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June 1989

EPA

Superfund Record of Decision:

Bally Ground Water Contamination, PA

50272-101

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Bally Ground Water, PA
First Remedial Action

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15. Supplementary Notes

16. Abstract (Limit: 200 words)

The Bally Ground Water site is a municipal water supply well field in the Borough of Bally in Berks County, near the Philadelphia metropolitan area. The Bally Well Field and the springs to the northwest of the site are the public water sources for approximately 1,200 Bally residents. The area near the site includes wetlands to the north and a manufacturing plant (the plant) 1,000 feet to the south of one of Bally Well Field's municipal wells (Well No. 3). Since the 1930s degreasing solvents containing methylene chloride, TCA, methanol, toluene, and TCE have been used in manufacturing at the plant. One of the plant's facilities includes a drum storage area which contains mpty drums, waste oil, and spent degreasers. A 1982 State water quality check identified the plant as a source of VOC contamination in Bally's municipal wells. Former lagoons underlie the plant and are also considered potential sources of aquifer contamination. From December 1982 to March 1987 the Borough of Bally did not use the contaminated Municipal Well No. 3 for water supply although the water was periodically pumped and discharged into a nearby pond to contain the contaminant plume. Pumping, however, had the effect of drawing VOCs deeper into the aquifer. The well was completely shut down in March 1987. Results of additional ground water contamination studies indicated that 19 of 35 wells sampled, contained detectable levels of VOCs. Currently a plume of VOC-contaminated ground water extends from the plant to the east

(See Attached Sheet)

17. Document Analysis a. Descriptors
Record of Decision - Bally Ground Water, PA
First Remedial Action
Contaminated Media: gw
Key Contaminants: VOCs (TCE)

b. Identifiers/Open-Ended Terms

c. COSATI Field/Group

18. Availability Statement	19. Security Class (This Report) None	21. No. of Pages 88
	20. Security Class (This Page) None	22. Price

16. Abstract (Continued)

and northeast. Plume contaminant movement has become more controlled since pumping and air stripping pilot testing began at Well No. 3. Ground water is the focus of this remediation because no remaining source of VOC contamination has been identified on the site. The primary contaminants of concern affecting the ground water are VOCs including TCE.

The selected remedial action for this site includes abandoning appropriate wells in the attainment area; pumping and treatment of ground water from Municipal Well No. 3 by air stripping with either vapor phase carbon, regenerable vapor phase carbon, or vapor phase catalytic oxidation, followed by discharging treated water to an adjacent stream or into the municipal potable water system, as needed, to provide a suitable alternative water supply; implementation of institutional controls restricting the use of operable private wells and the construction of new wells within the attainment area; and performing ground water and surface water monitoring to measure contaminant concentration and migration. The estimated present worth cost for this remedial action ranges from $2,950,000 to $3,640,000, which includes O&M costs from $105,000 to $189,000 depending on the chosen treatment option.

DECLARATION FOR THE RECORD OF DECISION

SITE NAME AND LOCATION

Bally Groundwater Contamination Site
Borough of Bally, Berks County, Pennsylvania

Statement of Purpose

This decision document presents the selected remedial action for the Bally Groundwater Contamination Superfund Site (Site) developed in accordance with the Comprehensive Environmental Response, Compensation and Liability Act of 1980, as amended by the Superfund Amendments and Reauthorization Act of 1986 (CERCLA), 42 U.S.C. Section 9601 et seq., and to the extent practicable, the National Contingency Plan (NCP), 40 C.F. R. Part 300.

Statement of Basis

This decision is based upon and documented in the contents of the Administrative Record. The attached index identifies the items which comprise the Administrative Record. The Commonwealth of Pennsylvania has reviewed, commented and concurred on this Record of Decision.

Description of the Selected Remedy

The remedial alternative presented in this document is the permanent remedy for resolving the groundwater contamination at the Site. This remedy is comprised of the following components:

1. Abandoning appropriate existing private wells and implementing institutional controls on the use of operable private wells and the construction of new wells;

2. Performing groundwater and surface water monitoring to measure contaminant concentrations and migrations by removing contaminated groundwater from the aquifer through continuous pumping of Municipal Well No. 3;

3. Treating the extracted groundwater by one of the treatment options retained for consideration and discharging the treated water from Municipal Well No. 3 to the adjacent stream or into the Borough of Bally potable water system as needed to provide suitable alternative water supply;

4. Performing necessary additional studies in the pre-design phase to evaluate the configuration of any additional groundwater extraction well(s) required.

Declaration

The selected remedy is protective of human health and environment, attains Federal and State requirements that are applicable or relevant and appropriate, and is cost-effective as set forth in Section 121(d) of CERCLA, 42 U.S.C.

Section 9621(d). This remedy satisfies the statutory preferences as set forth in Section 121(b) of CERCLA, 42 U.S.C. Section 9621(b), for remedies that employ treatment that reduce toxicity, mobility or volume as a principal element. After extensive studies it has been concluded that a specific source of contamination was not found. Although a specific contamination source area was not identified, the shallow ground water contamination plume had the highest concentration of contaminants. The aquifer contamination is attributed to a historic release with no discernible current source. Finally, it is determined that this remedy utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable.

This is a permanent remedy and will be reevaluated within five years of the completed remedial action in accordance with the NCP.

6/30/89
Date

Edwin B. Erickson
Regional Administrator

Table of Contents for Decision Summary

I. INTRODUCTION

The Borough of Bally is located in Berks County, Pennsylvania near the Philadelphia Metropolitan area. In 1982, the Bally Municipal Water Authority conducted a water quality check of the Bally water system and discovered the presence of elevated concentrations of chlorinated volatile organic compounds (VOCs) in Bally Municipal Well No. 3. A survey conducted in 1983 by the Pennsylvania Department of Environmental Resources (PADER) indicated that the Bally Engineered Structures, Inc. (BES) plant was a potential source of the VOC contamination (See Figure 1). Bally Municipal Well No. 3 was removed from the municipal supply system in December 1982 as a result of the presence of VOCs, most notably 1,1,1-trichloroethane (TCA) and trichloroethene (TCE), both commonly used industrial degreasers. These contaminants are both considered hazardous substances under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA).

BES signed a Consent Order in January 1987 with EPA to conduct the Remedial Investigation and Feasibility Study (RI/FS) at this site to define the problem and provide alternate ways to mitigate the problem. Groundwater remediation has become the focus of the remediation since no remaining contamination source has been identified on the facility's property.

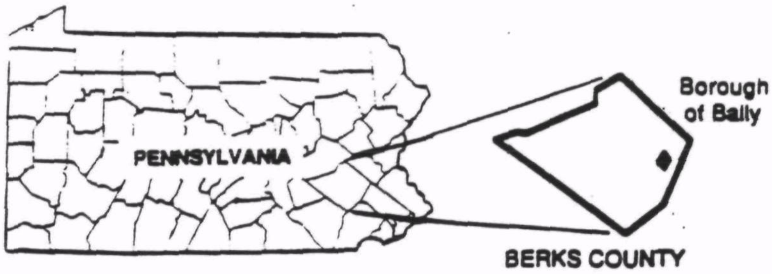
The Bally Site was evaluated through the Hazard Ranking System (HRS) and subsequently placed on the National Priority List (NPL) in 1987. The NPL is a list of hazardous waste sites targeted for action under the Superfund program.

II. SITE NAME, LOCATION, AND DESCRIPTION

The Bally Site consists of the Borough of Bally well field, located off Route 100 in Berks County, Pennsylvania (Figure 1). The Bally well field, along with a spring located northwest of the site, is the public water source for the Borough of Bally. Well No. 3 in Bally's system was initially found to be contaminated with up to 4,000+ parts per billion (ppb) total volatile organics from an unknown source. A number of other wells, including industrial, domestic, and monitoring wells and another municipal well (No. 1), have since been sampled and found to be contaminated.

According to the preliminary information developed by EPA and the PADER, a potential source was identified on the property of Bally Engineered Structures, Inc. (BES). The plant has been in operation approximately 1,000 feet south of the Municipal Well No. 3 since the early 1930's. Bally Case and Cooler Company (BCC), the original plant owners, produced urethane insulated, metal skinned panels for use in the construction of walk-in coolers, freezers and refrigerated buildings. BCC was bought out in 1972 by Sunbeam Corporation, and was later renamed BES. The Remedial Investigation (RI) confirmed the property as a source of the observed contamination.

SITE MAP - BOROUGH OF BALLY, WASHINGTON TOWNSHIP



THE BALLY SITE

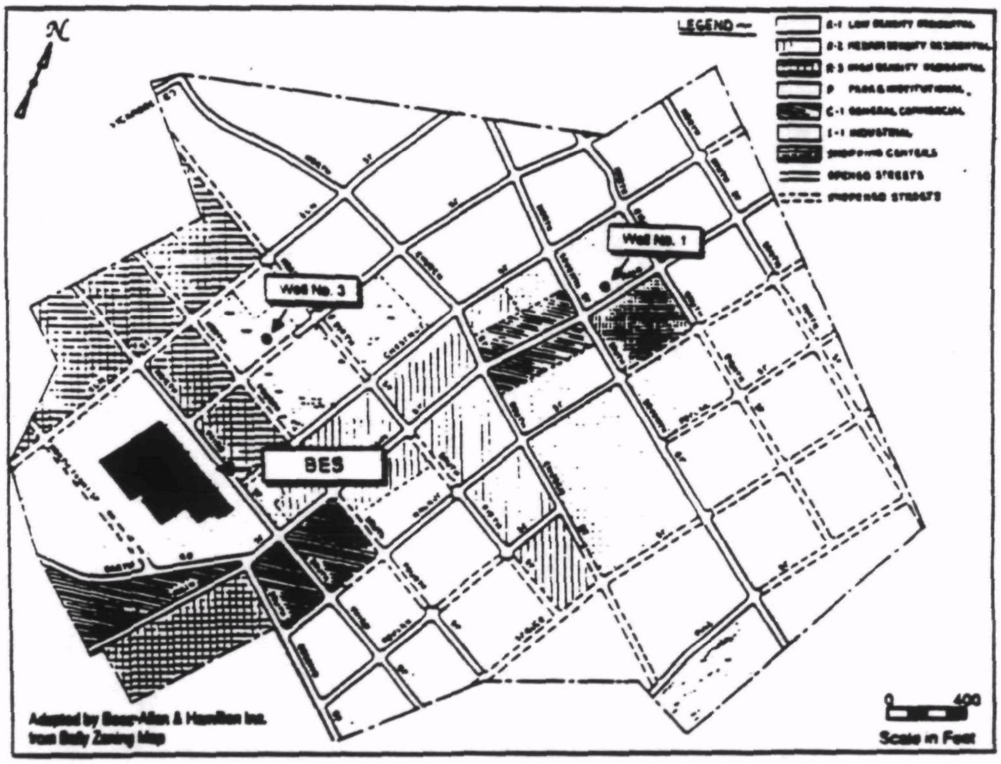


FIGURE 1

Structures on Bally Engineered Structure's property consist of the plant office and adjacent parking area, unoccupied trailer storage area, and lumber storage area. The drum storage area is a fenced and secured enclosure, presently containing empty drums, waste oil, and spent degreasers including Saf-T-Sol No. 15 and Saf-T-Sol No. 12. Additional facilities include a groundwater monitoring well located adjacent to the production complex which is also heavily contaminated with 1,1,1-trichloroethane (TCA) and trichloroethylene (TCE). Solvents containing the contaminants found in Municipal Well No. 3 and in Bally Engineered Structures' well were presumably used by BCC in the past. Waste disposal allegedly occurred on site until the mid-1960s. Three lagoons onsite were reportedly used in the past for waste disposal until they were backfilled and used for vehicular parking. The lagoon areas are at present covered by the plant buildings.

BES currently uses solvents containing unspecified hydrocarbons and methylene chloride in its manufacturing processes. Other solvents used within the past two years have contained TCA, methanol, toluene, and TCE.

From December 1982 until March 1987, the Borough did not use Municipal Well no. 3 for water supply, but periodically pumped the well, discharging to a nearby pond, in an effort to contain the contaminant plume. The well has been completely shut down since March 12, 1987, and an air stripper is currently being pilot tested for use on the well to remediate the groundwater contamination.

III. <u>SITE HISTORY</u>

Based on the initial indication in 1982 that samples from Municipal Well No. 3 contained elevated levels of VOCs, use of this well for public water supply was stopped. This action forced Bally to revert to the use of Municipal Well No. 1 and a series of springs to the northwest of the Borough as its municipal water supply. This scheme had been operative from 1959 through 1979, prior to bringing Municipal Well No. 3 on line. In addition to the municipal wells, there are two active industrial wells and several residential wells, within the +quifer downgradient of the BES plant.

Additional studies of the aquifer contamination problem were performed in 1983 by the PADER and the EPA. Although unaware of any sources of the VOC contamination resulting from its activities, BES met with PADER in 1984 and retained Environmental Resources Management (ERM) in 1985 to perform aquifer characterization studies to determine the source of contamination of Municipal Well No. 3. The results of the ERM study, published in October 1986, indicated that the BES plant was a likely source of the VOC contamination noted in the aquifer in the plant vicinity.

Manufacturing activities at the BES plant began in the 1930s with the production of high-quality cabinets and cedar chests by the Bally Case and Cooler Company (BCC). Production facilities were briefly commissioned in the 1940s by the government to assist in the war effort. In the 1950s the main product line became continuous line, porcelaincoated meat display cases and porcelain panels for use in constructing building facades. In 1972 BCC was acquired by Sunbeam Corporation (Sunbeam), and became a subsidiary of Allegheny International, Inc. (AI) in 1982 with AI's acquisition of Sunbeam. In 1984 BCC was renamed Bally Engineered Structures, Inc., in response to an increased emphasis on the manufacture of insulated panels and product diversification. On June 23, 1987, the business was sold to Bally Acquisition Corporation, while Dagan, Inc., a subsidiary of AI, has retained the property.

Use of degreasing solvents at the plant occurred in two principal areas. A 2,000-gallon capacity degreasing tank was formerly located in what is now the BES carpentry shop. This tank was used from the late 1950s until approximately 1969 to degrease the shells of the meat display cases prior to the application of a urethane insulating material. The cases were dipped in the tank and staged in the vicinity of the tank to dry prior to applying the insulation. TCE was the only solvent used in this tank.

The second area is a 600-gallon degreasing tank for cleaning small parts used to fabricate an interlocking mechanism for the insulated panels. This tank has been in continuous use since the early 1960s. TCA was used in the degreasing tank.

In addition, solvents have been used as flushing agents in cleaning molds and urethane foam injection nozzles in the plant foaming department since the mid-1960s.

The principal chlorinated VOCs found in the aquifer are TCA, TCE, and 1,1-dichloroethene (DCE). Spent degreasing solvents have been managed as a Resource Conservation and Recovery Act (RCRA) hazardous waste at BES since hazardous waste regulation began in 1980. Flushing agents used in the foaming department are recycled by a reprocessor and reused by BES. The major use of TCE was curtailed in about 1969 with the cessation of production of the meat display cases. TCA (Eaken Saf-T-Sol) was used in the small parts degreasing tank from 1980 until 1986, when it was replaced by a nonchlorinated solvent currently in use (Eaken Saf-T-Sol 31). None of the principal chlorinated VOCs found in the aquifer have been used as flushing agents in the foaming department since 1986. The history of solvent use at the plant and the character of chlorinated VOCs present in the aquifer suggested at the outset of the RI that the aquifer contamination may have arisen as a result of an historical release.

Based on a review of archival aerial photographs, the EPA had also suggested four former lagoons active in the 1950s and currently lying underneath plant production and office areas as potential sources of the aquifer contamination. Both the lagoons and the areas of degreasing solvent use in the plant were examined in the RI in an effort to define whether source areas persist at the BES facility.

In response to comments received from the EPA after submittal of the RI Report, Remcor the contractor for the responsibile party performed an additional source investigation within a parking area immediately adjacent to the northern perimeter of the BES plant. This investigation was conducted to determine whether an active source of VOC release to the aquifer was present within the unsaturated zone soils in this area. The investigation consisted of soil borings and collection of both soil and ground water samples for VOC analysis. This area was investigated because it lies hydraulically downgradient of the former lagoons and current and former degreasing areas, and hydraulically upgradient of contaminated shallow wells MW 86-4 and MW 86-3S. The results of the analyses indicate that no active subsurface source exists north of the BES plant.

IV. ENFORCEMENT HISTORY

BES signed a Consent Order in January 1987 with EPA to conduct the Remedial Investigation and Feasibility Study (RI/FS) at this site to define the problem and provide alternate ways to mitigate the problem. Special notice letters were sent to the Site's Potential Responsible Parties (PRPs) on May 30, 1989, extending to them the opportunity to implement the Remedidal Design and Remedial Action. EPA is waiting for their response.

V. SITE CHARACTERISTICS

A. Regional Geologic/Hydrogeologic Setting

The BES site lies within the Triassic Lowlands Physiographic Province, a former plateau-like region that has been modified by renewed erosion into gently rolling hills with less than 200 feet of overall relief. Triassic sediments, principally limestone fanglomerate with minor amounts of siltstone and shale, underlie the site area. These sediments extend to depths of thousands of feet. According to the geologic literature, the Reading Hills Physiographic Province lies immediately northwest of the Borough, with its eastern extent delineated by a major fault system, identified as the Triassic Border Fault. The Reading Hills Province consists of Cambrian and Precambrian Age basement rocks.

SITE GEOLOGIC INVESTIGATION

The uppermost geologic units defined within the site area consist of plant fill and colluvial materials (see Figure 2). The colluvial materials were found in all but the easternmost portions of the site area. These materials are clayey silts with a little gravel and are derived from weathering of the Precambriam and Cambrian rocks on the hillside to the west of the Borough. The greatest thickness of these materials was found to the northwest and along drainage courses.

A layer of residuum, weathered from the Triassic sediments, underlies the colluvial materials and overlies bedrock throughout the site area. The residuum is principally of silty clay to clayey silt composition with occasional fragments of limestone. The material grades into bedrock and, as such, retains much of the relict structure (e.g., joining, bedding) of the parent material. The thickness of the residuum was found to be highly variable, raging from 10 to 80 feet.

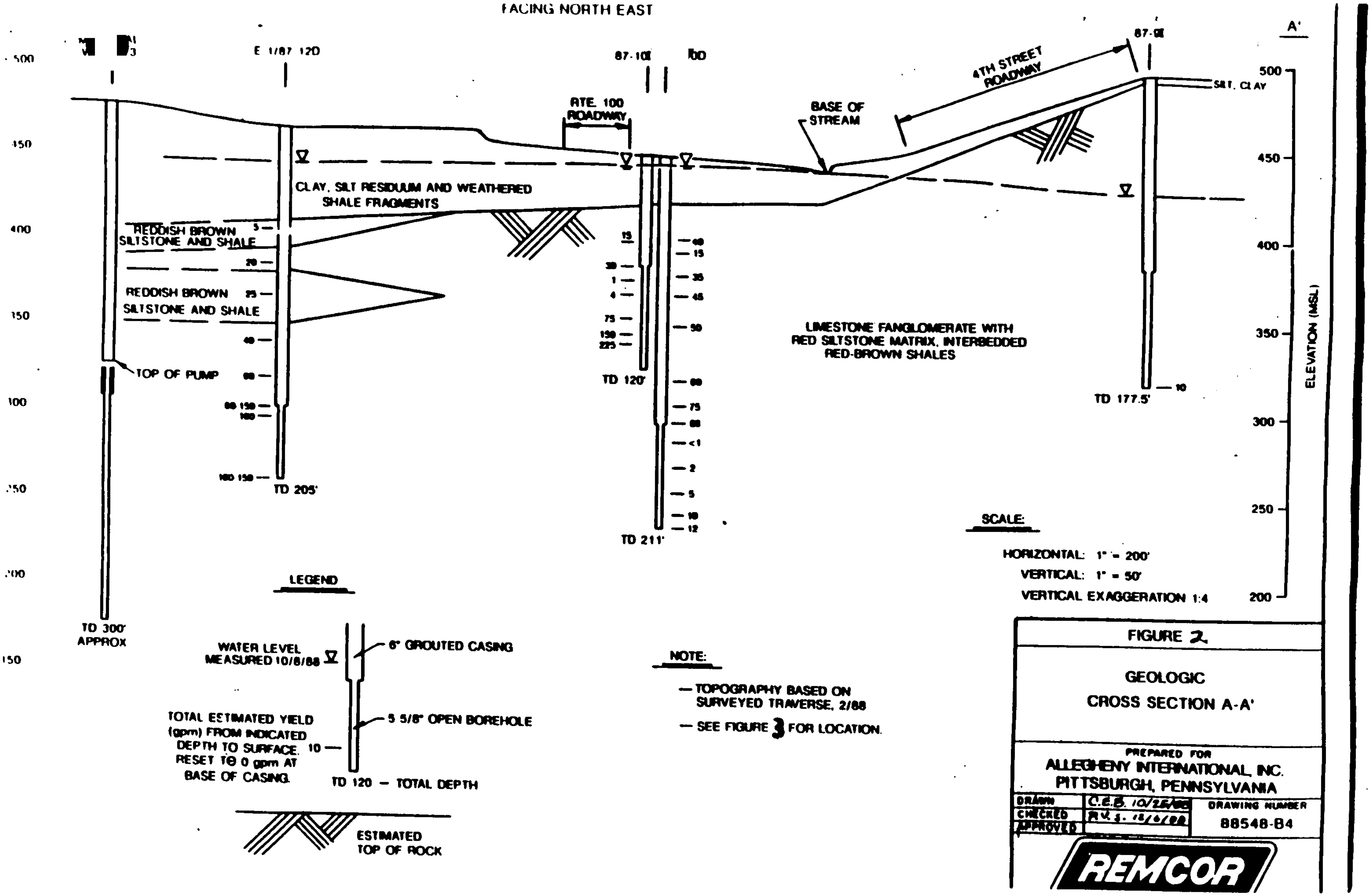

FACING NORTH EAST
A'
RTE. 100 ROADWAY
4TH STREET ROADWAY
BASE OF STREAM
SILT, CLAY
CLAY, SILT RESIDUUM AND WEATHERED SHALE FRAGMENTS
REDDISH BROWN SILTSTONE AND SHALE
REDDISH BROWN SILTSTONE AND SHALE
LIMESTONE FANGLOMERATE WITH RED SILTSTONE MATRIX, INTERBEDDED RED-BROWN SHALES
TOP OF PUMP
TD 300' APPROX
TD 205'
TD 120'
TD 211'
TD 177.5'
ELEVATION (MSL)
SCALE:
HORIZONTAL: 1" = 200'
VERTICAL: 1" = 50'
VERTICAL EXAGGERATION 1:4
LEGEND
WATER LEVEL MEASURED 10/8/88
6" GROUTED CASING
5 5/8" OPEN BOREHOLE
TOTAL ESTIMATED YIELD (gpm) FROM INDICATED DEPTH TO SURFACE. RESET TO 0 gpm AT BASE OF CASING
TD 120 — TOTAL DEPTH
ESTIMATED TOP OF ROCK
NOTE:
— TOPOGRAPHY BASED ON SURVEYED TRAVERSE, 2/88
— SEE FIGURE 3 FOR LOCATION.
FIGURE 2
GEOLOGIC CROSS SECTION A-A'
PREPARED FOR
ALLEGHENY INTERNATIONAL, INC.
PITTSBURGH, PENNSYLVANIA
DRAWN C.E.B. 10/25/88
CHECKED
APPROVED
DRAWING NUMBER
88548-B4
REMCOR

Figure 2

Bedrock encountered during the subsurface investigation was found to be exclusively of the Brunswick Formation. In the site area the bedrock was composed of limestone fanglomerate with interbedded siltstone and shale. It is significant to note that this finding differs from the published geologic literature which indicates that the western portion of the site should be underlain by quartzite rock characteristics of the Reading Hills Province. This finding is significant from a hydrogeologic perspective, in that the Triassic Border Fault separating the two units must be presumed to occur immediately west of Municipal Well No. 3. The frequency of discernible fractures in the fanglomerate was found to decrease with depth. In an exploratory corehole (E-1) in the vicinity of Municipal Well No. 3, an extensive fractured zone was found to occur to a depth of 140 feet, with more competent bedrock and more isolated fracture zones occurring below this depth.

