ENVIRONMENTAL ASSESSMENT OF PROPOSED REMEDIATION OF THE CHEMETRON FACILITIES AT THE BERT AVENUE SITE IN NEWBURGH HEIGHTS, OHIO

LICENSE NUMBER SUB-1357
DOCKET NUMBER 040-08724

CHEMETRON CORPORATION

January 24, 1997

Enclosure

FOREWORD

This Environmental Assessment (EA) reviews the environmental impacts of certain decommissioning actions proposed by Chemetron Corporation (Chemetron) at its facilities located on Bert Avenue in Newburgh Heights, Ohio. In connection with the review of the proposed action, staff of the U.S. Nuclear Regulatory Commission is also preparing a Safety Evaluation Report (SER), which evaluates conformance of the proposed action with NRC regulations and regulatory guidance. The SER may conclude that Chemetron's proposed action should be modified in one or more respects to more fully comply with NRC regulation and guidance. Such modifications to the proposed plan, should they come about and be implemented, would have no significant bearing on the overall environmental impact of the proposed decommissioning and would not change the conclusions of this EA. On issuance, the SER will be available for inspection and copying at the NRC Public Document Room, 2120 L Street, N.W., Washington, DC, and at the Local Public Document Room at the Garfield Heights Branch Library, 5409 Turney Road, Garfield Heights, Ohio (Docket Number 040-08724).

SUMMARY AND CONCLUSIONS

This Environmental Assessment (EA) was prepared by the staff of the U.S. Nuclear Regulatory Commission (hereafter called "the staff"), Office of Nuclear Material Safety and Safeguards, and Region III.

1. This action is administrative.

2. The proposed action is to approve plans by Chemetron Corporation (the licensee) to perform final decommissioning at its facilities located on Bert Avenue in Newburgh Heights, Ohio. The proposed decommissioning is part of a Chemetron decommissioning program that would remediate depleted uranium contamination in soils at the Harvard Avenue and Bert Avenue sites, and in the McGean-Rohco, Inc. (McGean-Rohco) complex adjacent to the Harvard Avenue site. The objective of the decommissioning actions is to terminate the license and release the Harvard Avenue site, the Bert Avenue site, and the McGean-Rohco complex for unrestricted use. On August 5, 1994, the staff published, in the Federal Register, a "Finding of No Significant Impact" and the associated EA for the remediation of the McGean-Rohco complex. On June 6, 1996, the staff published, in the Federal Register, a "Finding of No Significant Impact" and the associated EA for the remediation of the Harvard Avenue site.

3. The proposed decommissioning actions involve the disposal, under 10 CFR 20.2002, of the depleted uranium contaminated wastes, in a disposal cell located at the Bert Avenue site. This disposal would be limited to depleted uranium concentrations, acceptable under Option 2, of NRC's Branch Technical Position on "Disposal or Onsite Storage of Thorium or Uranium Wastes From Past Operations."

4. Solid wastes, as defined under the Resource, Conservation, and Recovery Act (RCRA) will be managed in accordance with the requirements of the Ohio Environmental Protection Agency (OEPA). No RCRA hazardous wastes have been identified at the Bert Avenue site.

5. In connection with the proposed decommissioning activity, the licensee intends to perform a final site radiation survey following the excavation of contaminated soils and the remediation. The final radiation survey would include residential and public areas adjacent to the Bert Avenue site along a 10-meter (m) (33-ft) -wide strip outside the north and west perimeter fences and the area south from the south fence to Bert Avenue and east to 29th Street.

6. The proposed decommissioning actions involve the shipment of contaminated wastes, exceeding the Option 2 limits in NRC's Branch Technical Position on "Disposal or Onsite Storage of Thorium or Uranium Wastes From Past Operations," to a licensed low-level radioactive waste disposal facility in Clive, Utah.

7. This EA assesses the environmental impacts of the decommissioning proposed by the licensee. It also considers alternatives to the

licensee's proposal. This EA has been prepared and issued pursuant to the National Environmental Policy Act of 1969 (NEPA) and 10 CFR Part 51 of NRC's regulations.

8. The staff has reviewed the potential impacts of the proposed decommissioning, both beneficial and adverse. The staff's conclusions are summarized as follows:

   a. Radiation exposures of persons living or traveling near the site because of onsite operations and waste transportation will be well within limits contained in NRC regulations and will be small in comparison to natural background radiation.

   b. The potential radiological impacts offsite of potential onsite accidents are small in comparison to natural background radiation.

   c. Nonradiological impacts, pertaining to the RCRA solid wastes, will be small since these wastes will be managed in accordance with OEPA requirements. Other nonradiological impacts of all kinds are negligible.

   d. Radiation doses to the public during remediation operations at the Bert Avenue site are expected to be less then 0.04 mSv (4 mrem). Assuming a worst-case situation, with no dispersion of airborne contamination over distance, the dose to a member of the public, during remediation operations, was calculated to be less than 0.24 mSv (24 mrem). These predicted doses are less than NRC's limits for radiation doses to the public in 10 CFR Part 20.

   e. Peak radiation doses to a hypothetical resident-farmer, who might establish a residence on the site, grow on and consume food from the site, and consume drinking water from an onsite groundwater well, over a 1000-year period, were calculated assuming the cover has been removed, to be 0.28 mSv/yr (28 mrem/yr) at 0 years after construction of the disposal cell. These predicted doses are less than NRC's limits for radiation doses to the public in 10 CFR Part 20.

   f. Groundwater doses were computed for time periods after 1000 years. The peak groundwater dose at a well 150 m (500 ft) from the Bert Avenue site at a depth of about 8 m (25 ft) below the base of the disposal cell would be 0.22 mSv/yr (22 mrem/yr) at 8000 years. The peak groundwater dose at a well 1500 m (5000 ft) from the Bert Avenue site at a depth of 76 m (250 ft) below the base of the disposal cell would be 0.02 mSv/yr (2 mrem/yr) at 65,000 years. Groundwater doses were also calculated assuming the groundwater table rises to the natural level of the filled-in ravine. The resulting doses are 1.0E-5 mSv/yr (0.001 mrem/yr) at 1000 years and 2.0E-4 mSv/yr (0.02 mrem/yr) at 10,000 years.

   g. Radiation doses to Bert Avenue site remediation workers from direct exposure are estimated to be less than 0.10 mSv (10 mrem) for a

2000-hour exposure period. Inhalation doses from a 2000-hour exposure would be less than 0.12 mSv (12 mrem). These predicted doses are substantially less than the routine occupation exposure limit of 0.05 Sv/yr (5 rem/yr) in 10 CFR Part 20.

h. The impacts from the transportation of radioactive materials are low and within NRC and Department of Transportation requirements. The potential consequences of a transportation accident are low and the probability of an accident with those consequences is very low.

i. The licensee has a radiation protection program that will maintain radiation exposures and effluent releases within the limits of 10 CFR Part 20 and will maintain exposures as low as is reasonably achievable.

j. Based on the very low minority populations in Newburgh Heights and Cuyahoga Heights and income statistics that show no significant low-income populations compared with those in Cuyahoga County and in the State of Ohio, there will be no significant minorities and low-income households that will be exposed to impacts from the proposed activities in Newburgh Heights and Cuyahoga Heights. Because there are no significant impacts from the proposed activities, there will be no environmental justice impacts.

k. No reasonably available alternative to the licensee's proposed plan is obviously superior.

9. On the basis of this EA, it is concluded that the proposed action will not result in any significant environmental impact and that the action called for, under NEPA and 10 CFR Part 51, is the issuance of a license amendment authorizing the licensee to perform final remediation of the Bert Avenue site as proposed by the licensee.

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1 INTRODUCTION

1.1 Background

Chemetron Corporation (Licensee) is the holder of Source Material License No. SUB-1357 (License) originally issued on June 12, 1979, by the U.S. Nuclear Regulatory Commission (NRC or Commission) pursuant to 10 CFR Part 40, for possession only of depleted uranium-contaminated waste in a facility located at 2910 Harvard Avenue, Newburgh Heights, Ohio (the Harvard Avenue site). The License was modified on October 1, 1987, to authorize the Licensee to possess the radioactive material at the McGean-Rohco site located between 28th and 29th Streets at Bert Avenue, Newburgh Heights, Ohio (the Bert Avenue site). The license was last renewed on January 10, 1990, and was due to expire on October 31, 1990. On October 1, 1990, Chemetron filed a license renewal application with NRC. Pursuant to 10 CFR 40.43(b), the License is continuing in effect.

In 1965, the Atomic Energy Commission issued License No. SUB-852 to Chemetron Corporation, which through its McGean Unit of the Inorganic Chemical Division, manufactured catalysts containing depleted uranium. These operations were carried out between 1965 and 1972 in facilities located at the Harvard Avenue site. By February 1972, manufacture of the catalysts had been terminated, and in December 1973, the License was amended to authorize storage only for the remaining depleted uranium. No activities involving source material, other than decontamination, have been conducted at the site since the termination of the catalyst production by Chemetron in 1972.

In 1975, the McGean Chemical Company, Inc., the predecessor to McGean-Rohco, Incorporated (McGean-Rohco), purchased the Harvard Avenue site. The Licensee, however, retained the License and responsibility for the depleted uranium remaining at the facility. In late 1977, the Licensee was acquired by Allegheny-Ludlum Industries, and merged into a wholly owned subsidiary. In 1979, the Licensee obtained a new NRC License, No. SUB-1357, to remediate the Harvard Avenue site. License SUB-1357 superseded SUB-852.

Remediation activities under the License began in 1979, with the expectation that the project would be completed in about 6 months. In August 1980, NRC informed the Licensee that source material contamination discovered at the Bert Avenue site in May 1980 also had to be remediated.

On October 26, 1984, Allegheny International, Inc., Chemetron's parent company, provided the results of its Bert Avenue site final surveys, indicating that depleted uranium concentrations were less than 1.3 Bq/gm (35 pCi/gm), the applicable NRC unrestricted release criteria provided in the 1981 Branch Technical Position (BTP), entitled, "Disposal or Onsite Storage of Thorium or Uranium Wastes from Past Operations" (Reference 1). On January 11, 1985, Oak Ridge Associated Universities (ORAU) submitted a report of its confirmatory surveys to NRC (Reference 2). The ORAU confirmatory surveys indicated that contamination exceeding 1.3 Bq/gm (35 pCi/gm) was still present at the Bert Avenue site.

On October 15, 1985, the Licensee requested that both the Harvard Avenue and Bert Avenue sites be released for unrestricted use. On January 29, 1986, ORAU submitted, to NRC, a report of its confirmatory surveys at the Harvard Avenue site (Reference 3), showing that radioactive contamination was still present, in excess of applicable NRC unrestricted release criteria provided in the 1981 BTP. On March 27, 1986, ORAU submitted a report of its confirmatory surveys at the Bert Avenue site to NRC (Reference 4). Contamination exceeding the unrestricted release criteria was found.

On February 20, 1988, Allegheny International, Inc., filed a voluntary petition under Chapter 11 in the U.S. Bankruptcy Court. On August 31, 1990, Allegheny International, Inc., requested NRC consent to transfer control of Chemetron's license to Sunbeam/Oster Company, Incorporated. Under this corporate arrangement Montey Corporation would be the direct parent of Chemetron, and Sunbeam/Oster Company would be the direct parent of Montey Corporation. The Licensee indicated in its August 31, 1990, submittal that it would have completed a revised remediation plan for the Harvard Avenue site by March 1, 1991. The staff confirmed this schedule with a provision of the consent of transfer dated September 11, 1990, requiring the submission of a revised remediation plan for the Harvard Avenue site by March 1, 1991.

On October 2, 1990, Chemetron submitted a request for license renewal to authorize possession of depleted uranium in the form of uranium oxide contamination at the Harvard Avenue and Bert Avenue sites for a 5-year term.

On January 3 and 4, 1991, NRC conducted a safety inspection of activities authorized by License No. SUB-1357 and transmitted to the Licensee its inspection findings in NRC letter dated January 28, 1991, which included a Notice of Violation for failure to adequately survey a portion of the restricted area at the Bert Avenue site before its release for unrestricted use. NRC also requested in a letter dated January 28, 1991, that the Licensee address NRC's concerns over low-level uranium contamination found in Buildings 14 and 20 of the McGean-Rohco complex.

From March 19 through April 15, 1991, NRC conducted special safety inspections of survey activities being conducted at the McGean site. During the inspection, contamination of equipment and structures was found in several buildings at the McGean site. An apparent violation of NRC requirements was identified -- loss of control of licensed material in an unrestricted area and not in storage (10 CFR 20.207(b)). Based on these inspection findings, NRC requested that an expanded site survey be performed and a written report documenting the results of the survey be submitted to NRC by April 5, 1991. The Licensee submitted its report, in two letters dated April 5, 1991, and April 12, 1991, on the status of the McGean surveys, which indicated that 7 of 11 McGean buildings surveyed were contaminated with depleted uranium in excess of NRC limits.

On July 18, 1991, the licensee requested that license conditions be revised to establish a submittal date of August 16, 1991, for the Harvard Avenue and the Bert Avenue remediation plans.

