Remedial Action at Plant 2 Sump Sta-Rite Industries, Delavan Operations

Sta-Rite Industries, Inc.
Water Equipment Division
Delavan, Wisconsin

January 1984

Donohue & Associates, Inc.
Engineers & Architects

Donohue

January 19, 1984

Sta-Rite Industries Incorporated
293 South Wright Street
Delavan, WI 53115

Attn: Mr. Dick LaChapell
Plant Manager

Re: Report of Remedial Action at
Plant 2 Sump, Delavan Operations
Donohue Project No. 12894.002

Dear Mr. LaChapell:

Enclosed is our report describing the remedial actions conducted in the vicinity of the sump near the north wall of Plant 2. The report discusses the reasons for the remedial action, the plant remedial action, the field work, and our estimate of the remaining pollutants in the soils in the vicinity of the sump. It is our opinion that the remedial action has removed the threat of significant groundwater contamination from the identified source. We recommend no further remedial action at that site.

If you have any questions concerning our report, please contact me. We appreciate the opportunity to provide these technical services to Sta-Rite Industries.

Very truly yours,

DONOHUE & ASSOCIATES, INC.

Michael L. Crosser

Michael L. Crosser
Project Manager

MLC/psk

Donohue & Associates, Inc.
4738 North 40th Street
Sheboygan, Wisconsin 53081
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414-458-8711

TABLE OF CONTENTS

	Page
TABLE OF CONTENTS	i
LIST OF TABLES	ii
LIST OF FIGURES	ii
LIST OF APPENDICES	ii
INTRODUCTION	1
CONDITIONS PRIOR TO REMEDIAL ACTION	1
PLANNED REMEDIAL ACTIONS	4
COMPLETED REMEDIAL ACTION PROCEDURES	4
CALCULATED CONDITIONS FOLLOWING THE REMEDIAL ACTION	6

TABLES

Table		Page
1	Soil and Water Analysis - Plant 2 Sump Area	3
2	Soil Data Obtained During Remedial Action Program	7

FIGURES

Figure		Page
1	Boring and Well Locations	2

APPENDICES

Title	Appendix
Remedial Action Procedures, Plant 2 Sump	A

REMEDIAL ACTION RELATED TO CONTAMINATED SOILS AT PLANT 2 STA-RITE INDUSTRIES, INC. DELAVAN OPERATIONS

INTRODUCTION

Since late 1982, investigations of the chlorinated solvent contamination detected in City Well 4 in Delavan, Wisconsin, have been underway. The Wisconsin Department of Natural Resources (DNR) suspected that Sta-Rite Industries Water Equipment Division facilities, located approximately 1,000 feet east of City Well 4, was the source of the solvent contamination. A site plan showing the location of the two Sta-Rite buildings (Plants 1 and 2) and City of Delavan Wells 3 and 4 is shown on Figure 1. The City retained Warzyn Engineering Company to investigate. With the cooperation of Sta-Rite Industries, Warzyn Engineering obtained soil and groundwater samples on Sta-Rite property. The samples were obtained in areas of potential contamination as identified by Sta-Rite and in areas between the potentially contaminated areas and City Well 4. Warzyn issued a preliminary report of their findings on February 16, 1983 which indicated solvent contaminated water at the groundwater surface near the southeast wall of Plant 1 and soil and near surface water contamination near the holding tank outside the north wall of Plant 2. Groundwater and surface samples from wells between the identified contaminated areas and City Well 4 showed decreasing amounts of solvent as the distance from the identified contaminated areas near Plants 1 and 2 increased. Wells near the Sta-Rite property line showed little or no contamination.