SITE HYDROGEOLOGY

From the hydrogeologic perspective, the site is characterized by a single, thick, unconfined (or locally semi-confined) aquifer that occurs within the limestone fanglomerate and overlying residuum. Transmission of ground water is principally controlled by secondary porosity cause by fractures, joints, and solutioning activity. The aquifer is presumed to extend vertically for several hundred feet with fractures decreasing with depth to a point at which open fractures no longer occur. The RI did not determine the effective depth of the aquifer/extent of open fractures. In the vicinity of Municipal Well No. 3 the bedrock is severely fractured, possibly due to the proximity of this area to the Triassic Border Fault. Well yields in this are were found to be several hundred gallons per minute (gpm).

Groundwater flow direction was determined in the RI to be principally eastward (Figures 3 and 4). Groundwater discharge to surface water may occur east of Route 100, but it was apparent from the subsurface investigation that this does not occur in the immediate site area. Surface water sampling results also do not suggest a connection between surface and groundwater in the site area. The horizontal hydraulic gradient under normal conditions ranged from 0.0025 to 0.02. A low hydraulic gradient occurs in the vicinity of Municipal Well No. 3 and Chestnut Street due to extensive fracturing and weathering of the aquifer in this area.

Influence of water levels from the daily pumping of Municipal Well No. 1 was found during baseline monitoring to extend to a point approximately halfway between the well and the BES plant (i.e., a distances of about 1,200 feet). Industrial withdrawal from the aquifer at Bally Ribbon Mill and the Great American Knitting Mill are approximately 20 percent of that from the municipal well and do not appreciably alter groundwater flow direction.

A 72-hours pumping test was performed at Municipal Well No. 3 to evaluate the response of the aquifer to pumping at this point. Based on historic data, it is possible to conclude that groundwater extraction and treatment at this location may serve to mitigate further spread of contamination within the aquifer and capture such contamination to a significant degree.

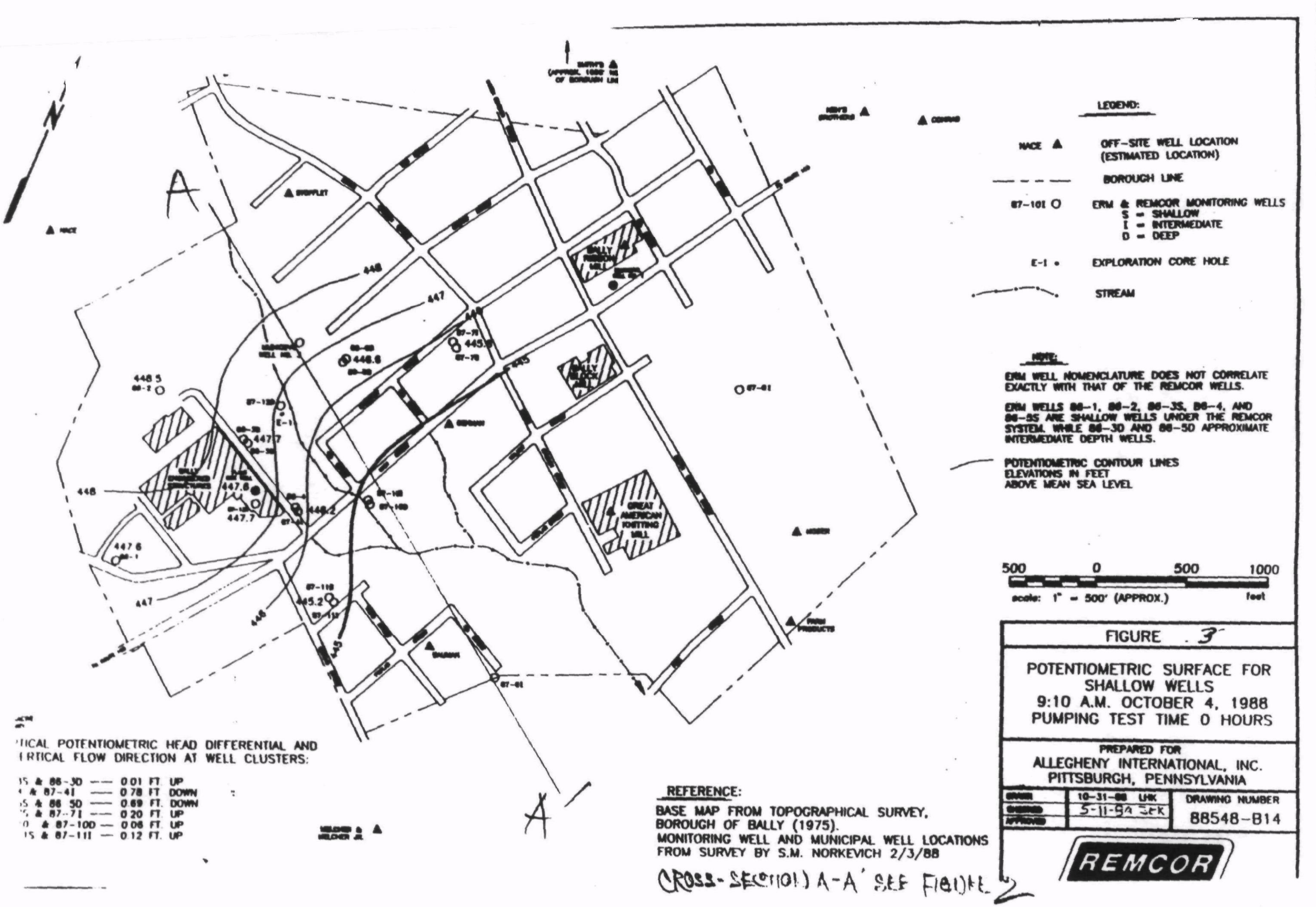
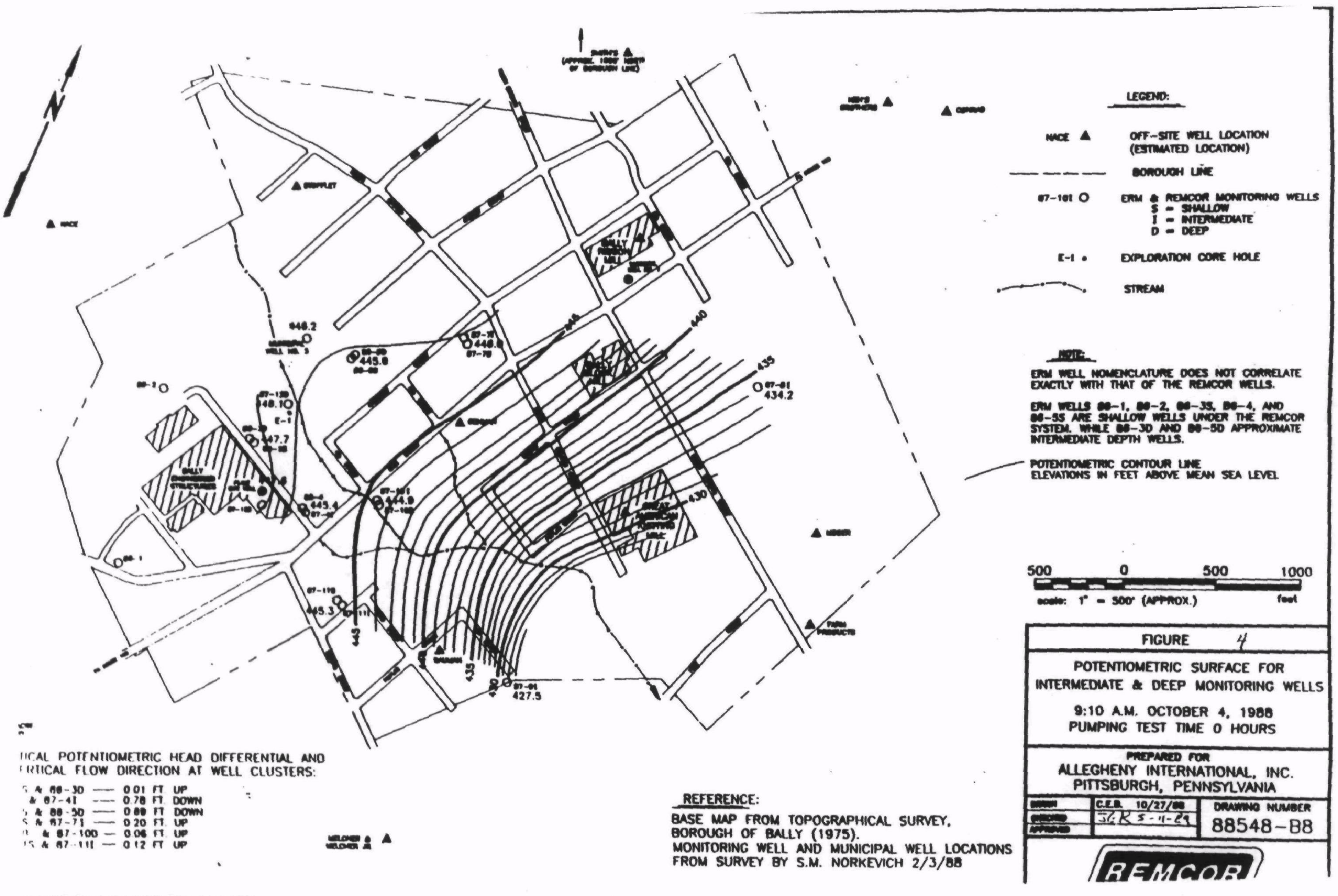

LEGEND:
OFF-SITE WELL LOCATION (ESTIMATED LOCATION)
BOROUGH LINE
87-101
ERM & REMCOR MONITORING WELLS
S = SHALLOW
I = INTERMEDIATE
D = DEEP
E-1
EXPLORATION CORE HOLE
STREAM
NOTE:
ERM WELL NOMENCLATURE DOES NOT CORRELATE EXACTLY WITH THAT OF THE REMCOR WELLS.
ERM WELLS 86-1, 86-2, 86-3S, 86-4, AND 86-5S ARE SHALLOW WELLS UNDER THE REMCOR SYSTEM. WHILE 86-3D AND 86-5D APPROXIMATE INTERMEDIATE DEPTH WELLS.
POTENTIOMETRIC CONTOUR LINES ELEVATIONS IN FEET ABOVE MEAN SEA LEVEL
500
0
500
1000
scale: 1" = 500' (APPROX.)
feet
FIGURE 3
POTENTIOMETRIC SURFACE FOR SHALLOW WELLS 9:10 A.M. OCTOBER 4, 1988 PUMPING TEST TIME 0 HOURS
PREPARED FOR
ALLEGHENY INTERNATIONAL, INC.
PITTSBURGH, PENNSYLVANIA
10-31-88 LHK
5-11-94 SEK
DRAWING NUMBER
88548-B14
REMCOR
REFERENCE:
BASE MAP FROM TOPOGRAPHICAL SURVEY, BOROUGH OF BALLY (1975).
MONITORING WELL AND MUNICIPAL WELL LOCATIONS FROM SURVEY BY S.M. NORKEVICH 2/3/88
CROSS-SECTION A-A' SEE FIGURE 2
A
A'
N
448
447
446
445
448.5
447.7
447.6
446.2
446.6
445.2
445.8
GREAT AMERICAN KNITTING MILL
ICAL POTENTIOMETRIC HEAD DIFFERENTIAL AND
RTICAL FLOW DIRECTION AT WELL CLUSTERS:
3S & 86-3D — 0.01 FT. UP
& 87-41 — 0.78 FT. DOWN
5S & 86-5D — 0.69 FT. DOWN
& 87-71 — 0.20 FT. UP
& 87-100 — 0.06 FT. UP
S & 87-111 — 0.12 FT. UP

Figure 3



LEGEND:
OFF-SITE WELL LOCATION (ESTIMATED LOCATION)
BOROUGH LINE
ERM & REMCOR MONITORING WELLS
S = SHALLOW
I = INTERMEDIATE
D = DEEP
EXPLORATION CORE HOLE
STREAM
NOTE:
ERM WELL NOMENCLATURE DOES NOT CORRELATE EXACTLY WITH THAT OF THE REMCOR WELLS.
POTENTIOMETRIC CONTOUR LINE ELEVATIONS IN FEET ABOVE MEAN SEA LEVEL
500 0 500 1000
scale: 1" = 500' (APPROX.)
feet
FIGURE 4
POTENTIOMETRIC SURFACE FOR INTERMEDIATE & DEEP MONITORING WELLS
9:10 A.M. OCTOBER 4, 1988
PUMPING TEST TIME 0 HOURS
PREPARED FOR
ALLEGHENY INTERNATIONAL, INC.
PITTSBURGH, PENNSYLVANIA
DRAWING NUMBER
88548-B8
REMCOR
REFERENCE:
BASE MAP FROM TOPOGRAPHICAL SURVEY, BOROUGH OF BALLY (1975).
MONITORING WELL AND MUNICIPAL WELL LOCATIONS FROM SURVEY BY S.M. NORKEVICH 2/3/88
ICAL POTENTIOMETRIC HEAD DIFFERENTIAL AND
RTICAL FLOW DIRECTION AT WELL CLUSTERS:
& 88-3D — 0.01 FT. UP
& 87-41 — 0.78 FT. DOWN
& 88-5D — 0.88 FT. DOWN
& 87-71 — 0.20 FT. UP
& 87-100 — 0.06 FT. UP
& 87-111 — 0.12 FT. UP
445.8
434.2
427.5
445.3
444.9
445.4
447.7
448.1
448.2
440
435
430

Figure 4

The conduct and interpretation of the pumping test are discussed in Section 3.3 of the RI Report. The maximum cone of depression developed during the pumping test was elongated in the north/south direction, reflecting the anisotropic nature of the aquifer. After 72 hours of pumping, the capture zone of Municipal Well No. 3 had reached the BES plant area, but did not extend significantly beyond State Route 100 to the east. Sluggish response to pumping in a few of the shallow monitoring wells indicated the presence of localized semi-confining conditions.

Estimates of transmissivity (T) and storativity (S) were generated from the pumping test and were found to range from 80,000 to 5,000 gallons per day per foot (gpd/ft) for T and between 10^{-1} to 10^{-3} for S. Interpretation of the data was complicated by aquifer anisotropy, partial penetration effects, and unavoidable pumping of Municipal Well No. 1 during the test. These factors, to an extent, limit the reliability of quantitative analysis from the test. The values generated, however, can still be used for future approximation of capture zones for different pumping schemes utilizing Municipal Well No. 3.

B. EXTENT OF CONTAMINATION

Source Delineation Investigation

In an initial effort to evaluate suspected sources of the aquifer contamination, borings were installed and subsurface soil samples were collected from four specific areas (Figure 5):

- Former degreasing area
- Present small-parts degreasing area
- Former northern lagoon area
- Former southern lagoon area

Subsequently, the northern perimeter of the plant was investigated via a series of borings.

An HNu photoionization (PID) was used to screen soil samples in the field as a basis for selection of samples to be submitted for Target Compound List (TCL) VOC analysis. Field screening readings are summarized in Table 2 of the RI Report. Readings above background (zero parts per million) were found only from soils taken from the former northern lagoon area and from selected borings immediately north of the BES plant. Ten samples were submitted for laboratory analysis from the former degreasing area, two from the present degreasing area, five from each of the former lagoon areas, and 25 from the northern perimeter area. TCL VOCs were detected in samples from the former degreasing area, where very low levels of TCE, TCA (i.e., less than 10 micrograms per kilogram [ug/kg]), and toluene (13 to 43 ug/kg; ug/kg=ppb) were found, and from one boring on the northern perimeter where TCA, TCE, and DCE were detected near the water table. Analytical data are summarized in RI Table 7.

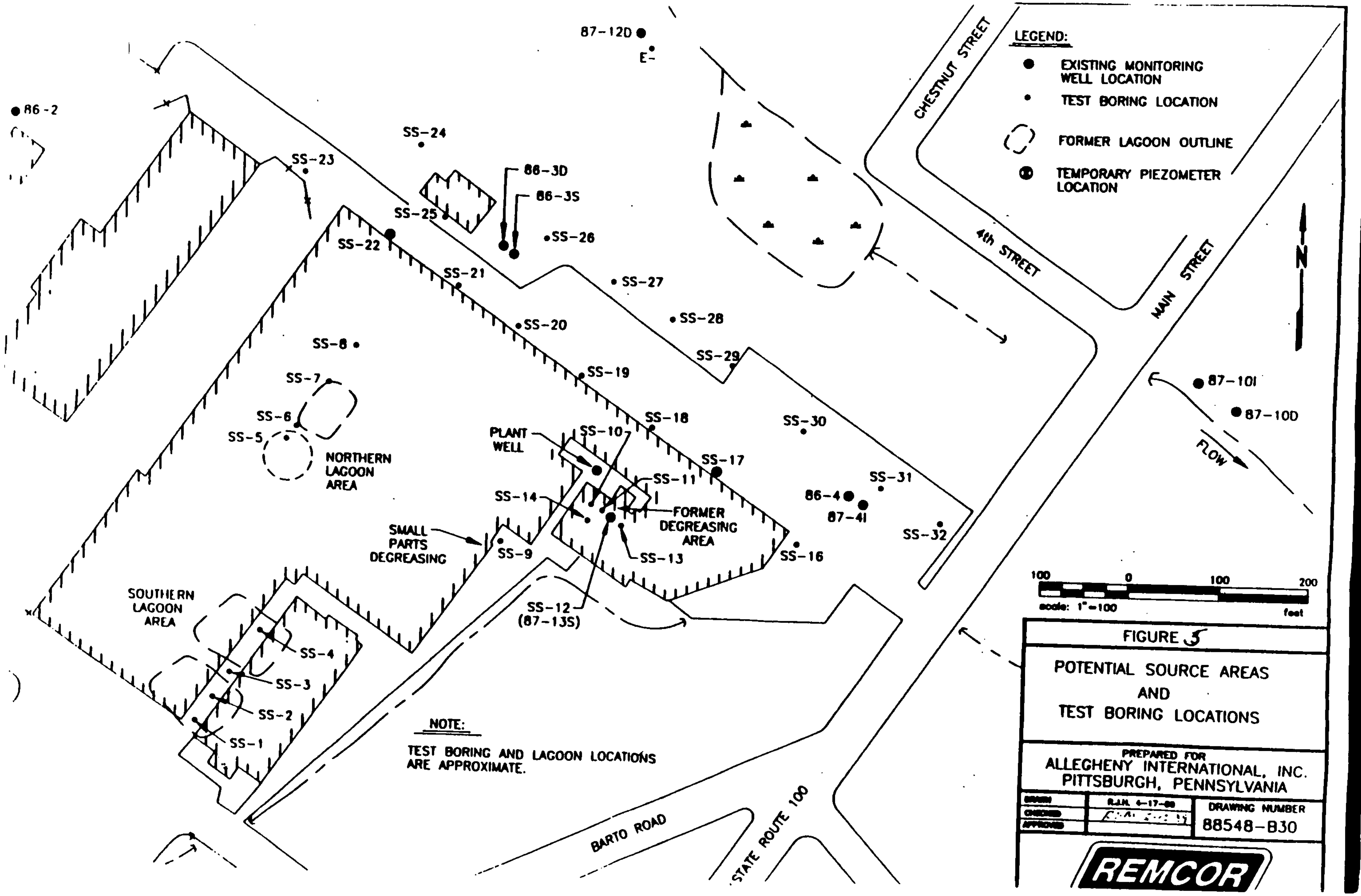

LEGEND:
EXISTING MONITORING WELL LOCATION
TEST BORING LOCATION
FORMER LAGOON OUTLINE
TEMPORARY PIEZOMETER LOCATION
CHESTNUT STREET
4th STREET
MAIN STREET
BARTO ROAD
STATE ROUTE 100
N
FLOW
86-2
87-12D
86-3D
86-3S
86-4
87-4I
87-10I
87-10D
SS-1
SS-2
SS-3
SS-4
SS-5
SS-6
SS-7
SS-8
SS-9
SS-10
SS-11
SS-12
(87-13S)
SS-13
SS-14
SS-16
SS-17
SS-18
SS-19
SS-20
SS-21
SS-22
SS-23
SS-24
SS-25
SS-26
SS-27
SS-28
SS-29
SS-30
SS-31
SS-32
PLANT WELL
NORTHERN LAGOON AREA
SOUTHERN LAGOON AREA
SMALL PARTS DEGREASING
FORMER DEGREASING AREA
NOTE:
TEST BORING AND LAGOON LOCATIONS ARE APPROXIMATE.
100 0 100 200
scale: 1"=100 feet
FIGURE 5
POTENTIAL SOURCE AREAS AND TEST BORING LOCATIONS
PREPARED FOR
ALLEGHENY INTERNATIONAL, INC.
PITTSBURGH, PENNSYLVANIA
DRAWN
CHECKED
APPROVED
R.J.H. 4-17-88
DRAWING NUMBER
88548-B30
REMCOR

Figure 5

The results of the source delineation investigation do not indicate conclusively that any of the suspected source areas are a principal source of the current extent of VOC ground water contamination. Nonetheless, the configuration of the contaminant plume supports the conclusion drawn from previous studies that the BES facility is a source of the contamination. The fact that specific source areas have not been found in the most likely areas suggests that the contamination may have arisen as a result of historic solvent management practices that permitted releases to the aquifer. These activities would most likely have occurred over a substantial period from the late 1950s until the early 1970s. These data suggest that there is no longer any active release of VOCs to the aquifer.

