LAW
ENVIRONMENTAL P.E., P.C.

DETERMINATION OF AMBIENT AIR QUALITY IMPACTS FROM GROUND-WATER COLLECTION AND TREATMENT

OLIN CHEMICALS FACILITY
NIAGARA FALLS, NEW YORK

Prepared for:

OLIN CHEMICALS

Charleston, Tennessee

June 18, 1996

LAW
ENGINEERING AND ENVIRONMENTAL SERVICES

June 18, 1996

Mr. Jim D. Frye
Project Manager
Central Group Engineering
Olin Chemicals
1186 Lower River Road, N.W.
Charleston, Tennessee 37310

Subject: **Determination of Ambient Air Quality Impacts From Ground-Water Collection and Treatment**
Olin Chemicals Facility, Niagara Falls, New York
LAW Project No. 11001-6-0021
Olin Corporation ESA #7734-113

Dear Mr. Frye:

Law Environmental P.E., P.C., in association with Law Engineering and Environmental Services, Inc. (LAW), is pleased to provide Olin Chemicals with this final report for the determination of ambient air quality impacts from ground-water collection and treatment at the Niagara Falls plant. Preparation of this report was done in general accordance with LAW's proposal number 13200-5-9000-0499, as amended, submitted on October 19, 1995 and authorized by Olin's Release Order No. 07027 dated March 1, 1996.

Sincerely,

F. David Shrimpton for
Frederick K. Marotte
Project Manager
Law Engineering and Environmental Services, Inc.

Glenn Coffman
Glenn N. Coffman, P.E.
Principal
Law Environmental P.E., P.C.

FKM/GNC:sch

cc: Olin Project Distribution List

LAW ENVIRONMENTAL P.E., P.C.
CORPORATE PLAZA WEST
286 WASHINGTON AVE. EXT., • ALBANY, NY 12203
(518) 869-0364 • FAX (518) 869-0992

DETERMINATION OF AMBIENT AIR QUALITY IMPACTS FROM GROUND-WATER COLLECTION AND TREATMENT

OLIN CHEMICALS FACILITY
NIAGARA FALLS, NEW YORK

Prepared for:

OLIN CHEMICALS

Charleston, Tennessee

Prepared by:

Law Environmental P.E., P.C.
in association with
Law Engineering and Environmental Services, Inc.

June 18, 1996

Project 11001-6-0021

1.0 BACKGROUND

This project involves the evaluation of ambient air quality impacts from a proposed ground-water collection and treatment system at an Olin Corporation (Olin) chemical production facility in Niagara Falls, New York. The site location is shown in Figure 1. Olin will be implementing a Remedial Plan to address ground-water contamination at the plant. This plan calls for the installation of a ground-water recovery and treatment system consisting of five recovery wells and five passive monitoring wells. The goals of this recovery system are to reduce the concentration of hazardous waste constituents in the site ground water and to restrict off-site migration of these constituents.

The collected ground-water will require treatment prior to disposal. Many of the constituents present in the ground-water are easily removed by air stripping. Ground-water treatment by air stripping is also a cost-effective treatment alternative. If an air stripper is installed, it will require a construction and operating permit from the New York State Department of Environmental Conservation (NYSDEC). The stripper exhaust is predicted to include emissions of regulated toxic air contaminants under Part 212 of the New York State air regulations. All but three of these State toxic air contaminants are also Federally-regulated hazardous air pollutants (HAPs). The three contaminants predicted to be emitted from the air stripper which are State air toxics, but not HAPs, are: 1,2-dichloroethene, 1,2-dichlorobenzene, and 1,3-dichlorobenzene.

The NYSDEC's *Air Guide-1* provides guidance for determining the allowable level of emissions from a given source of State-regulated toxic air contaminants. *Air Guide-1* prescribes that a modeled Ambient Air Quality Impacts Analysis be performed to determine the ground-level concentrations of the pollutants being emitted from the source. The predicted ground-level constituent concentrations are to be compared to *Air Guide-1* listed allowable constituent concentrations.

The procedures prescribed in *Air Guide-1* were used to evaluate ambient air quality impacts from the proposed stripper. This report summarizes the regulatory guidance for performing the impacts evaluation, discusses the development of the pollutant emission rates, explains the procedures used in the ambient air quality impacts analysis, and presents the results of this analysis.

2.0 REGULATORY GUIDANCE FROM NYSDEC

Applicable regulatory guidance and clarification of the *Air Guide-1* requirements have been gained through several conversations with Mr. Larry Stiller, a permitting engineer with NYSDEC Region 9. According to Mr. Stiller, the Olin facility does not currently produce significant air emissions of volatile organic compounds (VOCs) or HAPs. Furthermore, he stated that neither the Olin facility nor the joint venture facility between Olin and E.I. DuPont de Nemours & Co. (DuPont) is a major sources of regulated pollutants with regard to Title V. DuPont operates a chemical facility adjacent to the Olin site.

Air Guide-1 states that all emissions from the facility and emissions from neighboring facilities must be added together, along with measured background concentrations, and compared to the allowable emission rates. However, Mr. Stiller indicated that background concentrations of toxic air contaminants were not available for the Niagara Falls area. Furthermore, he did not believe there are any other nearby sources of the same pollutants that will be emitted from the air stripper. He stated that the NYSDEC does not usually go to that level of detail for an air stripper permit. He indicated that if refined modeling of Olin's emission rates alone showed compliance with *Air Guide-1* allowable concentrations, then a permit for the stripper will most likely be granted.

Constituent-specific allowable emission rates are based on the results of the impacts analysis and other parameters, such as toxicities of the pollutants being emitted. Mr. Stiller indicated that pollution controls will <u>probably not</u> be required if the following criteria are met, but he emphasized that *Air Guide-1* is a guidance document, and that the final decision regarding the potential need for control equipment will be up to the permitting engineer:

1) The emission rate of each *Air Guide-1* classified high toxicity air contaminant is below 1 pound per hour (lb/hr), and the emission rate of each *Air Guide-1* classified moderate toxicity air contaminant is below 10 lb/hr;

2) The calculated annual ambient air concentration of each constituent does not exceed the Air *Guide-1* listed Annual Guideline Concentration (AGC) for that constituent;

3) The calculated 1-hour ambient air concentration of each constituent does not exceed the Air Guide-1 listed Short-term Guideline Concentration (SGC) for that constituent; and

4) The predicted constituent-specific ambient air concentrations in the building cavity region are not above both the SGC and AGC values.

When the AGC for a given contaminant is based on potential carcinogenic risks, it represent estimates of air concentrations associated with an excess lifetime cancer risk of one-in-a-million. For air toxic contaminants not possessing carcinogenic traits, the AGC is based on other exposure parameters, such as LD_{50} (dermal or oral), LC_{50} (inhalation), and Threshold Limit Value (TLV-TWA). If a contaminant has the potential for both carcinogenic and non-carcinogenic health risks, the more stringent guideline concentration is used as the AGC.

According to the guidance given in *Air Guide-1,* the AGC value of a contaminant whose AGC is based on an excess lifetime cancer risk of one-in-a-million may be exceeded by a factor of 10. Exceeding a cancer-risk based AGC value by a factor of 10 results in an excess lifetime cancer risk of one-in-one-hundred-thousand, which is still considered to be adequate protection of human health. This *Air Guide-1* guidance was corroborated by Mr. Stiller. Most of the air contaminants to be emitted from the proposed air stripper have AGC values based on cancer risk.

3.0 CALCULATION OF EMISSION RATES

Average anticipated concentrations of ground-water influents at treatment plant start-up were calculated using data from the January 1996 Long-term Ground-water Pumping Study Preliminary Report. The data were summarized from analytical results from ground-water recovery wells OBA-17AB and OBA-22AB sampled over a 17-day pump test period. These wells are located in the area from which ground water will be pumped, and this data is assumed to be representative of ground water in the recovery well area.

The average concentration for each volatile and semi-volatile constituent detected during the pumping study was calculated for well OBA-17AB and well OBA-22AB. If a constituent was not detected in a sample, but the detection limit was below detected concentrations from other sampling events, the constituent was assumed to be present at the detection limit. Detection limits above the highest detected concentrations were ignored. Values noted by the reporting laboratory as estimated values below the detection limits were included in the average concentration determination. Since flow contribution from each of the recovery wells is anticipated to be approximately 12 gallons per minute (gpm), the estimated contaminant concentrations contributed by each well were averaged to obtain the average concentration for the recovery well system.

Air stripping efficiencies were obtained from air stripper modeling data. Emission rates (pounds per day) were then calculated using the average ground-water recovery system concentrations, air stripping efficiencies, and an assumed recovery system flow rate of 60 gpm.

4.0 AMBIENT AIR QUALITY IMPACTS DETERMINATION

The objective of the air quality impacts analysis was to determine whether constituent concentrations will be in compliance with the AGC and SGC values. It was determined that, at the predicted emissions levels, compliance with constituent guideline concentrations and protection of human health can be achieved by engineering an appropriate stack. The study investigated different combinations of stack heights, stack diameters, and exhaust gas velocities. To that end, three different, but equally-acceptable, methods of calculating ambient concentrations (not including cavity calculations) were explored: *Air Guide-1* hand calculations, SCREEN3 screening modeling, and ISCST3 refined modeling. Approval to use these methods of determining air impacts was obtained from Mr. Bob Gaza, a modeling contact in NYSDEC's Albany office. Mr. Gaza provided one year (1989) of preprocessed meteorological data consisting of Niagara Falls surface data and Buffalo upper air data for use with the ISCST3 model.

Air stripper stack parameters used in the final modeling are given in Table 1. A unit emission rate of 1 gram per second (g/s) was used in the modeling runs, and a unit emission rate of 1 pound per day (lb/day) was used in the hand calculations. In both cases, predicted concentrations for a unit emission rate were then scaled by the actual emission rate of each constituent to obtain actual, constituent-specific concentrations. Actual emission rates of each constituent are shown on the second page of Table 2. Note that the only emission rate above 1 lb/hr (i.e., 24 lbs/day) is for trichloroethene, which is a moderate toxicity contaminant. Since the emission rate of each *Air Guide-1* classified high toxicity air contaminant is below 1 pound per hour (lb/hr), and the emission rate of each *Air Guide-1* classified moderate toxicity air contaminant is below 10 lb/hr, the first criterion for not requiring additional emissions controls will be met by the air stripper.

In an effort to minimize the proposed stack height of the stripper, Olin requested evaluation of the air quality impacts for two scenarios which might affect plume downwash: 1) using all existing buildings, and 2) using only the buildings not scheduled for demolition next year. Calculations and modeling for both scenarios were performed using the methods mentioned above. The results indicated that demolishing the buildings would not lower the required stack height. Buildings 73 and 74, which are not scheduled for demolition, appear to be the buildings which most adversely affect plume downwash, based on the proposed stack location.