A Notice of Violation and Proposed Imposition of Civil Penalty Notice was issued to the Licensee on August 14, 1991. The Notice addressed the Licensee's failure to secure licensed material in the form of depleted uranium from unauthorized removal and failure to maintain the material under constant surveillance and immediate control. The Notice was the result of a violation identified during an NRC inspection conducted from March 19 through April 15, 1991, which located depleted uranium on and in equipment and structures in Building Numbers 1, 3B, 3C, 4, 5B, 6, 9, 10, 11, 14, 16A, 16B, 17, 19, and 20, which are unrestricted areas, at 2910 Harvard Avenue, Newburgh Heights, Ohio. Subsequently, an Order Imposing Civil Monetary Penalty in the amount of $7500 was served to the Licensee.

On June 28, 1991, Chemetron submitted its "Site Characterization Report, Harvard and Bert Avenue Sites" to NRC (Reference 5). This report was also reviewed by the Ohio Department of Health (ODH) and the Ohio Environmental Protection Agency (OEPA). On August 15, 1991, comments were transmitted to Chemetron indicating that there were substantive deficiencies in the report.

On August 16, 1991, Chemetron submitted the "Remediation Plan for the Harvard and Bert Avenue Sites" to NRC (Reference 6). Comments from NRC, ODH, and OEPA were transmitted to Chemetron on December 18, 1991. The remediation plan was considered to be conceptual in nature and therefore lacked sufficient detail, and was based on an inadequate site characterization.

On May 5, 1992, Chemetron and NRC entered into a Consent Order that established, as a license condition, June 15, 1992, as the submittal date for the Final Site Characterization Report for the Harvard Avenue and Bert Avenue sites. On June 15, 1992, Chemetron submitted the "Final Site Characterization Report, Harvard and Bert Avenue Sites" to NRC (Reference 7). On January 8, 1993, NRC approved this report.

On May 7, 1993, Chemetron requested an amendment to its license that would establish October 1, 1993, as the date for the submittal of the Site Remediation Plan for the Harvard Avenue and Bert Avenue Sites. On October 1, 1993, Chemetron submitted its "Site Remediation Plan, Chemetron Remediation Project, Harvard Avenue and Bert Avenue Sites" (Reference 8). However, the submittal did not contain the final radiation survey plan section, the safety analysis section, and the dose assessment section. On October 26, 1993, NRC issued a Confirmatory Order to Chemetron requiring that the final radiation survey plan section be submitted to NRC by November 1, 1993, and the safety analysis and dose assessment section be submitted to NRC by November 15, 1993. On November 1, 1993, Chemetron submitted the final radiation survey plan section, and on November 11, 1993, Chemetron submitted the safety analysis and the dose assessment sections. Also, on November 1, 1993, Chemetron submitted a remediation plan for the contamination at the McGean-Rohco complex. On March 24, 1994, Chemetron submitted a request to amend its license to authorize remediation in accordance with its "Site Remediation Plan."

On April 4, 1994, Chemetron requested the staff to separately review the remediation of the McGean-Rohco buildings so that remediation could began as quickly as possible. After the review of the portions of the Chemetron Final Remediation Plan for Harvard Avenue and Bert Avenue sites that addressed the McGean-Rohco building remediation, the staff published, in the Federal Register, on August 5, 1994, a Finding of No Significant Impact and an environmental assessment (EA) for the McGean-Rohco complex remediation (Reference 9). On August 9, 1994, the staff issued Amendment 4 to the Chemetron license authorizing Chemetron to conduct the McGean-Rohco building remediation. On August 9, 1994, the staff also issued a Safety Evaluation Report (SER) for the proposed remediation of the McGean-Rohco complex.

On December 5, 1994, Chemetron submitted its "Final Site Closure/Post-Closure Plan, Bert Avenue" (Reference 10) to OEPA. This submittal is intended to address the solid waste concerns that are under the jurisdiction of OEPA.

On February 28, 1995, Chemetron submitted Revision 1 to its "Site Remediation Plan" (Reference 11). This revision incorporated modifications to NRC comments on the originally submitted "Site Remediation Plan," and modifications from response letters, dated February 7, 1994; March 2, 1994; April 15, 1994; July 8, 1994; July 22, 1994; and December 19, 1994.

On May 18, 1995, Chemetron requested the staff to expedite and separately review the remediation of the Harvard Avenue site so that remediation would not be delayed because of the required OEPA review of the solid waste issues at the Bert Avenue site, under the jurisdiction of OEPA. The staff published, in the Federal Register, on June 6, 1996, a Finding of No Significant Impact and an EA for the Harvard Avenue remediation (Reference 12). On June 7, 1996, the staff issued Amendment 5 to the Chemetron license authorizing Chemetron to conduct the Harvard Avenue remediation. On June 7, 1996, the staff also issued an SER for the proposed remediation of the Harvard Avenue site.

1.2 Proposed Action

This EA concerns the proposed final remediation of the Chemetron facilities at Bert Avenue. The purpose of this decommissioning is to remediate radioactive contamination to levels such that the site can be released for unrestricted use.

In this action, Chemetron is also proposing to use onsite disposal, under 10 CFR 20.2002, for wastes from the remediation of the Bert Avenue site, with concentrations up to the Option 2 limits in the 1981 BTP. Wastes that exceed the concentration Option 2 limits in the 1981 BTP would be shipped offsite, to a licensed low-level waste disposal site for disposal. To meet OEPA requirements for the disposal of solid wastes, as defined in the Resource, Conservation, and Recovery Act, Subpart D, also present at the Bert Avenue site, Chemetron will construct a disposal cell cap meeting the provisions of the OEPA landfill post-closure requirements.

1.3 Need for Action

The proposed action is necessary to remove the contamination that exists at the Chemetron facilities at the Bert Avenue site. Decommissioning of these areas to a condition suitable for unrestricted release is an obligation that Chemetron must fulfill, either now or in the future. Chemetron has determined that it is to its advantage to proceed with the decommissioning, now, based on a weighing of many factors. These factors include, protection of those people occupying nearby residences at the Bert Avenue, the present and future costs of performing the remediation and disposing of the radioactive wastes, the cost of maintaining control over the existing site, and radiation exposure to workers and the public.

2 DESCRIPTION OF CHEMETRON FACILITY

This chapter provides descriptive information on the physical plant, including relevant portions of the facility's history.

2.1 General Facility Description

The decommissioning of the Chemetron facility will consist of remediation of three areas located in Newburgh Heights, Ohio and Cuyahoga Heights, Ohio (see Figure 2.1). These three areas are the Harvard Avenue site, the Bert Avenue site, and the McGean-Rohco complex.

The Harvard Avenue site, located at 2900 Harvard Avenue, in Cuyahoga Heights, Ohio, is the location of the former catalyst production operations. The site is located in an industrial area and is bounded on the north by Harvard Avenue, on the west by the Aluminum Company of America, on the south by the Newburgh and Southshore Railroad, and on the east by McGean-Rohco, Inc. From 1965 to 1972, Chemetron converted depleted uranium hexafluoride to U_3O_8 to be used in an antimony-silica-based catalyst that was sold for use in the production of plastics. The catalyst production building, identified as Building 21, has been demolished, and the site now consists of an open area of 12,000 m^2 (3 acres).

In 1975, some of the demolition wastes from Building 21 were disposed of at the Bert Avenue site, an unregulated landfill located in a residential area, at the end of East 27th Street and Bert Avenue, in Newburgh Heights, Ohio. The landfill is a steep-sided ravine, having a depth of about 15 m (50 feet), and has an area of about 28,000 m^2 (7 acres). It is located approximately three blocks north of the Harvard Avenue site. The landfill has been used from the 1940s to 1977 for the disposal of construction rubble, industrial and household equipment, and miscellaneous industrial solid wastes.

The McGean-Rohco complex consists of 13 major buildings and several smaller buildings, located at 2910 Harvard Avenue in Cuyahoga Heights, Ohio. These buildings are owned by McGean-Rohco, Inc., and are contaminated from airborne emissions from the former Chemetron depleted uranium processing and have contaminated equipment previously used by Chemetron.

2.2 Facility Operating History

The Atomic Energy Commission issued Source Material License SUB-852 to Chemetron on October 8, 1965. This license authorized Chemetron to possess and chemically convert depleted uranium hexafluoride into an antimony-silica-based catalyst containing U_3O_8. These operations ended in 1972. In 1974 equipment used in the production of the catalyst was dismantled and transferred to a Chemetron subsidiary holding a State of Kentucky source material license. Between 1972 and 1984, decommissioning activities took place in Building 21, the catalyst production building. In 1984, Building 21 was dismantled. In 1975, some of the contaminated building rubble, wastes, and soils from the Building 21 remediation were disposed of at the Bert Avenue landfill. In 1980, a member of the public notified NRC of these disposals,

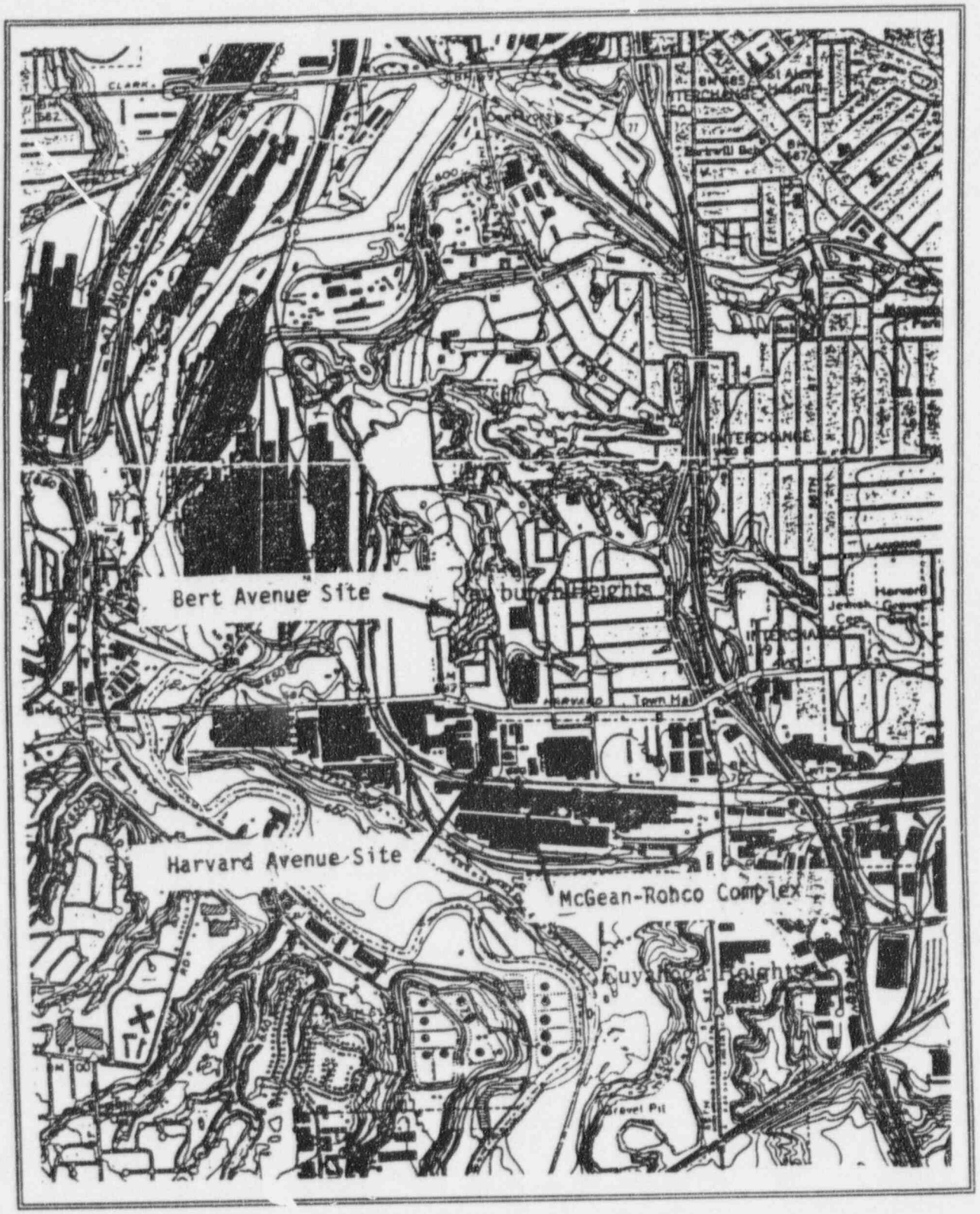

Figure 2.1 Location of Chemetron facilities.

which were made by Chemetron without NRC approval. Chemetron was subsequently cited for violation of NRC disposal requirements.

From 1972 to the present time, Chemetron has been attempting to decommission the Harvard Avenue and Bert Avenue sites. Between 1990 and 1992, Chemetron performed site characterization activities at the Harvard Avenue and Bert Avenue sites. On October 1, 1993, November 1, 1993, and November 15, 1993, Chemetron submitted, to NRC, a Site Remediation Plan addressing the Harvard Avenue site, the Bert Avenue site, and the McGean-Rohco complex (Reference 8). The Site Remediation Plan is intended to provide Chemetron's proposed decommissioning plan for remediating the remaining depleted uranium contamination to levels acceptable for unrestricted use. On February 28, 1995, Chemetron submitted a revised Site Remediation Plan (Reference 11). Currently, the Harvard Avenue remediation is complete and decontamination of the McGean-Rohco buildings is nearly complete.