Nature and Extent of Groundwater Contamination

The presence of VOCs in ground water was determined by sampling 18 monitoring wells, 4 industrial wells, and 11 residential wells, in addition to the 2 municipal wells and analyzing the samples for TCL VOCs. VOCs were found in 19 of the 35 wells sampled. The municipal well samples were also analyzed for TCL organics, with none detected.

The RI chemical-analytical data (RI Tables 8 and 9) show that a groundwater plume of VOC contamination extends from the BES plant to the east and northeast (Figures 6-8). The plume consists predominantly of TCA, TCE, and DCE. It is apparent that the full-scale pumping of Municipal Well NO. 3 from 1979 to 1982 has had the effect of drawing the VOCs deeper into the aquifer and to the north toward the well. Following cessation of pumping, the contaminant movement has become more controlled by the natural ground water flow direction to the east. Groundwater and contaminant migration has also been influenced by the pumping of Municipal Well No. 1.

Surface Water Investigation

Site Hydrologic Evaluation

The BES plant area and its immediate vicinity north of Barto Road are situated in a drainage basin of approximately 320 acres. Surface drainage is captured in two principal drainageways, both unnamed tributaries to the West Branch Perkiomen Creek. The more easterly of these receives approximately 80 percent of the drainage from the watershed and is a perennial stream. This stream originates in springs at the head of the drainage and flows past Municipal Well No. 3 and into an abandoned mill pond prior to discharging to the Bally storm sewer system and, ultimately, to the West Branch Perkiomen Creek. The second drainage is a minor feature, arising in a crop field northwest of the BES plant and primarily serving as an outlet for a tile drainage system in the fields.

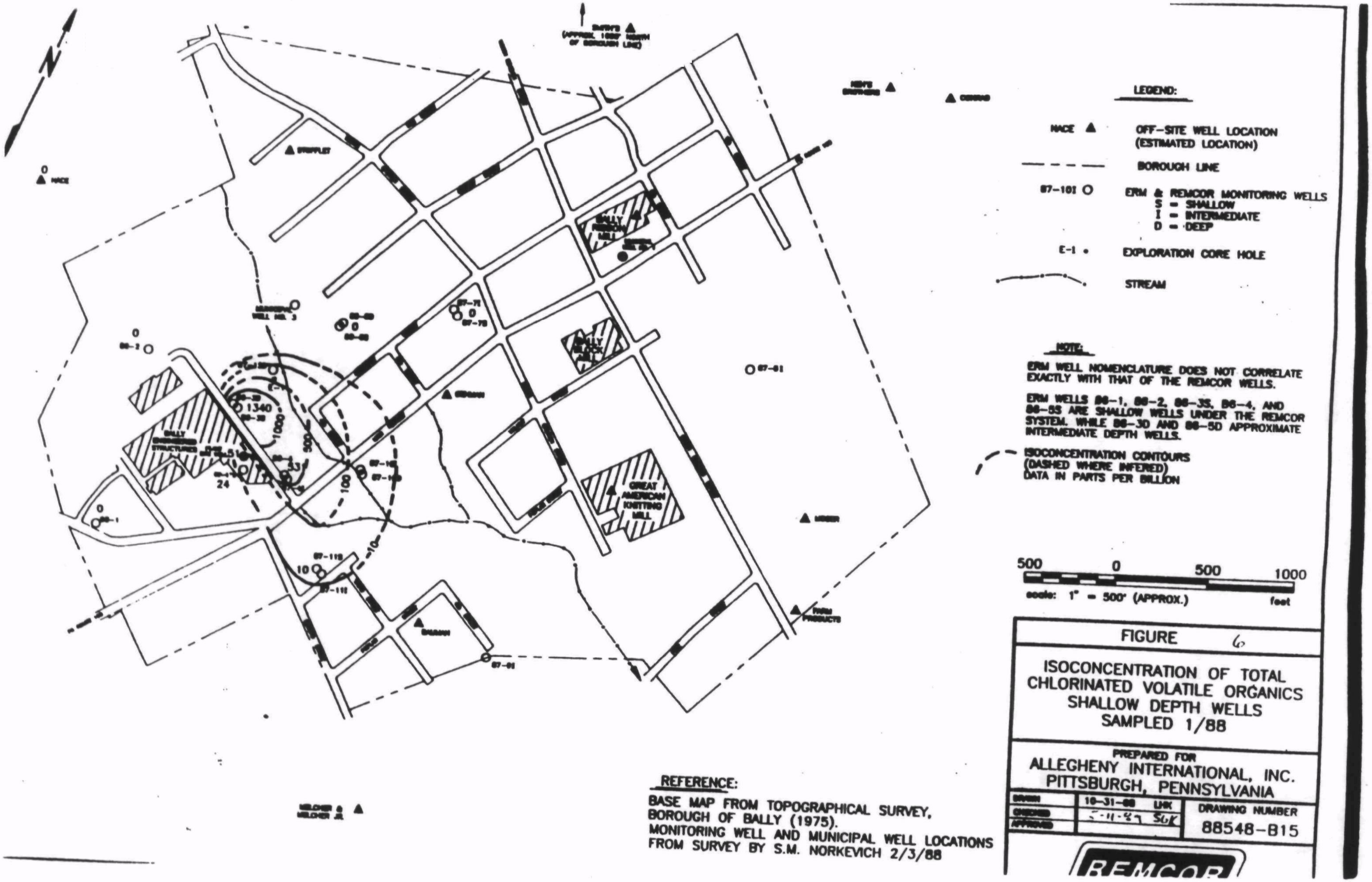
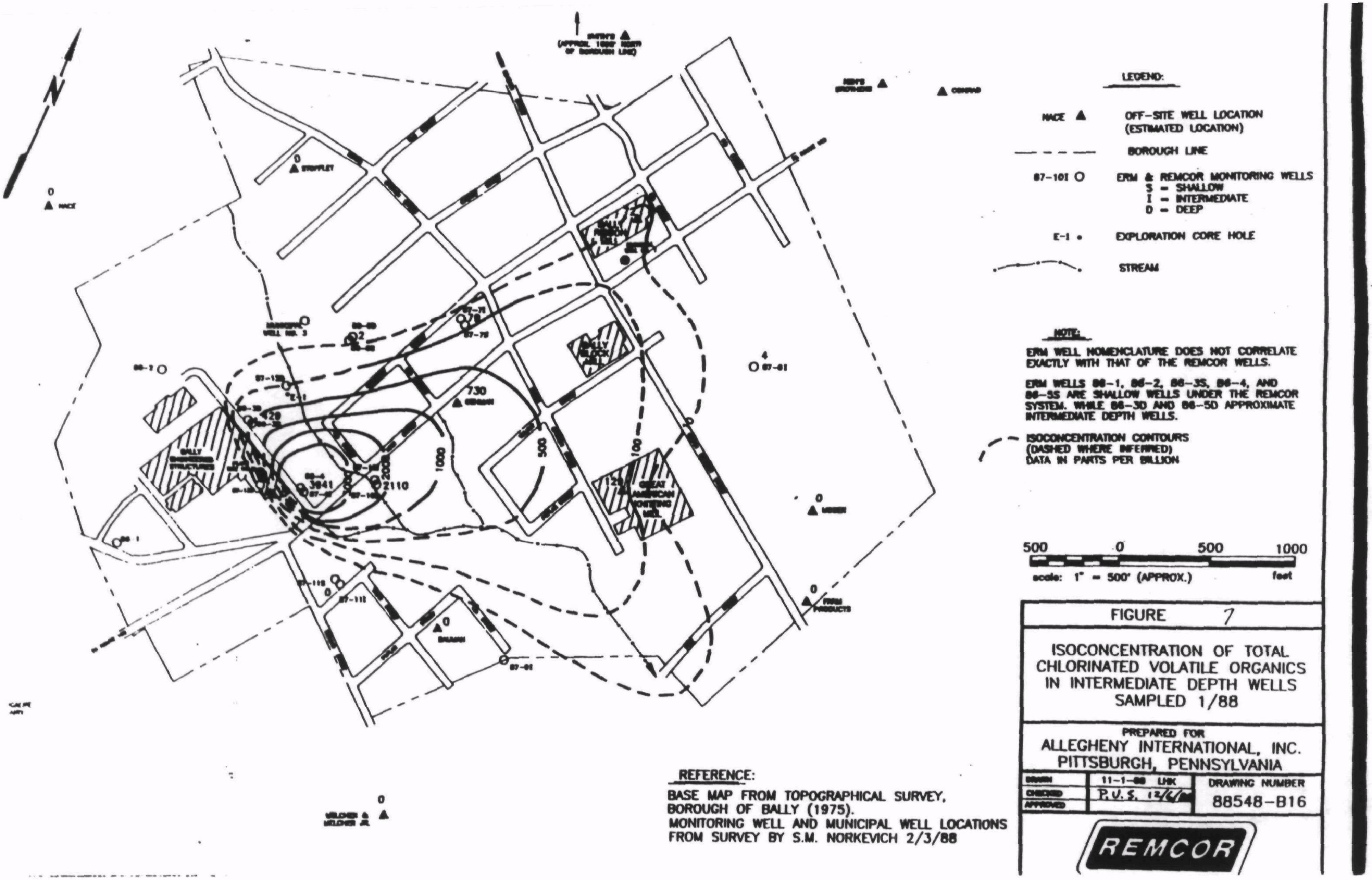

LEGEND:
OFF-SITE WELL LOCATION (ESTIMATED LOCATION)
BOROUGH LINE
87-101 O ERM & REMCOR MONITORING WELLS
S = SHALLOW
I = INTERMEDIATE
D = DEEP
E-1 • EXPLORATION CORE HOLE
STREAM
NOTE:
ERM WELL NOMENCLATURE DOES NOT CORRELATE EXACTLY WITH THAT OF THE REMCOR WELLS.
ERM WELLS 86-1, 86-2, 86-3S, 86-4, AND 86-5S ARE SHALLOW WELLS UNDER THE REMCOR SYSTEM, WHILE 86-3D AND 86-5D APPROXIMATE INTERMEDIATE DEPTH WELLS.
ISOCONCENTRATION CONTOURS (DASHED WHERE INFERED) DATA IN PARTS PER BILLION
500 0 500 1000
scale: 1" = 500' (APPROX.) feet
GREAT AMERICAN KNITTING MILL
1340
1000
500
100
10
24
10
FIGURE 6
ISOCONCENTRATION OF TOTAL CHLORINATED VOLATILE ORGANICS SHALLOW DEPTH WELLS SAMPLED 1/88
PREPARED FOR
ALLEGHENY INTERNATIONAL, INC.
PITTSBURGH, PENNSYLVANIA
10-31-88
DRAWING NUMBER
88548-B15
REFERENCE:
BASE MAP FROM TOPOGRAPHICAL SURVEY, BOROUGH OF BALLY (1975).
MONITORING WELL AND MUNICIPAL WELL LOCATIONS FROM SURVEY BY S.M. NORKEVICH 2/3/88

Figure 6



LEGEND:
NACE ▲ OFF-SITE WELL LOCATION (ESTIMATED LOCATION)
BOROUGH LINE
87-101 O ERM & REMCOR MONITORING WELLS
S = SHALLOW
I = INTERMEDIATE
D = DEEP
E-1 • EXPLORATION CORE HOLE
STREAM
NOTE:
ERM WELL NOMENCLATURE DOES NOT CORRELATE EXACTLY WITH THAT OF THE REMCOR WELLS.
ERM WELLS 86-1, 86-2, 86-3S, 86-4, AND 86-5S ARE SHALLOW WELLS UNDER THE REMCOR SYSTEM, WHILE 86-3D AND 86-5D APPROXIMATE INTERMEDIATE DEPTH WELLS.
ISOCONCENTRATION CONTOURS (DASHED WHERE INFERRED) DATA IN PARTS PER BILLION
500 0 500 1000
scale: 1" = 500' (APPROX.) feet
3941
2110
730
1000
500
100
FIGURE 7
ISOCONCENTRATION OF TOTAL CHLORINATED VOLATILE ORGANICS IN INTERMEDIATE DEPTH WELLS SAMPLED 1/88
PREPARED FOR
ALLEGHENY INTERNATIONAL, INC.
PITTSBURGH, PENNSYLVANIA
11-1-88 LHK
P.V.S. 12/6/88
DRAWING NUMBER
88548-B16
REMCOR
REFERENCE:
BASE MAP FROM TOPOGRAPHICAL SURVEY, BOROUGH OF BALLY (1975).
MONITORING WELL AND MUNICIPAL WELL LOCATIONS FROM SURVEY BY S.M. NORKEVICH 2/3/88

Figure 7

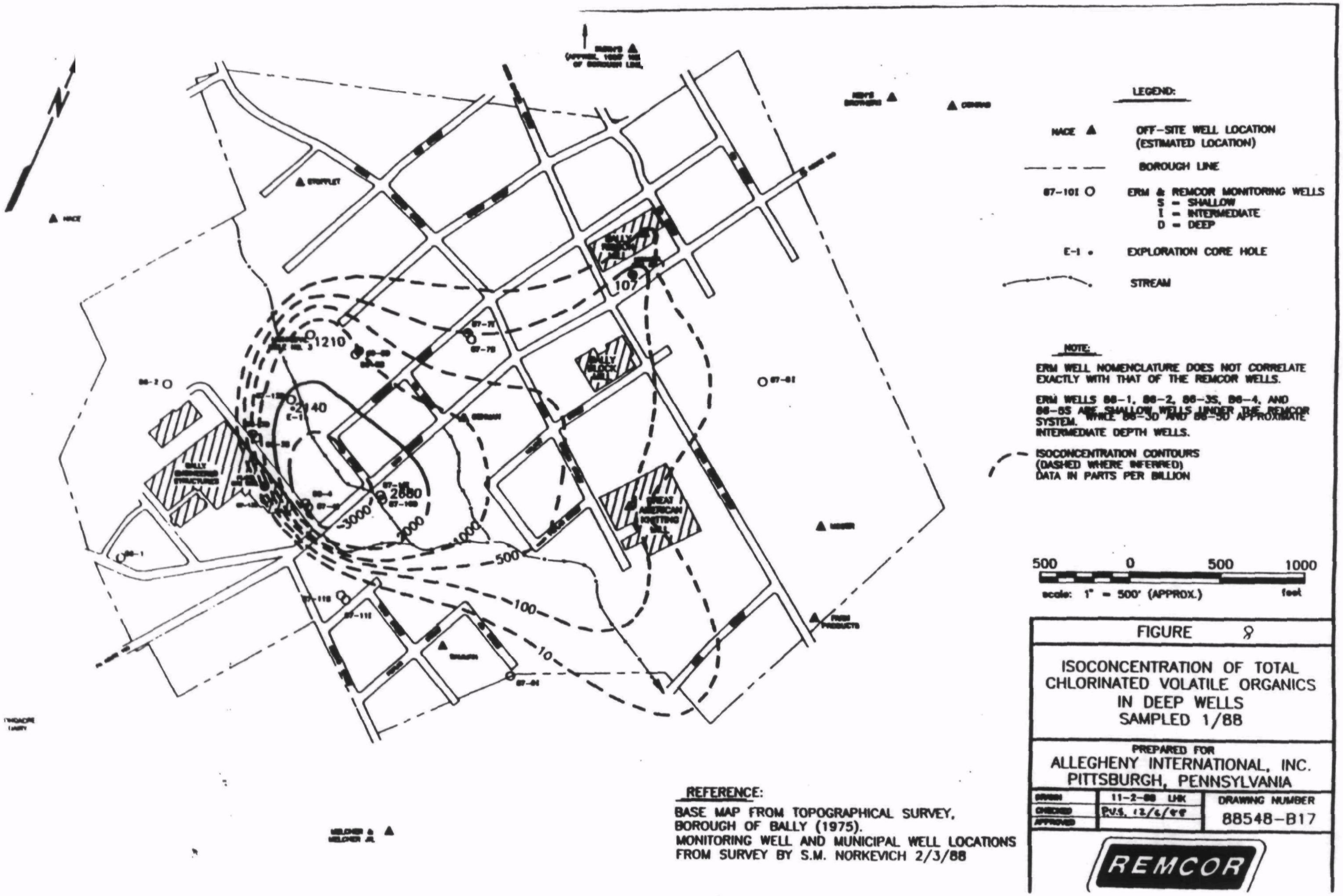

LEGEND:
NACE
OFF-SITE WELL LOCATION (ESTIMATED LOCATION)
BOROUGH LINE
87-101
ERM & REMCOR MONITORING WELLS
S - SHALLOW
I - INTERMEDIATE
D - DEEP
E-1
EXPLORATION CORE HOLE
STREAM
NOTE:
ERM WELL NOMENCLATURE DOES NOT CORRELATE EXACTLY WITH THAT OF THE REMCOR WELLS.
ISOCONCENTRATION CONTOURS (DASHED WHERE INFERRED) DATA IN PARTS PER BILLION
1210
2140
2680
107
3000
2000
1000
500
100
10
500 0 500 1000
scale: 1" = 500' (APPROX.)
feet
FIGURE 8
ISOCONCENTRATION OF TOTAL CHLORINATED VOLATILE ORGANICS IN DEEP WELLS SAMPLED 1/88
PREPARED FOR
ALLEGHENY INTERNATIONAL, INC.
PITTSBURGH, PENNSYLVANIA
11-2-88 LHK
DRAWING NUMBER
88548-B17
REMCOR
REFERENCE:
BASE MAP FROM TOPOGRAPHICAL SURVEY, BOROUGH OF BALLY (1975).
MONITORING WELL AND MUNICIPAL WELL LOCATIONS FROM SURVEY BY S.M. NORKEVICH 2/3/88

Figure 8

The abandoned mill pond has been inactive for some time; the breast of the impoundment was breached by the current owner within the past five years to reduce liability associated with the impoundment. As a component of the RI a preliminary wetlands assessment was conducted. A Palustrine wetlands has developed in this area and is readily defined by the perimeter of the former impoundment. Riparian weltland areas along the perennial stream form an extension of the Palustrine wetland to the northwest. On the basis of this preliminary assessment, it appears that these wetlands ares do not represent critical habitat elements in the local area, nor are they likely to in the future because of the extensive residential and commercial development in their immediate vicinity. In addition, the U.S. Fish & Wildlife Service (USF&WS) has determined that the site area is not of significant concern relative to the occurrence of special status species.

Extent of VOC Contamination in Surface Water and Sediments

Samples of surface water and sediment were collected initially at three locations during the RI, one within the perennial stream and two within the Palustrine wetland. Later, in response to EPA comments, two surface water and sediment samples were collected from the perennial stream to the east of Route 100 (Figure 9). Analytical results are summarized in RI Table 10. The initial samples revealed only the presence of acetone and methylene chloride at levels consistent with laboratory-induced contamination. The most easterly of the later samples revealed low levels of VOCs consistent with the suggestion that ground water discharges to the stream in this area.