Employing a 50-foot stack height with either downwash scenario, each method used to predict short-term ambient concentrations resulted in compliance with the SGC values. Use of the *Air Guide-1* hand calculations resulted in the lowest predicted annual concentrations. The results of these calculations are presented in Table 2. All but three contaminant annual concentrations were calculated to be less than the AGC values using the *Air Guide-1* calculations with either downwash scenario and a stack height of 50 feet. The three contaminant concentrations which were shown to exceed their respective AGC values all have cancer-risk based AGC values. Since the exceedance of those three AGC values was predicted to be less than a factor of 10, this meets the state criteria for protection of human health and welfare. The second and third criteria for not requiring additional emissions controls will be met by using a 50-foot stack height.

5.0 CAVITY REGION IMPACTS EVALUATION

The last component of the air quality impacts analysis required by NYSDEC is an evaluation of potential building cavity region impacts. First, the cavity region concentrations and the lengths of potential cavity regions surrounding each building are determined using the SCREEN3 model. If the SCREEN3 model predicts a cavity region concentration of 0.000 (zero) $\mu g/m^3$, then the plume rise is sufficient to exceed the cavity region height, and no further analysis is necessary. If the SCREEN3 model predicts a non-zero cavity region concentration for a particular building, then it must be determined whether the cavity region due to that building extends off-site. If it can be shown that the cavity region does not extend off-site in the direction for which a non-zero cavity region concentration was predicted, then cavity region concentrations do not need to be considered. Approval to use the SCREEN3 method of determining the potential for cavity impacts was obtained from Mr. Bob Gaza and his supervisor, Mr. Leon Sedefian.

The proposed air stripper is located east of Building 73 near the eastern edge of Plant 2, as shown in Figure 2. An enlargement of the area surrounding the air stripper, including the layout of buildings, is provided in Figure 3. Several buildings were evaluated as stand-alone structures. These include Buildings 73, 97, 78W, 75, 74, the penthouse on top of Building 97, and Building B (east of Building 73). These individual buildings were evaluated in SCREEN3 model runs 1 through 7 (see Table 3 and Figure 3).

Several groups of buildings were also considered in the cavity impacts analysis due to their close proximity to each other. Blocks of buildings were grouped together and assigned the height of the lowest structure in the group. Building Block 1, shown in Figure 4, consisted of Buildings 78W (60 feet tall) and 78E (50 feet tall) and was assigned a height of 50 feet. Building Block 2, shown in Figure 5, consisted of the previous two buildings plus Building 79. Building Block 3, shown in Figure 6, consisted of the previous three buildings plus Building 77. Building Block 4, shown in Figure 7, consisted of the previous four buildings plus Buildings 75, 76, 76A, 98, and 94. Building Block 5, shown in Figure 8, consisted of all the previous buildings plus Buildings 74, 74A, and 74B.

The cavity lengths and cavity region concentrations in the East-West (EW) and North-South (NS) directions were predicted using the SCREEN3 model for those buildings and building blocks of interest. In the East-West direction SCREEN3 predicted non-zero cavity region concentrations for only five buildings/building blocks (i.e., Buildings B, 97, 97 penthouse, 78W, and Building Block 1). However, by comparing the cavity lengths of those buildings in the East-West direction to the minimum distance to the property line in that direction, it was shown that the cavity regions for which non-zero concentrations were predicted do not extend off-site.

In the North-South direction, SCREEN3 predicted non-zero cavity region concentrations for four buildings/building blocks (i.e., Buildings 97, 97 penthouse, 78W, and Building Block 1). Comparison of the cavity lengths to the minimum distance to the property line showed that the cavity lengths do not extend off-site in the North-South direction for those buildings with predicted non-zero cavity region concentrations. The results of the cavity impacts analysis are presented in Table 3. As discussed above, cavity impacts are possible for a particular building only if a non-zero cavity region concentration is predicted by SCREEN3 and if the cavity length in that direction extends off-site. The cavity impacts analysis showed that no buildings in the vicinity of the stack satisfy both of these conditions. Therefore, no cavity impacts are projected.

6.0 CONCLUSION

The results of the air quality impacts analysis using a 50-foot stack height indicate compliance with NYSDEC guideline concentrations for protection of human health and welfare (within a factor of 10 for three constituents with cancer-risk based AGC values). Furthermore, no high toxicity air contaminant emissions are projected at rates greater than 1 lb/hr and no moderate toxicity air contaminant emissions are projected at rates greater than 10 lb/hr. This indicates a permit application can be prepared for the air stripper without including additional emissions controls.

ATTACHMENT 1

TABLES

TABLE 1
Modeling Parameters Used in Ambient Air Impacts Analysis
Olin Corporation, Niagara Falls Plant
Law Engineering and Environmental Services, Inc. Project No. 11001-6-0021

Description	Value Used	Units
Stack Height	15.2	m
Stack Inside Diameter	0.36	m
Stack Exit Velocity	9.5	m/s
Stack Gas Exit Temperature	283	K
Ambient Air Temperature	293	K
Receptor Height Above Ground	0	m
Urban/Rural Option	Rural	

By: sch Date: 5/23/96
Checked: psc Date: 5/28/96

TABLE 2
Air Guide-1 Modeling Results of Ambient Pollutant Concentrations From Air Stripper
Olin Corporation, Niagara Falls Plant
Law Engineering and Environmental Services, Inc. Project No. 11001-6-0021

Inputs
h_s = stack height = 50 ft
h_b = height of tallest building within downwash region = 60 ft

Determine If Plume Rise Should Be Considered

Is	h_s / h_b	<	2.5	?
Is	0.83	<	2.5	?
Yes	Plume rise should not be considered. Proceed with next step.			

Set the effective stack height (h_e) equal to the physical height (h_s).

$h_e = h_s =$ 50 ft

Model 1 lb/day emission rate and scale to the different pollutant emission rates.

Q = 1 lb/day = 0.04167 lb/hr

From Air Guide-1, the following equation is used to predict the maximum potential annual impacts:

$$C_p\ (ug/m^3) = \frac{4218\ Q}{h_e^{2.16}} = \frac{4218 \times 0.04167\ \text{lb/hr}}{50\ \text{ft} ** 2.16}$$

= 0.037594 ug/m^3 maximum annual concentration for 1 lb/day emission rate

From Air Guide-1, the following equation is used to predict the maximum short-term impact:

$C_{st}\ (ug/m^3) = C_p \times 420 =$ 15.7895 ug/m^3 maximum short-term concentration for 1 lb/day emission rate

TABLE 2
Air Guide-1 Modeling Results of Ambient Pollutant Concentrations From Air Stripper
Olin Corporation, Niagara Falls Plant
Law Engineering and Environmental Services, Inc. Project No. 11001-6-0021

Contaminant	Emission Rate @ 60 gpm (lb/day)	Max. Annual Ground Level Concentration for Actual Emission Rate (ug/m^3)[1]	NY State Air Guide-1 Annual Guideline Concentration, AGC (ug/m^3)	Are Predicted Annual Concentrations Under the AGC or In Exceedance?	If AGC is Exceeded, By What Factor is it Exceeded?	Max. Short-Term Ground Level Concentration for Actual Emission Rate (ug/m^3)[1]	NY State Air Guide-1 Short-Term Guideline Concentration, SGC (ug/m^3)	Are Predicted Short-Term Concentrations Under the SGC or In Exceedance?
vinyl chloride	0.4	0.0150	0.02	Under		6.316	1,300	Under
methylene chloride	0.8	0.0301	27	Under		12.632	41,000	Under
1,2-dichloroethene (total)	4.6	0.1729	1900	Under		72.632	190,000	Under
chloroform	3.7	0.1391	23	Under		58.421	980	Under
2-butanone (MEK)	1	0.0376	300	Under		15.790	140,000	Under
trichloroethene	27.7	1.0414	0.45	Exceeds	2.3	437.370	33,000	Under
benzene	0.9	0.0338	0.12	Under		14.211	30	Under
1,1,2-trichloroethane	0.1	0.0038	0.06	Under		1.579	13,000	Under
tetrachloroethene	11.6	0.4361	0.075	Exceeds	5.8	183.159	81,000	Under
1,1,2,2-tetrachloroethane	5.2	0.1955	0.02	Exceeds	9.8	82.106	1,600	Under
1,2-dichlorobenzene	0.6	0.0226	200	Under		9.474	30,000	Under
1,3-dichlorobenzene	0.3	0.0113	200	Under		4.737	30,000	Under
1,4-dichlorobenzene[2]	0.4	0.0150	143	Under		6.316	14,290	Under
1,2,4-trichlorobenzene	1.3	0.0489	9	Under		20.526	3,700	Under
chlorobenzene	2.4	0.0902	20	Under		37.895	11,000	Under

Notes:

1 Actual individual pollutant concentrations calculated by scaling the predicted concentration for a 1 lb/day emission rate by the actual emission rate of each pollutant (lb/day).

2 SGC and AGC values are interim values calculated from guidance in New York State Air Guide-1.

By: sch Date: 5/13/96
Checked: ww Date: 5/13/96

TABLE 3
Analysis Of Potential Cavity Impacts Using SCREEN3 Model
Olin Corporation, Niagara Falls Plant
Law Engineering and Environmental Services, Inc. Project No. 11001-6-0021

SCREEN3 Run No.	Building or Structure	Analysis in the East-West Direction				Analysis in the North-South Direction			
		SCREEN3 Predicted Cavity Region Concentration (ug/m^3)	SCREEN3 Predicted Cavity Length, EWCL (m)[1]	Minimum Distance to Property Line, EWD_{pl} (m)[2]	Does the Cavity Length Extend Off-Site?[3] EWCL>EWD_{pl}?	SCREEN3 Predicted Cavity Region Concentration (ug/m^3)	SCREEN3 Predicted Cavity Length, NSCL (m)[1]	Minimum Distance to Property Line, NSD_{pl} (m)[2]	Does the Cavity Length Extend Off-Site?[3] NSCL>NSD_{pl}?
1	73	0.000	N/A	N/A	N/A	0.000	N/A	N/A	N/A
2	B	1018	13.38	18.2	no	0.000	N/A	N/A	N/A
3	97	2258	15.75	90.7	no	2467	28.49	102.2	no
4	97 -Penthouse	13230	12.82	93.6	no	13230	12.82	106.6	no
5	78W	3503	20.88	49.4	no	2986	26.27	54.7	no
6	75	0.000	N/A	N/A	N/A	0.000	N/A	N/A	N/A
7	74	0.000	N/A	N/A	N/A	0.000	N/A	N/A	N/A
8	Block 1	1985	14.75	38.2	no	1843	34.59	51.4	no
9	Block 2	0.000	N/A	N/A	N/A	0.000	N/A	N/A	N/A
10	Block 3	0.000	N/A	N/A	N/A	0.000	N/A	N/A	N/A
11	Block 4	0.000	N/A	N/A	N/A	0.000	N/A	N/A	N/A
12	Block 5	0.000	N/A	N/A	N/A	0.000	N/A	N/A	N/A

Notes:

1) If a non-zero cavity region concentration was predicted by the SCREEN3 model, then the distance to the property line from the downwind edge of the building had to be compared to the cavity length in that direction. If a zero cavity region concentration was predicted, no further analysis was necessary.