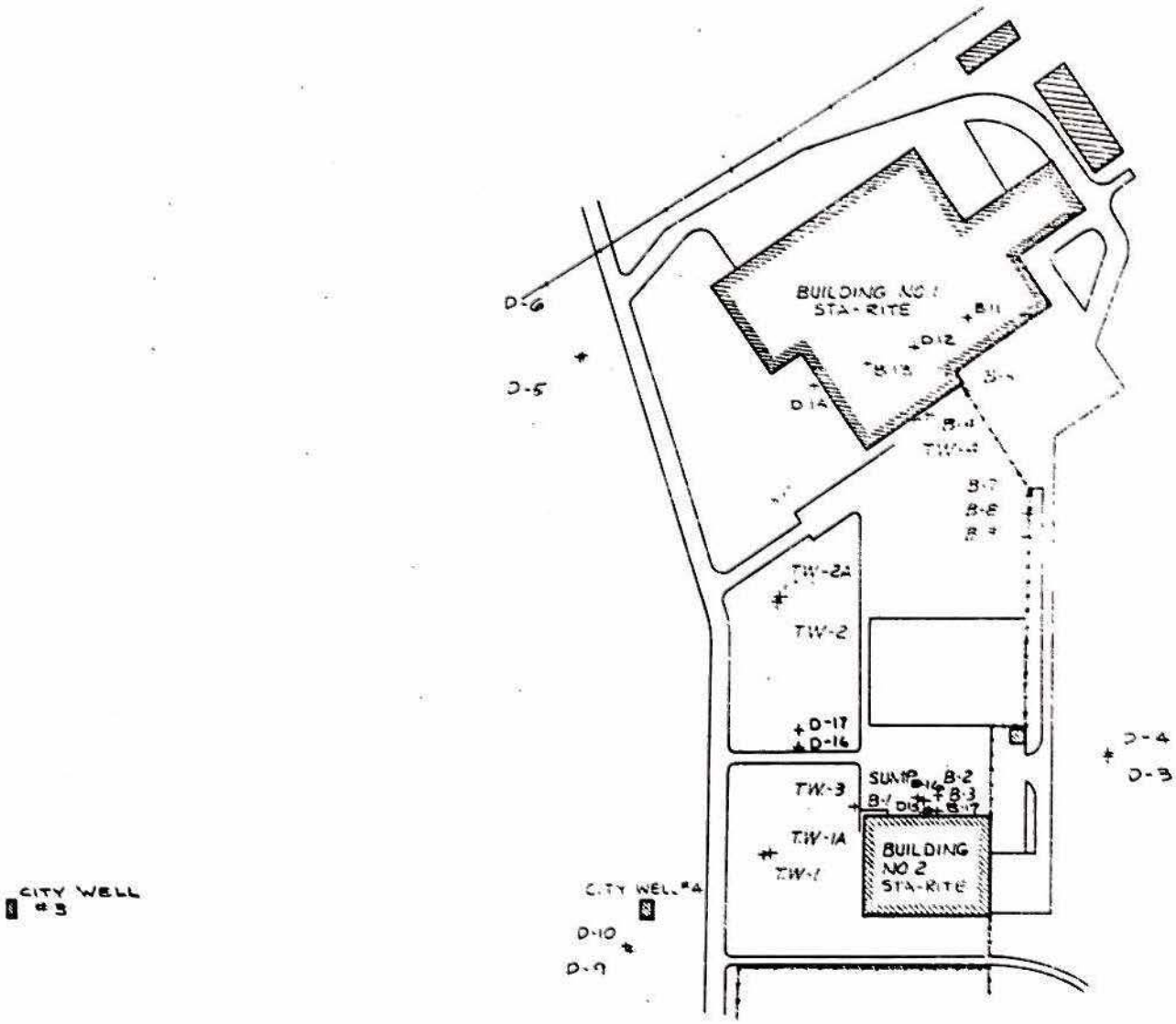
In January 1983, Sta-Rite retained Donohue to conduct further evaluations. Donohue obtained additional soil samples and placed groundwater monitoring and sampling wells to obtain data covering greater areal and vertical distances and conducted a pumping test to determine aquifer characteristics. Donohue also modeled the aquifer. Data and results were transmitted to Sta-Rite Industries in two reports issued in May 1983, and December 1983.

In September 1983, Sta-Rite Industries authorized Donohue to proceed with the development and implementation of a remedial action plan to address the contaminated soils in the vicinity of the sump along the north wall of Plant 2. Donohue prepared procedures for the remedial action. The proposal was transmitted to the DNR by Sta-Rite on September 28, 1983. The remedial actions have been completed.

This report describes the conditions prior to the remedial action, summarizes the planned remedial action procedures, discusses the actual field remedial actions completed, and discusses the conditions at the site following the remedial action.