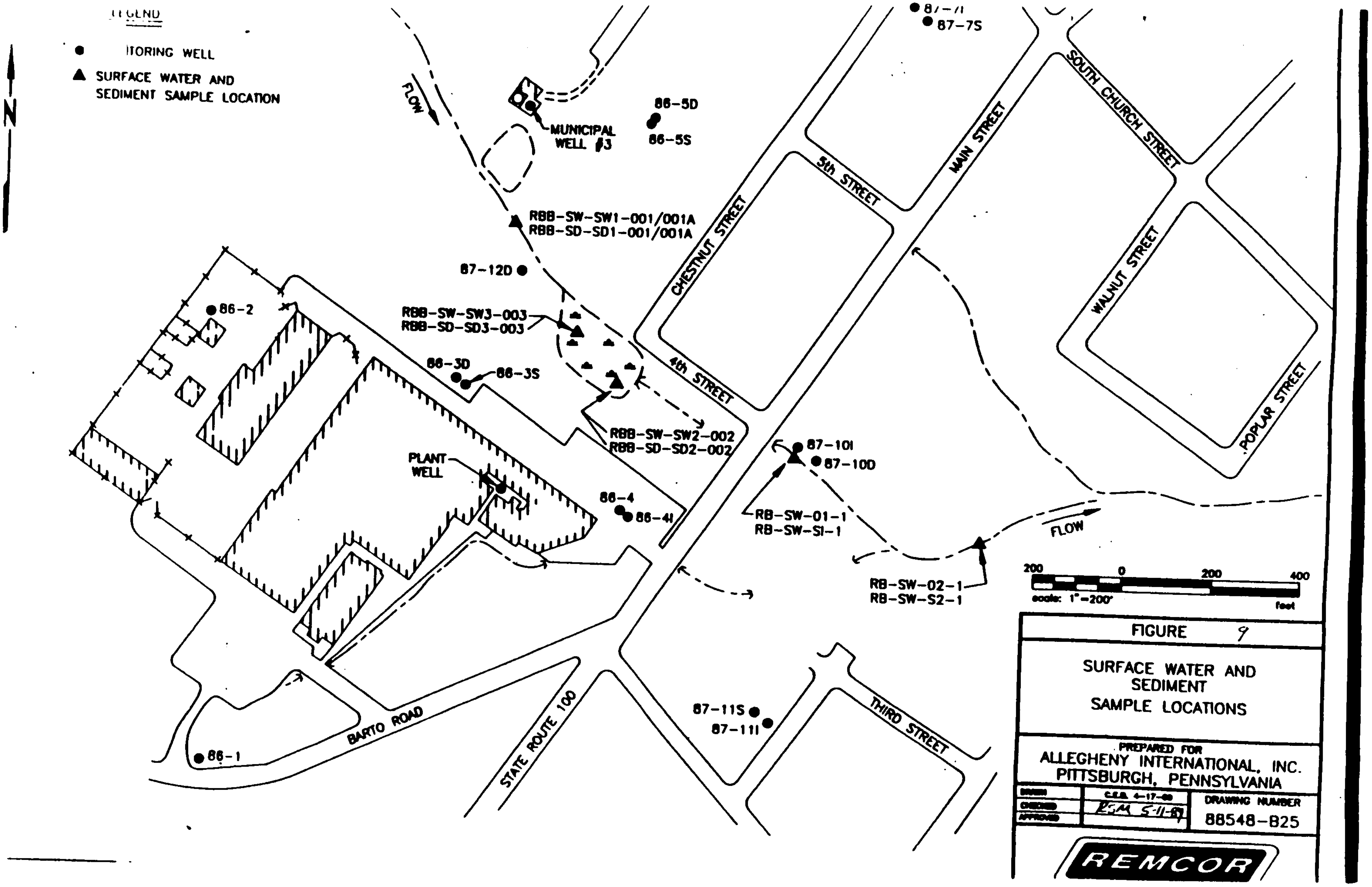
The hydrogeologic investigation determined that the wetland area north of the BES plant could not be receiving discharge from the contaminated aquifer. This fact is confirmed by the chemical-analytical results. It is possible, however, that groundwater could be discharging to the perennial stream east of Route 100 where the VOCs were detected.

SUMMARY OF SITE RISKS

An assessment of public health and environmental concerns was performed in accordance with guidelines established by the EPA for performance of such evaluations at Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) sites.

The following VOCs were selected as indicator compounds in the characterization of risk because of their presence in groundwater and their potential chronic health effects (i.e., primarily their suspected carcinogenicity) at low levels:

- Trichloroethene (TCE)
- Tetrochloroethane (TCA)
- Tetrachloroethene (PCE)
- Dichloroethane (DCE)
- 1,1,-Dichloroethane (DCA)
- Methylene chloride



LEGEND
ITORING WELL
SURFACE WATER AND SEDIMENT SAMPLE LOCATION
N
FLOW
MUNICIPAL WELL #3
86-5D
86-5S
87-7I
87-7S
RBB-SW-SW1-001/001A
RBB-SD-SD1-001/001A
87-12D
86-2
RBB-SW-SW3-003
RBB-SD-SD3-003
86-3D
86-3S
RBB-SW-SW2-002
RBB-SD-SD2-002
PLANT WELL
86-4
86-4I
87-10I
87-10D
RB-SW-01-1
RB-SW-S1-1
RB-SW-02-1
RB-SW-S2-1
FLOW
87-11S
87-11I
86-1
BARTO ROAD
STATE ROUTE 100
THIRD STREET
4th STREET
CHESTNUT STREET
5th STREET
MAIN STREET
SOUTH CHURCH STREET
WALNUT STREET
POPLAR STREET
200 0 200 400
scale: 1"=200'
feet
FIGURE 9
SURFACE WATER AND SEDIMENT SAMPLE LOCATIONS
PREPARED FOR
ALLEGHENY INTERNATIONAL, INC.
PITTSBURGH, PENNSYLVANIA
DRAWN C.E.B. 4-17-89
CHECKED
APPROVED
DRAWING NUMBER
88548-B25
REMCOR

Figure 9

The assessment considered noncarcinogenic and carcinogenic health effects and environmental toxicity for these compounds in defining risk to public health and the environment.

The only known current human exposure takes place through potable use of the contaminated municipal supply well (Municipal Well No. 1). The municipal system currently services approximately 1,200 residents of Bally. Remcor considered both ingestion and showering exposure pathways in defining cumulative risk.

In assessing risks associated with use of the municipal water supply, Remcor did not consider the effect of dilution of water drawn from the municipal well(s) by water from the springs. The relative contribution of each source is known to vary with seasonal conditions; significant pumping of the municipal well(s) is required only during the summer and fall months to supplement the springs. Existing data are not adequate, however, to permit a precise estimate of the contribution of each source to actual consumption. A cumulative carcinogenic risk estimated for use of the current municipal spring water, is 1.0×10^{-3}. In reality, this risk is significantly reduced by dilution of uncontaminated spring water occurring within the Municipal system. The amount of dilution is directly related to spring flow and, as such, will vary seasonaly. The risk of noncarcinogenic health effects is deemed acceptable for the current municipal ground water supply system in accordance with EPA guidance on risk assessment.

Future plans for the municipal water supply system are to reduce reliance on Municipal Well No. 1 and to use Municipal Well No. 3 as the primary supply well. Well No. 3 has been equipped with an air-stripping treatment unit. VOC concentrations to be achieved in the treated well water are those set forth in water supply and National Pollutant Discharge Elimination System (NPDES) permits issued by the PADER for this treatment system. The worse-case cumulative carcinogenic risks estimated for use of treated water from Municipal Well No. 3, again considering a worse-case scenario (no dilution of the well water with spring water), is 3.3. $\times 10^{-5}$. Estimated noncarcinogenic risks were again found within acceptable limits.

Contaminated ground water is not discharging to surface water in the immediate site vicinity. There is evidence, however, that groundwater discharge to surface water does occur east of Route 100. Surface water VOC concentrations found in one sample from this area were found to be below applicable criteria for the protection of aquatic biota. When using those concentrations to develop an estimated dose for dermal contact and accidental ingestion, the carcinogenic risk is estimated at 2.5×10^{-8}, well below the lower limit of the risk range considered acceptable for CERCLA sites by EPA policy (i.e, 10^{-4} to 10^{-7}).

VI. Community Relations History

The main community concerns for the affected residents and businesses revolve around the issues of:

1. Groundwater contamination on and off-site
2. Quality of alternate water supplies
3. Desire of affected residents to remain on private wells

The Borough of Bally routinely sends Municipal Well No. 1 analytical results to EPA. EPA has met on an individual basis with members of the community and with local officials.

REMEDIAL ACTION OBJECTIVES

Contaminated Media and Exposure Pathways

The medium that requires remediation at the BES Site is groundwater. The exposure pathway that is most critical is potable use through the municipal supply system. Under the current water supply configuration in Bally, residents are exposed to VOCs in groundwater extracted at Municipal Well No. 1. This well is used, in conjunction with uncontaminated spring water, for potable water supply within the Borough. The groundwater exposure routes that incur the predominant risks are ingestion and inhalation during showering. Worst-case cumulative carcinogenic risks have been calculated for these exposure routes for both the current water supply system and for the proposed future water supply system (Table 1). During the past two years, BES and the Borough of Bally have taken action to provide treatment of groundwater from Municipal Well No. 3 as a supplement to the springs. This approach reduces reliance on water from Municipal Well No. 1 as the primary source of supply.

The worst-case for both current and future water supply systems considers no use of (or dilution by) uncontaminated spring water. Although this is not the actual case under either system, the configuration of the supply piping makes it difficult to determine the actual contribution of either source to the water arriving at the tap. A single line carries pumped water to the reservoir and distributes water from the reservoir to the supply system. The estimated worst-case carcinogenic risk with use of the current water supply system is 1.0×10^{-3}. Under the proposed future system (use of treated water from Municipal Well No. 3), the worst-case risk is 3.3×10^{-5}. The risk of noncarcinogenic health effects was estimated to be acceptable for both current and proposed water supply systems.

Potable use of groundwater from residential wells within the Borough is not currently taking place. Risks were estimated for the hypothetical future use of wells installed within the most contaminated portion of the aquifer. The estimated carcinogenic risk is $1.8\ 10^{-2}$; the noncarcinogenic risk was estimated to be unacceptable.

TABLE 1

ESTIMATED WORST-CASE RISKS FOR THE BES SITE

PATHWAY	CARCINOGENIC RISK	NON-CARCINOGENIC
CURRENT RISKS:		
Potable use of current municipal water supply	1.0×10^{-3}	Acceptable(2)
Dermal contact/accidental ingestion of surface water	2.5×10^{-8}	Acceptable
Use of ground water as process water supply for local industries	Risks significantly less than those considered acceptable for workplace exposure	
FUTURE RISKS:		
Potable use of future Municipal Water Supply(1)	3.3×10^{-5}	Acceptable
Potable use of contaminant residential well	1.8×10^{-2}	Unacceptable

Notes:

(1) Assumes primarly reliance on treated water from Municipal Well No. 3.
(2) Acceptability of non-carcinogenic risk based on calculated Hazard Index (HI) less than unity, as documented in text.

CERCLA requires that remedial actions comply with Applicable or Relevant and Appropriate Requirements (ARARs) and are adequately protective of public health and the environment. Remediation levels for the BES Site will reflect the need to provide a suitable municipal water supply to mitigate current risk, as well as to effect aquifer restoration. Table 2 summarizes remediation levels by medium based on ARARs. The current air stripping treatment system at Municipal Well No. 3 has received permit authorization to operate from the PADER. Limits established in the NPDES permit for discharge of treated ground water to the adjacent stream, as well as limits established in the Water Quality Permit for use of the treated water as a public water supply, provide the primary ARARs for these actions. The permit levels are noted in Table 2.

Remedial action objectives defined for the BES Site are as follows:

- Prevent current and future ingestion of groundwater containing unacceptable levels of VOCs

- Restore the aquifer within a reasonable time frame to a condition such that levels of the VOC contaminants of concern are below remediation levels consistent with its use as a Class II aquifer.

Prevention of Ingestion of Contaminated Groundwater

Groundwater Remedial Actions (GRAs) that will address the first response objective include provision of an alternative municipal water supply and institutional control of future use of groundwater within the attainment area until such time as the aquifer has been adequately restored.

Remcor was retained by AI in 1987 to evaluate options for provision of an alternative water supply for the Borough of Bally, concurrent with performance of the RI/FS. An air stripping treatment system has been designed, permitted, and installed at Municipal Well No. 3 to address this concern. The rationale for Remcor's recommendation to proceed with treatment at Municipal Well No. 3 via air stripping is documented in Appendix A. The design and the operational testing of the air stripping system is also discussed.

As stated in "Guidance on Remedial Actions for Contaminated Ground Water at Superfund Sites" (EPA, March 1988), "Institutional controls implemented at the State or Local level that restrict ground water use should be implemented as part of the response action at all sites where exposure poses a threat to human health." There are no current risks via use of domestic wells at the BES Site. However, institutional controls should be implemented within the attainment area to prevent future use of any existing residential wells for drinking water and also to prevent the installation of additional wells for this purpose until the aquifer has been adequately restored. Additional investigation will be required in the pre-design phase of remedial action to better define the limits of the attainment area. Treatment of Municipal Well No. 3 will ensure the availability of a reliable source of drinking water for those served by the municipal system, which includes all residents within the attainment area as defined by the current data, as well as areas immediately downgradient. Institutional controls on use of domestic wells for future potable use will not inconvenience local residents primarily due to the ready accessibility of a reliable source of potable water from the municipal supply system.

The availability of springs as a second source of potable water to the Borough provides a measure of redundancy for Municipal Well No. 3. Periodic maintenance may be scheduled during periods of the year when the flow from the springs is adequate to satisfy the system demand. Institutional controls relative to conservation of water would permit the springs to meet demand at other times if nonroutine maintenance of the municipal well was required. Such nonroutine maintenance would result in minimal downtime for the municipal well during such times.

To supplement alternative water supply and institutional controls, appropriate general responses to prevent ingestion of contaminated groundwater may include the following:

Abandonment of any existing domestic wells within the attainment area found to contain unacceptable high levels of VOCs

Currently the data suggest that only one well may require abandonment to eliminate any potential for its use as a drinking water supply in the future

Ground water monitoring

- A groundwater monitoring program will be required in conjunction with remedial action to monitor attainment of remedial action objectives. Because the attainment area is not fully defined, additional site investigation will be required in the pre-design phase of remedial action to provide this definition. Groundwater monitoring would be modified as required to reflect the results of this investigation.

Community relations/public awareness program

- Periodic updates regarding the status of aquifer restoration and institutional controls will be required throughout the remedial action implementation to ensure public understanding.

Aquifer Restoration

EPA guidance (EPA, March 1988) indicates that provision of a readily accessible water supply with sufficient redundancy provides additional flexibility in addressing the second major response objective (i.e., aquifer restoration).

Despite a concerted effort in the RI to research history of solvent use and management at the BES plant and to evaluate the potential active sources of aquifer contamination no such source areas were found. The data indicate that aquifer contamination may have resulted from routine spillage of solvents used at the BES facility in the 1950s, 1960s, and early 1970s and that no definable source area exists. As such, no source removal or control actions are suggested that would aid in reducing the extent of aquifer restoration response actions.

GRAs identified to address the need for aquifer restoration involve collection and treatment of the VOC plume.

VIII. Description of ARARS

An ARAR, as defined, is an environmental law, regulation, or guideline that is either "applicable" or "relevant and appropriate" to a remedial action. "Applicable" requirements are those cleanup standards, standards of control, and other environmental protection requirements, criteria, or limitations, promulgated under Federal or State laws that specifically address chemicals/contaminants of concerns, remedial actions, locations of remediation, or other circumstances at a CERCLA-regulated site. "Relevant and appropriate" requirements are those which address problems or situations sufficiently similar to those encountered at a CERCLA-regulated site that their use is well suited to the particular site (Section 121 of CERCLA, 42 U.S.C. Section 9621 and 40 C.F.R. Section 300.68(i)).

ARARs can be divided into the following categories:

- Chemical/contaminant-specific requirements - Health or risk-based concentration limits or ranges in various environmental media for specific hazardous substances, pollutants, or chemicals/contaminants. These limits may take the form of cleanup levels, discharge levels and or maximum intake levels (such as for drinking water and breathing air for humans).

- Action-specific requirements - Controls or restrictions on particular types of remedial activities in related areas such as hazardous waste management or wastewater treatment.

- Location-specific requirements - Restrictions on remedial activities that are based on the characteristics of a site or its immediate environment. An example would be restrictions on wetlands development.

In accordance with the EPA Ground Water Protection Strategy, the aquifer which currently supplies potable water to the Borough of Bally is categorized as Class II. The presence of VOCs has affected the suitability of the aquifer for use as a domestic and municipal water supply. The Ground Water Protection Strategy will be considered relevant and appropriate guidance in development of remedial action objectives at this site. Consistent with the established EPA policy of returning contaminated ground water to the "highest beneficial use," chemical-specific ARARs established to protect drinking water supplies will be considered in establishment of remediation levels for the aquifer, as well as for any alternative water supply for the Borough.

Similarly, the PADER permitting authorities exercised in the National Pollutant Discharge Elimination System (NPDES) Discharge Permit, Water Supply Permit, and Air Operating Permit are action-specific ARARs that define acceptable standards for ground water treatment systems considered in defining and selecting remedial action technologies in the FS.

No location-specific ARARs have been identified for the proposed remedial response at the BES Site. Proposed activities will not directly or indirectly result in any adverse affects on any areas.

2.1.2.1 Chemical-Specific ARARs

The applicable chemical-specific ARARs at the Site are established by Maximum Contaminant Levels (MCLs) and Water Supply Permit requirements established by the PADER for those contaminants of concern identified in the RI endangerment assessment. MCLs are applicable, enforceable standards set for public water supply system that are promulgated under Section 1411-12 of the Public Health Service Act as amended by the Safe Drinking Water Act, 42 U.S.C. Sections 300(g)-(g)1 (SDWA). MCLs that are proposed (PMCLs), but not yet promulgated, are to be considered when final MCLs are not available. With the exception of methylene chloride, MCLs and PMCLs are available for all contaminants of concern at this site.

In the absence of MCLs, and PMCLs, the next ARARs to be considered are Health Advisories (HAs). HAs are nonenforceable contaminant limits published by the Office of Drinking Water. They are published for 1-day, 10-day, longer term (approximately 7 years), and lifetime exposures to chemicals. HAs are published for noncarcinogenic end points of toxicity only. Lifetime HAs are not recommended for Class A and Class B carcinogen because carcinogenic effects are expected to result in more stringent health standards. For Class C chemicals, an additional uncertainty factor of 10 is used to reflect possible carcinogenic effects.

Risk-Specific Doses (RSDs) for carcinogens may also be considered in establishing chemical-specific ARARs. RSDs are derived from cancer potency factors (CPFs), developed by the EPA Carcinogen Assessment Group (CAG) in a series of health assessment documents and by the EPA Environmental Criteria and Assessment Office in a series of health effects assessments. The CPF is the slope of the dose-response curve. The RSD represents an acceptable dose in milligrams per kilogram of body weight per day (mg/kg body weight/day). To calculate the concentration of a carcinogen in groundwater in milligrams per liter (mg/l) associated with a given cancer risk level, the following equation is used:

$$\text{Concentration} = \frac{\text{RSD (mg/kg/day) x body weight x cancer risk level}}{\text{drinking water ingestion rate (liters per day [l/day])}}$$

Body weight is assumed to be 70 kg (approximately 155 lbs.), and the drinking water ingestion rate is assumed to be 2 liters/day.

In accordance with established EPA policy for carcinogen, acceptable remediation levels generally lie within the 10^{-4} to 10^{-7} risk range, with the 10^{-6} risk used, as a starting point in establishing the preferred cleanup levels.

These ARARs are either applicable or to be considered relevant and appropriate relative to the attainment area for groundwater remedial action. The attainment area is defined as the area beyond the boundary of the waste source and within the boundary of the contaminant plume. In the absence of a defined source area at the BES Site, the attainment area is generally defined by the lateral limits of the VOC plume.

Action-Specific ARARs

Action-specific ARARs relating to the proposed remedial actions at the BES Site fall into two categories:

- Those affecting discharge of VOC-containing groundwater to surface water
- Those affecting releases of VOCs to the air.

Applicable action-specific ARARs include NPDES standards for discharge of groundwater to surface water. These standards are developed on a compound- and site-specific permitting basis under the Clean Water Act (CWA).

Action-specific ARARs also may be relevant and appropriate for releases of VOCs to ambient air from treatment of contaminated groundwater at extraction wells. Regulations to be considered relative to air emissions from groundwater treatment units at the BES Site have been defined by the EPA as follows (Abrams, April 6, 1989):

- Part D of the Clean Air Act (42 U.S.C. Sections 7401-7642) - This part deals with provisions for nonattainment areas. Berks County is classified as a nonattainment area for ozone. Part D requires that the lowest achievable emission rate (LAER) be achieved. This means that for any source, the emission rate reflects either the most stringent emission limitations contained in the implementation plan of any state for such class or category of source, unless the owner or operator of the proposed source demonstrates that such limitations are not achievable, or the most stringent emission limitation which is achieved in practice by such class or category of source, whichever is more stringent;.

- In response to Part D of the Clean Air Act, Pennsylvania established special requirements in Subchapter C, Sections 127.61 to 127.64 of Pennsylvania's Air Resource Regulations for sources located in or significantly impacting nonattainment areas. Relative to VOCs, this applies to any new source with maximum allowable emissions greater than 50 tons per year, 1,000 pounds per day, or 100 pounds per hour, whichever is more restrictive.

- National Ambient Air Quality Standard (NAAQS) for Ozone (40 C.F.R. Part 50) The ozone NAAQS is a one-hour standard concentration of 0.12 parts per million (ppm), not to be exceeded more than once per year.

Other guidance to be considered is the Pennsylvania Air Toxic Guidelines (ATGs). This guideline requires that the ambient ground-level concentration predicted for any air toxic substance for an aggregate of sources at a site be equal to or less than one percent of its corresponding ATG. These ATGs represent compound-specific ambient concentration guidelines.

Uncertainties relative to the application of air regulations to CERCLA response actions prohibit establishment of sites-pecific performance standards for release to ambient air from proposed groundwater treatment units at the BES Site. From a technical perspective, information is not available to evaluate whether LAER is relevant or appropriate; the *de minimis* nature of the anticipated source in the current instance (i.e., less than 100 pounds per hour) indicates that LAER is not applicable. However the current air stripping treatment system at the BES Site is operating with permit authorization from the PADER Bureau of Air Quality. The final PADER Air Operating Permit for this treatment system will establish acceptable performance standards for air emissions and should, therefore, be incorporated as the primary ARAR for air emissions at this site.