2) D_{pl} is the shortest distance from the building to the property line. EW designates the shortest distance in the East-West direction, while NS designates the shortest distance in the North-South direction.

3) Cavity impacts are possible for a particular building only if a non-zero cavity region concentration was predicted by SCREEN3 and if the cavity length extends off-site.

By: sch Date: 5/28/96
Checked: ww Date: 5/28/96

ATTACHMENT 2

FIGURES

FILE: g:\users\chunt\olin\report\fig1.wp5

DATE: May 21, 1996

SOURCE: U.S.G.S. 7.5-MINUTE TOPOGRAPHIC QUADRANGLE MAP: NIAGARA FALLS (1980), N.Y. - ONT.

CONTOUR INTERVAL: 5 FT

SCALE IN FEET: 1 INCH = 2000 FEET

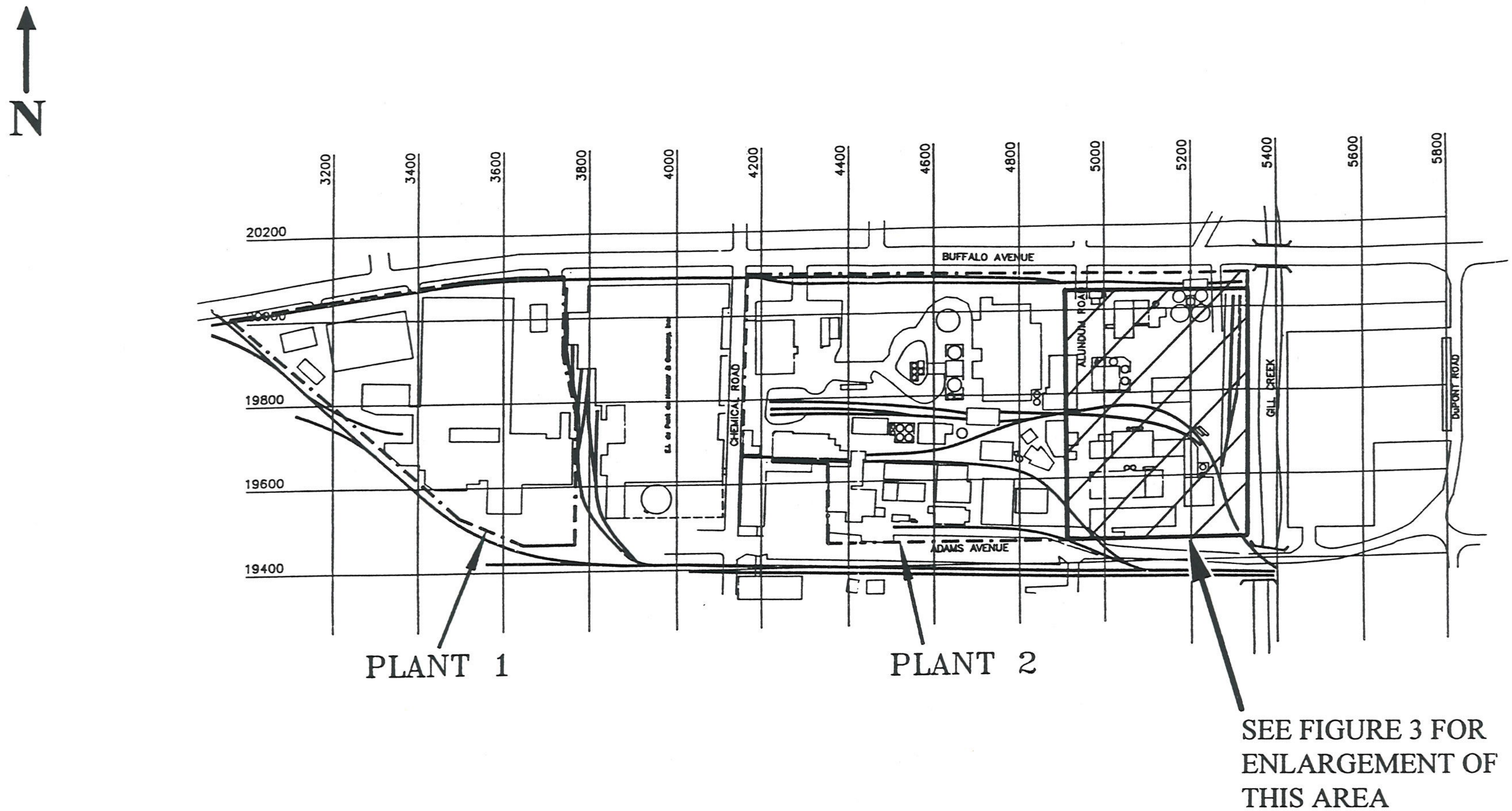
OLIN CORPORATION NIAGARA FALLS NEW YORK	LAW ENGINEERING AND ENVIRONMENTAL SERVICES, INC.	SITE LOCATION MAP JOB NO. 11001-6-0021 FIGURE 1

BY: SCH DATE: 5/22/96

CHECKED: PSC DATE: 5/22/96

FILE g:\users\chunt\olin\report\fig2.wp5

DATE: May 20, 1996



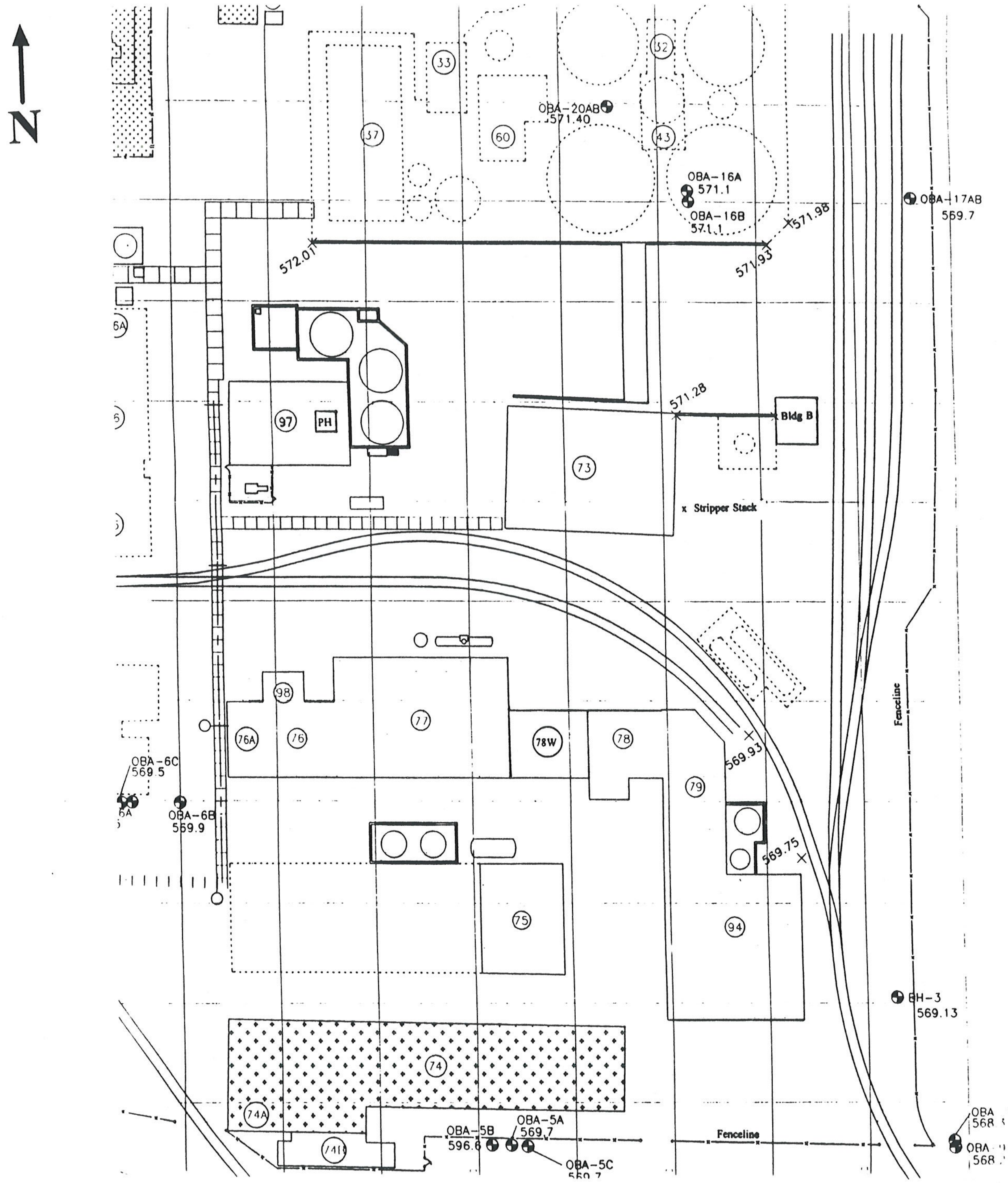
SCALE: 1 INCH = 400 FEET

OLIN CORPORATION NIAGARA FALLS NEW YORK	LAW ENGINEERING AND ENVIRONMENTAL SERVICES, INC.	SITE PLAN JOB NO. 11001-6-0021 FIGURE 2