2.3 Current Radiological Conditions

Current radiological conditions at the Bert Avenue site are described in detail in Chemetron's Final Site Characterization Report, dated June 15, 1992 (Reference 7). At the Bert Avenue site, Chemetron measured the radioactive concentrations in surface and subsurface soils, groundwater, surface water, and air. Chemetron reported a maximum surface concentration of U-238 of 87 Bq/gm (2341 pCi/gm) or 130 Bq/gm (3510 pCi/gm) total uranium. The most prominent area of surface contamination (Area B) is located atop and along the steep slope of the ravine (see Figure 2.2). Portions of Area B have contamination that exceed 37 Bq/gm (1000 pCi/gm) of U-238 or 56 Bq/gm (1500 pCi/gm) total uranium. Surface contamination is also reported along the natural drainage ditches and groundwater discharge areas (seeps) that discharge into the swampy area at the base of the ravine.

Subsurface soil contamination is reported by Chemetron in two primary areas (Areas A and B) of the Bert Avenue site (see Figure 2.2). The larger of the two areas (Area B) is 60-m (197-ft) long by about 30-m (98-ft) wide, and is located below the surface of the steep slope of the ravine. This area is a subsurface layer of contamination ranging from 1.2 m (4 ft) to 2.4 m (8 ft) in thickness and covered by up to 6.7 m (22 ft) of lower-activity material. This area contains the highest subsurface concentration, 338 Bq (9130 pCi/gm) of U-238 or 507 Bq/gm (13,700 pCi/gm) total uranium, at the Bert Avenue site. A smaller contaminated area of subsurface soil (Area A) is about 35 m (115 ft) long and 10 m (33 ft) wide. This layer is between 0.6 m (2 ft) and 1.8 m (6 ft) thick and is covered by up to 0.6 m (2 ft) of lower-activity material. The maximum activity found in this smaller area was 18.6 Bq/gm (502 pCi/gm) of U-238 or 28 Bq/gm (750 pCi/gm) total uranium.

The average activity at the Bert Avenue site was calculated to be 3.3 Bq/gm (89 pCi/gm) U-238 or 5.0 Bq/gm (134 pCi/gm) total uranium based on all samples having concentrations exceeding 0.74 Bq/gm (20 pCi/gm).

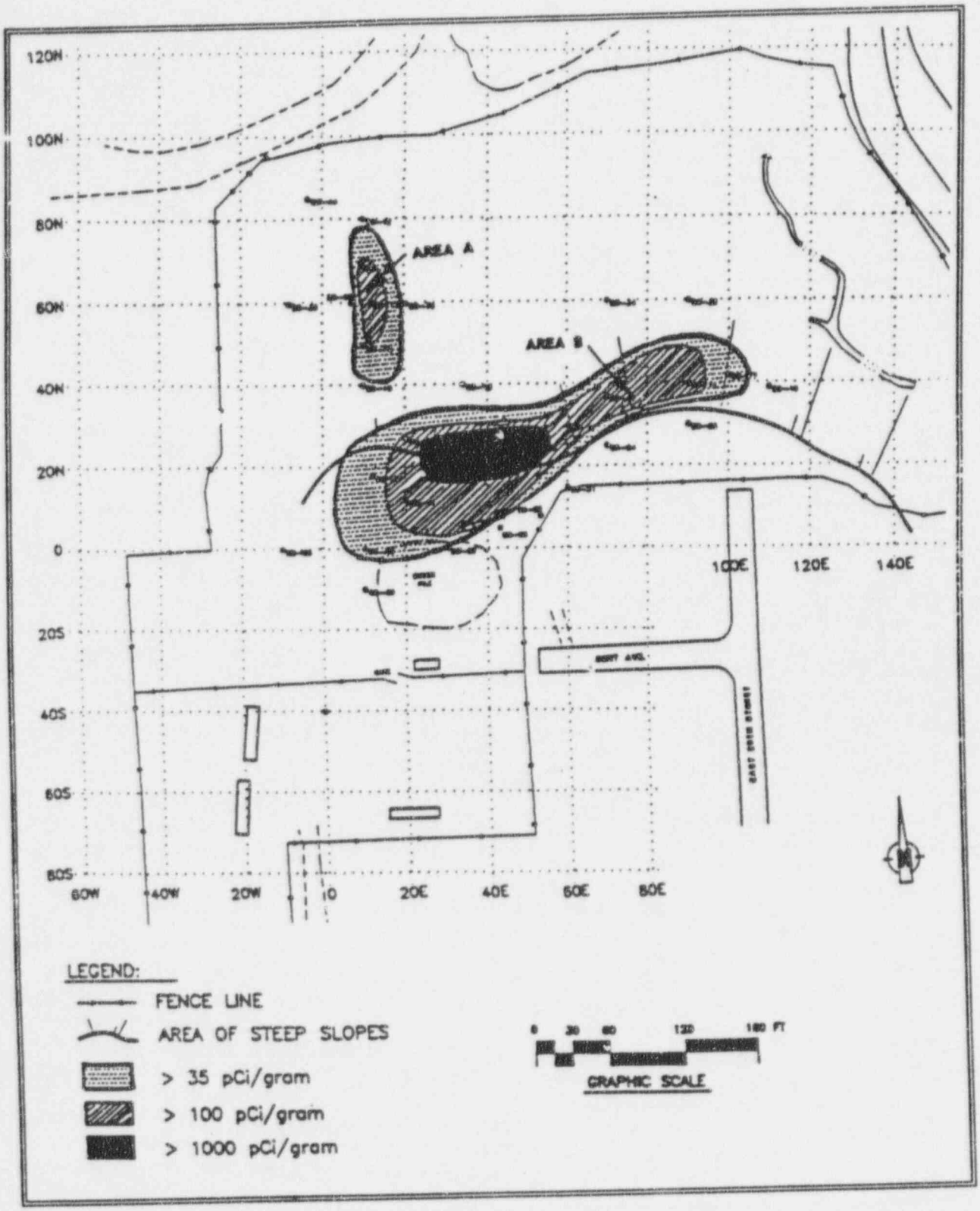

Figure 2.2 Location of highest surface and subsurface activities.

Offsite samples were taken and analyzed for U-238. Chemetron reported one sample having a concentration of 3 Bq/gm (81 pCi/gm). The other samples were less than 1.3 Bq/gm (35 pCi/gm) U-238. Subsequent to the Chemetron sampling, an additional location, near the site gate on Bert Avenue, was found, by a private consultant, to have a U-238 concentration of 47 Bq/gm (1283 pCi/gm). The staff took samples in this location and found a U-238 concentration of 28.4 Bq/gm (767 pCi/gm). Additional sampling of this area in November 1994 showed contamination over the foundation of a demolished house that had been backfilled with Bert Avenue waste materials in the early 1970s. Contamination up to 8.7 Bq/gm (234 pCi/gm) was found and partially excavated in November 1994. The remaining contaminated material will be remediated during the Bert Avenue site remediation.

Th-232 and Ra-226 concentrations in subsurface soils are reported to be below the 1981 BTP limits for thorium contamination (0.37 Bq/gm (10 pCi/gm)) and the U.S. Environmental Protection Agency (EPA) limits for radium contamination of 0.19 Bq/gm (5 pCi/gm) in surface soils and 0.56 Bq/gm (15 pCi/gm) in subsurface soils.

Four piles of excavated soil comprise about 1440 m^3 (51,000 ft^3) and are reported to contain average total uranium concentrations of approximately 1.8 Bq/gm (48 pCi/gm); 1.7 Bq/gm (46 pCi/gm); 0.66 Bq/gm (18 pCi/gm); and 0.89 Bq/gm (24 pCi/gm), respectively.

The volume of contaminated material at the Bert Avenue site containing U-238 above 0.56 Bq/gm (15 pCi/gm) is estimated to be over 28,300 m^3 (1,000,000 ft^3). The volume of contaminated material with U-238 in excess of 3.7 Bq/gm (100 pCi/gm) is estimated to be approximately 1980 m^3 (70,000 ft^3). The total volume of radioactive wastes that will require disposal in the cell is estimated to be 13,600 m^3 (482,000 ft^3). Chemetron estimates that 420 m^3 (15,000 ft^3) of wastes will require transport offsite to the Envirocare low-level waste disposal facility in Clive Utah.

Chemetron analyzed Bert Avenue site groundwater samples from 12 onsite monitoring wells and groundwater seeps. These samples, taken and prepared in accordance with EPA sampling protocols, showed uranium concentrations in the groundwater were less than the proposed EPA drinking water standard of 1.1 Bq/l (30 pCi/l). Ra-226 was also less than the proposed EPA groundwater standard of 0.74 Bq/l (20 pCi/l). Th-232 concentrations were measured and found to be less than the lower limit of detection. Note that no EPA drinking water limits have been proposed for thorium. Note also that there are no known drinking water wells in the vicinity of the Bert Avenue site, as public drinking water systems are used by local residents. Surface water samples were taken at various locations on the Bert Avenue site, including where surface water exits from the site at the Burke Brook Branch sewer discharge point. The samples taken at the Burke Brook Branch discharge point had uranium concentrations less than the proposed EPA drinking water standard. Other surface water samples had total uranium concentrations up to 1.9 Bq/l (52 pCi/l). These concentrations are well below NRC requirements for effluent release in 10 CFR Part 20, Appendix B (92 Bq/l (300 pCi/l)).

Radiological surveys of ground surfaces, performed by the staff in 1991, indicate radiation exposure levels of less than 8 nC/kg/hr (20 μR/hr) in unrestricted areas. Results of environmental radiation monitors (thermoluminescent dosimeters (TLDs) and air samplers) indicate that external and airborne radiation levels are consistent with natural background levels for the suburban Cleveland area.

Chemetron performed chemical analyses on groundwater, surface water, soil, and sediment samples at the Bert Avenue site. Elevated levels of aluminum, antimony, arsenic, and manganese were found in upgradient wells and in downgradient locations. The downgradient locations showed generally lower concentrations of these metals than the upgradient sources. Phthalate compounds and pesticides were also detected in some groundwater samples. The analytical laboratory also detected pesticides in some of the instrument and trip blank samples, causing some of these results to be considered suspect. Methylene chloride was found in 6 of the 14 monitoring wells at concentrations of up to 13 ppb, slightly above the lower limits of detection. In surface water samples, acetone was found at concentrations of up to 41 ppb. Acetone, at a concentration of 32 ppb, was also found at the location where sewerage discharges into the site. No polychlorinated biphenyls were detected in either groundwater or surface water samples.

Sediment samples were analyzed for Toxicity Characteristic Leaching Procedure (TCLP) metals, Target Analyte List (TAL) compounds, and Target Compound List (TCL) compounds. All TCLP metals were below EPA limits for Resource Conservation and Recovery Act (RCRA) hazardous waste classification. Elevated TAL inorganic compound levels were found for aluminum, arsenic, barium, cadmium, lead, and mercury. Acetone was the only TCL compound detected above instrument lower limits of detection.

Soil samples were analyzed for TCLP, TAL, and TCL compounds. TCLP metals were less than the EPA limits for RCRA hazardous waste classification. One TCLP pesticide -- heptachlor -- was found in one sample in a concentration that exceeds the RCRA hazardous waste classification limit. Methylene chloride, acetone, toluene, and xylene were detected in some of the samples.

3 DESCRIPTION OF CHEMETRON SITE AND ENVIRONMENT

3.1 Chemetron Site and Location

The Chemetron site consists of three general areas, the Harvard Avenue site, the Bert Avenue site, and the McGean-Rohco complex (see Figure 2.1). The Harvard Avenue site, located at 2900 Harvard Avenue in Cuyahoga Heights, Ohio, was the location of the catalyst production plant operated by Chemetron from 1965 to 1972. The Bert Avenue site, located on East 27th, East 29th, and Bert Avenue, about three blocks north of Harvard Avenue, in Newburgh Heights, Ohio, was an uncontrolled industrial disposal area. The McGean-Rohco complex, located at 2910 Harvard Avenue, in Cuyahoga Heights, Ohio, is owned by the McGean-Rohco Company and lies immediately east of the Harvard Avenue site. The complex consists of 13 main buildings and several auxiliary buildings that are currently being used by the McGean-Rohco Company.

The Harvard Avenue site and the McGean-Rohco complex are immediately adjacent sites, located on the south side of Harvard Avenue on an industrial site. The Harvard Avenue site is now an open area of about 12,000 m^2 (3 acres). The Harvard Avenue site and the McGean-Rohco complex are bounded by private residences and businesses located on the north side of Harvard Avenue, the Aluminum Company of America Cleveland Works to the west, the Newburgh and Southshore Railroad to the south, and the Ohio Cranks aft Company to the east.

The Bert Avenue site is bounded to the south and east by private residences, to the west by a public park area, and to the north by light industrial buildings. The disposal area consists of a steep-sided ravine having a depth of about 15 m (50 ft). The site has an area of about 28,000 m^2 (7 acres).

3.2 Climate

Based on over 30 years of recorded data, the average annual temperature in Cleveland, Ohio, is 9.8 C (49.7 F); the average annual rainfall is 89.9 cm (35.4 in.); and the average annual snowfall is 136 cm (53.6 in.).