A. Description of Major ARARs (See Table 2 and 2A)

Federal

Safe Drinking Water Act	- MCLs
Clean Water Act	- Ambient Water Quality Criteria
Clean Air Act, Part D	- Ozone Non-Attainment Area Criteria
National Ambient Air Quality Standards	- VOC standards

State

Pennsylvania Clean Streams Law - Section 402	- Ambient Water Quality Standards
Pennsylvania Safe Drinking Water Act	
Pennsylvania Rules and Regulations Title 25 Chapter 93	
Pennsylvania Air Resource Regulations	- VOC standards for Ozone Non-Attainment Areas
Pennsylvania Air Toxic Guidelines	- Ambient Ground-level Contamination Standards

B. Additional Requirements for Protectiveness

The selected site remedy must consider and be consistant with the following:

Federal Executive Order 11988, Floodplain Management 40 C.F.R. Part 6, Appendix A	Action to avoid adverse effects, minimize potential harm, restore and preserve natural and beneficial value.
Federal Executive Order 11990 Protection of Wetlands, 40 C.F.R. Part 6, Appendix A	Action to minimize destruction, loss, or degradation of wetlands.
Federal Clean Water Act	Differential Ground-water Policy Class IIA aquifer.

TABLE 2

REMEDIATION AND DISCHARGE LIMITS
DERIVED FROM ARARS

CONTAMINANT CONCENTRATION ARARs (ppm)

MEDIUM	TCE	TCA	DCE	PCE	METHYLENE CHLORIDE	1,1-DCA	1,2-DCA
Ground Water	0.005 (MCL)(1)	0.2 (MCL)	0.007 (MCL)	0.005 (PMCL)(2)	0.005 (RSD)(3)	NE (4)	NE
Treated Ground Water	0.001 (MWS)(5)	0.2 (MWS/MCL)	0.007 (MWS/MCL)	NE	NE	NE	NE
Surface Water	0.033 (NPDES)(6)	Monitor Only (NPDES)	0.00063 (NPDES)	0.0014 (NPDES)	Monitor Only (NPDES)	Monitor Only (NPDES)	Monitor Only (NPDES)

(1) MCL - Maximum Contaminant Level

(2) PMCL - Proposed MCL

(3) RSD - Risk Specific Dose

(4) NE - None Established: These compounds have not been detected in Municipal Well No. 3

(5) MWS - Municipal Water Supply Permit

(6) NPDES - National Pollutant Discharge Elimination System Permit

TABLE 2 A

CONTAMINANTS EXCEEDING RELEVANT STANDARDS AND GUIDELINES
BALLY, PENNSYLVANIA

Compound	CONCENTRATION (mg/l) MUNICIPAL WELL	CONCENTRATION (mg/l) GEHMAN WELL	MCL[1] (mg/l)	AWQC[2] (mg/l)	DRINKING WATER (mg/l) HEALTH ADVISORIES 1-DAY 10-kg	DRINKING WATER (mg/l) HEALTH ADVISORIES 10-DAY 10-kg	DRINKING WATER (mg/l) HEALTH ADVISORIES LIFETIME 70-kg
Trichloroethene	0.015	0.19	0.005	2.8×10^{-3}	NA[3]	NA	NA
1,1-Dichloroethene	0.019	0.12	0.007	3.3×10^{-5}	1.0	1.0	NA
1,1,1-Trichloroethane	0.073	0.42	0.20	18.4	140	35.0	1.0

(1) MCL - Maximum Contaminant Level - federal drinking water standard.

(2) These Ambient Water Quality Criteria (AWQC) values are adjusted for drinking water only and represent the 10^{-6} cancer risk.

(3) "NA" indicates not available.

IX. DESCRIPTION OF THE ALTERNATIVES

Conclusions of Screening Technology

Tables 3 and 4 contain summaries of the data contained in this section and provide easy reference to the pertinent data concerning each option considered and identifies those remedial technologies and treatment process options that have been retained for incorporation into remedial action alternatives.

DEVELOPMENT AND EVALUATION OF REMEDIAL ACTION ALTERNATIVES

DEVELOPMENT OF REMEDIAL ACTION ALTERNATIVES

This section briefly identifies the rationale for development of remedial alternatives at the BES Site. The number of different alternatives is limited because of the practical limitations on containment technologies and the absence of an active source of VOCs to the aquifer. The process options for treatment of extracted groundwater were screened early in the FS to obviate the need to perform additional screening prior to the final detailed evaluation in the FS.

General Approach

The approach taken to development and evaluation of remedial action alternatives for the BES Site follows that described in "Guidance on Remedial Actions for Contaminated groundwater at Superfund Sites" (EPA, March 1988). Remedial alternatives are developed by assembling component technologies and treatment process options from those that passed the screening. These technologies and process options are considered effective in meeting the defined remedial response objectives and are implementable at the BES Site.

In conjunction with the RI/FS, an air stripping treatment system has been implemented at Municipal Well No. 3 to provide a suitable alternative water supply for the Borough of Bally. In configuring and evaluating alternative remedial actions to be implemented at the BES Site, the air stripping treatment system is considered an element of existing site conditions.

In general, there are two classes of response actions (EPA, March 1988) that may be appropriate for remedial action at the BES Site. The first of these is natural attentuation, embodied in the minimal/no action alternative. The second is active restoration of the aquifer. In the absence of an active source of VOCs to the aquifer, active restoration at the BES Site would consist of groundwater extraction at one or more wells within the attainment area. The third class of response, containment, was not found to be applicable to this site because of hydrogeologic conditions (i.e., thick, highly productive aquifer residing primarily within a fractured bedrock flow system), as discussed in the technology screening.

TABLE 3

TECHNOLOGIES TO BE SCREENED FOR SUITABILITY
BALLY ENGINEERED STRUCTURES SITE
FEASIBILITY STUDY REPORT

RESPONSE ACTION	TECHNOLOGY	CONTAMINATED MEDIA
Minimal/No-Action		
	Ground Water Monitoring	Ground water
	Institutional Control of Ground Water Use	Ground water
	Resident Relocation	Ground water
	Selective Well Abandonment	Ground Water
Alternate Water Supply	Installation of New Municipal Supply Well	Ground water
	Provision of Potable Water From Adjacent Municipalities or Other Outside Sources	Ground water
	Treatment of Existing Municipal Well	Ground Water
Aquifer Restoration Via Ground Water Extraction and Treatment		
Containment	Vertical Barriers	Ground water
Collection	Extraction Wells	Ground water
	Hydraulic Displacement	Ground water

TABLE 3
(Continued)

RESPONSE ACTION	TECHNOLOGY	CONTAMINATED MEDIA
Treatment	Ultraviolet (UV) Photolysis-Ozonation	Ground water
	Wet Air Oxidation	Ground water
	Chemical Treatment	Ground water
	Liquid Phase Carbon Adsorption	Ground water
	Air Stripping	Ground water
	Steam Stripping	Ground water
	Air Stripping with Vapor-Phase Carbon Adsorption	Ground water and emissions to the air
	Air Stripping with Regenerable Vapor Phase Carbon	Ground water and emissions to the air
	Air Stripping with Vapor Phase Catalytic Oxidation	Ground water and emissions to the air
	Distillation	Ground water
	Reverse Osmosis	Ground water
	Biological Treatment	Ground water
Off-Site Disposal	Transport to Treatment Center	Ground water
	Discharge to Surface Water	Ground water

TABLE 4

TECHNOLOGIES TO BE RETAINED
FOR THE DEVELOPMENT OF ALTERNATIVES
BALLY ENGINEERED STRUCTURES SITE
FEASIBILITY STUDY REPORT

RESPONSE ACTION	TECHNOLOGY	CONTAMINATED MEDIA
Minimal/No-Action	Ground Water Monitoring	Ground Water
	Institutional Control of Ground Water Use	Ground Water
	Selective Well Abandonment	Ground Water
Alternative Water Supply	Treatment of Existing Municipal Well	Ground Water
Aquifer Restoration Via Ground Water Extraction and Treatment		
Collection	Extraction Wells	Ground Water
Treatment	Ultraviolet (UV) Photolysis-Ozonation	Ground Water
	Liquid Phase Carbon Adsorption	Ground Water
	Air Stripping	Ground Water
	Air Stripping with Vapor-Phase Carbon Adsorption	Ground Water and Emissions to the Air
	Air Stripping with Regenerable Vapor Phase Carbon	Ground Water and Emissions to the Air
	Air Stripping with Vapor Phase Catalytic Oxidation	Ground Water and Emissions to the Air
Off-Site Disposal	Discharge to Surface Water	Ground water

Because of its location within the attainment area, Municipal Well No. 3 may also function as an extraction well for contaminated groundwater. Monitoring of VOC concentrations in water pumped from the well since continuous pumping was initiated on February 6, 1989 suggest that this may be the case (Appendix A). The capture zone for Municipal Well No. 3, as well as its ultimate effect on the VOC contaminant plume, cannot be determined presently with the available date. The degree to which Municipal Well No. 3 may contribute to remedial action can best be determined through a period of monitoring. The Borough of Bally intends to begin utilizing treated groundwater from this well in June 1989. This source will provide a suitable alternative water supply to meet the demands of the municipality for the near future. All residents within the attainment area have access to the municipal supply system and none are currently using domestic wells as a potable supply.

EPA guidance (March 1988) suggests that three to five alternatives be carried through the detailed evaluation to provide a suitable range of response options and cost. The guidance further suggests that one of the alternatives for Class II groundwaters represent a rapid remediation scenario for comparison. In the absence of an active source of VOCs to the aquifer, active remediation at the BES Site will involve one or more extraction wells, with treatment of the extracted groundwater. Adequate data is not currently available to predict the optimal configuration or extraction wells, nor to estimate the time frame required for successful aquifer restoration.

The presence of an operational alternative water supply, coupled with appropriate institutional controls to prevent use of contaminated groundwater and the absence of an active source of contamination, reduce the urgency of overall aquifer restoration at this site. In consideration of the above, the prudent course of action at the BES Site involves performance of additional studies to evaluate the need for further remedial action prior to implementing any actions beyond the ongoing pumping at Municipal Well No. 3. This approach has provided the frame work for development of remedial action alternatives.

It is apparent that if active restoration of the aquifer is selected as the recommended remedial response, additional site investigation required as an element of the additional studies will need to address the following issues:

- Resolution of the limits of the attainment area, especially in the direction of downgradient groundwater flow

- Evaluation of the effects of continuous pumping of Municipal Well No. 3 on aquifer contaminant levels

- Determination of the effective capture zone of Municipal Well No. 3 during long-term pumping

- Determination of the appropriate well location and the optimal means of treatment of extracted groundwater in the event that an additional extraction well(s) is required.

Anticipated components of such additional studies are as noted:

- Periodic monitoring of water levels and target VOCs in observation wells in the vicinity of Municipal Well No. 3 during continuous pumping of the well

- Installation of additional nested groundwater monitoring wells at one or more locations

- Sampling of the new groundwater monitoring wells and selected existing wells for target VOCs

- Installation of an aquifer test well and performance of pumping tests utilizing this well and suitable observation wells

The time frame for initiation of the additional field studies for predesign should provide an adequate period for evaluation of the effects of pumping at Municipal Well No. 3. The need for additional extraction wells can be established prior to conducting these studies. CERCLA, as amended, requires that the effectiveness of groundwater remedial actions be evaluated within five years of implementation. A period of from two to three years to monitor pumping at Municipal Well No. 3 would provide an adequate basis for evaluation. The provision of a suitable alternative water supply via treatment at Municipal Well No. 3 affords the necessary flexibility to defer further remedial action for this period of time without risk to public health or environmental receptors.

Definition of Remedial Alternatives

Two basic alternatives have been defined for remedial action at the BES Site:

- Alternative No. 1 - Minimal/No-Action (Natural Attenuation)

- Alternative No. 2 - Groundwater Extraction and Treatment and Alternative Water Supply

The second of these alternatives will involve use of Municipal Well No. 3 both as an alternative water supply and a groundwater extraction well. Pre-design studies associated with this alternative will determine the need for additional extraction wells to fully address remedial action objectives within the attainment area.

Alternative No. 1 - Minimal/No-Action (Natural Attenuation)

The minimal/no-action remedial alternative consists of the following elements:

- Abandoning appropriate existing private wells in the attainment area (e.g., Mable Gehman Well)

- Implementing institutional controls (e.g., deed restrictions) on the use of operable private wells and the constructions of new wells within the attainment area

- Conducting public education programs to increase public awareness about the presence of these restrictions

- Performing groundwater and surface water monitoring to measure contaminant concentrations and migration

- Performing semiannual site inspections

- Performing a site review every five years.

This option does not actively reduce the Toxicity, Mobility and Volume (TMV) of the contaminants. The Minimal/ no action option reduces the risk of the general public's potential of future exposure to contaminants in groundwater from private wells by reducing the potential for contact with the contaminated groundwater. In the absence of an active source, natural attenuation of VOC contamination would ultimately result in aquifer restoration.

This option utilizes the existing monitoring wells located at the BES Site. The use of Municipal Well No. 3 as an alternative water supply would not be mandated as a part of this option (although this action may occur independent of the recommended CERCLA remedial action). In any event, this alternative does not assume that Municipal Well No. 3 would be pumped continuously as a groundwater extraction well.

Alternative No. 2 - Groundwater Extraction and Treatment and Alternative Water Supply

This alternative is composed of the following items:

- Abandoning appropriate existing private wells in the attainment area

- Implementing institutional controls on the use of operable private wells and the construction of new wells within the attainment area

- Performing groundwater and surface water monitoring to measure contaminant concentrations and migration

- Removing contaminated groundwater from the aquifer through continuous pumping of Municipal Well No. 3 (with the potential for installation of additional extraction wells in the attainment area, if required)

- Treating the extracted groundwater by one of the treatment options retained for consideration

- Discharging the treated water from Municipal Well No. 3 to the adjacent stream or into the Borough of Bally potable water system, as needed to provide a suitable alternative water supply

- Performing necessary additional studies in the pre-design phase to evaluate the optimal configuration of any additional groundwater extraction well(s) required.

Implementation of this alternative reduces the mobility and volume of the contamination within the aquifer. Treatment process options resulting in destruction of the VOCs also reduce the toxicity of the contaminants. This alternative also reduces the risk associated with public use of contaminated water.

The following process options have been identified for Alternative No. 2:

Option No.	Description
2A	UV Photolysis-Ozonation Treatment
2B	Liquid Phase Carbon Adsorption Treatment
2C	Air Stripping Treatment
2D	Air Stripping Treatment with Vapor Phase Carbon
2E	Air Stripping Treatment with Regenerable Vapor Phase Carbon
2F	Air Stripping Treatment with Vapor Phase Catalytic Oxidation

The capital costs associated with this alternative would be significantly reduced if the existing air stripping system were selected as the recommended treatment process. Treated water would be used by the Borough of Bally to supply the potable system and excess treated water would be discharged to the adjacent stream. Existing monitoring wells would be used to monitor the concentration and migration of the contaminants.

DETAILED ANALYSIS OF REMEDIAL TECHNOLOGIES

This section contains a detailed analysis of each of the remedial options. The analysis is based on the following criteria in accordance with EPA guidance (EPA, August 1988):

Short-term effectiveness
Long-term effectiveness
Implementability
Reduction of TMV of contaminants
Cost
Compliance with ARARs
Overall protection of human health and the environment
State and community acceptance.

State and community acceptance of each alternative and process option will be discussed in the final FS document prepared after receipt of public comments. In general, however, state acceptance of the existing pumping and treatment system at Municipal Well No. 3 is documented in its approval of operating permits for the treatment system. Process flow diagrams for each of the treatment options are provided in Figures 6 thru 11.

Analysis of Alternative No. 1 - Minimal/No Action (Natural Attenuation

This option consists primarily of reducing the risk of contact with the contaminants and monitoring the extent and degree of contamination.

Short-Term Effectiveness

Implementation of the minimal/no-action alternative is not expected to result in an increased risk to the community or to the environment. Remedial actions contemplated under this alternative (i.e., well abandonment) can be completed expeditiously. The reliability of the abandonment procedure in preventing future access to the well is essentially 100 percent.

During the abandonment of existing private wells in the contaminated zone, workers should be aware of the possibility of organic vapors being released from the well. Field screening instruments would be used to monitor for the presence of any hazardous vapors. Dermal protection may also be warranted for workers closing the well(s). Local residents would be asked to avoid the work areas during closure. The Mabel Gehman well is the only private well that is currently being considered for abandonment.

Long-Term Effectiveness and Performance

The risks established for use of the current municipal water supply system (i.e., baseline risks) would not be actively reduced. As presented in the RI, the estimated worst case carcinogenic risk posed by using the contaminated Municipal Well No. 1 water supply for potable purposes is 1.0×10^{-3}. The non-carcinogenic risks posed by this exposure pathway were estimated to be acceptable.

Elimination of risk to potential future residential well users would be achieved through this alternative by implementing institutional controls. The effectiveness of such controls will depend on strict enforcement.

Long-term management associated with this option would include semiannual site inspections and site reviews every five years. Groundwater and surface water monitoring would also be performed on a long-term basis to monitor contaminant levels and migration.

Implementability

Implementation of this option would be very simple. The abandonment of the Mabel Gehman well would consist of removing the pump and pressure grouting the well bore. A bentonite-rich group would be used to absorb any water in the well during the grouting process. Deed restrictions are easily implemented but difficult to enforce in long-term operation. Use of monitoring wells and residential wells will facilitate implementation of a monitoring program.

Reduction of Toxicity, Mobility, or Volume of Contaminants

Because no treatment or containment technologies are included as part of this option, the TMV of the contaminants would not be reduced and exposure due to the migration of VOCs within the aquifer would continue to occur.

Cost

Costs associated with the minimal/no-action alternative include costs for grouting existing wells and performing periodic monitoring. Administrative costs for implementing and enforcing deed restrictions, conducting public education programs, and site inspections and reviews must also be considered. The initial capital costs for this option are estimated $82,800. These costs include implementing deed restriction, a public awareness program, and abandoning the Gehman well. An annual operating cost of $10,000 is estimated for the monitoring and inspection procedures. Based on a 30-year operating life and an annual inflation rate of 5 percent, the net present cost of this option is $264,000.

Compliance with ARARs

This alternative does not comply with ARARs for an alternative municipal water supply. Chemical specific ARARs for aquifer restoration within the attainment area may ultimately be achieved via natural attenuationn.

Overall Protection of Human Health and the Environment

Provision of a suitable alternative water supply will adequately mitigate the potential for ingestion or contact with contaminated water in the municipal supply system. Institutional controls will ensure that no future use of contaminated domestic wells will occur. Groundwater extraction and discharge of treated effluent to surface waters will pose no unacceptable impact to environmental receptors and will be performed in full compliance with applicable regulations (i.e., NPDES discharge permits).

Analysis of Process Option 2A - Liquid Phase UV Photolysis-Ozonation Technology

This option provides UV photolysis-ozonation (UV/Ozone) treatment with Alternative No. 2.

Short-Term Effectiveness

Implementation of this option would not cause an increased risk to the community provided institutional controls are properly administered and an alternate municipal water source was available during construction and permitting of the treatment system. Implementation of this system would require that Municipal Well No. 3 be taken off-line from the potable water supply system for a portion of the construction phase. This period would be expected to last approximately three to six months. During the replacement of the pump at Municipal Well No. 3, workers should be aware of the possibility of organic vapors being released from the well. Continuous air monitoring would be undertaken during construction and appropriate personal protective equipment (PPE) would be utilized.

Long-Term Effectiveness

This process would provide adequate treatment capability in long-term operation. Contaminant levels in the water would be reduced to the effluent requirements as specified in the appropriate permits. No releases to the air would be expected because the contaminants are destroyed.

Because O&M of this system is somewhat complex, the possibility of a system malfunction is increased. The overall reliability of the various treatment options must be considered when comparing this option to less complicated treatment methods with similar results.

Implementability

Installation of the treatment system would require the replacement of the current well pump at Municipal No. 3. The UV/Ozone reaction unit would arrive on-site, pre-assembled. The existing piping, electrical and control systems would be modified to install the new treatment systems. New pad and foundations would be required while utilizing the existing structure for housing electrical and control systems. All design and permitting would be done prior to bringing the treatment system on-line with the potable water supply system.

Reduction of Toxicity, Mobility, and Volume of Contaminants

UV/Ozone treatment in conjunction with ground water extraction reduced the toxicity, mobility and volume of the contaminants. Mobility and volume reductions are provided by ground water extraction. This treatment technology consists of chemical treatment (as opposed to physical treatment); thus, the contaminants are oxidized to inert products (water and carbon dioxide).

Because the contaminants are chlorinated hydrocarbons, chloride products will also result and may require further treatment if concentrations exceed recommended values.

Cost

Capital costs for this option include those costs associated with implementation of the minimal/no-action technologies, and the equipment needed for the UV/Ozone treatment system. These initial costs are estimated to be $793,000. Capital costs for replacement and reconditioning of equipment are expected to be approximately $98,000 every five years. Operating costs for this system are approximately $131,000 per year. The operating cost is largely composed of the electrical costs for the UV lamps and the ozone generator. The net present worth cost of this option is $3.10 million for a 30 year operating life and a five percent discount rate.

Compliance with ARARs

This process option complied with ARARs for municipal water and discharge to surface waters. No air emissions would occur because VOCs are completely destroyed in the treatment process.

Overall Protection of Human Health and the Environment

Protection from dissolved organics in the water pumped to the potable water system is provided by the UV/Zone treatment system. Because this option reduced the TMV of the contaminants, it provided a great deal of overall protection. Institutional controls proposed as part of the basic alternative provide protection by obviating the future possibility of exposure to untreated ground water from residential wells. This alternative effectively protects the public from hazards created by absorption, ingestion, and inhalation exposure via the municipal water supply. Because no air releases are generated, no risks via this pathway are created. The estimated carcinogenic risk of using the municipal water supply is lowered from 1.0×10^{-3} (baseline case) to at least 3.3×10^{-5}, with adherence to the contaminant levels established in the Water Supply Permit for Municipal Well No. 3 by the PADER (Appendix A).