BY: SCH DATE: 5/20/96

CHECKED: PSC DATE: 5/20/96

FILE g:\users\chunt\olin\report\fig3.wp5 DATE: May 17, 1996



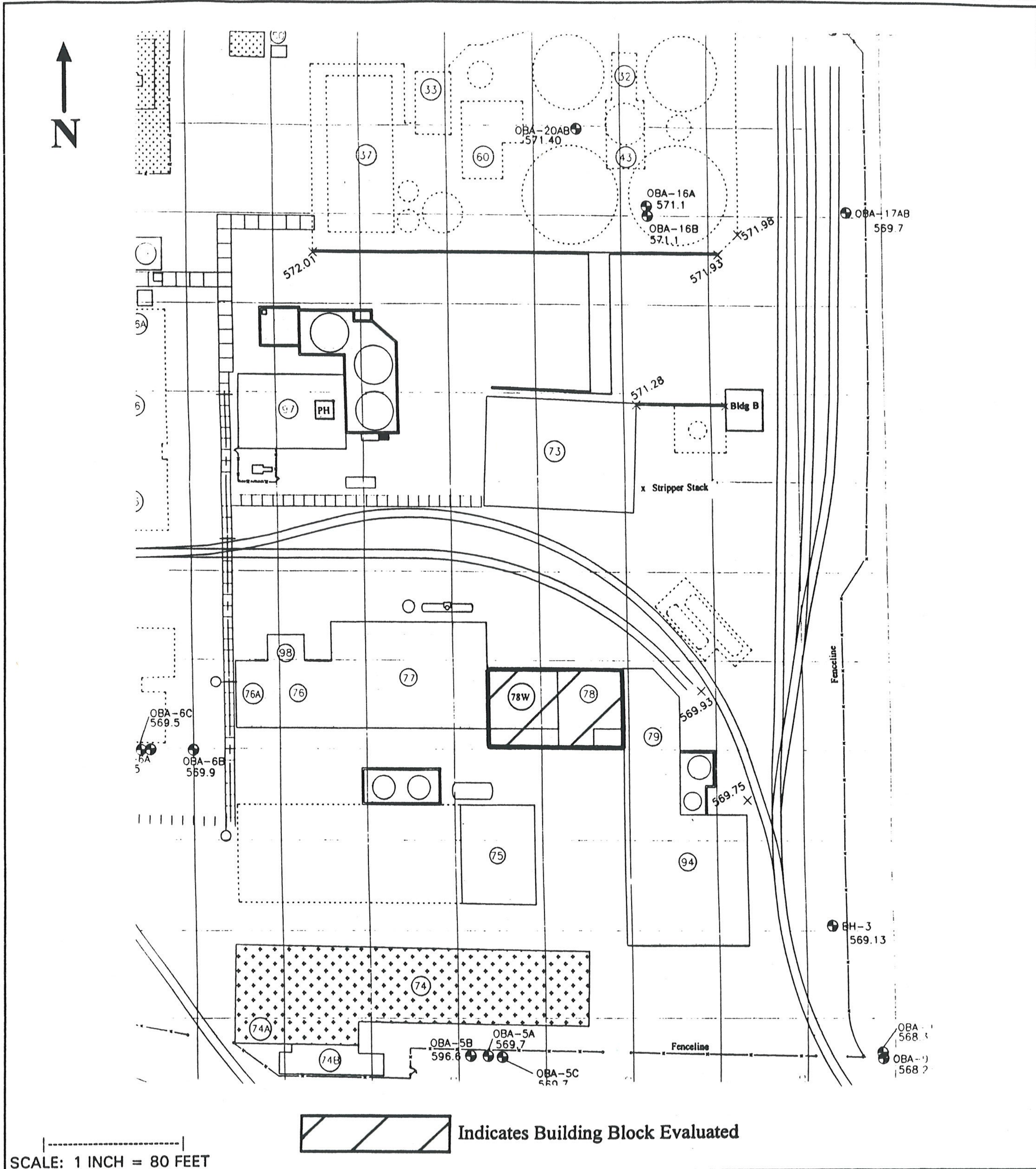
SCALE: 1 INCH = 80 FEET

OLIN CORPORATION NIAGARA FALLS NEW YORK	LAW ENGINEERING AND ENVIRONMENTAL SERVICES, INC.	BUILDING LAYOUT IN DOWNWASH REGION SCREEN3 RUNS 1 THROUGH 7 JOB NO. 11001-6-0021 FIGURE 3

BY: SCH DATE: 5/20/96
CHECKED: PSC DATE: 5/20/96

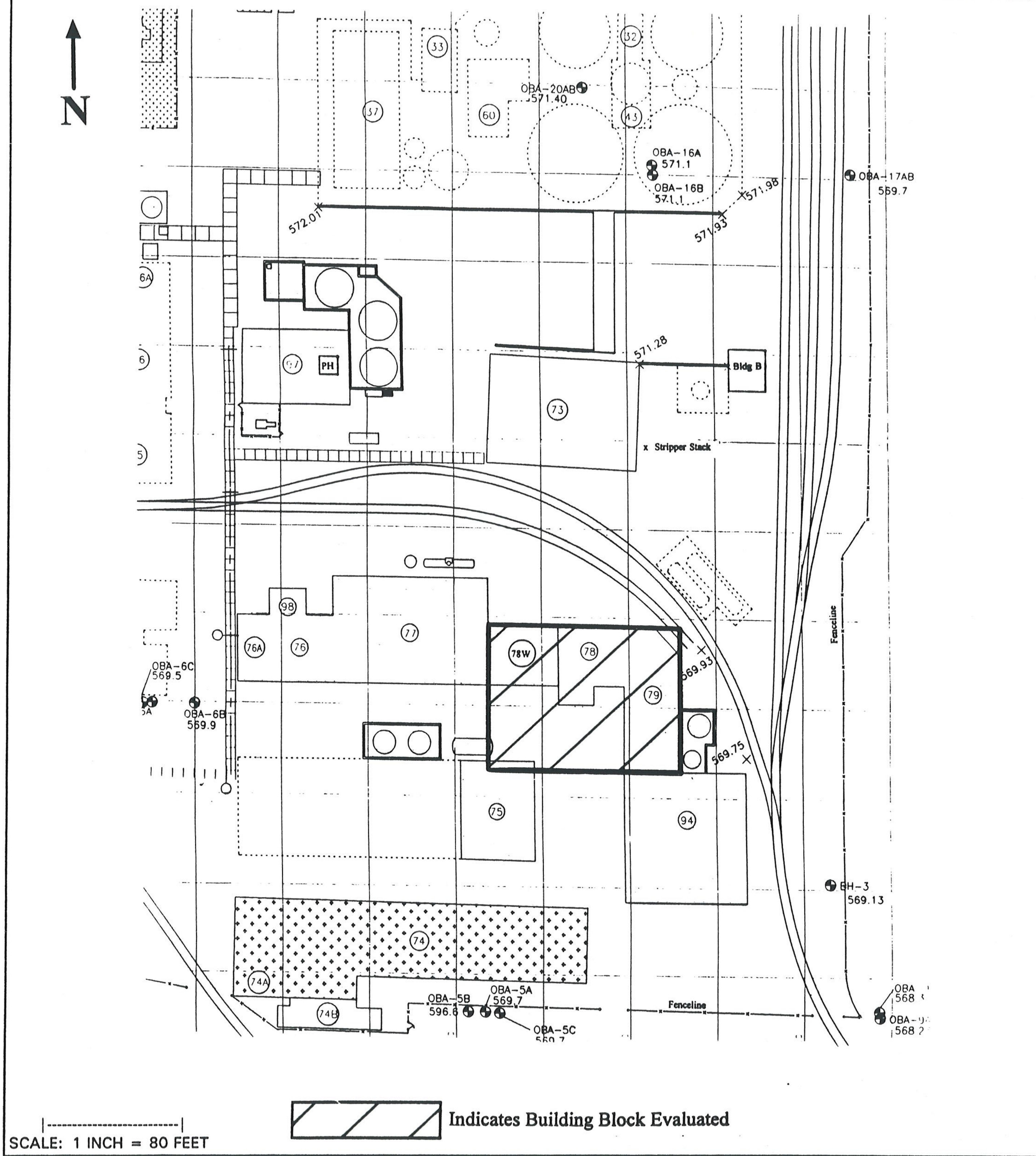
FILE g:\users\chunt\olin\report\fig4.wp5

DATE: May 17, 1996



OLIN CORPORATION NIAGARA FALLS NEW YORK	LAW ENGINEERING AND ENVIRONMENTAL SERVICES, INC.	BUILDINGS GROUPED IN BUILDING BLOCK 1 SCREEN3 RUN 8 JOB NO. 11001-6-0021 FIGURE 4