January is the coldest month, having an average high temperature of 0.6 C (33 F) and an average low temperature of -7.2 C (19 F). July is the hottest month with an average high temperature of 28 C (82 F) and an average low temperature of 16 C (61 F). About 84 percent of the annual average snowfall occurs in the months of December, January, February, and March. The greatest monthly average snowfall occurs in January. February is the driest month, with an average normal precipitation of 5.6 cm (2.20 in.). June is the wettest month, with an average normal precipitation of 8.9 cm (3.49 in.).

The predominant wind direction is from the south. The wind velocity is less than 20.9 km/hr (13 mi/hr) 65 percent of the time and is greater than 54 km/hr (32 mi/hr) 0.1 percent of the time.

3.3 Demography and Socioeconomics

The Villages of Newburgh Heights and Cuyahoga Heights, Ohio, are suburbs of Cleveland in Cuyahoga County. Based on the 1990 census (References 13 and 14), the population of Newburgh Heights is 2310. Cuyahoga Heights is 682, the City of Cleveland is 505,616, and Cuyahoga County is 1,412,140. In Newburgh Heights, the population has a median age of 34.6 and is 99.3 percent white. The median value of owner-occupied housing units is $47,300, and the median household income is $24,621. In Cuyahoga Heights, the population has a median age of 40.6 and is 98.8 percent white. The median value of owner-occupied housing units is $67,800, and the median household income is $30,234. In the City of Cleveland, the population has a median age of 31.9 and is 49.5 percent white and 46.6 percent black. The median value of owner-occupied housing units is $40,900, and the median household income is $17,822. In Cuyahoga County, the population has a median age of 34.9 and is 72.5 percent white and 24.8 percent black. The median value of owner-occupied housing units is $72,100, and the median household income is $28,595.

3.4 Land

Newburgh Heights and Cuyahoga Heights are mixed residential and industrial communities. Based on the 1977 General Land Use Map for Cuyahoga County, Ohio, the land use is classified as predominantly industry, wholesale, and storage, with a small amount of commercial and office use.

The elevations of Newburgh Heights and Cuyahoga Heights are approximately 210 m (690 ft) above mean sea level near Harvard Avenue. The elevations decrease with a slope of 1 percent, to the northwest, toward the Cuyahoga River. Slopes range about 5 to 18 percent along the boundaries of the Cuyahoga River flood plain, which is located about 1.6 km (1 mile) to the south, east, and north of the Chemetron sites.

The Bert Avenue site is at the head of a steeply-sloped ravine having a depth of approximately 15 m (50 ft). Disposal of various industrial, construction, and household wastes has resulted in substantial backfilling of the ravine on the east, west, and south slopes. A depression, located in the northeast corner of the ravine, consists of a marshy area, that collects runoff from the site and from an open sewer line. The area around the Bert Avenue site has been significantly modified in the past by the filling of natural ravines and valleys for industrial development.

3.5 Surface Water

At the Bert Avenue site, surface runoff and seeps from the sides of the ravine drain into the marshy area, in the northeast corner of the ravine. The marshy area drains through a culvert northwest to the Cuyahoga River.

3.6 Groundwater

The principal hydrogeologic units in the region are the Undifferentiated Unit and the Lacustrine Unit. The Undifferentiated Unit forms a confined water

table above the Lacustrine Unit. This water table is occasionally used for industrial water supply. The Lacustrine Unit overlies a bedrock aquifer. The bedrock aquifer, considered to be a separate hydrologic system, is separated from the confined water table in the Undifferentiated Unit by about 180 m (600 ft) of clay. Wells in the area generally have low water production, except in cases where there are sand and gravel lenses. Drinking water in Newburgh Heights and Cuyahoga Heights comes from the Cleveland public water supply system. There are no known uses of groundwater for drinking purposes in the vicinity of the Bert Avenue site.

At the Bert Avenue site, the groundwater table is approximately 2.4 to 8.8 m (8 to 29 ft) below grade in the Undifferentiated Unit and sometimes in the fill material. The Lacustrine Unit forms the lower boundary of the water table. The thickness of the aquifer varies from 0.3 to 12 m (1 to 40 ft) depending on location. The thicker sections lie further from the ravine slopes. Groundwater flows from the sides of the ravine inward to the marshy area in the northeast corner. Chemetron hydraulic conductivity testing showed conductivities in the Undifferentiated Unit from 7.5E-2 cm/sec (2.5E-3 ft/sec) to 6.26E-5 cm/sec (2.1E-6 ft/sec) with an average of 7.9E-4 cm/sec (2.6E-5 ft/sec). In the Lacustrine Unit conductivities varied from 6.68E-6 cm/sec (2.2E-7 ft/sec) to 8.34E-6 cm/sec (2.7E-7 ft/sec) with an average of 7.6E-6 cm/sec (2.5E-7 ft/sec).

Chemetron analyzed seasonal fluctuations of the groundwater table. Changes in groundwater elevations were observed over time; however, no reversal of groundwater gradients was found.

4 PROPOSED DECOMMISSIONING ACTION

The proposed decommissioning scope of work includes: (1) remediation of the Harvard Avenue site and construction of a disposal cell, (2) remediation of the Bert Avenue site and construction of a disposal cell, and (3) remediation of the McGean-Rohco Complex buildings. On August 5, 1994, the staff published in the Federal Register an EA and Finding of No Significant Impact for the McGean-Rohco Complex remediation (Reference 9). On June 6, 1996, the staff published in the Federal Register an EA and Finding of No Significant Impact for the Harvard Avenue remediation (Reference 12).

4.1 Major Decommissioning Activities, Tasks, and Schedules

This section describes the specific work efforts necessary to accomplish the desired decommissioning of the Bert Avenue site. The general work activities necessary to achieve unrestricted use criteria are:

1. Obtain applicable OEPA approvals,
2. Prepare site,
3. Excavate, segregate, and stockpile contaminated materials,
4. Construct disposal cells in excavated areas,
5. Place contaminated materials in disposal cells,
6. Perform final radiation surveys to demonstrate compliance with unrestricted use criteria,
7. Construct disposal cell covers,
8. Ship contaminated materials exceeding the unrestricted use criteria to a licensed low-level waste disposal site.

4.1.1 Obtain Applicable OEPA Approvals

At the Bert Avenue site, there are both radioactive contaminated wastes and solid wastes. The OEPA has regulatory jurisdiction, under RCRA, Subpart D, over the solid waste materials. On December 5, 1994, Chemetron submitted its "Final Site Closure/Post-Closure Plan, Bert Avenue" (Reference 10) to OEPA. On July 24, 1996, OEPA approved the post-closure plan with conditions. Chemetron and OEPA are currently resolving issues related to outstanding conditions. Before remediation at the Bert Avenue site can begin, Chemetron must obtain, from OEPA, a permit to dig and authorization to close the landfill site.

4.1.2 Site Preparation

Site preparation involves setting up construction zones, entry and exit points, and setting up personnel and radiological controls needed for the remediation.

4.1.3 Excavate, Segregate, and Stockpile Contaminated Materials

Before the disposal cell can be constructed, contaminated materials at the Bert Avenue site will be excavated, segregated, and stockpiled. Contaminated materials having activity levels exceeding the unrestricted release limits will be segregated for shipment to a licensed low-level waste disposal site. Stormwater and groundwater control systems will be constructed. All construction activities will use standard earth-moving equipment.

At the Bert Avenue site, temporary stormwater retention areas will be constructed for the stockpile area and for the disposal cell area. Stockpile areas will use liners and covers, and be located in the southwest corner of the site and within the boundaries of the disposal cell.

4.1.4 Construct Disposal Cell

Following the excavation and stockpiling of contaminated materials and before construction of the disposal cells, surveys will be performed to ensure that all contamination has been removed and that the areas below the cells meet NRC unrestricted use limits.

Figures 4.1 and 4.2 show the plan and elevation views of the proposed Bert Avenue cell. Chemetron will construct and modify the storm sewer that flows through the site. The open storm sewer will be replaced with a pipe connecting the existing sewer lines. Because of space limitations within the site area, the disposal cell construction will be sequenced by first constructing the northern portion of the cell, moving wastes into it, and then constructing the southern portion of the cell. Below the waste layer, the cell will consist of a 3-m (10-ft) to 6.1-m (20-ft) granular fill underdrain layer containing perforated drainage pipes, a geotextile to separate the granular fill from the clay layer above it, a 1.5-m (5-ft) compacted clay layer, a 0.3-m (1-ft) stormwater control drainage layer, and another geotextile separation layer. The compacted clay layer will extend up the sides of the disposal cell and be 0.9-m (3-ft) thick.

4.1.5 Place Wastes in Disposal Cells

In the Bert Avenue disposal cell, the waste layer will be approximately 2.7 m (9 ft) in thickness. Waste will be emplaced and compacted in 0.3-m (1-ft) lifts.

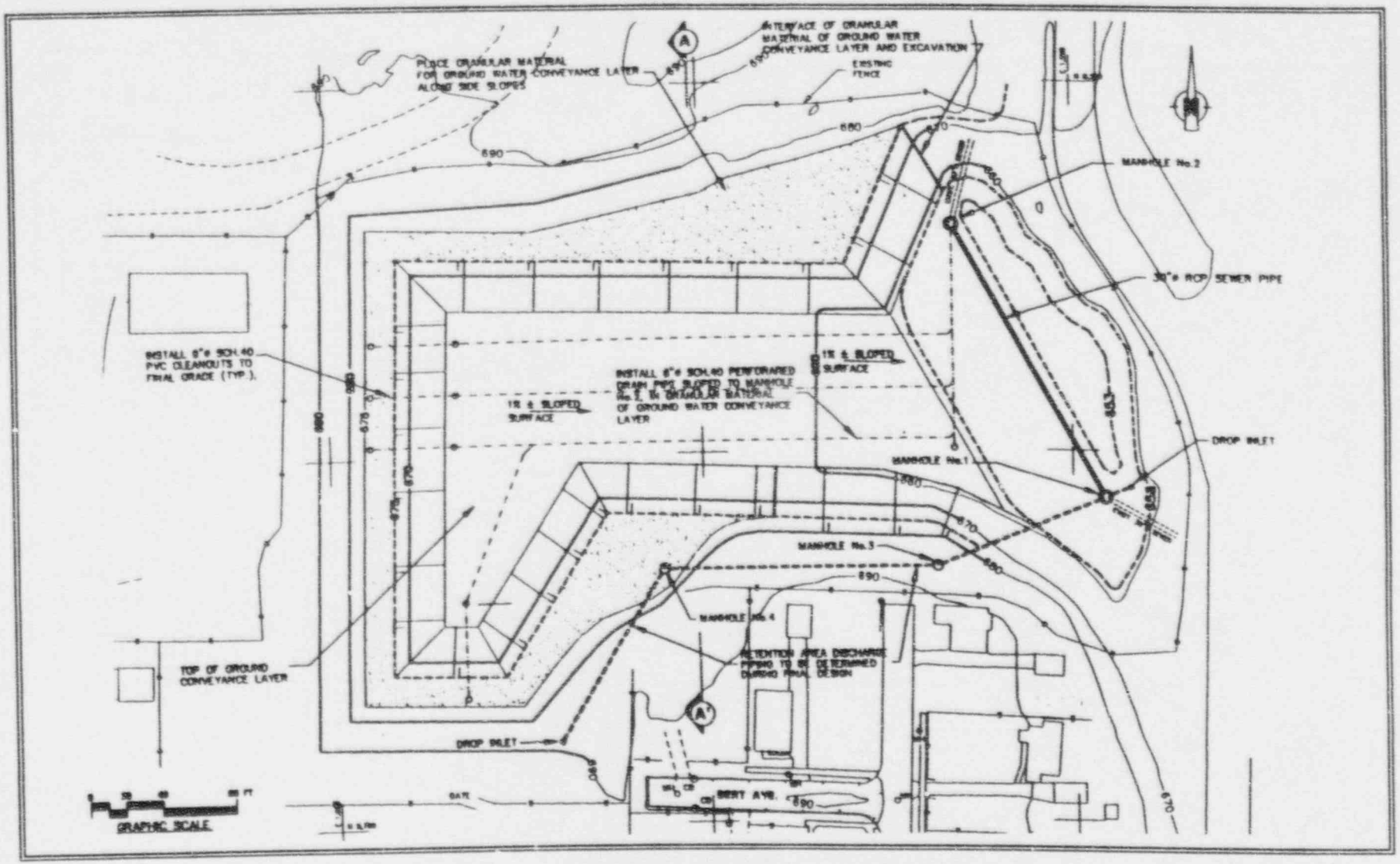

Figure 4.1 Bert Avenue disposal cell - plan view.