CONDITIONS PRIOR TO REMEDIAL ACTION

The extent of contamination in the vicinity of the sump at Plant 2 was investigated by Warzyn Engineering and Donohue. Borings and monitoring wells in the vicinity of the sump are shown on Figure 1. Location of the borings, wells, and the specific soil and groundwater samples collected are discussed in more detail in Table 1. Warzyn collected two soil samples in the



Donohue

12894.
DEC. 1983

Engineers & Architects

BORING & WELL LOCATIONS

STA-RITE INDUSTRIES, INC.
WATER EQUIPMENT DIVISION
DELAVAN, WISCONSIN

N

0 100' 300'

FIGURE 1

TABLE 1

SOIL AND WATER ANALYSIS - PLANT 2 SUMP AREA
(Before Soils Removal)

Sample Description	Concentrations in µg/kg or µg/l		
	Trichloro-ethylene	1,1,1-Trichloro-ethane	Tetrachloro-ethylene
Warzyn B-1, near sump, 10 feet deep, Soil	600,000	<500	13,800
Warzyn B-2, near sump, 15 feet deep, Soil	820,000	<5,000	17,300
Warzyn B-3, 10 feet from sump, 15 feet deep, Soil	NOT ANALYZED BECAUSE NO SOLVENT ODOR		
Donohue B-15, 50 feet northwest of sump, 10 feet deep, Soil	6		8
Donohue B-15, 32 feet deep, Soil	520		47
Donohue D-15, Groundwater	110,000	<85	1,830
Donohue B-16, 50 feet northeast of sump, 12 feet deep, Soil	29		5
Donohue B-16, 27 feet deep, Soil	22		4
Donohue B-17, 25 feet northwest of sump, 9 feet deep, Soil	36		13
Donohue sample 18 feet directly below sump, soil	980,000		280,000

immediate vicinity of the sump at 10- and 15-foot depths and one sample 10 feet from the sump, 10 feet deep. The samples near the sump contained significant quantities of trichloroethylene and tetrachloroethylene. The sample 10 feet from the sump had no odor and was not analyzed. To further investigate the extent of contamination, Donohue placed three additional soil borings and converted one of the soil borings to a groundwater monitoring well. In addition, a soil sample was collected immediately below the sump at the 18-foot depth. The data are shown in Table 1. All soil samples collected from borings away from the immediate vicinity of the sump and above the groundwater table show only trace amounts of the chlorinated solvents. The soil from directly beneath the sump shows significant amounts of both trichloroethylene and tetrachloroethylene. The groundwater within 25 feet of the sump is contaminated with both trichloroethylene and tetrachloroethylene as shown by Well D-15. This well is screened at the surface of the groundwater table where the maximum concentration of contaminants would be expected. The soil at the groundwater table also shows small amounts of trichloroethylene and trace amounts of tetrachloroethylene. We suspect that the contamination found in the soils at the groundwater table depth is due to contaminants in the groundwater rather than contamination in the soil itself.

Based on the investigations, Donohue concluded that there was contamination in the soil in the immediate vicinity of the sump which would contribute to contamination of the groundwater, even though there has been no discharge of solvents to the sump for over five years.

PLANNED REMEDIAL ACTIONS

The remedial actions suggested by Donohue included excavation of the sump tank and contaminated soils. We expected that much of the soil from the excavation would be contaminated only with chlorinated solvents which would be removed by spreading the soils on pavement and allowing the solvents to evaporate. We recognize the possibility that some of the soil in the immediate vicinity of the sump might be sufficiently contaminated with non-volatile pollutants, for example paint sludge, that air drying would not be a satisfactory treatment. We planned to isolate these soils for further evaluation and possible off-site disposal at a hazardous waste landfill. Details of the remedial action procedures were transmitted to the DNR on September 28, 1983. A copy of that transmittal is included as Appendix A.