BY: SCH DATE: 5/20/96
CHECKED: PSC DATE: 5/20/96

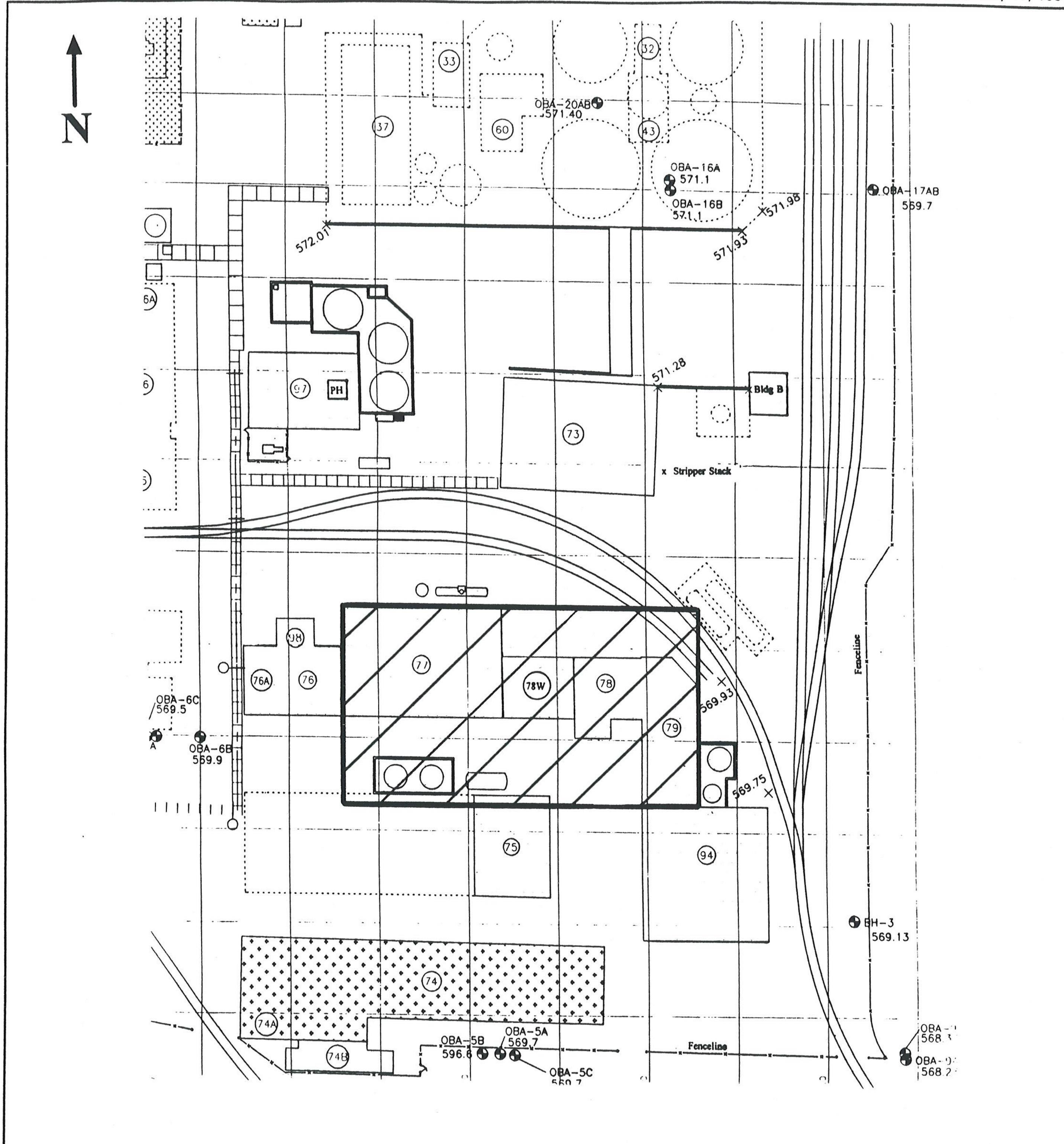


OLIN CORPORATION NIAGARA FALLS NEW YORK	LAW ENGINEERING AND ENVIRONMENTAL SERVICES, INC.	BUILDINGS GROUPED IN BUILDING BLOCK 2 SCREEN3 RUN 9 JOB NO. 11001-6-0021 FIGURE 5

BY: SCH DATE: 5/20/96
CHECKED: PSC DATE: 5/20/96

FILE g:\users\chunt\olin\report\fig6.wp5

DATE: May 17, 1996



SCALE: 1 INCH = 80 FEET

Indicates Building Block Evaluated

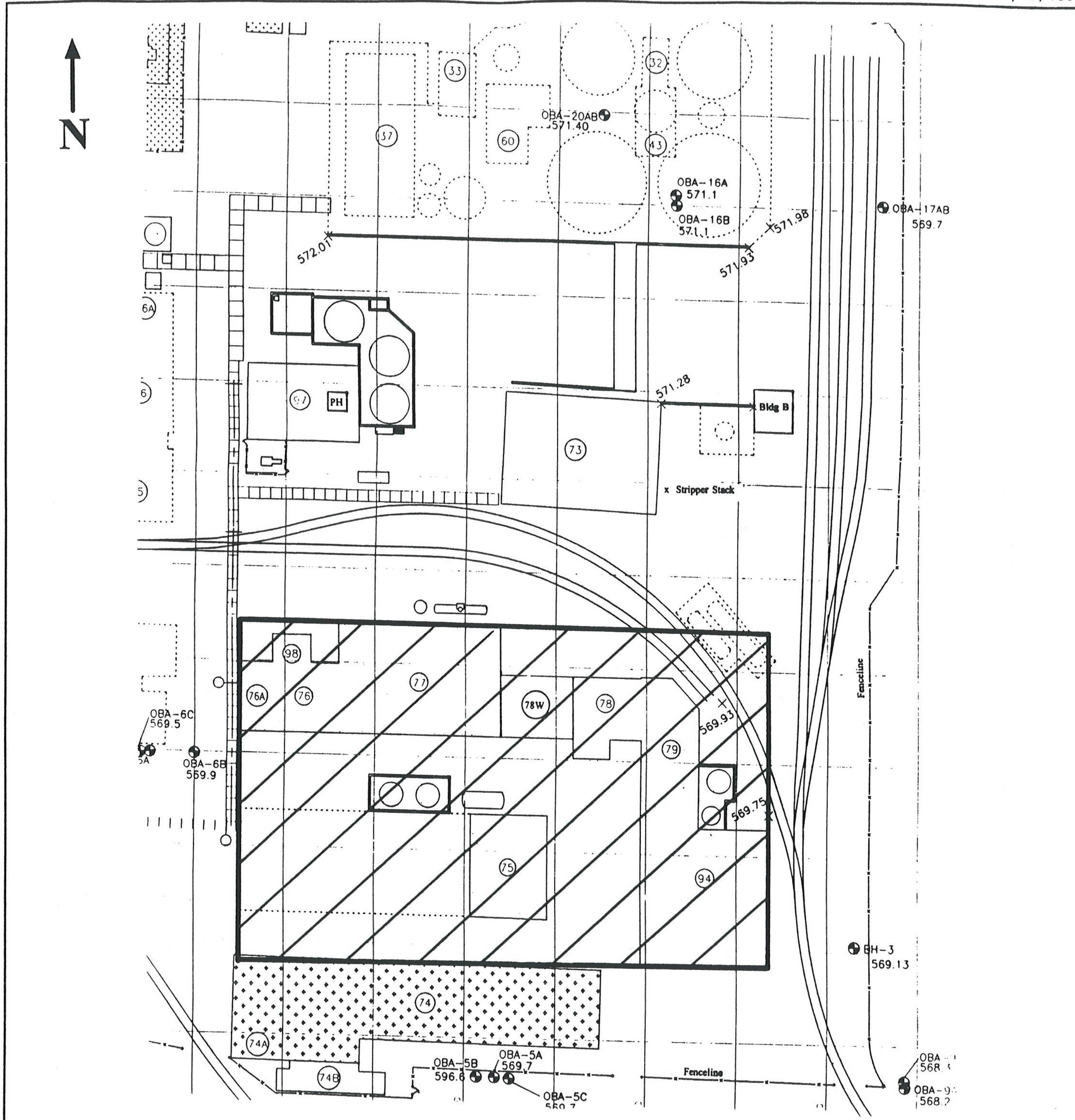
OLIN CORPORATION
NIAGARA FALLS
NEW YORK

LAW
ENGINEERING AND ENVIRONMENTAL SERVICES, INC.

BUILDINGS GROUPED IN
BUILDING BLOCK 3
SCREEN3 RUN 10

JOB NO. 11001-6-0021 FIGURE 6

BY: SCH DATE: 5/20/96
CHECKED: PSC DATE: 5/20/96



SCALE: 1 INCH = 80 FEET

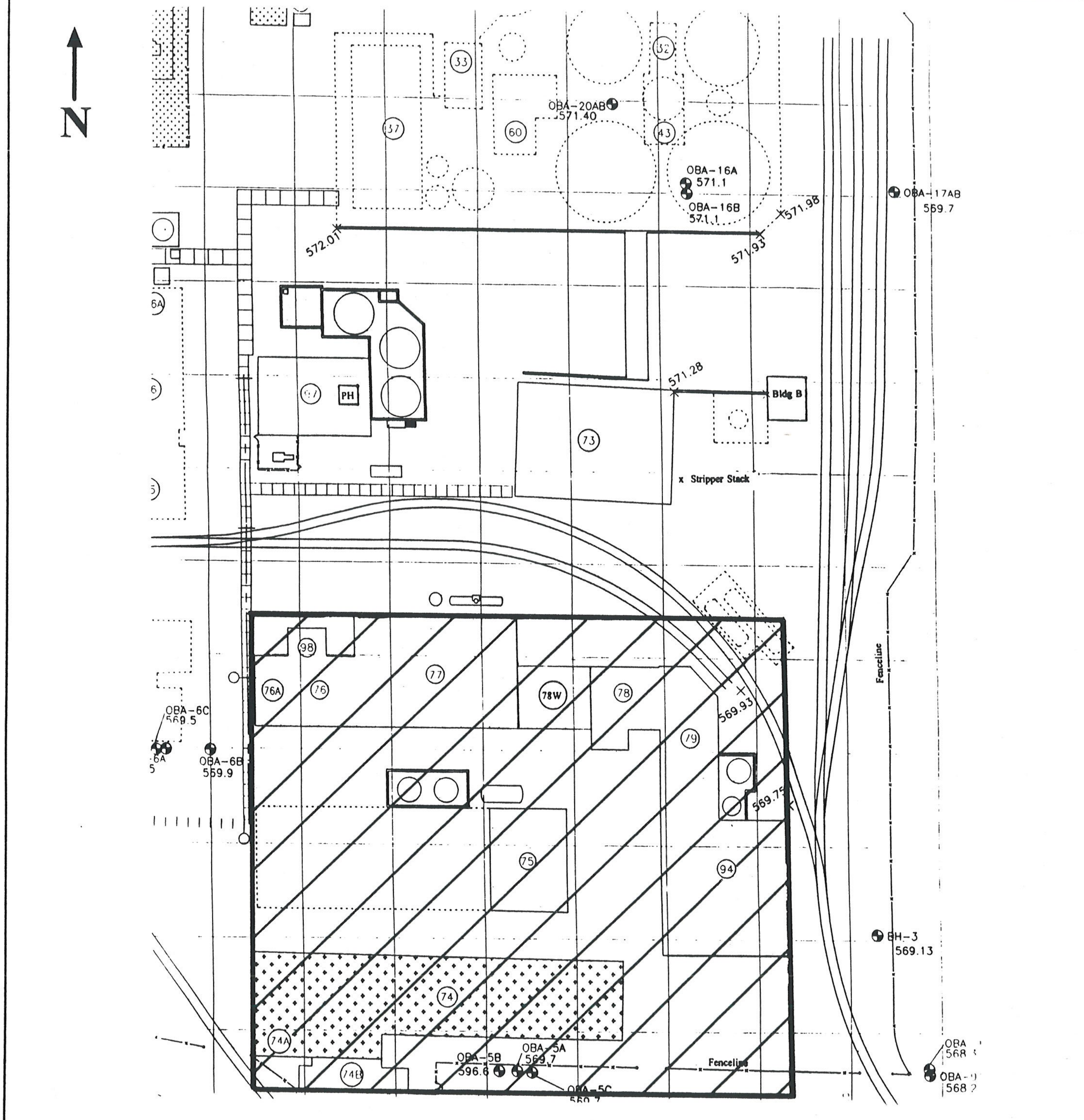
Indicates Building Block Evaluated

OLIN CORPORATION NIAGARA FALLS NEW YORK	LAW ENGINEERING AND ENVIRONMENTAL SERVICES, INC.	BUILDINGS GROUPED IN BUILDING BLOCK 4 SCREEN3 RUN 11 JOB NO. 11001-6-0021 FIGURE 7

BY: SCH DATE: 5/20/96
CHECKED: PSC DATE: 5/20/96

FILE g:\users\chunt\olin\report\fig8.wp5

DATE: May 17, 1996



SCALE: 1 INCH = 80 FEET

Indicates Building Block Evaluated

OLIN CORPORATION
NIAGARA FALLS
NEW YORK

LAW
ENGINEERING AND ENVIRONMENTAL SERVICES, INC.