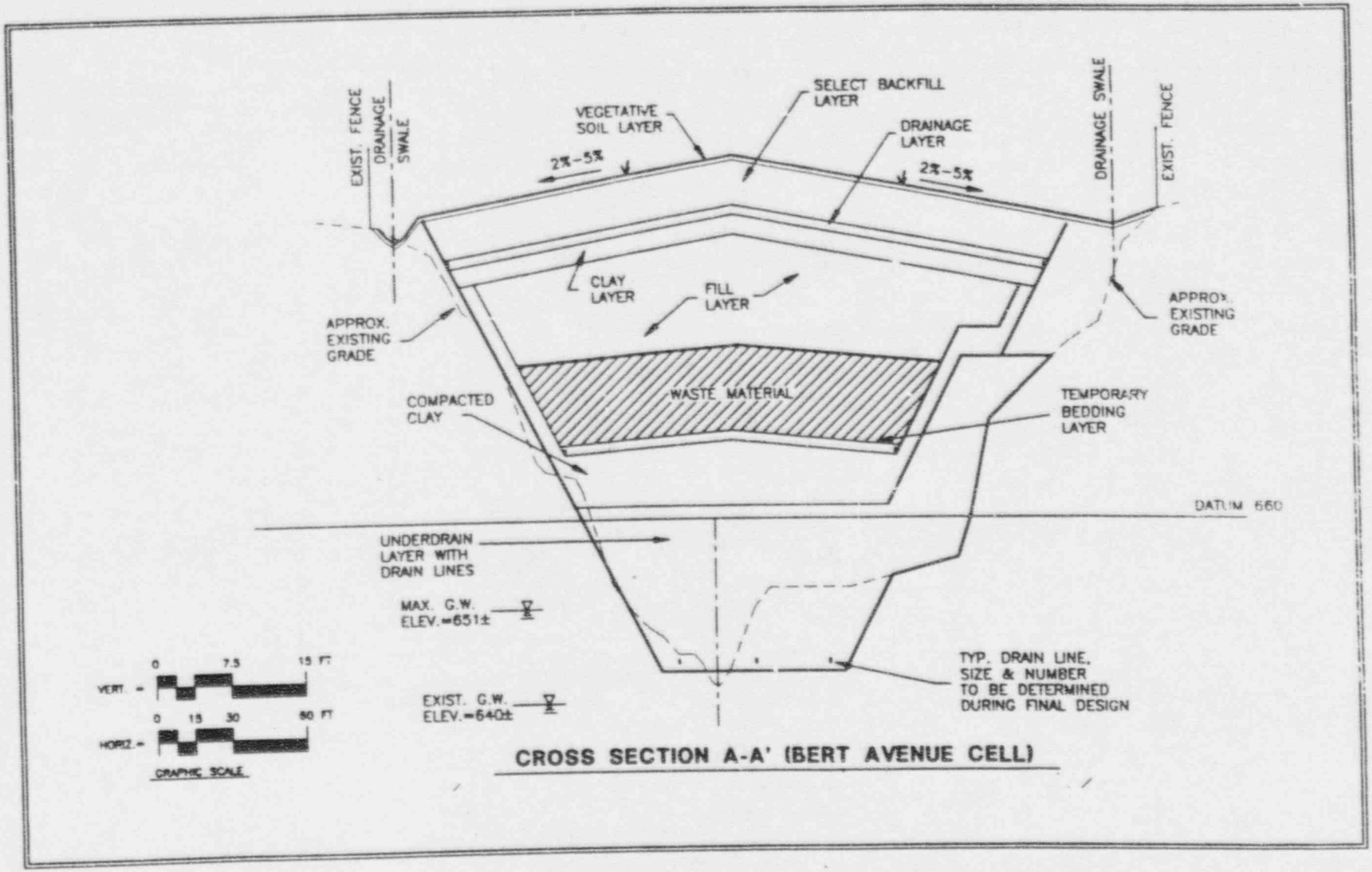

Figure 4.2 Bert Avenue disposal cell - elevation view.

4.1.6 Perform Final Radiation Surveys

Final radiation surveys will be performed in areas surrounding the disposal cell in accordance with NUREG/CR-5849, "Manual for Conducting Radiological Surveys in Support of License Termination" (Reference 15). The objective of these procedures is to demonstrate, with a 95 percent confidence level, that there are no radioactive hot spots having levels that exceed the averaging criteria in NUREG/CR-5849.

Final radiation surveys will also be performed to ensure that wastes placed in the disposal cell are less than 5.98 Bq/gm (161 pCi/gm) when averaged over a 100-m^2 (1070-ft^2) area and meet the averaging criteria in NUREG/CR-5849. The final surveys will consist of performing radiation scans over 100 percent of each 0.3-m (1-ft) lift and taking one sample for gamma spectroscopic analysis in every 10-m (33-ft) x 10-m (33-ft) area at every 0.3-m (1-ft) lift. If scans or samples indicate activity that exceeds 5.98 Bq/gm (161 pCi/gm), Chemetron will take further samples and determine compliance with the averaging criteria in NUREG/CR-5849. These criteria address averaging concentrations over any 100-m^2 (1070-ft^2) area and using the $(100/A)^{1/2}$ elevated area criteria. Material that exceeds the averaging criteria in NUREG/CR-5849 shall be removed and shipped offsite to a licensed low-level waste disposal site.

NRC will perform confirmatory surveys to ensure that Chemetron's final surveys reflect the actual radiological conditions at the site.

4.1.7 Construct Disposal Cell Covers

After emplacement of the radioactive wastes and conduct of the final surveys, compacted non-radioactive solid wastes will be placed on top of the radioactive materials. Compacted select fill will be added to bring the level of the cell up to the desired elevations. The Bert Avenue cover will consist of a 0.5-m (1.5-ft) compacted clay layer and a 60-mil high-density polyethylene membrane cover, a 0.3-m (1-ft) drainage layer, a geotextile for separation, a 1.4-m (4.5-ft) to 1.5-m (5-ft) select backfill layer, and a 0.15-m (0.5-ft) vegetative cover. The cover will be graded to be equal to the surrounding terrain and will completely fill in the ravine.

4.1.8 Ship Wastes That Exceed the Onsite Cell Limits

Any contaminated materials that exceed the Option 2 limits in the BTP will be shipped to a licensed low-level waste disposal site. Chemetron proposed to ship wastes to the Envirocare facility in Clive, Utah.

4.1.9 Schedule

After NRC and OEPA approvals, Chemetron is proposing a 24-month schedule for the remediation of the Bert Avenue site. This schedule includes site preparations, final design preparations, selection of contractors, excavation, waste emplacement, final and confirmatory surveys, and finishing of site grading. The disposal cell excavation and waste emplacement will take approximately 15 months for the Bert Avenue site.

4.2 Radiological Controls

Radiological controls to be implemented include controls limiting effluent releases to the environment and radiation exposure to workers and the public. An environmental monitoring program will be implemented as an additional safeguard. The radiation controls are subject to the Chemetron Radiological Control Program (Reference 16) and the Chemetron Remediation Project Quality Assurance Program (Reference 17).

4.2.1 Effluent Release Controls and Environmental Monitoring

Airborne monitoring sampling stations will be established for the remediation operations. Four sampling stations will be placed at the perimeters of the Bert Avenue site. Chemetron will collect samples at least weekly and measure gross alpha and gross beta in each of the samples. Five percent of the samples will be analyzed for total uranium. Releases will meet 10 CFR Part 20 airborne effluent requirements. Environmental TLDs are placed along the perimeters of the Bert Avenue site and will be assayed on a quarterly basis.

Liquid effluents will be collected in holding and sediment retention basins. Gross alpha, gross beta, and uranium assays will be performed whenever releases are made. Releases will meet 10 CFR Part 20 liquid effluent requirements. Surface water and groundwater samples will also be made quarterly at the Bert Avenue site.

4.2.2 Worker Exposure Controls

The radiation protection program will be implemented by qualified the staff under the direction of the Radiation Safety Officer (RSO). The goal of the radiation protection program is to ensure that remediation activities are conducted in full compliance with all NRC regulations, and that all occupational radiation exposures are within the limits of 10 CFR Part 20 and are reduced to levels as low as is reasonably achievable (ALARA). The radiation protection program is described in the Radiological Control Plan (Reference 16) and will be implemented through written procedures.

To control occupational exposures, restricted areas will be identified, posted, and access to them will be controlled. A radiation work permit program will also be used to ensure workers understand: the tasks they are assigned, the radiation hazards in the work area, and the monitoring and personnel protection requirements for the task. Personnel external monitoring will be accomplished through the use of personnel dosimetry, using TLDs, and radiation surveys. Surveys will be performed before persons work in radiation areas, and on personnel exiting contaminated areas. All workers will have urine samples collected and analyzed before work begins and on termination. The bioassay program will be consistent with the recommendations in Regulatory Guide 8.9 (Reference 18).

Respiratory protection equipment will be available and will be used in compliance with 10 CFR 20.1703. Action levels have been developed and are presented in the Radiological Control Plan (Reference 16). Chemetron, in a letter dated February 13, 1995, notified NRC Region III that it planned to

implement its respiratory protection program in evaluating exposure from the intake of radioactive materials. This notification, in accordance with 10 CFR 20.1703(d), allows Chemetron to take credit for its respiratory protection program in determining exposures.

A contamination control program will be implemented to minimize the spread of contamination. All personnel and equipment leaving the site will be surveyed and meet criteria in "Guidelines for Decontamination of Facilities and Equipment Prior to Release for Unrestricted Use or Termination of License for Byproduct, Source or Special Nuclear Material" (Reference 19).

An ALARA program will be implemented to ensure that exposures are reduced to ALARA levels. This program will encompass work task planning, control and monitoring of personnel and operations, radiation work permits, training, and tracking exposures.

4.2.3 Unrestricted Use Criteria

Chemetron proposed to use the unrestricted use criteria listed in "Guidelines for Decontamination of Facilities and Equipment Prior to Release for Unrestricted Use or Termination of License for Byproduct, Source or Special Nuclear Material" (Reference 19) for surfaces of buildings and equipment, and the 1981 BTP, "Disposal or Onsite Storage of Thorium or Uranium Wastes from Past Operations" (Reference 1) for soils. Specific values are given below --

Soils:	Depleted uranium on the surface	1.3 Bq/gm (35 pCi/gm) (total uranium)
	Depleted uranium in the disposal cell	5.9 Bq/gm (161 pCi/gm) (total uranium)
	Thorium on the surface	0.37 Bq/gm (10 pCi/gm) (total thorium)

Equipment and building surfaces:

5000 dpm alpha/100 cm^2 (15.5 in^2); averaged over 1 m^2 (10.8 ft^2)
5000 dpm beta-gamma/100 cm^2 (15.5 in^2); averaged over 1 m^2 (10.8 ft^2);
15,000 dpm alpha/100 cm^2 (15.5 in^2); maximum over 100 cm^2 (10.8 ft^2);
15,000 dpm beta-gamma/100 cm^2 (15.5 in^2); maximum over 100 cm^2 (10.8 ft^2);
1000 dpm alpha/100 cm^2 (15.5 in^2); removable
1000 dpm beta-gamma/100 cm^2 (15.5 in^2); removable

Exposure rate:

Soils	2.6 pC/kg (10 μR/hr) average above background at 1 m (3.3 ft)
	5.2 pC/kg (20 μR/hr) maximum above background at 1 m (3.3 ft)
Equipment and buildings	1.3 pC/kg (5 μR/hr) above background at 1 m (3.3 ft)

The depleted uranium limits for the disposal cells were determined based on solubility data from uranium solubility tests using the Kalkwarf Method (Reference 20). Uranium solubility tests were performed on waste samples from the Bert Avenue site. The solubility data were used to calculate disposal limits using the following equation:

$$\text{Depleted Uranium Limit (pCi/gm)} = 170/[(F_1)(0.56) + (1 - F_1)(1.9)]$$

where F_1 is the insoluble fraction (i.e., the fraction of "Y" classified material if the Kalkwarf method is used).

Based on the average of three samples, the limit for depleted uranium was computed to be 5.98 Bq/gm (161 pCi/gm).

4.3 Waste Management and Disposal

4.3.1 Waste Generation

Remediation activities are expected to generate the following volumes of wastes:

Bert Avenue:	Radioactive wastes to be disposed of in the cell	480,000 ft^3
	Non-radioactive solid wastes to be disposed of in the cell	590,000 ft^3
	Wastes to be shipped offsite	15,000 ft^3

All wastes to be shipped offsite will be Class A wastes.

4.3.2 Waste Handling and Packaging

Chemetron indicated that specific waste packaging methods will be selected during the remediation. These methods will comply with NRC and Department of Transportation (DOT) packaging and shipping requirements. NRC will require, under a license condition, Chemetron to submit the specific waste packaging and shipping methods to be used for NRC review before making any offsite waste shipment.

4.3.3 Waste Transportation and Disposal

Chemetron indicated that specific transportation methods will be selected during the remediation. These methods will comply with NRC and DOT packaging and shipping requirements. Covered trucks or covered railcar hopper cars will be used.

Chemetron plans to ship wastes to the Envirocare disposal site in Clive, Utah. The Envirocare disposal site is licensed by the State of Utah for low-level radioactive waste disposal. Disposals will be made in compliance with 10 CFR Part 20 and State of Utah requirements.

4.4 Organization and Responsibilities

The Chemetron decommissioning project organization is headed by the Program Manager, who is responsible for overall project control. The Program Manager is also responsible for meeting environmental, health and safety, quality assurance, and technical requirements. The Project Manager/RSO, who is responsible for site safety operations, licensing, and radiation protection reports to the Program Manager. The Quality Assurance (QA) Coordinator, Environmental Safety and Health Coordinator, the Laboratory Manager, Field Operations Supervisor, Engineering Design Coordinator, and the Excavation and Construction Subcontractors report to the Project Manager. The QA Coordinator can report directly to the Program Manager to ensure independence of the QA Program. The Program Manager and the Project Manager/RSO have sufficient nuclear program management experience and technical qualifications to manage the remediation activities.