COMPLETED REMEDIAL ACTION PROCEDURES

On November 11, 1983, Tom Gapinske of Donohue met with Gary Pilcher of Sta-Rite Industries and Robert Magill of Magill Construction Company. Mr. Gapinske told Mr. Magill that the expected extent of excavation would be at least three feet beneath the base of the existing sump and a minimum of three feet around the sump's perimeter. He indicated visibly contaminated soils would be placed in a Waste Management, Inc., dumpster for disposal and the soils that were slightly contaminated with chlorinated solvents only would be spread on the parking lot for air drying. He indicated that Magill would be responsible for covering the excavation to prevent runon and would be responsible for bracing the excavation if necessary to ensure that the foundation for Plant 2 would not be jeopardized. He also indicated that Magill would be responsible for maintaining the storm sewer lines which run parallel to the plant, approximately 36 inches below the ground surface.

On November 21, 1983, at 8:30 a.m., a Magill Construction Company operator arrived on-site with a tractor-mounted end loader with a rear-mounted backhoe and a dump truck. Mr. Gapinske briefed him on the nature of the project and the excavation was begun. The materials approximately 30 inches from the perimeter of the sump were removed to a depth of approximately 6 feet. At that time, Mr. Gapinske observed that the sump was constructed of 3-foot, concrete sewer manhole sections. There was red discoloration where the concrete sections were joined, indicating seepage through the joints. The top collar and two 3-foot sections were removed easily with a crane. The last section of the tank was embedded in soil that had underground extensive cementation. The soils were extremely hard and brown-red in color. The backhoe did not have enough power to penetrate this soil. After discussions with Bob Magill, it was decided that activities for the day would cease and arrangements would be made for obtaining a larger backhoe and to continue the excavation on Tuesday, November 22, 1983.

Before leaving the job site, Magill placed a plastic cover over the excavation to prevent runon and installed a snow fence around the excavation for safety. The excavated soils were transported to an area surrounded by straw bales. The material was spread to a maximum depth of six inches.

On November 22, 1983, a subcontractor of Magill arrived at the site with a crawler-mounted backhoe and a dump truck. At 9:30 a.m., a dump truck and operator from Magill Construction arrived. The crawler-mounted backhoe had difficulty excavating the red cemented soil; however, it was making progress. At approximately 10:00 a.m., the bucket of the backhoe broke. Magill was informed and instructed the backhoe operator to obtain a new bucket at his shop which was approximately one hour away. Magill sent his tractor-mounted end loader to the site and installed a pneumatic hammer to break up the cemented soil. At approximately 11:30 a.m., Magill's hammer was on-site and penetrating the red cemented soil. The backhoe operator returned, and the backhoe and the hammer working together removed the cemented soil. The cemented soil layer was 4 to 5 feet thick. This cemented soil and the soils immediately around the sump were stockpiled in an area that was separate from the air drying soils. The excavation continued to a maximum depth of 18 feet. A sample was collected from the bottom of the excavation for solvent analysis. Approximately 25 yards of contaminated soils were stockpiled remote from the air drying soils. The soils at the bottom of the excavation appeared clean, but did have a solvent odor. Work for the day was completed at 3:30 p.m.

One week later, soil was again sampled from the bottom of the excavation and the air drying soils were sampled and analyzed.

Because of soil stability conditions, the proximity of the plant to building foundation, and the prediction of inclement weather, further excavation was not practical. Based on the results of our sample analysis, we calculated that following the remedial action, the site would no longer be a significant source of contamination. On December 1, 1983, the contractor placed approximately 10 cubic yards of No. 8 washed stone in the excavation as a base for installing a new holding tank. The stone was leveled and a 1,500-gallon tank was installed. Sealant was placed around the upper lip of the tank and the cover was installed. The air dried soils were used as backfill around the tank and the area was restored to its original grade. The soils were compacted with the backhoe.

Samples of the soils that were not replaced were collected for EP toxicity analysis for lead and chromium to determine whether the soils could be air dried and handled as a non-hazardous waste or whether the metals content would be sufficiently high to require off-site disposal at a hazardous waste landfill.

CALCULATED CONDITIONS FOLLOWING THE REMEDIAL ACTION

The amount of solvents remaining in the soil following the remedial action and their impact on groundwater contamination can be calculated using the data collected during the construction program. The data are shown in Table 2.

Prior sampling (Table 1) indicates that there is no soil contamination beyond ten feet from the sump. Based on this information and information from Table 2, we can calculate the amount of solvent remaining in the soils following the remedial action. We present below the calculation assuming worst case assumptions and a calculation assuming more reasonable approximations.