BUILDINGS GROUPED IN
BUILDING BLOCK 5
SCREEN3 RUN 12

JOB NO. 11001-6-0021

FIGURE 8

BY: SCH DATE: 5/20/96
CHECKED: PSC DATE: 5/20/96

ATTACHMENT 3

SCREEN3 MODEL RUNS

SCREEN3 RUN #1

```
                                                                 05/10/96
                                                                 09:10:23
 ***  SCREEN3 MODEL RUN  ***
 *** VERSION DATED 95181 ***

OLIN NIAGARA FALLS - CAVITY LENGTH OF BLDG 73, SCH, BLD73_50

SIMPLE TERRAIN INPUTS:
   SOURCE TYPE              =        POINT
   EMISSION RATE (G/S)      =      1.00000
   STACK HEIGHT (M)         =      15.2000
   STK INSIDE DIAM (M)      =        .3600
   STK EXIT VELOCITY (M/S)=         9.5000
   STK GAS EXIT TEMP (K)    =     283.0000
   AMBIENT AIR TEMP (K)     =     293.0000
   RECEPTOR HEIGHT (M)      =        .0000
   URBAN/RURAL OPTION       =        RURAL
   BUILDING HEIGHT (M)      =      10.1000
   MIN HORIZ BLDG DIM (M)   =      19.0000
   MAX HORIZ BLDG DIM (M)   =      26.0000

TA > TS!!!  BUOY. FLUX SET = 0.0

BUOY. FLUX =      .000 M**4/S**3;  MOM. FLUX =    2.924 M**4/S**2.

*** FULL METEOROLOGY ***

 *** CAVITY CALCULATION - 1 ***        *** CAVITY CALCULATION - 2 ***
  CONC (UG/M**3)       =    .0000        CONC (UG/M**3)       =    .0000
  CRIT WS @10M (M/S)   =    99.99        CRIT WS @10M (M/S)   =    99.99
  CRIT WS @ HS (M/S)   =    99.99        CRIT WS @ HS (M/S)   =    99.99
  DILUTION WS (M/S)    =    99.99        DILUTION WS (M/S)    =    99.99
  CAVITY HT (M)        =    11.50        CAVITY HT (M)        =    10.67
  CAVITY LENGTH (M)    =    20.74        CAVITY LENGTH (M)    =    22.61
  ALONGWIND DIM (M)    =    19.00        ALONGWIND DIM (M)    =    26.00

CAVITY CONC NOT CALCULATED FOR CRIT WS > 20.0 M/S.  CONC SET = 0.0

     ***************************************
     *** SUMMARY OF SCREEN MODEL RESULTS ***
     ***************************************

 CALCULATION      MAX CONC    DIST TO   TERRAIN
  PROCEDURE      (UG/M**3)    MAX (M)    HT (M)
--------------   -----------  -------   -------

***************************************************
** REMEMBER TO INCLUDE BACKGROUND CONCENTRATIONS **
***************************************************
```

SCREEN3 RUN #2

05/10/96
09:13:52

```
 ***  SCREEN3 MODEL RUN  ***
 *** VERSION DATED 95181 ***

OLIN NIAGARA FALLS - CAVITY LENGTH OF BLDG B, SCH, BLDB_50

SIMPLE TERRAIN INPUTS:
   SOURCE TYPE              =        POINT
   EMISSION RATE (G/S)      =      1.00000
   STACK HEIGHT (M)         =      15.2000
   STK INSIDE DIAM (M)      =        .3600
   STK EXIT VELOCITY (M/S)=         9.5000
   STK GAS EXIT TEMP (K)    =     283.0000
   AMBIENT AIR TEMP (K)     =     293.0000
   RECEPTOR HEIGHT (M)      =        .0000
   URBAN/RURAL OPTION       =        RURAL
   BUILDING HEIGHT (M)      =       9.1000
   MIN HORIZ BLDG DIM (M)   =       6.5000
   MAX HORIZ BLDG DIM (M)   =       7.2000

TA > TS!!!  BUOY. FLUX SET = 0.0

BUOY. FLUX =      .000 M**4/S**3;  MOM. FLUX =    2.924 M**4/S**2.

*** FULL METEOROLOGY ***

 *** CAVITY CALCULATION - 1 ***        *** CAVITY CALCULATION - 2 ***
  CONC (UG/M**3)      =    1018.         CONC (UG/M**3)      =    .0000
  CRIT WS @10M (M/S)  =    18.70         CRIT WS @10M (M/S)  =    99.99
  CRIT WS @ HS (M/S)  =    20.33         CRIT WS @ HS (M/S)  =    99.99
  DILUTION WS (M/S)   =    10.00         DILUTION WS (M/S)   =    99.99
  CAVITY HT (M)       =    14.85         CAVITY HT (M)       =    14.31
  CAVITY LENGTH (M)   =    13.38         CAVITY LENGTH (M)   =    11.52
  ALONGWIND DIM (M)   =     6.50         ALONGWIND DIM (M)   =     7.20

CAVITY CONC NOT CALCULATED FOR CRIT WS > 20.0 M/S.  CONC SET = 0.0

     ***************************************
     *** SUMMARY OF SCREEN MODEL RESULTS ***
     ***************************************

 CALCULATION      MAX CONC    DIST TO   TERRAIN
  PROCEDURE      (UG/M**3)    MAX (M)    HT (M)
--------------  -----------  -------   -------
BLDG. CAVITY-1    1018.          13.        --  (DIST = CAVITY LENGTH)
BLDG. CAVITY-2    .0000          12.        --  (DIST = CAVITY LENGTH)

***************************************************
** REMEMBER TO INCLUDE BACKGROUND CONCENTRATIONS **
```

SCREEN3 RUN #3

05/10/96
09:41:13

```
 ***  SCREEN3 MODEL RUN  ***
 *** VERSION DATED 95181 ***

OLIN NIAGARA FALLS - CAVITY LENGTH OF BLDG 97, SCH, BLD97_50

SIMPLE TERRAIN INPUTS:
   SOURCE TYPE              =        POINT
   EMISSION RATE (G/S)      =      1.00000
   STACK HEIGHT (M)         =      15.2000
   STK INSIDE DIAM (M)      =        .3600
   STK EXIT VELOCITY (M/S)=         9.5000
   STK GAS EXIT TEMP (K)    =     283.0000
   AMBIENT AIR TEMP (K)     =     293.0000
   RECEPTOR HEIGHT (M)      =        .0000
   URBAN/RURAL OPTION       =        RURAL
   BUILDING HEIGHT (M)      =      14.3000
   MIN HORIZ BLDG DIM (M)   =      12.8000
   MAX HORIZ BLDG DIM (M)   =      18.9000

TA > TS!!!  BUOY. FLUX SET = 0.0

BUOY. FLUX =     .000 M**4/S**3;  MOM. FLUX =    2.924 M**4/S**2.

*** FULL METEOROLOGY ***

 *** CAVITY CALCULATION - 1 ***       *** CAVITY CALCULATION - 2 ***
  CONC (UG/M**3)       =    2467.      CONC (UG/M**3)       =    2258.
  CRIT WS @10M (M/S) =      1.50      CRIT WS @10M (M/S) =      2.97
  CRIT WS @ HS (M/S) =      1.63      CRIT WS @ HS (M/S) =      3.23
  DILUTION WS (M/S)  =      1.00      DILUTION WS (M/S)  =      1.61
  CAVITY HT (M)      =     21.45      CAVITY HT (M)      =     18.40
  CAVITY LENGTH (M)  =     28.49      CAVITY LENGTH (M)  =     15.75
  ALONGWIND DIM (M)  =     12.80      ALONGWIND DIM (M)  =     18.90

     ***************************************
     *** SUMMARY OF SCREEN MODEL RESULTS ***
     ***************************************

 CALCULATION      MAX CONC    DIST TO  TERRAIN
  PROCEDURE      (UG/M**3)    MAX (M)   HT (M)
--------------  -----------  -------  -------
BLDG. CAVITY-1    2467.          28.       --   (DIST = CAVITY LENGTH)
BLDG. CAVITY-2    2258.          16.       --   (DIST = CAVITY LENGTH)

***************************************************
** REMEMBER TO INCLUDE BACKGROUND CONCENTRATIONS **
***************************************************
```

SCREEN3 RUN #4

05/10/96
09:42:35

```
 ***  SCREEN3 MODEL RUN  ***
 *** VERSION DATED 95181 ***

OLIN NIAGARA FALLS - CAVITY LENGTH OF BLDG 97 PENTHOUSE, SCH, BLDPH_50

SIMPLE TERRAIN INPUTS:
   SOURCE TYPE              =        POINT
   EMISSION RATE (G/S)      =      1.00000
   STACK HEIGHT (M)         =      15.2000
   STK INSIDE DIAM (M)      =        .3600
   STK EXIT VELOCITY (M/S)=         9.5000
   STK GAS EXIT TEMP (K)    =     283.0000
   AMBIENT AIR TEMP (K)     =     293.0000
   RECEPTOR HEIGHT (M)      =        .0000
   URBAN/RURAL OPTION       =        RURAL
   BUILDING HEIGHT (M)      =      16.8000
   MIN HORIZ BLDG DIM (M)   =       3.0000
   MAX HORIZ BLDG DIM (M)   =       3.0000

TA > TS!!!  BUOY. FLUX SET = 0.0

BUOY. FLUX =     .000 M**4/S**3;  MOM. FLUX =    2.924 M**4/S**2.

*** FULL METEOROLOGY ***

 *** CAVITY CALCULATION - 1 ***        *** CAVITY CALCULATION - 2 ***
  CONC (UG/M**3)       =    .1323E+05    CONC (UG/M**3)       =    .1323E+05
  CRIT WS @10M (M/S)  =     1.00         CRIT WS @10M (M/S)  =     1.00
  CRIT WS @ HS (M/S)  =     1.09         CRIT WS @ HS (M/S)  =     1.09
  DILUTION WS (M/S)   =     1.00         DILUTION WS (M/S)   =     1.00
  CAVITY HT (M)       =    38.11         CAVITY HT (M)       =    38.11
  CAVITY LENGTH (M)   =    12.82         CAVITY LENGTH (M)   =    12.82
  ALONGWIND DIM (M)   =     3.00         ALONGWIND DIM (M)   =     3.00

     ***************************************
     *** SUMMARY OF SCREEN MODEL RESULTS ***
     ***************************************

 CALCULATION        MAX CONC    DIST TO   TERRAIN
  PROCEDURE        (UG/M**3)    MAX (M)    HT (M)
--------------    -----------   -------   -------
BLDG. CAVITY-1     .1323E+05       13.        --   (DIST = CAVITY LENGTH)
BLDG. CAVITY-2     .1323E+05       13.        --   (DIST = CAVITY LENGTH)

***************************************************
** REMEMBER TO INCLUDE BACKGROUND CONCENTRATIONS **
***************************************************
```