Analysis of Process Option 2B - Liquid Phase Carbon Adsorption Technology

This option provides liquid phase granular activated carbon treatment for Alternative No. 2.

Short-Term Effectiveness

Implementation of this technology is not expected to result in an increased risk in the short term provided the institutional controls are administered properly and an alternative water supply (e.g., springs) is available to the residents during construction. Implementation of this system would required that Municipal Well No. 3 be taken off-line from the potable water supply system for a portion of the construction phase. This period would be expected to last approximately two to four months. During the replacement of the pump at Municipal Well No. 3, workers should be aware of the possibility of organic vapors being released from the well. Screening instruments would be used to monitor the breathing zone. Effectiveness during the periods when the carbon is approaching saturation would not be reduced if a standby adsorption unit was always available. This setup would allow the operator to bring the stand by carbon unit on line and remove the spent bed in a short period of time.

Long-Term Effectiveness and Permanence

Long-term effectiveness should remain high through the lifetime of the project with this treatment option. Carbon adsorption is a very effective methods of removing low levels of VOCs from ground water. Monitoring of the effluent discharge from the carbon units will identify the most efficient changeout time and maximal carbon usage. In this event that contaminant concentrations in the water rise, the system will retain its effectiveness but the carbon usage will increase with more frequent changeout.

Implementability

Implementability of carbon adsorption system is relatively simple. Granular activated carbon units are pre-assembled and are easily linked. The control system, associated with this treatment technology, is not complex and can be installed in a short period of time. Construction of the system is expected to take two to four months. Carbon adsorption is effective at reducing the volume of contaminants but not their toxicity, thus spent carbon must be disposed of or regenerated.

Cost

Costs for Alternative No. 2 with the liquid phase carbon system are the highest among process options presented here due to the high operating cost associated with carbon replacement. The initial capital expenditure projected for this option is expected to be approximately $584,000.

Five year replacement/reconditioning costs can be converted to a net present worth cost of $4.77 million for a 30 year lifetime and 5 percent discount rate.

Compliance with ARARs

This treatment option complied with ARARs for water supply and discharge to surface waters. No air emissions would be associated with this treatment option.

Overall Protection of Human Health and the Environment

This option reduces the possibility of contact with contaminated ground water by implementation of institutional controls, and the use of liquid phase liquid phase carbon reduces the level of contamination in the ground water before it is sent to the potable water system. This protection can be seen in the reduction of risk from 1.1. x 10^{-3} to at least 3.3. x 10^{-5} for use of the municipal water supply. Because no vapor effluent is generated, no risk is associated with airborne contaminants.

Analysis of Process Option 2C - Air Stripping Technology

This option provides air stripping treatment for Alternative No. 2. Appendix A contain a detailed explanation of the air stripping system currently in use at Municipal Well No. 3.

Short-Term Effectiveness

Because there is an operational air stripping system at the BES site, implementation of this alternative would not cause an increased risk to the community or the environment in the short-term. This system is capable of 24 hour per day operation and can be initiated immediately.

Long-Term Effectiveness and Permanence

The air stripping system currently in operation at Municipal Well No. 3 has been proven to be effective at reducing the VOC concentrations in the ground water to levels below those required by the Pennsylvania Safe Drinking Water Act of May 1, 1987 (Public Law [P.L.] 206, No. 43); the Clean Water Act, 33 U.S.C., Section 1251, et seq. (the "Act"); and the Pennsylvania Clean Streams Law, as amended, 35 P.S., Section 69.1., et seq. The effectiveness of the air stripping towers at removing VOCs from the ground water to acceptable levels will remain constant unless the contaminant concentrations in the water increase markedly. A determination of the overall effectiveness of this alternative must also consider the risks associated with the release of the VOCs to the air.

Estimated risks were calculated in the RI for future ground water supply conditions that would utilize this alternative, assuming a switch from primary reliance on Municipal Well No. 1 to treated Municipal Well No. 3 for potable water supply. The risk was calculated as a worst-case because the total supply was assumed to be derived from Municipal Well No. 3 with no dilution from the springs. The carcinogenic risk for potable water exposure is reduced from 1.0 x 10^{-3} (current conditions) to 3.3. x 10^{-5} under the this alternative. This reduction is consistent with achieving the contaminant levels specified in the PADER Water Quality Permit.

Risk reduction is accomplished over the long-term by reducing contaminant concentrations in the water used by the public, while also reducing the possibility of residents contacting untreated water at private wells through the use of institutional operation and maintenance of the air stripping system, a ground water monitoring program, and performance of semi-annual site inspections and site reviews every five years.

Carcinogenic risks associated with VOC releases from the stripping towers to the air have been estimated by utilizing an air-dispersion model and actual weather data (i.e., stability classes and wind speeds) from Allentown, Pennsylvania for 1981. Using the nearby residents and children playing in the adjacent ballfield as worst-case receptors, the airborne concentrations were estimated using an air dispersion model. The carcinogenic risk for exposure to these levels was calculated to be in the range of 7.3×10^{-5} to 1.8×10^{-6}. The details of the air-dispersion model and exposure assumptions and calculations are presented in Appendix B.

Implementability

Implementation of this option is demonstrated by the presence of the air stripping system on site.

Reduction of Toxicity, Mobility, and Volume of Contaminants

The air stripping treatment system, in conjunction with other components of Alternative No. 2, is capable of reducing the mobility of VOCs in ground water. Because VOCs are not destroyed but are transferred from ground water to air, no reduction in toxicity of contaminants occurs directly as a result of air stripping. However, VOCs will be subject to some photolytic degradation and dispersion upon release to the air.

Cost

Costs for the air stripping alternative are significantly reduced due to the presence of the operating air stripping treatment system at Municipal Well No. 3. For this reason, no capital costs are required to implement this treatment process option. A capital cost for repairing or replacing equipment of $47,000 every five years is expected. An annual operating cost of $57,700 includes the administrative costs for institutional controls and operation of the air stripping system. These cost represent a net present worth cost of $1.2 million with a discount rate of 5 percent and a 30-year operating life.

Compliance with ARARs

The air stripping process option has demonstrated effectiveness in achieving ARARs for public water supply and discharge to surface waters. Acceptable emissions levels will be established in the PADER Air Operating Permit.

Overall Protection of Public Health and the Environment

The air stripping treatment system provides adequate protection from adverse effects caused by contact with contaminated water. This protection is seen in the reduction in risk associated with use of the current municipal water supply from 1.0×10^{-3} to 3.3×10^{-5} for lifetime use of treated water from Municipal

Well No. 3. Air stripping does not, however, provide protection from contact with airborne VOCs. However, the worst-case risk calculated for 30 year exposure to the airborne VOCs is only 7.3. x 10^{-5} which is within acceptable risk range of 10^{-4} to 10^{-7} established by EPA policy for CERCLA remedial action.

Analysis of Process Option 2D - Air Stripping/Vapor Phase Carbons Technology

This option combines ground water extraction with the air stripping treatment option and vapor phase carbon adsorption for treatment of the off-gas containing the VOCs with Alternative No. 2. Figure 9 provides the process flow diagram for this option.

Short-Term Effectiveness

Implementation of this option will require retrofitting of the existing treatment system, estimated to take approximately four to six months. During a portion of this period, the current air stripping system could not function to provide an alternative water supply or as a remedial response action. For this reason, minimal effectiveness would occur in the short term. After completion of the modifications to the air stripping system, the entire treatment system can be operated full time for remedial purpose.

The minimal protection provided during construction is identical to that presented with the minimal/no-action alternative. When the air stripper is operating following the installation of the carbon units, the protection provided for potable water use is identical to that given for the air stripping alternative.

Long-Term Effectiveness and Permanence

Reduction in the risk associated with use of the municipal water supply from 1.0 x 10^{-3} (current risk) to 3.3. x 10^{-5} would occur after implementation of this treatment option. The estimated risk associated with inhalation of VOCs emitted from the air stripping towers without gas collection and treatment (Option 2C) would be reduced by approximately two orders of magnitude with Process Option 2D. This reduction in risk associated with air is the result of treating the effluent gas from the air stripping towers with the vapor phase carbon adsorption units based on 99.9 percent removal efficiency.

Implementability

Implementation of this option is greatly facilitated by the existence of an air stripping system on-line at Municipal Well No. 3. This option would require that vapor effluent from the existing stripping towers be vented to vapor phase carbon adsorption units to remove the VOCs before discharging the air. In order to improve the efficiency of the carbon units, a heater would be installed on each air duct leaving the towers to reduce the relative humidity of the air stream prior to adsorption. These modifications to the existing system are expected to take three months for completion. Permits currently applying to the air stripping system would require modifications to account for alterations to the system.

Reduction in Toxicity, Mobility, and Volume of Contaminants

TMV considerations relative to mobility and volume are identical to those with Process Option 2C though collection of VOC emissions on the activated carbon air emissions are essentially eliminated. Regeneration of the spent carbon will be performed by the vendor.

Cost

Initial capital costs for this option include those costs associated with implementation of the minimal-action technologies, modifications to the existing air stripping system, and the first set of activated carbon units. These costs are estimated to be $484,000. Capital costs for replacing or reconditioning equipment are estimated to be $82,000 every five years. Operating costs for the air stripping/vapor phase carbon adsorption option are considerably higher than for air stripping due to the added cost of carbon replacement. The total annual operating cost is estimated to be $189,000. For comparison, these costs can be converted to a net present worth cost of $3.64 million for the 30-year operating life and a discount rate of five percent.

Compliance with ARARs

Treatment with this process option would comply with ARARs for water supply and aquifer restoration. No release of VOCs to ambient air would occur. Spent carbon units would be regenerated by the vendor.

Overall Protection of Human and the Environment

Protection from hazards created by contaminated water is provided by the air stripping treatment of the ground water. Protection from inhalation of airborne VOCs is through off-gas collection by the activated carbon units. This process option effectively provides protection from the contaminants affecting the public through absorption, ingestion, and inhalation. The decrease in risk associated with use of ground water from the municipal supply system is identical to that given for the air stripping alternative. The risk associated with inhalation of airborne VOCs is also reduced by about two orders of magnitude in comparison with that calculated for the air stripping option alone.

Analysis of Process Option 2E - Air Stripping with Regenerable Vapor Phase Carbon Technology

This process option combines air stripping treatment and vapor phase carbon adsorption for treatment of the gas containing the VOCs with Alternative No. 2. It differs from Option 2D in that the carbon is regenerated on site and the VOCs are periodically destroyed in a thermal oxidation unit.

Short-Term Effectiveness

Installation of this equipment is estimated to take four to six months. During a portion of this period, the current air stripping system could not function to provide an alternative water supply or remedial response. For this reason, the effectiveness is considered minimal during this initial period. After completion of the modifications to the air stripping system, the entire treatment system can be operated full time for water supply, as well as ground water extraction and treatment.

The minimal protection provided during construction is identical to that presented with the minimal/no-action alternative. When the air stripper becomes operational with this process option, the protection provided to the municipal water supply is identical to that given for the air stripping alternative.

Long-Term Effectiveness and Permanence

After the four to six month construction period, this treatment option will provide an adequate level of protection for water supply purpose. Protection from adverse effects caused by elevated VOC concentrations can be seen in the reduction in the risk associated with use of the municipal water supply from 1.0 x 10^{-3} to 3.3. x 10^{-5}. The risk associated with the airborne VOCs will be reduced approximately two orders of magnitude through collection of off-gases. This risk reduction is based on 99.9 percent removal efficiency, which can be achieved via vapor phase carbon treatment.

Implementability

Implementation of this option is greatly facilitated by the existence of an air stripping system on-line at Municipal Well No. 3. This option would require that the air discharge from the existing stripping towers be routed to vapor phase carbon adsorption units to remove the VOCs prior to being discharge to the air. In order to improve the efficiency of the carbon units, a heater would be installed on each air duct from the towers to reduce the relative humidity of the air stream. Also, a thermal regeneration unit is included to regenerate the spent carbon on site and to destroy the VOCs by thermal oxidation. This significantly reduced the operating costs associated with vapor phase carbon. These modifications to the existing air stripping treatment system would require four to six months to complete. Permits currently applying to the air stripping system would require modifications to account for alterations to the system. These issues are included in the cost estimate prepared for this option.

Reduction in Toxicity, Mobility and volume of Contamination

TMW considerations for this process option are the same as those identified for Option 2D. The on-site thermal oxidation unit would ensure destruction of the VOCs, thereby reducing toxicity.

Cost

Initial capital costs for this process option include modifications to the existing air stripping system and the first set of activated carbon units. These costs are estimated to be $992,000. Capital costs for replacing or reconditioning equipment are estimated to be $116,000 every five years. Operating costs for the air stripping/vapor phase carbon adsorption option are considerably higher than or air stripping due to is estimated to be $105,000. For comparison, these costs can be converted to a net present worth cost of $2.95 million for the 30-year operating life and a discount rate of five percent.

Compliance with ARARs

This process option complied with all ARARs for water supply and aquifer restoration. There are also no significant air emissions.

Overall Protection of Human Health and the Environment

Protection from hazards created by contaminated water is provided by the air stripping treatment of the ground water. Protection from inhalation of airborne VOCs is ensured by the activated carbon units. This alternative effectively provides protection from the contaminants affecting the public through absorption, ingestion, and inhalation. The decrease in risk associated with use of the municipal water supply is identical to that discussed for the air stripping alternative. The risk associated with airborne VOCs is also reduced by approximately two orders of magnitude in comparison to Option 2C.

Analysis of Process Option 2F - Air Stripping/Vapor Phase Catalytic Oxidation Technology

This option provides air stripping treatment and vapor phase catalytic oxidation for treatment of the off-gas containing the VOCs with Alternative No. 2.

Short-Term Effectiveness

Installation of this equipment is estimated to take four to six months. During a portion of this period, the air stripping system could not function to treat water from Municipal Well No. 3. For this reason, the effectiveness is only minimal for the initial construction period. After completion of the modifications to the air stripping system, the treatment system would be fully operational to address both alternative water supply and ground water extraction and treatment.

The minimal protection provided during construction is identical to that presented with the minimal/no-action alternative. When the air stripper becomes operational with this process option, the protection provided for potable water use is identical to that give for the air stripping alternative.

Long-Term Effectiveness

After the four to six month construction period and the modifications are complete, adequate protection will be provided by the system. The risk associated with use of the municipal water supply will be reduced from 1.0.

x 10^{-3} to 3.3. x 10^{-5}. The risk associated with the airborne VOCs will also be reduced by approximately two orders of magnitude. This increased protection is the result of treating the effluent gas from the air stripping towers with the vapor phase catalytic oxidation unit. This risk reduction is based on 99.9 percent removal efficiency, which can be achieved via vapor phase catalytic oxidation.

Implementability

Implementation of this option is greatly facilitated by the existence of an air stripping system on-line at Municipal Well No. 3. This option would require that air discharge effluent from the existing stripping towers be routed to a vapor phase catalytic oxidation unit to remove the VOCs prior to being discharge to the air. These modifications to the existing system are expected to take four to six months for completion. Permits currently applying to the air stripping system would require modifications to account for alterations to the system. All of these issues are included in the cost estimate prepared for this option.

Reduction in Toxicity, Mobility, and Volume of Contaminants

TMW considerations are identical to those discussed for Option 2E.

Cost

Initial capital costs specified to this option include those costs associated with modifications to the existing air stripping system, and acquisition of the catalytic oxidation unit. These costs are estimated to be $707,000. Capital costs for replacing or reconditioning equipment are estimated to be $110,000 every five years. The total annual operating cost is estimated to be $145,000. For comparison, these costs can be converted to a net present worth cost of $3.28 million for the 30-year operating life and an annual inflation rate of 5 percent.

Compliance with ARARs

Compliance with ARARs is identical to that discussed for Option 2E.

Overall Protection of Human Health and the Environment

Protecting from hazards created by contaminated water is provided by the air stripping treatment of the ground water. Protection from inhalation of airborne VOCs is achieved via the catalytic oxidation unit. This alternative effectively provided protection from the contaminants affecting the public through absorption, ingestion, and inhalation. The decrease in risk associated with use of the municipal water supply is identical to that estimated for other air stripping options. The risk associated with airborne VOCs is reduced by about two orders of magnitude with referenced to Option 2C through off-gas collection.

XI. Documentation of Significant Changes

No significant changes to the preferred alternative presented in the proposed plan have occurred.

XII. Selected Remedial Criteria

A. Evaluation Criteria

Section 121 of SARA and the current version of the National Contingency Plan (NCP) (50 Fed. Reg. 47912, November 20, 1985) establish a variety of requirements pertaining to remedial actions under CERCLA. The following nine criteria were used in the evaluation of the remedial action alternatives at Bally:

- Overall protection of human health and the environment addresses whether or not a remedy provides adequate protection and describes how risks posed through each pathway are eliminated, reduced or controlled through treatment, engineering controls, or institutional controls.

- Compliance with ARARs addresses whether or not a remedy will meet all of the applicable or relevant and appropriate requirements of other Federal and State environmental statutes and/or provides ground for invoking a waiver.

- Long-term effectiveness and permanence refers to the ability of a remedy to maintain reliable protection of human health and the environmental over time once cleanup goals have been met.

- Reduction of toxicity, mobility or volume is the anticipated performance of the treatment technologies a remedy may employ.

- Short-term effectiveness addresses the period of time needed to achieve protection, and any adverse impacts on human health and the environment that may be posed during the construction and implementation period until cleanup goals are achieved.

- Implementability is the technical and administrative feasibility of a remedy, including the availability of materials and services needed to implement a particular option.

- Cost includes estimated capital and operation and maintenance costs and net present worth costs.

- State Acceptance indicates whether, based on its review of RI/FS and Proposed Plan, the State concurs on, opposes, or has no comment on the preferred alternative at the present time.

- Community Acceptance will be assessed in the Record of Decision following a review of the public comments received on the Administrative Record and Proposed Plan.

B. Determination of Preferred Remedial Alternative

The preferred alternative is alternative number 2 with D, E, or F process option selection based on final design decisions and air emission concentration. This alternative selects the treatment of groundwater by airstripping with appropriate air emissions controls and meets the goal of protecting human health and the environment and restoring the contaminated groundwater to a clean and uncontaminated condition.

The preferred alternative provides complete protection and final remediation in the short and long-term.

EPA, in consultation with PADER, has made a preliminary determination that the preferred alternative provides the best balance of tradeoff with respect to the nine criteria. The preferred alternative is anticipated to meet the following statutory requirements to:

- Protect human health and the environment
- Attain ARARS
- Be cost-effective
- Utilize permanent solutions and alternative treatment (or resource recovery) technologies to the maximum extent practicable

In summary, at this time the preferred alternative is believed to provide the best balance of trade-offs among alternatives with respect to the criteria used to evaluate remedies. Based on the information available at this time, therefore, EPA and PADER believe the preferred alternative would be protective, would attain ARARs, would be costeffective, and would utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable.

Schedule

Remedial Design and Construction for the final remedy is anticipated to commence in Fall 1989.

C. Statement of Findings Regarding Wetlands and Floodplains

The focus of this decision is to provide and interim remedial alternative for the contaminated groundwater, defined as the first operable unit for this site. Further work at this site will consider the impact of contamination on wetlands, floodplains and surface water. A wetlands assessment will be performed during the next phase of this project.

XIII. Statutory Determinations

A. Protection of Human Health and the Environment

The selected remedy will reduce and controls the amount of groundwater contamination which will ensure adequate protection of human health and the environment. No unacceptable short and long-term risks or cross-media impact will be caused by implementation of the remedy.

Based on a review of volatile organic chemical analytical data from collected groundwater samples from impacted off-site wells and given the vinyl chloride concentrations in the untreated groundwater, the use of granular activated carbon filters has proven to be successful in reducing the concentrations of the contaminants of concern (TCE, DCE) to non-detectable levels.

B. Attainment of ARARs

The selected remedy will attain the applicable or relevant and appropriate requirements by:

- Preventing current and future ingestion of ground water containing unacceptable levels of VOCs, and
- Restoring the aquifer within a reasonable time frame to a condition such that levels of indicator VOCs are below remediation levels and the aquifer may be suitable for use as a Class II aquifer.

The ARARs are as follows:

Federal

Safe Drinking Waste Act	- MCLs
Clean Water Act	- Ambient Water Quality Criteria
Clean Air Act, Part D	- Ozone Non-Attainment Area Criteria
National Ambient Air Quality Standards	- VOC Standards

State

Pennsylvania Clean Stream Law - Section 402	- Ambient Water Quality Standards
Pennsylvania Air Resource Regulations	- VOC Standards for Ozone Non-Attainment Areas
Pennsylvania Air Toxic Guidlines	- Ambient Ground-level Contamination Standards

Additional Requirements for Protectiveness

The selected site remedy is consistent with the following:

Federal Executive Order 11988, Floodplain Management 40 C.F.R. Part 6, Appendix	- Action to avoid adverse effects, minimize potential harm, restore and preserve natural beneficial value.
Federal Executive Order 11990, Protection of Wetlands, 40 C.F.R. Part 6, Appendix A	- Action to minimize destruction, loss, or degradation of wetlands.
Federal Clean Water Act	- Differential Groundwater Policy Class IIA aquifer

C. Cost-effectiveness

The selected remedy provides overall effectiveness commensurate to its costs such at that it represents value for the money. The PRPs are maintaining the current systems described in the selected remedial alternative in compliance with the PADER Consent Order and Agreement. This is a cost savings to the government.

D. Utilization of permanent solutions employing alternative technologies to the maximum extent practicable

The selected remedy is the most appropriate solution for this operable unit and represents the maximum extent to which permanent solutions and treatment can be practicably utilized.

E. Preference for treatment a principal element

The preference is satisfied since treatment is the principle element of the chosen alternative.