Calculation 1 - Worst Case Assumptions

Assume that concentrations of trichloroethylene and 1,1,1-trichloroethane found beneath the sump extend for a radius of 10 feet from the sump and soil is contaminated to a depth of 35 feet:

Volume of contaminated soil = (10) ft^2 x 3.14 x 35 ft = 10,990 cu ft

Volume of soil treated = 1,350 cu ft

Remaining contaminated soil = 10,900 cu ft - 1,350 cu ft = 9,640 cu ft

Density of the soil is approximately 100 lb/cu ft; therefore, weight of the contaminated soil is:

$$9{,}640 \text{ cu ft} \times \frac{100 \text{ lb}}{\text{cu ft}} = 964{,}000 \text{ lbs}$$

Total concentration of trichloroethylene and 1,1,1-trichloroethane is:

980 + 280 = 1,260 ppm

Weight of solvent in soils is:

$$0.964 \text{ million lbs of soil} \times \frac{1{,}260 \text{ lbs solvent}}{\text{million lbs soil}} = 1{,}214 \text{ lbs of solvent}$$

Calculation 2 - Realistic Case

Assume that concentrations of trichloroethylene and 1,1,1-trichloroethane found beneath the sump extend for a radius of 5 feet from the sump and soil is contaminated to a depth of 35 feet:

TABLE 2

D DURING REMEDIAL ACTION PROGRAM

Trans 1,2-dichlorotheylene	1,1,1-Trichloro-ethane	Trichloro-ethylene	Tetrachloro-ethylene	Toluene
	(1) - HEAVY SOLVENT ODOR, NO ANALYSIS			
	(2) 980		280	
	980		280	
<0.25	0.035	0.83	0.82	0.19
<0.25	<0.20	1.6	3.2	0.52

Volume of contaminated soil = $(5 \text{ ft})^2 \times 3.14 \times 35 \text{ ft} = 2{,}748$ cu ft

Volume of soil treated = 1,350 cu ft

Remaining contaminated soil = 1,398 cu ft

Weight of solvent in soils is:

$$1{,}398 \text{ cu ft soil} \times \frac{100 \text{ lbs soil}}{\text{cu ft soil}} \times \frac{.001260 \text{ lbs solvent}}{\text{lb soil}} = 176 \text{ lbs solvent}$$

Using worst case assumptions, we calculated that approximately 1,200 pounds of solvent remain in the soil. Using more realistic assumptions, we calculated approximately 175 pounds of solvent remain in the soil.

The groundwater modeling report, issued in December 1983, indicates that the level of solvent found in City Well 4 (200 µg/l) could result from an annual input of 25,000 pounds of solvent per year to the groundwater table in the vicinity of the sump at Plant 2. Even considering the worst case assumptions, the amount remaining in the soil is less than 5 percent of the estimated annual input up until approximately 5 years ago. The modeling report further shows that approximately 1 percent of the solvents discharged to the groundwater table in the vicinity of Plant 2 can enter the City Well 4 water. If all the remaining solvents in the soils discharge to the groundwater table in 1 year, the concentration of solvent in the City Well 4 would be less than 4 µg/l. It is more reasonable to expect that the transport of the solvents from the soil to the groundwater table will take place over a period of 5 to 10 years, resulting in insignificant concentrations arriving in City Well 4 water.

It is our opinion that the concentrations now found in City Well 4 are the result of the movement of a contaminant flume that is now moving out of the area and dispersing. Also, we cannot exclude the possibility of sources of contamination in the immediate vicinity of City Well 4. If the contamination now found in City Well 4 is a result of past disposal operations on Sta-Rite property, the concentration of contaminants in the well should decrease over the next 2 to 5 years. In any case, further remedial actions in the vicinity of the sump at Plant 2 will have insignificant effect on the quality of water in City Well 4.

The EP toxicity test on the stained soil that was not returned to the excavation showed a lead concentration of 0.19 mg/l and a chrome concentration of 0.05 mg/l. The soil should be aerated during the spring of 1984 to remove volatile solvents, then disposed as a conventional waste.