SCREEN3 RUN #5

05/10/96
09:48:00

```
 ***  SCREEN3 MODEL RUN   ***
 *** VERSION DATED 95181 ***

OLIN NIAGARA FALLS - CAVITY LENGTH OF BLDG 78W, SCH, BL78W_50

SIMPLE TERRAIN INPUTS:
   SOURCE TYPE            =        POINT
   EMISSION RATE (G/S)    =      1.00000
   STACK HEIGHT (M)       =      15.2000
   STK INSIDE DIAM (M)    =        .3600
   STK EXIT VELOCITY (M/S)=       9.5000
   STK GAS EXIT TEMP (K)  =     283.0000
   AMBIENT AIR TEMP (K)   =     293.0000
   RECEPTOR HEIGHT (M)    =        .0000
   URBAN/RURAL OPTION     =        RURAL
   BUILDING HEIGHT (M)    =      18.3000
   MIN HORIZ BLDG DIM (M) =      10.4000
   MAX HORIZ BLDG DIM (M) =      12.2000

TA > TS!!!  BUOY. FLUX SET = 0.0

BUOY. FLUX =     .000 M**4/S**3;  MOM. FLUX =    2.924 M**4/S**2.

*** FULL METEOROLOGY ***

 *** CAVITY CALCULATION - 1 ***        *** CAVITY CALCULATION - 2 ***
  CONC (UG/M**3)      =    2986.        CONC (UG/M**3)      =    3503.
  CRIT WS @10M (M/S)  =     1.00        CRIT WS @10M (M/S)  =     1.00
  CRIT WS @ HS (M/S)  =     1.09        CRIT WS @ HS (M/S)  =     1.09
  DILUTION WS (M/S)   =     1.00        DILUTION WS (M/S)   =     1.00
  CAVITY HT (M)       =    32.29        CAVITY HT (M)       =    30.61
  CAVITY LENGTH (M)   =    26.27        CAVITY LENGTH (M)   =    20.88
  ALONGWIND DIM (M)   =    10.40        ALONGWIND DIM (M)   =    12.20

     ***************************************
     *** SUMMARY OF SCREEN MODEL RESULTS ***
     ***************************************

 CALCULATION        MAX CONC    DIST TO   TERRAIN
  PROCEDURE        (UG/M**3)    MAX (M)    HT (M)
--------------    -----------  -------   -------
BLDG. CAVITY-1     2986.          26.        --   (DIST = CAVITY LENGTH)
BLDG. CAVITY-2     3503.          21.        --   (DIST = CAVITY LENGTH)

***************************************************
** REMEMBER TO INCLUDE BACKGROUND CONCENTRATIONS **
***************************************************
```

SCREEN3 RUN #6

```
                                                          05/20/96
                                                          12:50:52
 ***  SCREEN3 MODEL RUN  ***
 *** VERSION DATED 95181 ***

OLIN NIAGARA FALLS - CAVITY LENGTH OF BLDG 75, SCH, BLD75_50

SIMPLE TERRAIN INPUTS:
   SOURCE TYPE              =        POINT
   EMISSION RATE (G/S)      =      1.00000
   STACK HEIGHT (M)         =      15.2000
   STK INSIDE DIAM (M)      =        .3600
   STK EXIT VELOCITY (M/S)=         9.5000
   STK GAS EXIT TEMP (K)    =     283.0000
   AMBIENT AIR TEMP (K)     =     293.0000
   RECEPTOR HEIGHT (M)      =        .0000
   URBAN/RURAL OPTION       =        RURAL
   BUILDING HEIGHT (M)      =       9.8000
   MIN HORIZ BLDG DIM (M)   =      13.0000
   MAX HORIZ BLDG DIM (M)   =      16.8000

TA > TS!!!  BUOY. FLUX SET = 0.0

BUOY. FLUX =     .000 M**4/S**3;  MOM. FLUX =    2.924 M**4/S**2.

*** FULL METEOROLOGY ***

 *** CAVITY CALCULATION - 1 ***       *** CAVITY CALCULATION - 2 ***
  CONC (UG/M**3)      =    .0000       CONC (UG/M**3)      =    .0000
  CRIT WS @10M (M/S) =    99.99       CRIT WS @10M (M/S) =    99.99
  CRIT WS @ HS (M/S) =    99.99       CRIT WS @ HS (M/S) =    99.99
  DILUTION WS (M/S)   =    99.99       DILUTION WS (M/S)   =    99.99
  CAVITY HT (M)       =    12.60       CAVITY HT (M)       =    11.49
  CAVITY LENGTH (M)   =    18.85       CAVITY LENGTH (M)   =    12.46
  ALONGWIND DIM (M)   =    13.00       ALONGWIND DIM (M)   =    16.80

CAVITY CONC NOT CALCULATED FOR CRIT WS > 20.0 M/S.  CONC SET = 0.0

     ***************************************
     *** SUMMARY OF SCREEN MODEL RESULTS ***
     ***************************************

 CALCULATION       MAX CONC    DIST TO   TERRAIN
  PROCEDURE       (UG/M**3)    MAX (M)    HT (M)
--------------   -----------   -------   -------

***************************************************
** REMEMBER TO INCLUDE BACKGROUND CONCENTRATIONS **
***************************************************
```

SCREEN3 RUN #7

05/10/96
14:42:09

```
 ***  SCREEN3 MODEL RUN  ***
 *** VERSION DATED 95181 ***

OLIN NIAGARA FALLS - CAVITY LENGTH OF BLDG 74, SCH, BLD74_50

SIMPLE TERRAIN INPUTS:
   SOURCE TYPE              =        POINT
   EMISSION RATE (G/S)      =      1.00000
   STACK HEIGHT (M)         =      15.2000
   STK INSIDE DIAM (M)      =        .3600
   STK EXIT VELOCITY (M/S)=         9.5000
   STK GAS EXIT TEMP (K)    =     283.0000
   AMBIENT AIR TEMP (K)     =     293.0000
   RECEPTOR HEIGHT (M)      =        .0000
   URBAN/RURAL OPTION       =        RURAL
   BUILDING HEIGHT (M)      =       3.7000
   MIN HORIZ BLDG DIM (M)   =      22.3000
   MAX HORIZ BLDG DIM (M)   =      61.9000

TA > TS!!!  BUOY. FLUX SET = 0.0

BUOY. FLUX =      .000 M**4/S**3;  MOM. FLUX =    2.924 M**4/S**2.

*** FULL METEOROLOGY ***

 *** CAVITY CALCULATION - 1 ***      *** CAVITY CALCULATION - 2 ***
  CONC (UG/M**3)      =    .0000      CONC (UG/M**3)      =    .0000
  CRIT WS @10M (M/S)  =    99.99      CRIT WS @10M (M/S)  =    99.99
  CRIT WS @ HS (M/S)  =    99.99      CRIT WS @ HS (M/S)  =    99.99
  DILUTION WS (M/S)   =    99.99      DILUTION WS (M/S)   =    99.99
  CAVITY HT (M)       =     3.70      CAVITY HT (M)       =     3.70
  CAVITY LENGTH (M)   =    20.90      CAVITY LENGTH (M)   =    15.57
  ALONGWIND DIM (M)   =    22.30      ALONGWIND DIM (M)   =    61.90

CAVITY CONC NOT CALCULATED FOR CRIT WS > 20.0 M/S.  CONC SET = 0.0

     ***************************************
     *** SUMMARY OF SCREEN MODEL RESULTS ***
     ***************************************

 CALCULATION       MAX CONC    DIST TO   TERRAIN
  PROCEDURE       (UG/M**3)    MAX (M)    HT (M)
--------------  -----------  -------   -------

***************************************************
** REMEMBER TO INCLUDE BACKGROUND CONCENTRATIONS **
***************************************************
```

SCREEN3 RUN #8

```
                                                              05/10/96
                                                              10:37:54
  ***   SCREEN3 MODEL RUN   ***
  *** VERSION DATED 95181 ***

OLIN NIAGARA FALLS - CAVITY LENGTH OF BLDG BLOCK 1, SCH, GRP1_50

SIMPLE TERRAIN INPUTS:
   SOURCE TYPE              =        POINT
   EMISSION RATE (G/S)      =      1.00000
   STACK HEIGHT (M)         =      15.2000
   STK INSIDE DIAM (M)      =        .3600
   STK EXIT VELOCITY (M/S)=         9.5000
   STK GAS EXIT TEMP (K)    =     283.0000
   AMBIENT AIR TEMP (K)     =     293.0000
   RECEPTOR HEIGHT (M)      =        .0000
   URBAN/RURAL OPTION       =        RURAL
   BUILDING HEIGHT (M)      =      15.2000
   MIN HORIZ BLDG DIM (M)   =      13.7000
   MAX HORIZ BLDG DIM (M)   =      23.8000

TA > TS!!!  BUOY. FLUX SET = 0.0

BUOY. FLUX =      .000 M**4/S**3;  MOM. FLUX =     2.924 M**4/S**2.

*** FULL METEOROLOGY ***

 *** CAVITY CALCULATION - 1 ***       *** CAVITY CALCULATION - 2 ***
  CONC (UG/M**3)       =    1843.      CONC (UG/M**3)       =    1985.
  CRIT WS @10M (M/S)  =     1.24      CRIT WS @10M (M/S)  =     2.97
  CRIT WS @ HS (M/S)  =     1.35      CRIT WS @ HS (M/S)  =     3.23
  DILUTION WS (M/S)    =     1.00      DILUTION WS (M/S)    =     1.61
  CAVITY HT (M)        =    22.74      CAVITY HT (M)        =    18.38
  CAVITY LENGTH (M)    =    34.59      CAVITY LENGTH (M)    =    14.75
  ALONGWIND DIM (M)    =    13.70      ALONGWIND DIM (M)    =    23.80

      ***************************************
      *** SUMMARY OF SCREEN MODEL RESULTS ***
      ***************************************

 CALCULATION      MAX CONC   DIST TO  TERRAIN
  PROCEDURE       (UG/M**3)   MAX (M)   HT (M)
 --------------  -----------  -------  -------
BLDG. CAVITY-1     1843.          35.       --   (DIST = CAVITY LENGTH)
BLDG. CAVITY-2     1985.          15.       --   (DIST = CAVITY LENGTH)

***************************************************
** REMEMBER TO INCLUDE BACKGROUND CONCENTRATIONS **
***************************************************
```