APPENDIX A

ANALYTICAL DATA

TABLE 3-3
ON-/OFF-SITE WELLS - SAMPLING RESULTS
(all results ppb)
(blank = none detected)

Well #	Date Sampled (1986)	Total Chlorinated Volatiles	1,1-Dichloroethene	1,1-Dichloroethane	Trans-1,2 Dichloroethene	Chloroform	1,2-Dichloroethane	1,1,1-Trichloroethane	Trichloroethene	Tetrachloroethene
86-1	5/12									
86-2	5/13									
86-3S	5/12	1482	170	8				1300	4	
86-3D	5/12	676	130	240				210	90	
86-4	5/13	7244	570	7	11	7	2	2300	4300	47
86-5S	5/12	3						3		
86-5D	5/12	145	4					31	110	
Plant Site Well	5/13	240	10		12			11	170	37
Farm Products	5/13									
Gr. Amer. Knit.	5/13	43	3					26	14	
Bally Rib. Mill	5/13	39	2					27	4	6
G. Smith Res.	5/13									
Kohs Bros.	5/13									
C. Conrad Res.	5/13									
L. Bauer Res.	5/13									
Moser Res.	5/13									
Gehman Res.	5/14	304	34					160	110	
Longacre Dairy	5/14									
Mace Residence	5/14									
Munic. Well #1	5/14	61	5					46	10	
Munic. Well #3	5/14	3509	360	4		1	1	2500	640	3
PMLC[a]			7				5	200	5	5

[a]PMLC: EPA Proposed Maximum Contaminant Levels (11/85)

NOTE: Well locations shown on Figures 3-3 and 3-6.

Source:
"Hydrogeologic Investigation of the Bally Engineered Structures, Inc. Facility, Bally, Pennsylvania, Phase II Report," October 27, 1986, Environmental Resources Management, West Chester, Pennsylvania

TABLE 7
CHEMICAL-ANALYTICAL DATA
SOIL
BALLY ENGINEERED STRUCTURES RI/FS
BALLY, PENNSYLVANIA

S A M P L E N U M B E R

COMPOUND (ug/kg)	SS1-002 2.0-4.0	SS1-003 4.0-6.0	SS2-004 6.0-8.0	SS3-005 7.0-9.5	SS4-005 8.0-10.0	SS6-001 3.0-3.2	SS6-002 4.9-5.3	SS6-002A 4.9-5.3	SS6-003 7.0-7.3	SS7-002 3.3-3.8	SS7-005 7.1-7.4
1,1,1-Trichloroethane	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6	<6
Trichloroethane	<6	<6	<6	<6	<6	<6	<6	3J	<6	<6	<6
Toluene	R	R	R	R	R	<6	<6	<6	<6	<6	<6
Methylene Chloride	R	R	R	R	R	R	R	R	R	R	R
Acetone	R	R	R	R	R	R	R	R	R	R	R

COMPOUND (ug/kg)	SS9-001 4.0-6.0	SS9-001A 4.0-6.0	SS9-002 6.0-8.0	SS10-001 0-2.0	SS11-001 3.0-5.0	SS11-002 7.0-9.0	SS11-003 10.0-12.0	SS12-002 3.0-5.0	SS12-003 5.0-7.0	SS13-001 7.0-8.0	SS13-002 10.0-12.0	SS14-001 3.0-5.0	SS14-003 7.0-9.0
1,1,1-Trichloroethane	<6	<6	<6	<6	6	13	10	<6	<6	<6	<6	<6	<6
Trichloroethane	<6	<6	<6	<6	8	<6	<6	<6	<6	<6	<6	<6	<6
Toluene	R	R	R	<6	43	6	5J	13	36	<6	<6	<6	<6
Methylene Chloride	R	R	R	R	R	R	R	R	R	R	R	R	R
Acetone	R	R	R	R	R	R	R	11	12	R	R	R	R

NOTES: See Figure 3 for soil boring (SS1 etc.) locations; 4.0-6.0 etc. indicates depth from which sample was taken.
R indicates the chemical was rejected during the validation process.
J indicates an estimated concentration.

TABLE 7 (CONT)

S A M P L E N U M B E R

COMPOUND (ug/kg)	SS-16-1 0.0-1.5	SS-16-2 6.0-7.5	SS-17-3 9.0-10.0	SS-18-1 12.0-14.0	SS-19-1 6.0-8.0	SS-19-1 6.0-8.0 (SPLIT)	SS-19-2 14.0-16.0	SS-19-2 14.0-16.0 (SPLIT)	SS-20-1 15.0-16.0	SS-21-2 15.0-16.0	SS-22-2 5.0-6.0	SS-22-3 11.0-12.0	SS-22-4 19.0-20.0
1,1,1-Trichloroethane	<620	<125	<125	<125	<125	<6.0	<620	<6.0	<125	<125	<125	<125	<100
1,1,2-Trichloroethane	<620	<125	<125	<125	<125	<6.0	<620	12.0	<125	<125	<125	<125	<100
Trichloroethene	<620	<125	<125	<125	<125	<6.0	<620	320	<125	<125	<125	<125	<100
1,1-Dichloroethene	<620	<125	<125	<125	<125	<6.0	<620	12.0	<125	<125	<125	<125	<100
1,2-Dichloroethene	<620	<125	<125	<125	<125	<6.0	<620	6.0	<125	<125	<125	<125	<100
Tetrachloroethene	<620	<125	<125	<125	<125	<6.0	<620	<6.0	<125	<125	<125	<125	<100

COMPOUND (ug/kg)	SS-23-1 8.0-9.0	SS-23-2 19.0-20.0	SS-25-1 19.5-20.0	SS-26-1 6.5-7.5	SS-26-2 21.0-22.0	SS-27-1 0.5-1.0	SS-27-2 4.0-6.0	SS-27-4 20.0-22.0	SS-28-1 5.0-6.0	SS-28-2 19.0-20.0	SS-29-3 17.0-18.0	SS-29-3 17.0-18.0 (SPLIT)
1,1,1-Trichloroethane	<125	<125	<125	<125	<125	<5.0	<125	<125	<125	<125	<125	<6.0
1,1,2-Trichloroethane	<125	<125	<125	<125	<125	<5.0	<125	<125	<125	<125	<125	<6.0
Trichloroethene	<125	<125	<125	<125	<125	<5.0	<125	<125	<125	<125	<125	<6.0
1,1-Dichloroethene	<125	<125	<125	<125	<125	<5.0	<125	<125	<125	<125	<125	<6.0
1,2-Dichloroethene	<125	<125	<125	<125	<125	<5.0	<125	<125	<125	<125	<125	<6.0
Tetrachloroethene	<125	<125	<125	<125	<125	<5.0	<125	<125	<125	<125	<125	<6.0

COMPOUND (ug/kg)	SS-30-2 11.0-12.0	SS-31-1 13.0-14.0	SS-32-1 6.0-8.0	SS-32-2 11.0-12.0
1,1,1-Trichloroethane	<125	<125	<125	<125
1,1,2-Trichloroethane	<125	<125	<125	<125
Trichloroethene	<125	<125	<125	<125
1,1-Dichloroethene	<125	<125	<125	<125
1,2-Dichloroethene	<125	<125	<125	<125
Tetrachloroethene	<125	<125	<125	<125

NOTES: See Figure 3 for soil boring (SS1 etc.) locations; 4.0-6.0 etc. indicates depth from which sample was taken.
Sample numbers listed on this page are each prefixxed by "RD-".
SPLIT" refers split sample submitted to separate laboratories for analysis.
Analytical data for samples RD-SS-16 to RD-SS-29 were not subjected to CLP validation [illegible]

TABLE 10
CHEMICAL-ANALYTICAL DATA
SURFACE WATER AND SEDIMENT
BALLY ENGINEERED STRUCTURES RI/FS
BALLY, PENNSYLVANIA

SURFACE WATER SAMPLE NUMBER

DETECTED COMPOUND (ug/l)	SW1-001	SW1-001A	SW2-002	SW3-003	RB-SW-01	RB-SW-02
Chloroform	ND	ND	ND	ND	ND	ND
Methylene Chloride	3BJ	3BJ	ND	ND	ND	ND
Acetone	14	13	ND	ND	ND	ND
1,1-Dichloroethene	ND	ND	ND	ND	ND	18
1,2-Dichloroethene	ND	ND	ND	ND	ND	16
1,1,1-Trichloroethane	ND	ND	ND	ND	ND	6
Trichloroethene	ND	ND	ND	ND	ND	ND

SEDIMENT SAMPLE NUMBER

DETECTED COMPOUND (ug/l)	SD1-001	SD1-001A	SD2-002	SD3-003	RB-SW-S1	RB-SW-S2
Chloroform	ND	ND	ND	79	ND	ND
Methylene Chloride	5BJ	5BJ	ND	12J	ND	ND
Acetone	7BJ	15BJ	ND	200BJ	ND	ND
1,1-Dichloroethene	ND	ND	ND	ND	ND	ND
1,2-Dichloroethene	ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	ND	ND	ND	ND	ND	ND
Trichloroethene	ND	ND	ND	ND	ND	11

NOTES: See Figure 2B for sample locations.
SW or SW-00 indicates surface water.
SD or SW-S0 indicates sediment.
ND indicates chemical was not detected above the method detection limit.
B indicates the chemical was also detected in the method blank.
J indicates the quantitation is estimated.

TABLE 8
CHEMICAL-ANALYTICAL DATA
GROUND WATER (MONITORING, MUNICIPAL, AND INDUSTRIAL WELLS)
BALLY ENGINEERED STRUCTURES RI/FS
BALLY, PENNSYLVANIA

SAMPLE NUMBER

CHEMICAL (ug/l)	IW-001	IW-002	PW-001	IW-003	BW-001	BW-003	BW-003A	MW-001	MW-002	MW-03S	MW-03SA	MW-03D	MW-04S
1,1,1-Trichloroethane	53	70	ND	ND	73	840	620	ND	ND	1000	1100	100	60
Trichoroethene	9	32	45	ND	15	260	200	ND	ND	ND	ND	ND	410
1,1-Dichloroethene	10	19	ND	ND	19	290	210	ND	ND	280	300	100	35J
1,1-Dichloroethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	60	ND
Tetrachloroethene	ND	ND	6	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

CHEMICAL (ug/l)	MW-04I	MW-05S	MW-05D	MW-07S	MW-07I	MW-08I	MW-09I	MW-10I	MW-10D	MW-11S	MW-11I	MW-12D	MW-13S
1,1,1-Trichloroethane	470	ND	ND	ND	47	4J	ND	600	1300	3J	ND	780	4J
Trichoroethene	3100	ND	ND	ND	15	ND	ND	870	970	7	ND	670	17
1,1-Dichloroethene	200	ND	ND	ND	14	ND	ND	330	410	ND	ND	310	3J
1,1-Dichloroethane	81J	ND	2J	ND	3J	ND	ND	230	ND	ND	ND	370	ND
Methylene Chloride	ND	ND	ND	3BJ	ND	ND	ND	21J	60BJ	ND	ND	100	3BJ
Toluene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	3J
Acetone	ND	ND	ND	23	ND	ND	ND	ND	200	ND	ND	ND	37

NOTES: See Figure 4 for well locations.
ND indicates chemical was not detected above the method detection limit.
B indicates the chemical was also detected in the method blank.
J indicates the quantitation is estimated.

IW = Industrial Well
IW-001 is the Bally Ribbon Mill's Well.
IW-002 is the Great American Knitting Mill's Well.
IW-003 is the Longacre Dairy Well.

PW-001 is the BES Plant Well.

BW = Borough (Municipal) Well
BW-001 is Municipal Well No. 1.
BW-003/003A is Municipal Well No. 3.

TABLE 9
CHEMICAL-ANALYTICAL DATA
GROUND WATER (RESIDENTIAL WELLS)
BALLY ENGINEERED STRUCTURES RI/FS
BALLY, PENNSYLVANIA

SAMPLE NUMBER

CHEMICAL (ug/l)	RW-001 KERN	RW-002 CONRAD	RW-003 SMITH	RW-004 STOFFLET	RW-005 MELCHER	RW-006 MELCHER	RW-007 GERMAN	RW-008 BAUMAN	RW-009 HACK	RW-010 MOSER	RW-010A MOSER	RW-011 FARM PRODUCTS
1,1,1-Trichloroethane	ND	ND	ND	ND	ND	ND	420	ND	ND	ND	ND	ND
Trichloroethene	ND	ND	ND	ND	ND	ND	100	ND	ND	ND	ND	ND
1,1-Dichloroethene	ND	ND	ND	ND	ND	ND	120	ND	ND	ND	ND	ND

NOTES: See Figure 4 for well locations.
ND indicates chemical was not detected above the method detection limit.

TABLE 11

DOSE-RESPONSE EVALUATION
HUMAN HEALTH EFFECTS
BALLY ENGINEERED STRUCTURES SITE

CHEMICAL	CPF (mg/kg/day) ORAL	CPF (mg/kg/day) INHALATION	AIC[1,2] (mg/kg/day) ORAL	AIC[1,2] (mg/kg/day) INHALATION	MCL[3] (MCLG) (mg/l)	EPA DRINKING WATER HEALTH ADVISORIES ONE-DAY 10 kg (mg/l)	TEN-DAY 10 kg (mg/l)	LIFETIME 70 kg (mg/l)	AWQC (drinking water only)
1,1,1-Trichloroethane	NC[4]	NC	5.4×10^{-1}	6.3	0.20	140	35.0	1.0	NA
Trichloroethene	1.1×10^{-2}	1.3×10^{-2}	9.0×10^{-2}	NA[5]	0.005	NA	NA	NA	0
1,1-Dichloroethene	5.8×10^{-1}	1.16	9.0×10^{-3}	NA	0.007	1.0	1.0	NA	0
1,1-Dichloroethane	NC	NC	1.2×10^{-1}	1.38×10^{-1}	NA	NA	NA	NA	NA
Tetrachloroethene	5.1×10^{-2}	3.3×10^{-3}	1.0×10^{-2}	NA	(0)	NA	34.0	NA	0
Methylene Chloride	7.5×10^{-3}	1.43×10^{-2}	6.0×10^{-2}	NA	NA	NA	NA	NA	0
				NA				NA	

(1)AIC - Allowable Intake on a Chronic Basis.
(2)AICs given for 1,1,1-trichloroethane and methylene chloride are from Health Effects Assessment Documents; all others are RFDs.
(3)MCL - Maximum Contaminant Level - federal drinking water standard.
(4)"NC" indicates noncarcinogen.
(5)"NA" indicates not available.

BALLY GROUNDWATER CONTAMINATION SUPERFUND SITE
PROPOSED REMEDIAL ACTION PLAN
PRESENTED BY
THE UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

The United States Environmental Protection Agency (EPA) is seeking comments on the proposed remedial action plan for the Bally Groundwater Contamination Superfund Site.

This proposed plan presents actions that EPA has considered with regard to public concern related to the Bally Groundwater Contamination Site in the Borough of Bally, Berks County, Pennsylvania. These actions were identified by Remedial Investigation Reports and a Feasibility Study which were prepared to evaluate the extent of the contamination problem at the site, the potential risks to the public health and the environment and the steps to be taken to correct the problem.

Section 117(a) of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), 42 U.S.C. Section 9617(a), requires publication of a notice and a brief analysis of a Proposed Plan for any remedial action at a Site. The proposed plan begins with a brief history of the Bally Site, followed by a summary of each of the remedial alternatives EPA considered for dealing with the groundwater contamination at this site, and includes EPA's rationale for recommending and, in some cases eliminating, any one of these remedial alternatives. In addition, this proposed plan identifies the preliminary decision on a preferred alternative and explains the rationale for the preference. EPA is seeking public comment on all of the remedial alternatives currently under consideration. At the conclusion of this proposed plan, a glossary of terms that may be unfamiliar to the general public is provided.

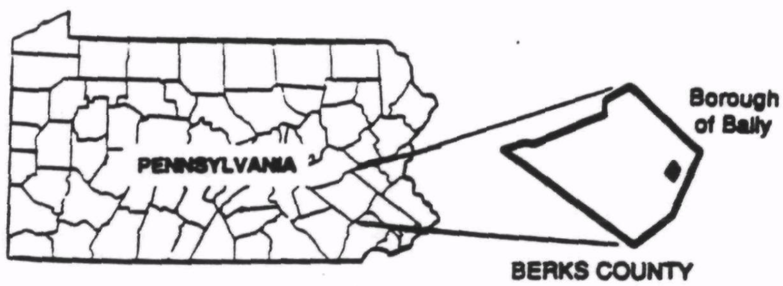
SITE DESCRIPTION AND HISTORY

The Borough of Bally is located in Berks County, Pennsylvania near the Philadelphia metropolitan area. In 1982, the Bally Municipal Water Authority conducted a water quality check of the Bally water system and discovered the presence of elevated concentrations of chlorinated volatile organic compounds (VOCs) in Bally Municipal Well NO. 3. A survey conducted in 1983 by the Pennsylvania's Department of Environmental Resources indicated that the Bally Engineered Structures, Inc. (BES) plant was a potential source of the VOC contamination (See Figure 1). Bally Municipal Well No. 3 was removed from the municipal supply system in December 1982 as a result of the presence of VOCs, most notably 1,1,1, trichloroethane (TCA) and trichloroethene (TCE), both commolly used industrial degreasers. These contaminants are both considered hazardous substances under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA).

BES signed a Consent Order in January 1987 with EPA to conduct the Remedial Investigation and Feasibility Study (RI/FS) at this site to define the problem and provide alternate ways to mitigate the problem. Groundwater remediation has become the focus of the remediation since no remaining contamination source has been identified on the facility's property.

The Bally Site was evaluated through the Hazard Ranking System (HRS) and subsequently placed on the National Priorities List (NPL) in 1987. The NPL is a list of hazardous waste sites targeted for action under the Superfund program.

SITE MAP - BOROUGH OF BALLY, WASHINGTON TOWNSHIP



THE BALLY SITE

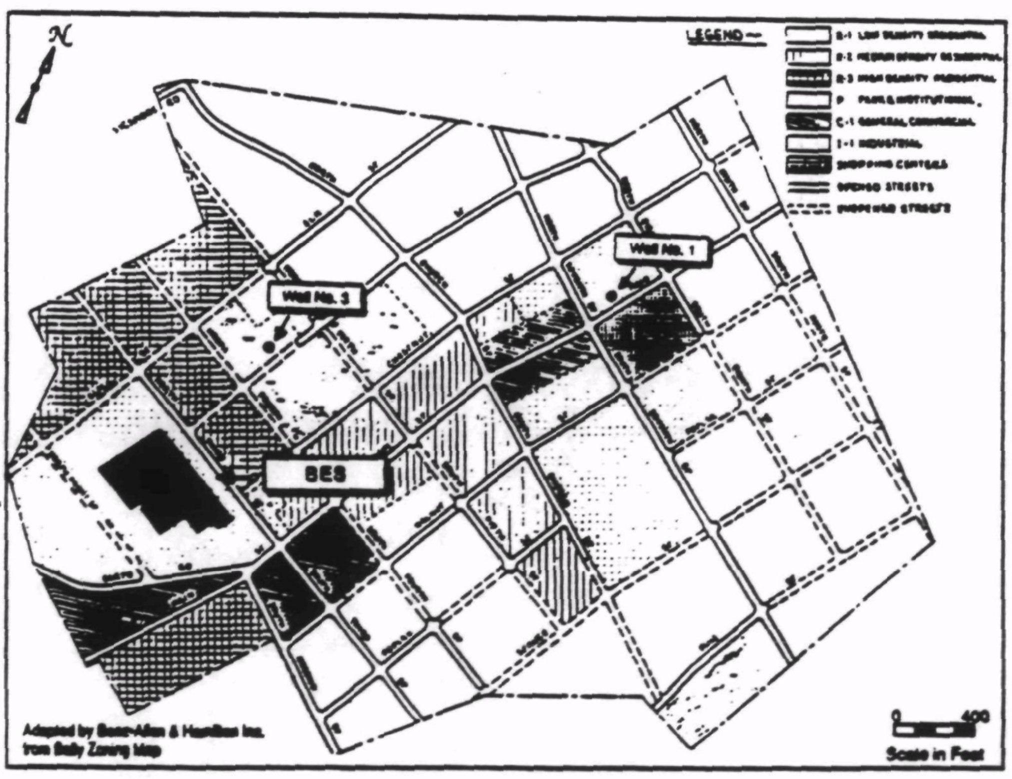


FIGURE 1

COMMUNITY ROLE IN THE SELECTION PROCESS

This proposed plan is being distributed to solicit public comment regarding the proposed alternative and the other alternatives to clean up the contamination at this Site. Detailed information on all of the material discussed here may be found in the documents contained in the Administrative Record (AR) for the Site, including the RI/FS Report. Copies of these documents are available for review at the following information repository location:

Bally Borough Business Office
South Seventh Street
Bally, Pennsyvalnia 19503
215-845-2351

The public comment period will run from May 21, 1989, to June 19, 1989. If a public meeting is requested or if you have any written comments, questions and requests for information can be sent to:

Patricia Tan, Project Manager
U.S. EPA Region III
841 Chestnut Street
Philadelphia, PA 19107
215-597-3164

Barbara Brown
Community Relations Coordinator
U.S. EPA Region III
841 Chestnut Street
Philadelphia, PA 19107
215-597-9871

A request for a public meeting should be made by June 1st.

EVALUATION CRITERIA

A Remedial Investigation/Feasibility Study (RI/FS) performed under a 1987 Consent Order with EPA, was completed in May 1989. The RI/FS identified remedial action alternatives that would address the contamination of the Site. These alternatives were then evaluated against the following nine criteria:

- Overall protection of human health and the environment: whether the remedy provides adequate protection and describes how risks posed through each pathway are eliminated, reduced or controlled through treatment, engineering controls, or institutional controls.

- Compliance with ARARs: whether or not a remedy will meet all of the applicable or relevant and appropriate requirements (ARARs) of other Federal and State environmental statutes and/or provides grounds for invoking a waiver. Whether or not the remedy complies with advisories, criteria and guidance that EPA and PADER have agreed to follow.

- Long-term effectiveness and permanence: the ability of the remedy to maintain reliable protection of human health and the environment over time once cleanup goals have been met.

