of this well was threaded onto the top of the well casing rather than bolted to the concrete slab. This may be important in regard to the method of removal of this well; at the present time there is no indication of the removal method used.

Another well was located in a small wellhouse at the hip-roofed barn (Point E, Attachment 1). The well was cased and was between 80-90 feet in depth. An electric pump (Delco generating system) was installed in this well as this was prior to local availability of electricity. The method of closing of this well is unknown at the present time. This well is not far from the current test well No. 10 and the surface water flow pattern from the pad area northwest of Plant 1. There was another well at the farmhouse to the north (Point F, Attachment 1). This was a dug well of approximately three feet in width and 30 feet deep. Because this area is north of the present railroad, the well located at Point F is not of the same significance as the other two.

An eight mile tile drainage system was located on the northern third of the FMPC site. Although much of this system has been disrupted due to construction, the remnants need to be considered for a present understanding of groundwater flow.

Many individuals interviewed referred to the pond which was located where Pit 2 would be developed as "spring fed." Although this was almost the unanimous opinion of those interviewed, this description was initially regarded with skepticism as most ponds in this area rely upon runoff for water supply. As the watershed area of the pond was quite small, in relation to the water level of the pond, and as a result of other indications, it was concluded that a spring had supplied a significant portion of the water in the pond. The value of this information is best understood in relation to the nature of the spring found in Pit 3. The springs were apparently a reflection of a perched water table. After being pumped out (this would include the volume of water

from the spring supplying the pond) the pond area became dry enough for further excavation. The same pattern related to the spring in Pit 3; after the water contained in that particular spring had drained, there was no real continuation of water flow.

An understanding of all the springs is important when considering what significance the presence of former springs may have on the pit area at the present time. The water from a spring was a release from the perched water table. The water table in all cases except that of the spring supplying the pond, was supplemented by a tile drainage system. This drainage system should have been interrupted at various points during plant construction; with each interruption, the volume of water supplied to the tributary would have been less. The most important aspect to consider is that the water of such a system, even when intact, is neither under great pressure nor is of great volume (i.e., connected to the underlying aquifer). It merely reflects water which has infiltrated and is retained by the perched water table.

Since most of the drainage area of this tributary has been disrupted, the former tributary and its associated subsurface water flow should be of little significance at the present time. The only segment of the system which remained intact was the limited area between the south wall of Pit 5 and the north wall of Pit 3. The small amount of water which infiltrates this area would have had little effect on an impermeable pit wall or liner. The sand seam which was noted at this point, however, is of significance when considered in regard to Well No. 7, also located in this area (Point G, Attachment 1).

Well No. 7 was removed to allow for construction of Pit 5. During the time Well No. 7 was used, however, high levels of contaminants were observed there. The well log indicated that sand was reached after only eight feet of topsoil. This sand was unbroken by clay and continued to a depth of 60 feet where it became a sand and gravel mixture until it reached the well's end depth of 116 feet. It should be noted that this record reflects the simplicity of reporting by the well driller (Hyden Bro.) and may also be observed in two other wells. According to the source of this information (USGS), and despite this simplicity, the well log record should be considered accurate.

Well No. 7 was filled with concrete when it was removed. The value of Well No. 7 is that it now provides information about the near-surface geology at an important location in the pit area. This information raises questions about the vulnerability of the area to a potential leak in the liner of Pit 5. If the well profile is correct, it indicates there may be no clay barrier to stop contaminants from reaching the underlying aquifer. This possibility should be examined more closely through the use of borings to verify preliminary data. In addition, an examination should determine the extent to which the indicated clayless area relates to Pit 3. Additional data is needed due to Well No. 7's proximity of Pit 3 and the relationship that the sandy clay layer, indicated during construction, could have to the integrity of Pit 3.

The precision of existing data on the microgeology of the pit area depends on the specific source of information used. Most of the information was generated from drilling test well profiles. There is a dearth of reliable

data other than from these wells. An attempt to use the cross section D-D of Dames and Moore Task A Report (boring C-24) to better understand the eastern region of Pit 5 was of no value since this boring is improperly located. (The Corps of Engineers borings 23-25 should be located at the railroad abutment at Paddy's Run.) Clearly, more information is needed for a better understanding of the pit areas.