SCREEN3 RUN #9

05/10/96
10:39:01

```
 ***  SCREEN3 MODEL RUN  ***
 *** VERSION DATED 95181 ***

OLIN NIAGARA FALLS - CAVITY LENGTH OF BLDG BLOCK 2, SCH, GRP2_50

SIMPLE TERRAIN INPUTS:
   SOURCE TYPE            =        POINT
   EMISSION RATE (G/S)    =      1.00000
   STACK HEIGHT (M)       =      15.2000
   STK INSIDE DIAM (M)    =        .3600
   STK EXIT VELOCITY (M/S)=       9.5000
   STK GAS EXIT TEMP (K)  =     283.0000
   AMBIENT AIR TEMP (K)   =     293.0000
   RECEPTOR HEIGHT (M)    =        .0000
   URBAN/RURAL OPTION     =        RURAL
   BUILDING HEIGHT (M)    =      10.7000
   MIN HORIZ BLDG DIM (M) =      25.0000
   MAX HORIZ BLDG DIM (M) =      33.5000

TA > TS!!!  BUOY. FLUX SET = 0.0

BUOY. FLUX =     .000 M**4/S**3;  MOM. FLUX =    2.924 M**4/S**2.

*** FULL METEOROLOGY ***

 *** CAVITY CALCULATION - 1 ***       *** CAVITY CALCULATION - 2 ***
  CONC (UG/M**3)      =    .0000        CONC (UG/M**3)      =    .0000
  CRIT WS @10M (M/S)  =    99.99        CRIT WS @10M (M/S)  =    99.99
  CRIT WS @ HS (M/S)  =    99.99        CRIT WS @ HS (M/S)  =    99.99
  DILUTION WS (M/S)   =    99.99        DILUTION WS (M/S)   =    99.99
  CAVITY HT (M)       =    11.52        CAVITY HT (M)       =    10.99
  CAVITY LENGTH (M)   =    32.89        CAVITY LENGTH (M)   =    27.62
  ALONGWIND DIM (M)   =    25.00        ALONGWIND DIM (M)   =    33.50

CAVITY CONC NOT CALCULATED FOR CRIT WS > 20.0 M/S.  CONC SET = 0.0

     ***************************************
     *** SUMMARY OF SCREEN MODEL RESULTS ***
     ***************************************

 CALCULATION       MAX CONC   DIST TO  TERRAIN
  PROCEDURE       (UG/M**3)   MAX (M)   HT (M)
--------------   -----------  -------  -------

***************************************************
** REMEMBER TO INCLUDE BACKGROUND CONCENTRATIONS **
***************************************************
```

SCREEN3 RUN #10

05/10/96
10:36:58

```
 ***   SCREEN3 MODEL RUN   ***
 *** VERSION DATED 95181 ***

OLIN NIAGARA FALLS - CAVITY LENGTH OF BLDG BLOCK 3, SCH, GRP3_50

SIMPLE TERRAIN INPUTS:
   SOURCE TYPE              =        POINT
   EMISSION RATE (G/S)      =      1.00000
   STACK HEIGHT (M)         =      15.2000
   STK INSIDE DIAM (M)      =        .3600
   STK EXIT VELOCITY (M/S)=         9.5000
   STK GAS EXIT TEMP (K)    =     283.0000
   AMBIENT AIR TEMP (K)     =     293.0000
   RECEPTOR HEIGHT (M)      =        .0000
   URBAN/RURAL OPTION       =        RURAL
   BUILDING HEIGHT (M)      =       8.5000
   MIN HORIZ BLDG DIM (M)   =      33.2000
   MAX HORIZ BLDG DIM (M)   =      61.0000

TA > TS!!!  BUOY. FLUX SET = 0.0

BUOY. FLUX =      .000 M**4/S**3;  MOM. FLUX =     2.924 M**4/S**2.

*** FULL METEOROLOGY ***

 *** CAVITY CALCULATION - 1 ***       *** CAVITY CALCULATION - 2 ***
  CONC (UG/M**3)      =    .0000        CONC (UG/M**3)      =    .0000
  CRIT WS @10M (M/S) =    99.99        CRIT WS @10M (M/S) =    99.99
  CRIT WS @ HS (M/S) =    99.99        CRIT WS @ HS (M/S) =    99.99
  DILUTION WS (M/S)  =    99.99        DILUTION WS (M/S)  =    99.99
  CAVITY HT (M)      =     8.58        CAVITY HT (M)      =     8.50
  CAVITY LENGTH (M)  =    38.21        CAVITY LENGTH (M)  =    29.40
  ALONGWIND DIM (M)  =    33.20        ALONGWIND DIM (M)  =    61.00

CAVITY CONC NOT CALCULATED FOR CRIT WS > 20.0 M/S.  CONC SET = 0.0

     ***************************************
     *** SUMMARY OF SCREEN MODEL RESULTS ***
     ***************************************

 CALCULATION       MAX CONC    DIST TO  TERRAIN
  PROCEDURE       (UG/M**3)    MAX (M)   HT (M)
 --------------  -----------  -------  -------

***************************************************
** REMEMBER TO INCLUDE BACKGROUND CONCENTRATIONS **
***************************************************
```

SCREEN3 RUN #11

05/20/96
13:10:18

```
 ***  SCREEN3 MODEL RUN   ***
 *** VERSION DATED 95181 ***

OLIN NIAGARA FALLS - CAVITY LENGTH OF BLDG BLOCK 4, SCH, GRP4_50

SIMPLE TERRAIN INPUTS:
   SOURCE TYPE              =        POINT
   EMISSION RATE (G/S)      =      1.00000
   STACK HEIGHT (M)         =      15.2000
   STK INSIDE DIAM (M)      =        .3600
   STK EXIT VELOCITY (M/S)=        9.5000
   STK GAS EXIT TEMP (K)    =     283.0000
   AMBIENT AIR TEMP (K)     =     293.0000
   RECEPTOR HEIGHT (M)      =        .0000
   URBAN/RURAL OPTION       =        RURAL
   BUILDING HEIGHT (M)      =       4.6000
   MIN HORIZ BLDG DIM (M) =      54.9000
   MAX HORIZ BLDG DIM (M) =      89.0000

TA > TS!!!  BUOY. FLUX SET = 0.0

BUOY. FLUX =      .000 M**4/S**3;  MOM. FLUX =     2.924 M**4/S**2.

*** FULL METEOROLOGY ***

 *** CAVITY CALCULATION - 1 ***       *** CAVITY CALCULATION - 2 ***
  CONC (UG/M**3)       =    .0000      CONC (UG/M**3)       =    .0000
  CRIT WS @10M (M/S) =    99.99      CRIT WS @10M (M/S) =    99.99
  CRIT WS @ HS (M/S) =    99.99      CRIT WS @ HS (M/S) =    99.99
  DILUTION WS (M/S)    =    99.99      DILUTION WS (M/S)    =    99.99
  CAVITY HT (M)        =     4.60      CAVITY HT (M)        =     4.60
  CAVITY LENGTH (M)    =    26.68      CAVITY LENGTH (M)    =    24.12
  ALONGWIND DIM (M)    =    54.90      ALONGWIND DIM (M)    =    89.00

CAVITY CONC NOT CALCULATED FOR CRIT WS > 20.0 M/S.  CONC SET = 0.0

     ***************************************
     *** SUMMARY OF SCREEN MODEL RESULTS ***
     ***************************************

 CALCULATION        MAX CONC     DIST TO   TERRAIN
  PROCEDURE        (UG/M**3)    MAX (M)    HT (M)
 --------------   -----------   -------   -------

***************************************************
** REMEMBER TO INCLUDE BACKGROUND CONCENTRATIONS **
***************************************************
```

SCREEN3 RUN #12

05/10/96
14:43:04

```
 ***   SCREEN3 MODEL RUN   ***
 *** VERSION DATED 95181 ***

OLIN NIAGARA FALLS - CAVITY LENGTH OF BLDG BLOCK 5, SCH, GRP5_50

SIMPLE TERRAIN INPUTS:
   SOURCE TYPE              =        POINT
   EMISSION RATE (G/S)      =      1.00000
   STACK HEIGHT (M)         =      15.2000
   STK INSIDE DIAM (M)      =        .3600
   STK EXIT VELOCITY (M/S)=         9.5000
   STK GAS EXIT TEMP (K)    =     283.0000
   AMBIENT AIR TEMP (K)     =     293.0000
   RECEPTOR HEIGHT (M)      =        .0000
   URBAN/RURAL OPTION       =        RURAL
   BUILDING HEIGHT (M)      =       3.7000
   MIN HORIZ BLDG DIM (M)   =      77.7000
   MAX HORIZ BLDG DIM (M)   =      90.2000

TA > TS!!!  BUOY. FLUX SET = 0.0

BUOY. FLUX =      .000 M**4/S**3;  MOM. FLUX =     2.924 M**4/S**2.

*** FULL METEOROLOGY ***

 *** CAVITY CALCULATION - 1 ***         *** CAVITY CALCULATION - 2 ***
  CONC (UG/M**3)       =     .0000       CONC (UG/M**3)       =     .0000
  CRIT WS @10M (M/S)   =     99.99       CRIT WS @10M (M/S)   =     99.99
  CRIT WS @ HS (M/S)   =     99.99       CRIT WS @ HS (M/S)   =     99.99
  DILUTION WS (M/S)    =     99.99       DILUTION WS (M/S)    =     99.99
  CAVITY HT (M)        =      3.70       CAVITY HT (M)        =      3.70
  CAVITY LENGTH (M)    =     22.25       CAVITY LENGTH (M)    =     21.76
  ALONGWIND DIM (M)    =     77.70       ALONGWIND DIM (M)    =     90.20

CAVITY CONC NOT CALCULATED FOR CRIT WS > 20.0 M/S.  CONC SET = 0.0

     ***************************************
     *** SUMMARY OF SCREEN MODEL RESULTS ***
     ***************************************

 CALCULATION        MAX CONC    DIST TO   TERRAIN
  PROCEDURE        (UG/M**3)    MAX (M)    HT (M)
--------------    -----------   -------   -------

***************************************************
** REMEMBER TO INCLUDE BACKGROUND CONCENTRATIONS **
***************************************************
```