4.5 Employee Staffing and Training

4.5.1 Employee Staffing

Chemetron intends to perform the remediation primarily through the use of contractor personnel. B. Koh & Associates will provide the Program Manager, the Project Manager/RSO, the QA Coordinator, and the Environmental Safety and Health Coordinator. Contractor support from Dames & Moore will be responsible for engineering and design. Other contractor support will be provided for laboratory services, excavation and construction, decontamination, and radiation protection.

4.5.2 Training

Chemetron's worker training program is described in the "Radiation Worker Handbook and Training Manual" (Reference 21). The program includes site orientation training, radiation safety training, and industrial safety training. The training program is consistent with the requirements in 10 CFR Part 19.

Site orientation training is required of all who enter controlled areas and addresses chemical and radioactive material labeling and posting, the need to

limit exposures to workers and the public, and recognition of emergency signals.

Radiation safety training includes basic radiation safety principles and practices, biological effects of radiation, public and worker dose limits, radiological controls, radiation safety responsibilities, emergency procedures, rights of workers, airborne radiation controls, bioassay requirements, prenatal exposures, dosimetry, radiation work permits, waste minimization, and the ALARA program. Workers must pass a written examination before being allowed unescorted access to the sites.

Industrial training presents information on industrial hazards that may be encountered during the remediation, proper safety procedures for using specialized equipment (including construction equipment), and emergency procedures.

4.6 Quality Assurance

The Chemetron QA Program is documented in the Chemetron Remediation Project QA Program and in the QA Project Plan (Reference 17). These documents address management controls and requirements for ensuring quality in remediation activities. The plan includes requirements of management audits and radiation protection program controls. The QA Coordinator reports directly to the Project Manager/RSO, but can also independently raise quality issues directly with the Program Manager.

4.7 Financial Assurance

Chemetron has a decommissioning funding plan in place that includes a parent guarantee, submitted by the Sunbeam-Oster Company, of $7,465,000. This amount is based on a decommissioning cost estimate that reflects the use of onsite disposal cells at the Harvard Avenue and Bert Avenue sites, and is a reasonable estimate of the decommissioning cost for both sites. The estimated cost for remediating the Bert Avenue site is $5,345,000. Decommissioning will be funded from existing Chemetron assets or assets from its parent company, Montey Corporation. In the Chemetron and Montey Corporation balance sheets, liabilities substantially exceed the listed assets. The stated liabilities are substantially comprised of the Chemetron decommissioning costs. The Chemetron liabilities are also reflected in the Montey Corporation balance sheets. If Chemetron and Montey Corporation assets are insufficient to carry out the decommissioning, the staff will request Chemetron to draw on the parent guarantee from Sunbeam-Oster Company.

4.8 Emergency Planning

Emergency procedures are provided in the Chemetron Health and Safety Procedures, Emergency Procedures, and "Radiological Control Plan" (Reference 16). These procedures address specific actions to be taken by Chemetron staff in case of an emergency. Potential emergencies include accidents, accidental releases, fires, explosions, and natural disasters. Emergency procedure training is addressed in the "Radiation Worker Handbook and Training Manual" (Reference 21).

Offsite assistance can be provided, if necessary, by the police and fire departments in Cuyahoga Heights and Newburgh Heights and from local hospitals. The Program Manager will ensure that local fire, police, and medical emergency units are aware of the decommissioning activities and emergency procedures. A list of personnel to be contacted in the event of an emergency will be provided to Chemetron remediation staff and security officers.

5 ENVIRONMENTAL IMPACTS OF THE PROPOSED ACTION

5.1 Radiological Impacts on the Public and Workers

Radiological impacts on members of the public may result from inhalation and ingestion of releases of radioactivity in air and in water during the remediation operations, direct exposure to radiation from radioactive materials at the site during remediation operations, and transport for disposal. The public will also be exposed to radiation as a result of the onsite disposals. Decommissioning workers may receive doses primarily by ingestion, inhalation, and direct exposure during the remediation activities. In addition to impacts from routine operations, the potential radiological consequences of accidents are considered.

5.1.1 Radiological Impacts on the Public

The licensee provided an estimate of dose to the public from airborne effluents to be generated during the excavation activities associated with the decommissioning of Bert Avenue site. The estimation was performed using the CAP88PC computer code (Reference 22) (a program developed by EPA to demonstrate compliance with the "National Emission Standards for Hazardous Air Pollutants," 40 CFR Part 61) and predicted a maximum public dose from airborne effluents of 0.04 mSv (4 mrem) for the Bert Avenue site. The licensee assumed that the nearest receptor is 50 m (164 ft) away from the release point.

The staff performed a conservative, independent analysis of the potential for public exposure from airborne effluents. The staff did not use dispersion modeling to estimate the public dose from airborne effluents. Instead, the airborne concentration in the immediate excavation area was estimated and that concentration was used to estimate the maximum public dose, assuming no dispersion between the excavation area and the location of the closest offsite resident. The staff assumed the following:

1. 200 $\mu g/m^3$ (1.23E-8 lb/ft^3) mass loading factor;
2. 4.8 Bq/gm (130 pCi/g) (total depleted uranium);
3. no dispersion from the point of generation to the location of the nearest offsite resident.

The estimated airborne concentration of uranium in the immediate area of the excavation is 9.9E-22 Bq/ml (2.7E-14 μCi/ml), approximately 47 percent of the 10 CFR Part 20, Appendix B, Table 2, Column 1, limit for unrestricted areas. The limit that applies in this case is a weighted average of the limits for U-238 and U-234, assuming that the U-234 activity concentration is 50 percent of the U-238 concentration in the uranium at the Chemetron site, the weighted limit is 2.11E-21 Bq/ml (5.7E-14 μCi/ml). Using the weighted limit, and assuming that continuous exposure at the limit results in 0.5 mSv (50 mrem) (the 10 CFR Part 20 airborne dose limits to members of the public are based on an individual receiving 0.5 mSv (50 mrem) when exposed to a concentration equal to the limit), the estimated dose to the nearest resident during

excavation of soil at the Chemetron Bert Avenue site is approximately 0.24 mSv (24 mrem).

Since the estimated maximum dose from potential airborne effluents is a significant fraction of the 10 CFR Part 20 limits, the staff is applying a license condition to require an air sampling program at the site perimeter, and, when airborne concentrations exceed 1.1E-21 Bq/ml (3.0E-14 μCi/ml), to require that the use of dust-suppression measures be considered during the excavation of the contaminated soil at the Bert Avenue site.

The staff performed dose assessments for the Bert Avenue disposal cell using the RESRAD computer code, Version 5.61 (Reference 23). Groundwater doses after 1000 years were analyzed using the NEFTRAN II computer code (Reference 24). The RESRAD code calculates dose impacts assuming a resident-farmer scenario, where an individual would construct a residence, live there, grow food, and consume all drinking water from a conservatively located groundwater well. For the Bert Avenue disposal cell, a waste volume of 15,000 m^3 (530,000 ft^3), at an average concentration of 3.2 Bq/gm (87 pCi/gm) U-238; 0.032 Bq/gm (0.87 pCi/gm) U-235; and 1.71 Bq/gm (42.6 pCi/gm) U-234, was assumed. Calculations were performed using a 2.4-m (8-ft) cover and no cover. The drinking water consumption rate was assumed to be 730 l/yr (193 gal/yr) and the distribution coefficient for uranium in the disposal cell clay liner and natural unsaturated lacustrine clay layer was assumed to be 10 ml/g (280 $in.^3$/lb). The staff also used parameters recommended in staff guidance (Reference 25).

For the RESRAD analysis the distance from the groundwater well to the ground surface was assumed to be 140 m (460 ft). This well depth was based on the regional geology of the Bert Avenue site. The swampy area at the base of the Bert Avenue site lies just above a lacustrine clay layer that is at least 180-m (600-ft) thick. Overlaying the lacustrine clay layer are fill deposits and an undifferentiated surficial layer that is about 12- to 15-m (40- to 50-ft) thick. The Bert Avenue ravine is cut into the surficial layer. Some groundwater occurs in the surficial deposits. However, groundwater in the surficial deposits is unsuitable for potable water supplies because of industrial development in the area. These groundwater supplies may also be insufficient to provide a reliable source of water for domestic use. Because the lacustrine clays have a relatively low porosity and would not provide sufficient water volumes for domestic use, it was assumed that the groundwater well is drilled into a sand and gravel deposit that is assumed to exist between a depth of 81 m (265 ft) and 155 m (510 ft). This assumption is based on the existence of a groundwater well about 1.6 km (1 mile) from the Bert Avenue site that is drilled to 160 m (523 ft) and boring log information that shows the sand and gravel layer at a depth of 81 m (265 ft) to 155 m (510 ft).

The results of the calculations are shown in Figures 5.1 and 5.2. Over a 1000-year period, the peak dose, assuming a cover and using the RESRAD code, was computed to be 7E-5 mSv/yr (0.007 mrem/yr). These doses include doses from the groundwater dependent pathways, such as direct consumption of groundwater and consumption of food irrigated by groundwater, and groundwater independent pathways, such as inhalation, ingestion, and direct exposure. The doses are dominated by the radon inhalation pathway. These radon inhalation

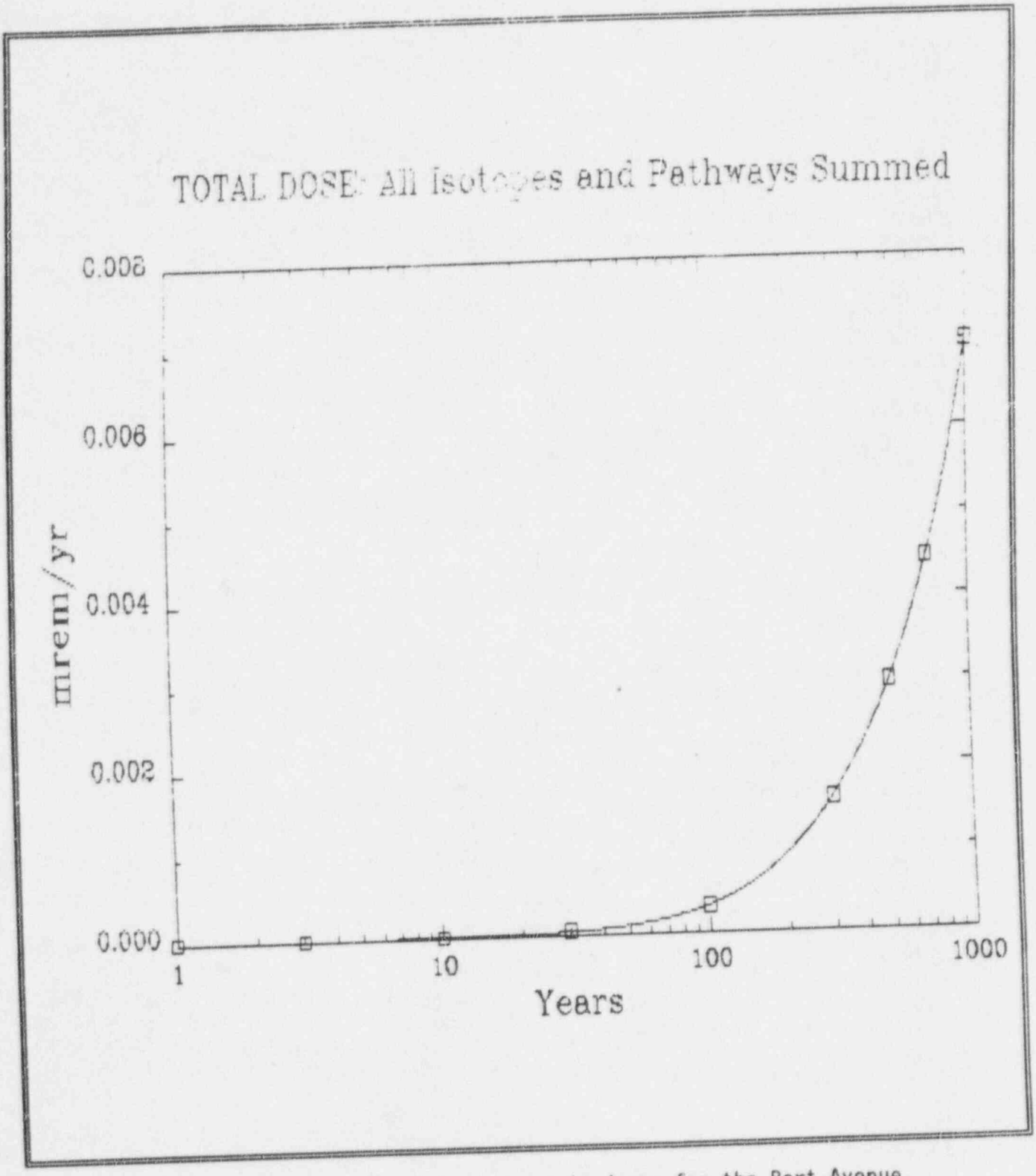

Figure 5.1 Resident-farmer scenario doses for the Bert Avenue disposal cell with cover.