APPENDIX A

REMEDIAL ACTION PROCEDURES
PLANT 2 SUMP

STA-RITE INDUSTRIES, INC.
Water Equipment Division
293 SOUTH WRIGHT STREET, DELAVAN, WISCONSIN 53115, (414) 728-5551

September 28, 1983

Wisconsin Department of Natural Resources
P. O. Box 13248
Milwaukee, WI 53213

Attn.: Mr. Ronald Kazmierczak
Assistant District Director

Re: Remedial Action Related to Contaminated Soils in The Vicinity of the Sump at Plant 2, Sta-Rite Industries, Delavan, Wisconsin

Dear Mr. Kazmierczak:

In accordance with discussions with Ted Bosch and Frank Trcka, we intend to proceed with removal and decontamination of soils in the vicinity of the sump at Plant 2 at our facilities in Delavan, Wisconsin. The attached remedial action plan has been developed by Donohue & Associates after consultation with Waste Management of Wisconsin and Magill Construction of Elkhorn, Wisconsin. We intend to proceed with the work in the next two to four weeks because of our desire to prevent any contamination spread and also for ease of excavation during milder weather conditions.

Concurrent action has started with the City of Delavan to design and implement a system of treatment for Well #4 to place this well back in service as soon as possible. This is being accomplished by a team consisting of Sta-Rite, City of Delavan, Donohue & Associates, and Crispell-Synder engineers. The details of their effort will be described more fully when we respond to your letter of August 18, 1983.

If you have any questions concerning our activities, please contact me. In case you wish to observe the excavation, we will call you before the work begins.

Very truly yours,

STA-RITE INDUSTRIES, INC.

Dick A LaChapell

Dick A. LaChapell
Plant Manager

DAL:cvd

PROCEDURES FOR REMOVAL, TREATMENT, AND DISPOSAL OF SOILS SURROUNDING THE SUMP AT STA-RITE PLANT 2 DELAVAN, WISCONSN

Prepared By:
DONOHUE & ASSOCIATES, INC.

The following procedures for remedial action at the Sta-Rite Industries Plant 2 sump area have been developed following consultation with Waste Management of Wisconsin and Magill Construction. The following procedure will substantially reduce the soil contaminants and assure that there is no further contamination of groundwater from the sump area. The steps are to be followed in sequence:

1. Contract with Waste Management of Wisconsin to remove any water that has seeped into the sump.

2. Contract with Waste Management of Wisconsin to supply a dumpster to contain soils contaminated with oils or paint sludges.

3. After the sump water has been removed by Waste Management of Wisconsin and the dumpster is on-site, begin excavation of soils within 3 feet of the sump perimeter. Place the soils in the dumpster.

4. Remove soils between 3 and 5 feet of the sump perimeter. If the soils contain visible oil or paint sludge, place in the dumpster. If the soils appear clean, spread on the adjacent parking lot in a layer no deeper than 6 inches to allow evaporation of trace solvents.

5. Remove, demolish, and dispose of sump tank.

6. Continue excavation to at least 3 feet beneath the sump bottom elevation. If paint sludges or oil are apparent in the soil, continue the excavation until clean soils are reached. Then excavate 2 additional feet. Place oil and paint contaminated soils in the dumpster and spread clean soils as in Step 4.

7. Collect samples of soil from the bottom of the excavation and from the soils spread on the parking lot. Analyze the soils for trichloroethylene, 1,1,1 trichloroethane, and toluene.

8. Shelter the hole to minimize runon of water from the surface or from rain during the period that the soils are being analyzed.

9. Cover contaminated soils in the dumpster and transport to Waste Management for disposal.

10. If the soils from the bottom of the excavation contain less than 500 micrograms per gram of total solvents, discontinue the excavation. If the soils contain greater than 500 micrograms per gram, excavate an additional 3 feet and spread the soils on the parking lot as in Step 4. If the soils in the parking lot contain less than 100 micrograms per gram of total solvents, they will be used to fill the excavation. If the soils contain greater than 100 micrograms per gram, the soils will be air dried for an additional week and analyzed.

12. Fill in the excavation to grade.

During the period of excavation, a representative of Donohue & Associates will be on-site to direct the disposition of the soils as the excavation proceeds. The excavation contractor will be responsible for protecting the Plant 2 building foundation. If bracing is required, the excavation can require 3 days. If no bracing is required, the excavation will be completed in 1 day.

MC:psk