- Reduction of toxicity, mobility or volume: the anticipated performance of the treatment technologies the remedy may employ.

- Short-term effectiveness: the period of time needed to achieve protection, and any adverse impacts on human health and the environment that may be posed during the construction and implementation period until cleanup goals are achieved.

- Implementability: the technical and administrative feasibility of a remedy, including the availability of materials and services needed to implement a particular option.

- Cost: includes estimated capital, operation and maintenance, and net present worth costs.

- State Acceptance: indicates whether, based on its review of RI/FS and Proposed Plan, the State concurs on, opposes, or has no comment on the preferred alternative at the present time.

- Community Acceptance: will be assessed in the Record of Decision following a review of the public comments received on the Administrative Record and the Proposed Plan.

REMEDIAL INVESTIGATION AND RISK ASSESSMENT FINDINGS

The historical problem at the BES site is VOC contamination of groundwater. Site investigations have not identified significant contamination of any other media or located the specific source or sources of the groundwater contamination. The source is believed to be a historic release or releases associated with solvent use and management of spent solvents at the BES plant. The following compounds were selected as indicator compounds:

- Trichloroethane (TCA)
- Trichloroethene (TCE)
- Dichloroethene (DCE)
- Tetrachloroethene (PCE)
- Methylene chloride
- Dichloroethane (DCA)

These compounds were selected because of their presence in groundwater and their potential chronic health effects at low levels, primarily suspected carcinogenicity.

The only known current human exposure takes place through potable use of the contaminated municipal water supply. VOCs currently enter the supply via Municipal Well No. 1 which taps the contaminated aquifer. A cumulative carcinogenic risk estimated for use of the current municipal system, considering no dilution of well water with uncontaminated spring water, is 9.9×10^{4}. This means that there is the potential for approximately ten additional incidence of cancer in an exposed population of 10,000 people, or one in 1,000. The risk of noncarcinogenic health effects is deemed acceptable for the current municipal groundwater supply system.

Future plans for the municipal water supply system are to revert to using Municipal Well No. 3, which has been equipped with an air-stripping treatment unit. VOC concentrations to be achieved in the effluent of this well are those set forth in water supply and NPDES permits issued by the PADER. The cumulative carcinogenic risk estimated for use of this well and these VOC concentrations, again considering no dilution of the well water with spring water, is 3.6×10^{-5}, or approximately four additional incidence of cancer in an exposed population of 100,000 people. Estimated noncarcinogenic health risks are acceptable.

Currently, no residential wells know to be contaminated are being used. Use of wells know to be contaminated, or installation of wells in contaminated areas, should be restricted. The carcinogenic risk estimates for use of the Gehman residential well is 6.4×10^{-3}, or approximately six additional incidence of cancer in an exposed population of 1,000 people. The noncarcinogenic health risks associated with using this well are estimated to be marginally acceptable; the estimated contaminant dose is 81 percent of that deemed unacceptable.

Contaminated groundwater is not discharging to surface water in the wetland adjacent to the BES plant. There is evidence that groundwater discharges to the unnamed tributary further to the southeast. Surface water VOC concentrations have not been found in this stretch of the unnamed tributary. However, VOC concentrations detected in well MW 87-10I in this vicinity are far lower than Ambient Water Quality Criteria established for the protection of aquatic biota.

Based upon the information presented in the Remedial Investigation and Risk Assessment, the following remedial action objectives have been developed:

1. Hydraulic groundwater control should be established to contain the identified Site contaminants and to reduce the concentration and mass of these contaminants present in groundwater.

Two alternatives were specifically developed to address the groundwater contamination at the Site. These alternatives were identified and evaluated according to the previous described criteria required by CERCLA.

Development and Screening of Remedial Action Alternatives

The following remedial action alternatives were developed, each providing a different degree of remediation:

Alternative No. 1 - Minimal/No Action: Abandoning appropriate existing private wells; implementing institutional controls on the use of operable private wells and the construction of new wells; conducting public education programs to increase public awareness about the presence of these restriction; performing groundwater and surface water monitoring to measure contaminant concentrations and migration; performing semiannual site inspections; performing a site review every five years.

Estimated Construction Cost: $82,800.
Estimated Operation and Maintenance Cost: $264,345.
Estimated Implementation Timeframe: 30 year

Alternative No. 2 - Groundwater Extraction and Treatment and Alternative Water Supply: Abandoning appropriate existing private wells; implementing institutional controls on the use of operable private wells and the construction of new wells; performing groundwater and surface water monitoring to measure contaminent concentrations and migrations by removing contaminated groundwater from the aquifer through continuous pumping of Municipal Well No. 3; treating the extracted groundwater by one of the treatment options retained for consideration; discharging the treated water from Municipal Well NO. 3 to the adjacent stream or into the Borough of Bally potable water system, as needed to provide a suitable alternative water supply, performing necessary additional studies in the pre-design phase to evaluate the optimal configuration of any additional groundwater extraction well(s) required.

Estimated Construction Cost: $991,818.
Estimated Operation and Maintenance Cost: $323,132
Estimated Implementation Timeframe: 30 year

PRELIMINARY DETERMINATION OF PREFERRED REMEDIAL ALTERNATIVE

Recommendations for Remedial Actions

Alternative No. 2 is recommended since it is the most protective, technically feasibility, practical and effective remedial action for the Bally Groundwater Contamination Site.

Implementation of these recommended remedial activities will meet the objectives of CERCLA to protect human health and the environment, to be cost effective, and to utilize treatment technologies to the maximum extent possible.

EPA, in consulation with PADER, has made a preliminary determination that the preferred alternative provides the best balance with respect to the nine criteria. In addition, groundwater remediation is consistent with the policy of the Pennsylvania Clean Streams Law which provides for the remediation and restoration of polluted streams and groundwater to a clean and unpolluted condition.

SUMMARIZING THE STATUTORY FINDINGS

In summary, at this time the preferred alternative is believed to provide the best balance of trade-offs among alternatives with respect to the criteria used to evaluate remedies. Based on the information available at this time, therefore, EPA believes the preferred alternative would be protect human human health and the environment, would attain ARARs, would be cost-effective, and would utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable.

The proposed remedial activities focus on the known Site contamination. These activities will reduce the risk the Site currently presents to human health and the environment. If unknown conditions or information becomes available and actions are warranted to protect human health and the environment or to prevent abate, or minimize an actual or threatened release of hazardous substances on at or from the Site, previous activities performed at the Site shall not be deemed to limit the power and authority of EPA and the Commonwealth of Pennsylvania.

NEXT STEPS

Following the conclusion of the 30-day public comment period on this proposed remedy, a Responsiveness Summary will be prepared. Changes to the preferred alternative or a change from the preferred alternative to another alternative may be made if public comments or additional data indicate that modifications to the preferred alternative or a different remedy would better achieve the cleanup goals for the Site. The Responsiveness Summary will summarize citizen's comments on the proposed remedy and EPA's responses to these comments. Thereafter, EPA will prepare a formal decision document that summarizes the decision process and the selected remedy. This document will include the Responsiveness Summary. Copies will be made available, for public review, in the information repository listed previously.

GLOSSARY OF TERMS

Administrative Record (AR) - A legal document that contains information on a Superfund site. The AR serves as the basis for the selection of a Superfund response action, and this record is available to the public.

ARARs - Applicable or relevant and appropriate Federal, State or other promulgated public health and environmental requirement.

CERCLA - Comprehensive Environmental Response, Compensation, and Liability Act established a Trust Fund for the purposes of cleanup at hazardous waste sites identified on the National Priority List.

Feasibility Study (FS) - The purpose of this study is to identify and screen cleanup alternatives for remedial action, and to analyze in detail the technology and costs involved with the various alternatives.

National Contingency Plan (NCP) - Contains the regulations that govern the Superfund program.

National Priorities List (NPL) - EPA's list of the nation's top priority hazardous waste sites that are eligible to receive federal money for response under superfund.

Remedial Design - An engineering phase that follows the Record of Decision when technical drawings and specifications are developed for the subsequent remedial action at a site on the National Priorities List (NPL).

Remedial Investigation (RI) - The purpose of this study is to gather the data necessary to determine the type and extent of contamination at a Superfund site.

Superfund - The common name used for the Comprehensive Environmental Response, Compensation, and Liability Act, also referred as the Trust fund. The Superfund program was established to help pay for cleanup of hazardous waste sites and to take legal action to force those responsible for the sites to clean them up.

APPENDIX B

RESPONSIVENESS SUMMARY

RESPONSIVENESS SUMMARY FOR THE PROPOSED REMEDIAL ACTION PLAN AT THE BALLY GROUNDWATER CONTAMINATION SUPERFUND SITE

BERKS COUNTY, PENNSYLVANIA

JUNE 20, 1989

RESPONSIVENESS SUMMARY FOR THE PROPOSED REMEDIAL ACTION PLAN AT THE BALLY GROUNDWATER CONTAMINATION SUPERFUND SITE BERKS COUNTY, PENNSYLVANIA

JUNE 20, 1989

Table of Contents

I. Introduction

The Bally Superfund Site in the Borough of Bally is located in Berks County, Pennsylvania near the Philadelphia metropolitan area. In 1982, the Bally Municipal Water Authority conducted a water quality check of the Bally water system and discovered the presence of elevated concentrations of chlorinated volatile organic compounds (VOCs) in Bally Municipal Well No. 3. A survey conducted in 1983 by the Pennsylvania Department of Environmental Resources indicated that the Bally Engineered Structures, Inc. (BES) plant was a potential source of the VOC contamination. Bally Municipal Well No. 3 was removed from the municipal supply system in December 1982 as a result of the presence of VOCs.

BES signed a Consent Order in Jaunary 1987 with EPA to conduct the Remedial Investigation and Feasibility Study (RI/FS) at this site to define the problem and provide alternate ways to migitate the problem. Groundwater remediation has become the focus of the remediation since no remaining contamination source has been identified on the facility's property.

The Bally Site was placed on the Superfund National Priorities List (NPL) in 1987.

II. Summary of Community Relations Activities

Concern about potential TCE contamination of Bally's water supply originated in 1982 with the news of contamination of private wells in adjacent townships. Aftert Bally oficials tested the Borough's water supply, they confirmed the test results with DER and EPA officials and, in January 1983, notified Bally residents of the contamination and that well Number 3 was shut off. The information was released through local newspapers. Borough officials also notifed residents, by use of a mobile public address system, of a Borough meeting and advised residents to boil water until additional sampling of the Borough's distribution system could be completed. Approximately 40 to 50 Borough and area residents attended an initial meeting which was succeeded by meetings the following two weeks. Citizen concern subsided once it became clear that Well Number 3, the exposure route of the contamination, was not being used. Few individuals attended the third public meeting.

The Proposed Remedial Action Plan was made available for comment and review by placing an advertisement in a local newspaper in May of 1989. A public meeting to discuss the Proposed Remedial Action Plan was also offered to area residents. However, requests for such a meeting were never received.

III. Written Comments

EPA did not receive written or verbal comments on the Proposed Remedial Action Plan for the Bally Superfund Sites.

APPENDIX C

ADMINISTRATIVE RECORD INDEX

BALLY GROUND WATER CONTAMINATION SITE
ADMINISTRATIVE RECORD FILE *
INDEX OF DOCUMENTS

SITE IDENTIFICATION

1) Hazard Ranking System Report, prepared by NUS Corporation, 8/29/85. P. 100002-100037. References are listed on P. 100037.

2) Report: Preliminary Assessment and Site Inspection of Bally Case and Cooler Company, prepared by NUS Corporation, 9/20/85. P. 100038-100209. References are listed on P. 100065.

* Administrative Record File available 5/19/89.

Note: Company or organizational affiliation is mentioned only when it appears in the file.

REMEDIAL ENFORCEMENT PLANNING

1) Administrative Order by Consent In The Matter of : Bally Groundwater Contamination, Bally Engineered Structures, Inc., 12/30/86. P. 200001-200016.

REMEDIAL RESPONSE PLANNING

1) Report: Bally Engineered Structures Plant Letter Report, prepared by Environmental Resources Management, 2/11/86. P. 300001-300140. References are listed on P. 300079-300080.

2) Report: Final Evaluation Report, Evaluation of the Hydrogeologic Investigation of the Bally Engineered Structures, Inc. Facility, Phase II Report, prepared by NUS Corporation, 2/87. P. 300141-300151.

3) Report: Work Plan, Scope of Work, Phase III Remedial Investigation/Feasibility Study, Bally Engineered Structures Site, Bally, Pennsylvania, prepared by REMCOR, Inc., 9/23/87. P. 300152-300301. References are listed on P. 300230-300231.

4) Report: Quality Assurance Project Management Plan-Index, Phase III Remedial Investigation/Feasibility Study, Bally Engineered Structures Site, Bally, Pennsylvania, prepared by REMCOR, Inc., 9/23/87. P. 300302-300324. References are listed on P. 300324.

5) Report: Health and Safety Plan, Phase III Remedial Investigation/Feasibility Study, Bally Engineered Structures Site, Bally, Pennsylvania, prepared by REMCOR, Inc., 9/23/87. P. 300325-300407.

6) Report: Field Sampling and Analysis Plan, Phase III Remedial Investigation/Feasibility Study, Bally Engineered Structures Site, Bally, Pennsylvania, prepared by REMCOR, Inc., 9/23/87. P. 300408-300497.

7) Letter to Ms. Patricia Tan, U.S. EPA, from Mr. John A. George, REMCOR, Inc., re: Transmittal of November 1987 status report for the Remedial Investigation/Feasibility Study, 12/8/87. P. 300498-300541. The following are attached:

   a) November 1987 monthly status report;
   b) December 1987 monthly status report;
   c) a letter regarding the resumption of the RI/FS activities;
   d) June 1988 monthly status report;
   e) July 1988 monthly status report;
   f) August 1988 monthly status report;

g) September 1988 monthly status report;
h) October 1988 monthly status report;
i) November 1988 monthly status report;
j) December 1988 monthly status report;
k) January 1989 monthly status report;
l) April 1989 monthly status report.

8) Letter to Ms. Patricia Tan, U.S. EPA, from Mr. Dean R. Parson, REMCOR, Inc., re: Transmittal of the Borough of Bally, Water Well No. 3, Air Stripping System Revised Specifications report, 1/5/88. P. 300542-300558. The report is attached.

9) Letter to Ms. Mabel Gehman from Mr. John A. George, REMCOR, Inc., re: Evaluation of ground water contamination, 8/26/88. P. 300559-300561.

10) Letter to Mr. Joseph Melcher from Mr. John A. George, REMCOR, Inc., re: Evaluation of ground water contamination, 8/26/88. P. 300562-300564.

11) Letter to Reverend Ted Nace from Mr. John A. George, REMCOR, Inc., re: Evaluation of ground water contamination, 8/26/88. P. 300565-300567.

12) Letter to Mr. Joseph Melcher, Sr. from Mr. John A. George, REMCOR, Inc., re: Evaluation of ground water contamination, 8/26/88. P. 300568-300570.

13) Letter to Mr. Carl Stofflet from Mr. John A. George, REMCOR, Inc., re: Evaluation of ground water contamination, 8/26/88. P. 300571-300573.

14) Letter to Mr. Gene Smith from Mr. John A. George, REMCOR, Inc., re: Evaluation of ground water contamination, 8/26/88. P. 300574-300576.

15) Letter to Mrs. Paul R. Newman from Mr. John A. George, REMCOR, Inc., re: Evaluation of ground water contamination, 8/26/88. P. 300577-300579.

16) Letter to Ms. Lyn Moser from Mr. John A. George, REMCOR, Inc., re: Evaluation of ground water contamination, 8/26/88. P. 300580-300582.

17) Letter to Mr. Henry Kehs, Kehs Brothers' Garage, from Mr. John A. George, REMCOR, Inc., re: Evaluation of ground water contamination, 8/26/88. P. 300583-300585.

18) Letter to Mr. Charles Conrad from Mr. John A. George, REMCOR, Inc., re: Evaluation of ground water contamination, 8/26/88. P. 300586-300588.

19) Letter to Mr. Richard Bauman from Mr. John A. George, REMCOR, Inc., re: Evaluation of ground water contamination, 8/26/88. P. 300589-300591.

20) Report: Draft Phase III Remedial Investigation Report, Bally Engineered Structures Site, Bally, Pennsylvania, Volume I-Text, prepared by REMCOR, Inc., 12/88. P. 300592-300780. References are listed on P. 300779-300780.

21) Report: Draft Phase III Remedial Investigation Report, Bally Engineered Structures Site, Bally, Pennsylvania, Volume II, Appendices A through I, prepared by REMCOR, Inc., 12/88. P. 300781-301009. References are listed on P. 300976, 300977, 300980-300981, 300984-300985, 300989 and 300992-300993.

22) Memorandum to Mr. Jeff Orient, NUS Corporation, from Mr. Haia Roffman, NUS Corporation, re: Comparison of REMCOR and CLP analytical chemical results, 12/27/88. P. 301010-301047.

23) Letter to Ms. Patricia Tan, U.S. EPA, from Mr. Dean R. Parson, REMCOR, Inc., re: Status of the Air Stripper Startup and Performance Testing, 1/12/89. P. 301048-301049.

24) Report: Work Plan, Additional Source Investigation, Bally Engineered Structures Site, Bally, Pennsylvania, prepared by REMCOR, Inc., 2/89. P. 301050-301074.

25) Letter to Ms. Patricia Tan, U.S. EPA, from Mr. Dean R. Parson, REMCOR, Inc., re: Transmittal of the Temporary Air Operating Permit for the Bally Air Stripping System at Well No. 3, 3/29/89. P. 301075-301097.

26) Report: Draft Feasibility Study Report, Bally Engineered Structures Site, Bally, Pennsylvania, prepared by REMCOR, Inc., 5/89. P. 301098-301270. References are listed on P. 301231-301270.

COMMUNITY INVOLVEMENT/CONGRESSIONAL CORRESPONDENCE/IMAGERY

1) Report: Site Analysis, Bally Case and Cooler, Bally Pennsylvania, prepared by The Bionetics Corporation, 8/86. P. 500001-500025.

2) Report: Final Report, Community Relations Plan, Bally Site, Bally, Pennsylvania, prepared by Booz, Allen & Hamilton, Inc., 10/19/88. P. 500026-500049.

GENERAL GUIDANCE DOCUMENTS *

1) "Promulgation of Sites from Updates 1-4," Federal Register, dated 6/10/86.
2) "Proposal of Update 4," Federal Register, dated 9/18/85.
3) Memorandum to U. S. EPA from Mr. Gene Lucero regarding community relations at Superfund Enforcement sites, dated 8/28/85.
4) Groundwater Contamination and Protection, undated by Mr. Donald V. Feliciano on 8/28/85.
5) Memorandum to Toxic Waste Management Division Directors Regions I-X from Mr. William Hedeman and Mr. Gene Lucero re: Policy on Floodplains and Wetlands Assessments for CERCLA Actions, 8/6/85.
6) Guidance on Remedial Investigations under CERCLA, dated 6/85.
7) Guidance on Feasibility Studies under CERCLA, dated 6/85.
8) "Proposal of Update 3," Federal Register, dated 4/10/85.
9) Memorandum to Mr. Jack McGraw entitled "Community Relations Activites at Superfund Sites - Interim Guidance," dated 3/22/85.
10) "Proposal of Update 2," Federal Register, dated 10/15/84
11) EPA Groundwater Protection Strategy, dated 9/84.
12) Memorandum to U.S. EPA from Mr. William Heckman, Jr. entitled "Transmittal at Superfund Removal Procedures - Revision 2," dated 8/20/84.
13) "Proposal of Update 1," Federal Register, dated 9/8/83.
14) Community Relations in Superfund: A Handbook (interim version), dated 9/83.
15) "Proposal of First National Priority List," Federal Register, dated 12/30/82.
16) "Expanded Eligibility List," Federal Register, dated 7/23/82.
17) "Interim Priorities List," Federal Register, dated 10/23/81.
18) Uncontrolled Hazardous Waste Site Ranking System: A User's Manual (undated).
19) Field Standard Operating Procedures - Air Surveillance (undated).
20) Field Standard Operating Procedures - Site Safety Plan (undated).

* Located in EPA Region III office.

PENNSYLVANIA DER

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL RESOURCES
Post Office Box 2063
Harrisburg, Pennsylvania 17120

Deputy Secretary for
Environmental Protection

June 29, 1989

717-787-5028

Mr. Edwin B. Erickson
Regional Administrator
USEPA Region III
841 Chestnut Building
Philadelphia, PA 19107

Re: Letter of Concurrence
Bally Superfund Site, draft Record Of Decision (ROD)

Dear Mr. Erickson:

The draft Record Of Decision (as received June 7, 1989, and amended by telefax June 21, 1989) for the Bally Superfund site has been reviewed by the Department. It is my understanding that this Record of Decision will be submitted to you for your approval.

The proposed remedy would consist of pumping the contaminated groundwater in municipal well #3, treating the groundwater, and using the treated water in the Borough of Bally potable water system as needed, while discharging any excess not needed by the water system. Design studies would be conducted to determine the best configuration of the overall pump and treat system.

I hereby concur with the EPA's proposed remedy, with the following conditions:

* EPA will assure that the Department is provided an opportunity to fully participate in any negotiations with responsible parties.

* The Department will be given the opportunity to concur with decisions related to the design of the remedial action, to assure compliance with DER design specific ARARs.

* The Department's position is that its design standards are ARARs pursuant to SARA Section 121, and we will reserve our right to enforce those design standards.

* The Department will reserve our right and responsibility to take independent enforcement actions pursuant to state and federal law.

* This concurrence with the selected remedial action is not intended to provide any assurances pursuant to SARA Section 104(c)(3).

Thank you for the opportunity to concur with this EPA draft Record Of Decision. If you have any questions regarding this matter please do not hesitate to contact me.

Sincerely,

Mark M. McClellan
Deputy Secretary