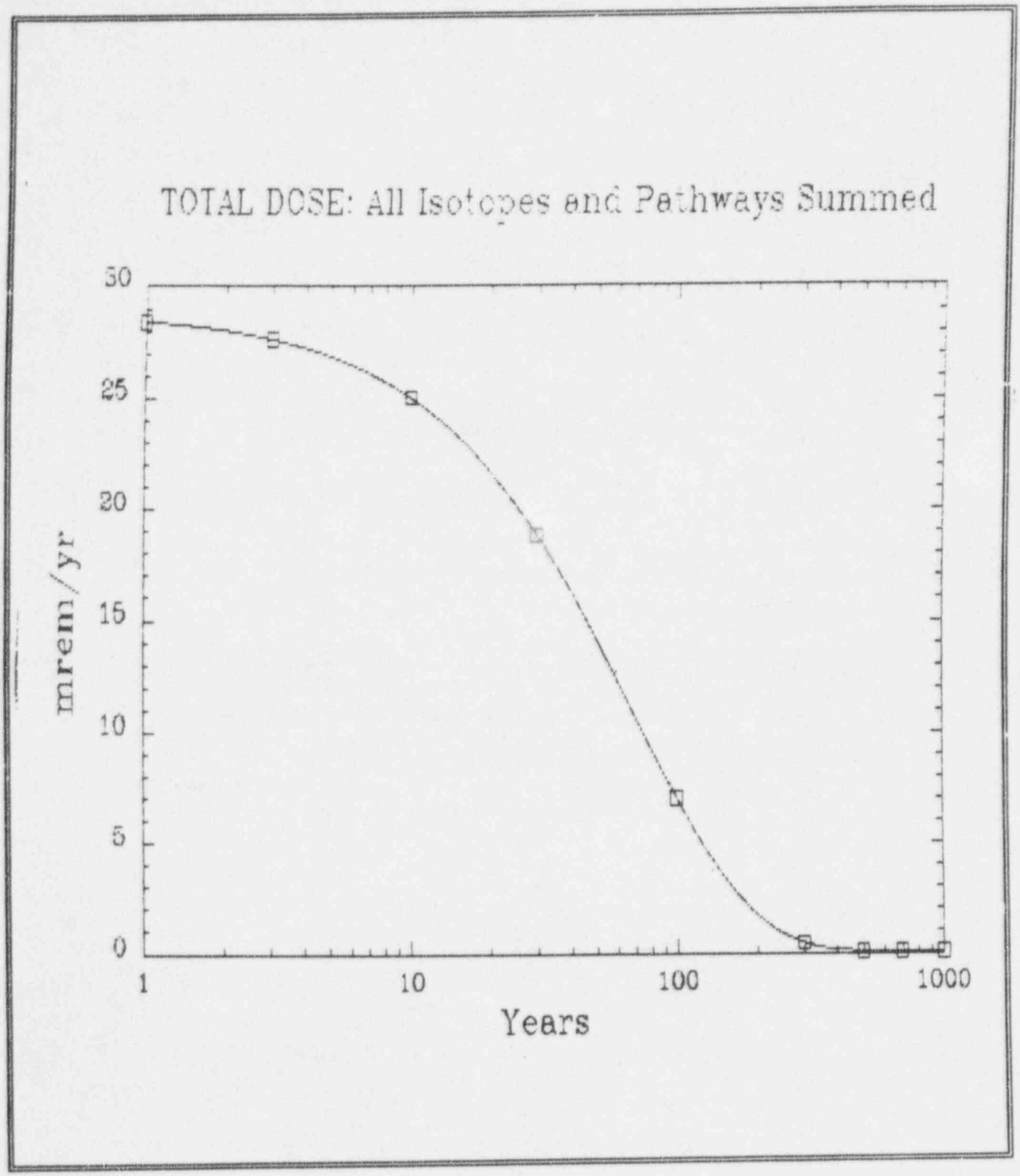

Figure 5.2 Resident-farmer scenario doses for the Bert Avenue disposal cell with no cover.

doses continue to increase from 2.5E-5 mSv/yr (0.0025 mrem/yr) at 1000 years to about 5E-5 mSv/yr (0.005 mrem/yr) at 10,000 years. Assuming no cover, the peak dose over a 1000-year period is 0.28 mSv/yr (28 mrem/yr). In both the cover and no-cover cases, doses result from the groundwater independent pathways (inhalation, ingestion, and direct exposure). No groundwater pathway effects were observed in the calculations during the 1000-year time period.

Groundwater pathways after 1000 years were evaluated using the NEFTRAN II code. The NEFTRAN II code was used for this analysis because it can more realistically model the actual dispersion of radionuclides through the lacustrine clay layer than does the RESRAD model. The NEFTRAN II code was used to simulate radionuclide migration in the contaminated soil, clay liner, and lacustrine clay unit. Radionuclide releases from the site were assumed to travel in the lacustrine clay and enter a sand and gravel layer where a withdrawal well was assumed to be located. Key assumptions used in the analysis are as follows:

1. The inventory of U-238 was assumed to be 79.6 GBq (2.15 Ci). The total inventory of U-234 was assumed to be 38.8 GBq (1.05 Ci).

2. Doses are based on release of U-234 and U-238; U-235 was not included because of its negligible dose as compared with the other two nuclides.

3. All releases from the site were assumed to be intercepted by the well; (i.e., well production is assumed to be sufficient to justify capture of all releases).

4. Annual well production is 4240 m^3 (150,000 ft^3), based on a reasonable family farm irrigation and consumption rate. Nuclide concentrations at the well are based on 4240 m^3 (150,000 ft^3) of water per year and not the volumetric waste flux out of the disposal unit. This assumes the well will mix fresh and contaminated water at the intake and be sufficient to capture all releases. The model conservatively assumes that there is a sufficient well-production volume such that all the contaminants that reach the well depth in a given year are pumped into the well.

5. Two well locations were used: one at 150 m (500 ft) from the Bert Avenue site and the other at 1500 m (5000 ft) from the Bert Avenue site. Both well locations assume that the vertical migration of nuclides is sufficient to allow interception of the contamination in the sand and gravel layer (see Figure 5.3). For the 1500-m (5000-ft) location currently known to exist, a vertical migration of about 76 m (250 ft) is necessary for this to occur. This is considered to be a conservative assumption considering the properties of the lacustrine clay layer. For the 150-m (500-ft) location there is additional conservatism by assuming the sand and gravel layer exist at a significantly shallower depth.

6. Disposal cell design properties do not change over the evaluation period.

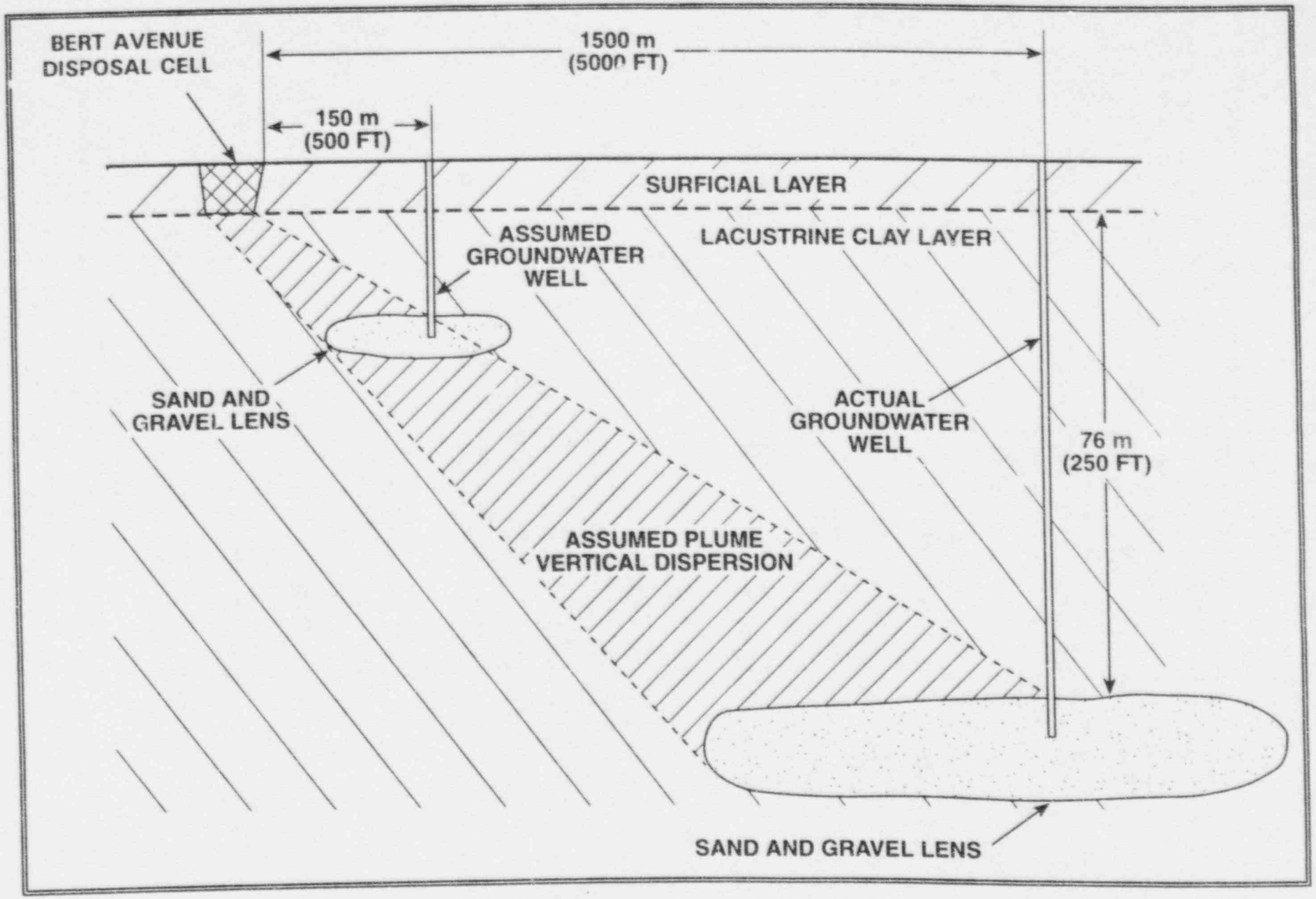

Figure 5.3 Assumed groundwater plume dispersion for NEFTRAN II analysis.

7. The dimensions of the disposal cell are 55 m (180 ft) by 100 m (330 ft) with a thickness of 2.7 m (9 ft).

8. The dimensions of the clay liner surrounding the contaminated soil are 0.9 m (3 ft) on the sides and 1.5 m (5 ft) on the bottom.

9. Hydraulic properties of the contaminated soil are:
porosity of 0.2; bulk density of 1.65 grams/cc (103 lb/ft^3);
conductivity of 20 m/yr (66 ft/yr).

10. Hydraulic properties of the clay liner are:
porosity of 0.4;
bulk density of 1.65 grams/cc (103 lb/ft^3);
conductivity of 0.03 m/yr (0.1 ft/yr).

11. Hydraulic properties of the lacustrine clay are:
porosity of 0.3;
bulk density of 1.65 grams/cc (103 lb/ft^3);
conductivity of 3 m/yr (10 ft/yr);
gradient 10 percent.

12. The solubility of uranium in water is assumed to be 50 mg/l (0.0031 lb/ft^3).

13. The dispersion length is 10 percent of the travel path.

14. The groundwater flux through the disposal unit is determined assuming: (a) a gradient of 1 across the clay liner (bottom) because of perched conditions; (b) the conductivity of the clay liner will limit the flow; and (c) the flow is downward -- this results in a volumetric flux of 168 m^3/yr (5940 ft^3/yr) based on an area of 5520 m^2 (59,400 ft^2), conductivity of 0.03 m/yr (0.1 ft/yr), and a gradient of 1.

15. The distribution coefficient (Kd) used for the clay liner and lacustrine clay is 10 ml/g (280 in.^{3}/lb). No retardation is assumed in the contaminated soil.

16. The drinking water pathway dose conversion factor for U-234 is 5.7E-5 mSv/yr per Bq/m^3 (2.1E8 mrem/yr per Ci/m^3) and 5.1E-5 mSv/yr per Bq/m^3 (1.9E8 mrem/yr per Ci/m^3) for U-238.

The results of the NEFTRAN II analysis indicate a peak annual dose of 0.22 mSv (22 mrem) at 8000 years using the well location 150 m (500 ft) from the Bert Avenue site and 0.02 mSv (2 mrem) at approximately 65,000 years at the well location 1500 m (5000 ft) from the Bert Avenue site.

The staff evaluated the groundwater effects if the cell underdrain system ceases to function and the groundwater table rises to the level of the natural topography (see Figure 5.4). Assuming a 10 percent gradient along the longest dimension of the cell, inferred from the cell design slope, and a clay conductivity of 10^{-7} cm/sec (0.1 ft/yr), the water flow rate through the clay liner would be 0.46 m^3/yr (16.2 ft^3/yr). Using the following conservative

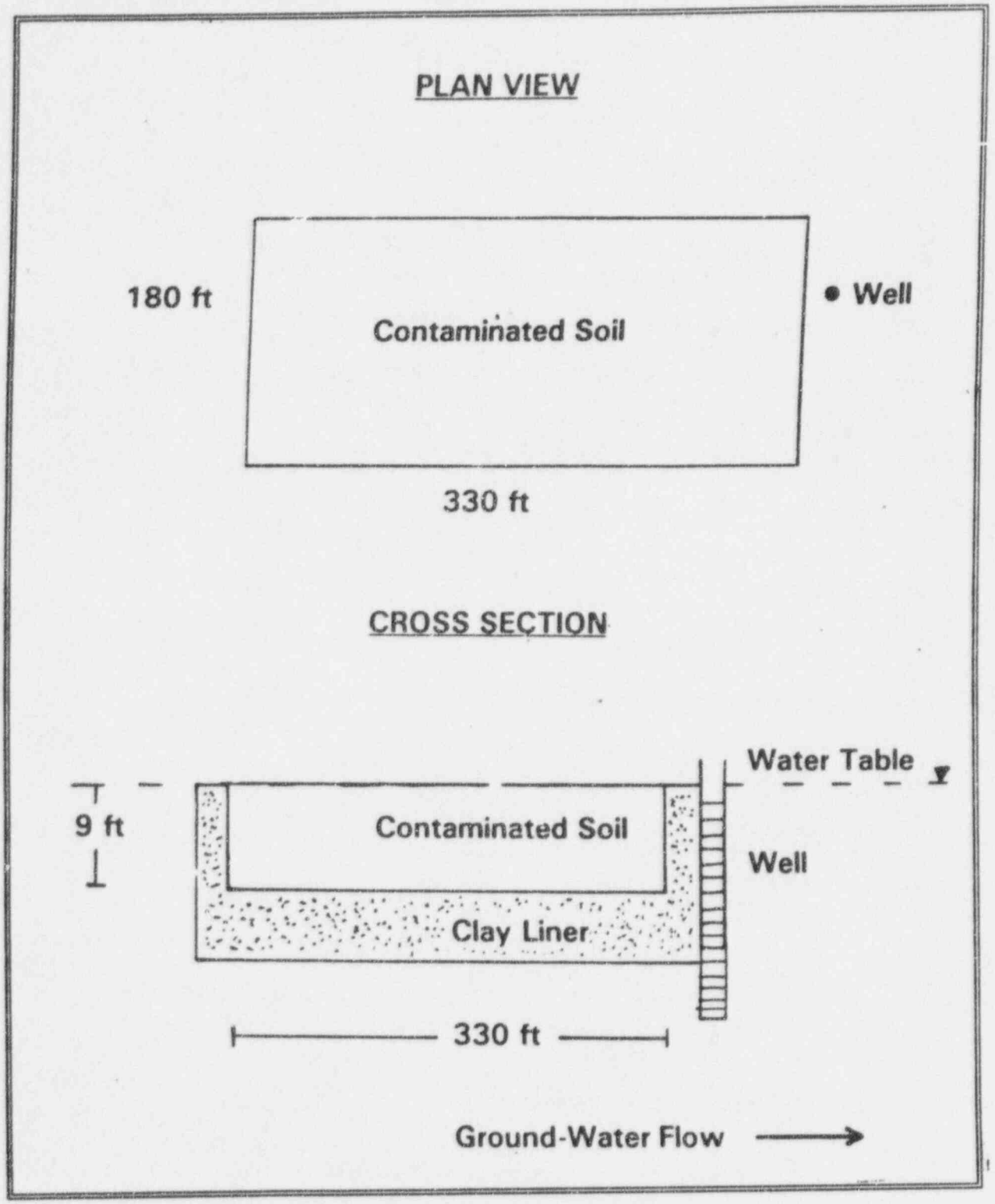

Figure 5.4 Conceptual model for water flow through the Bert Avenue cell assuming a rise in the water table.

geochemical assumptions, the dose from uranium leaving the disposal cell, with a sufficient amount of fresh water (4240 m^3/yr (150,000 ft^3/yr)) to meet the annual demand of a resident family-farmer, was computed:

1. clay distribution coefficient of 10 ml/gm (280 $in.^3$/lb);
2. contaminated soil distribution coefficient of 5 ml/gm (138 $in.^3$/lb);
3. uranium solubility of 5E-5 gm/ml (1.8E-6 lb/$in.^3$);
4. all the water passing through the cell is intercepted by the groundwater well.

The resulting dose was calculated to be 1.0E-5 mSv/yr (0.001 mrem/yr) at 1000 years and 2.0E-4 mSv/yr (0.02 mrem/yr) at 10,000 years.

The staff also analyzed the groundwater effects if the underdrain system continued to function, but the contaminated waste layer became saturated with water forming a perched water zone (see Figure 5.5). This scenario results in a greater head for water movement through the clay liner than the scenario where the groundwater level rises to the level of the natural topography. The water flow direction is downward through the clay liner at a rate of 168 m^3/yr (5940 ft^3/yr). Assuming similar conservative geochemical parameters as above, the dose to an individual member of a resident family-farmer using water at a rate of 4240 m^3/yr (150,000 ft^3/yr) would be 0.26 mSv/yr (26 mrem/yr) at 1000 years and the peak dose would be 0.71 mSv/yr (71 mrem/yr) at 1650 years.

The above doses estimated for the public are less than the 1 mSv/yr (100 mrem/yr) limit for exposures to the public in 10 CFR Part 20.

5.1.2 Radiological Impacts on Workers

During the remediation of the contaminated materials, workers will receive doses from direct exposure and from the inhalation of dusts containing depleted uranium. From direct exposure, assuming the maximum measured background radiation levels at the Bert Avenue site of 0.4 mSv/yr (40 mrem/yr), a Chemetron worker would receive a direct exposure dose of 0.091 mSv/yr (9.1 mrem/yr) for a 2000-hour working-year exposure. Assuming an average total uranium concentration of 4.8 Bq/gm (130 pCi/gm); a dust loading of 200 µg (4.4E-7 lb) of soil per m^3 (35.3 ft^3) of air; a respiratory rate of 1.2 m^3 (42.4 ft^3) of air per hour; a 3000-hr exposure; and dose conversion factors from Federal Guidance Report No. 11 (Reference 26), Chemetron computed the inhalation dose to be 0.12 mSv (12 mrem). The above doses are substantially below the 10 CFR Part 20 limit of 0.05 Sv/yr (5 rem/yr) for routine occupational exposure.

5.1.3 Waste Transportation Impacts

Wastes can be shipped by either truck or rail. Assuming shipment by 15-m^3 (20-yd^3) dump trucks, 28 truckloads would be required to ship the 420 m^3 (15,000 ft^3) of contaminated materials that exceed the Option 2 limits. Assuming covered hopper railcars having a capacity of 59 MT (130 tons), about 62 m^3 (80 yd^3) of wastes could be shipped in each railcar. At this capacity, seven railcars would be needed for the shipments.

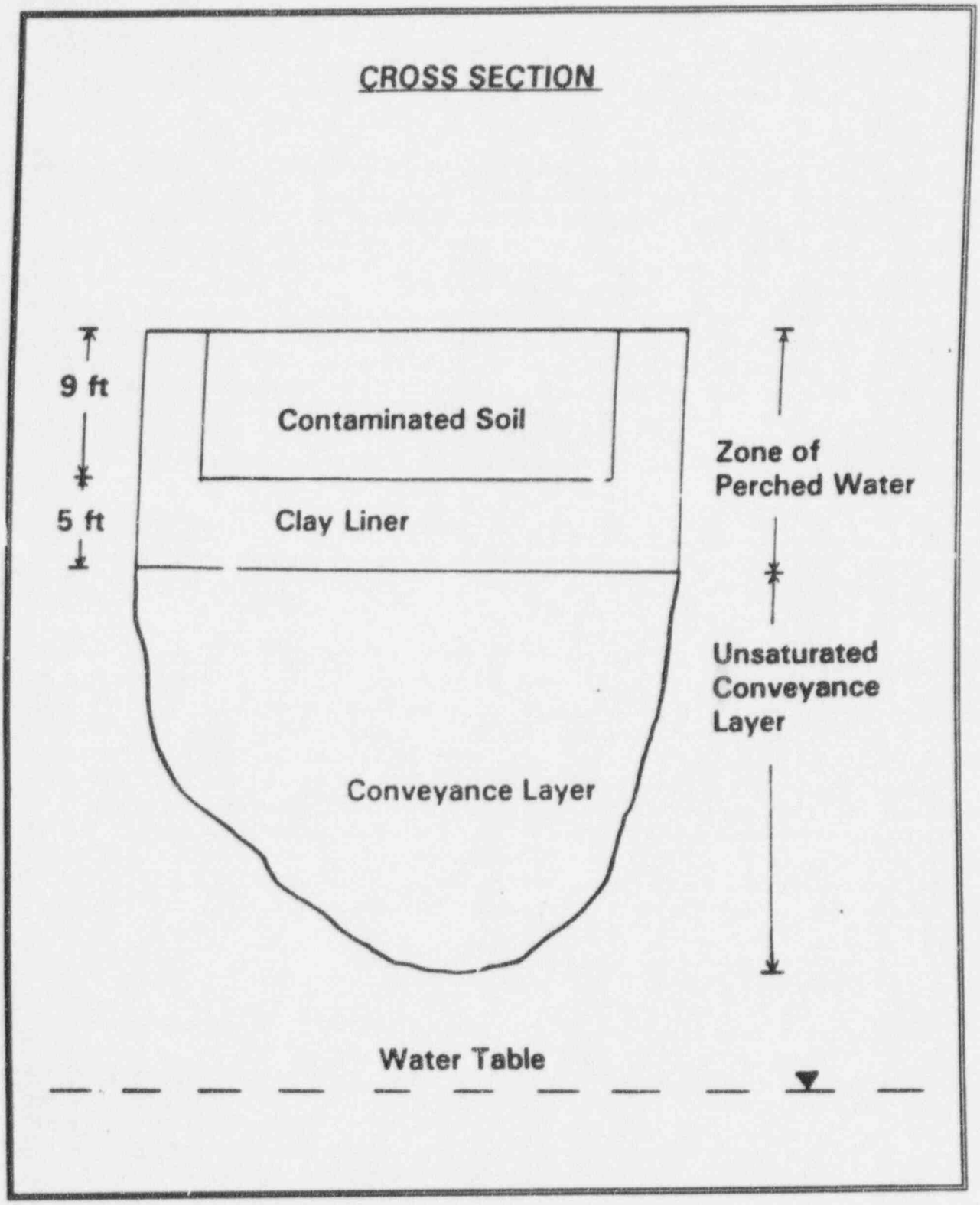

Figure 5.5 Conceptual model for water flow through the Bert Avenue cell assuming local perched water conditions.

For truck shipments, it was assumed that the route depicted on Figure 5.6 would be used from Cleveland, Ohio, to Clive, Utah. This route is 2860-km (1775-miles) long and, at an average speed of 80 km/hr (50 mile/hr), the trip duration would be 36 hr. For rail shipments a route length of 2860-km (1775-miles) long was also assumed, and, at an average speed of 64 km/hr (40 mile/hr), the trip duration would be 45 hr.

The staff performed calculations using the MICROSHIELD code (Reference 27) to determine exposure rates at the sides of trucks or railcars, having 0.32 cm (0.125 in.) steel sides, containing wastes at a concentration of 529 Bq/gm (14,300 pCi/gm) total uranium, the maximum concentration found in Chemetron's waste characterization program. The exposure rate in the truck cab, 61 cm (2 ft) from the end of the truck, would be 1.47E-3 mSv/hr (0.147 mrem/hr) above background. The exposure rate 2.0 m (6.6 ft) from the side of the truck would be 2.1E-4 mSv/hr (0.021 mrem/hr) above background. At these exposure rates the truck driver would receive a dose of less than 0.0588 mSv (5.88 mrem) per trip. The total exposure for the 28 trips would be 1.65 person-mSv (165 person-mrem). The exposures to truck drivers would be substantially less than NRC and DOT limits of 2 mrem/hr in occupiable spaces within the truck cab and 10 mrem/hr at 1.8 m (6 ft) from any side of the truck.

Because of the near-background exposure rates, individuals traveling along the highway adjacent to the trucks or residing near the highway would receive negligible exposures from these shipments. Background exposure rates are generally about 2.6 pC/kg (10 μR/hr) to 3.9 pC/kg (15 μR/hr).

For rail shipments, exposure rates at 61 cm (2 ft) from the end of the railcar would be 3.88E-3 mSv/hr (0.388 mrem/hr), and at 2.0 m (6.6 ft) from the sides of a railcar having 0.32-cm (0.125-in.) steel sides would be 5.08E-4 mSv/hr (0.0508 mrem/hr). Assuming a 2900-km (1800-mile) trip at an average speed of 65 km/hr (40 mile/hr), the trip duration would be 45 hr. Assuming the train operators remained at 2 ft from the end of the railcar over this duration, the operators would receive 0.233 mSv (23.3 mrem) per trip. Assuming one trip of seven cars is made with four train operators, the total exposure would be 0.932 person-mSv (93.2 person-mrem). Because of the near-background exposure rates, individuals residing or standing near the railroad line would receive negligible exposures from these shipments. These exposures are well within NRC and DOT limits.

5.1.4 Impacts of Potential Accidents

The staff reviewed the licensee's estimated potential consequences of postulated accidents. The licensee evaluated two worst-case accident scenarios -- a truck tipping over, releasing its contents, and a truck fire causing radioactivity to be dispersed into the air. The scenarios assumed the maximum total uranium concentration of 507 Bq/gm (13,700 pCi/gm) total uranium found at the Bert Avenue site in Chemetron's site characterization. Receptors ten m (32.8 ft) away would receive a dose of 4.3E-4 mSv (4.3E-2 mrem) from the truck spill accident and 0.04 mSv (4 mrem) from the truck fire accident.

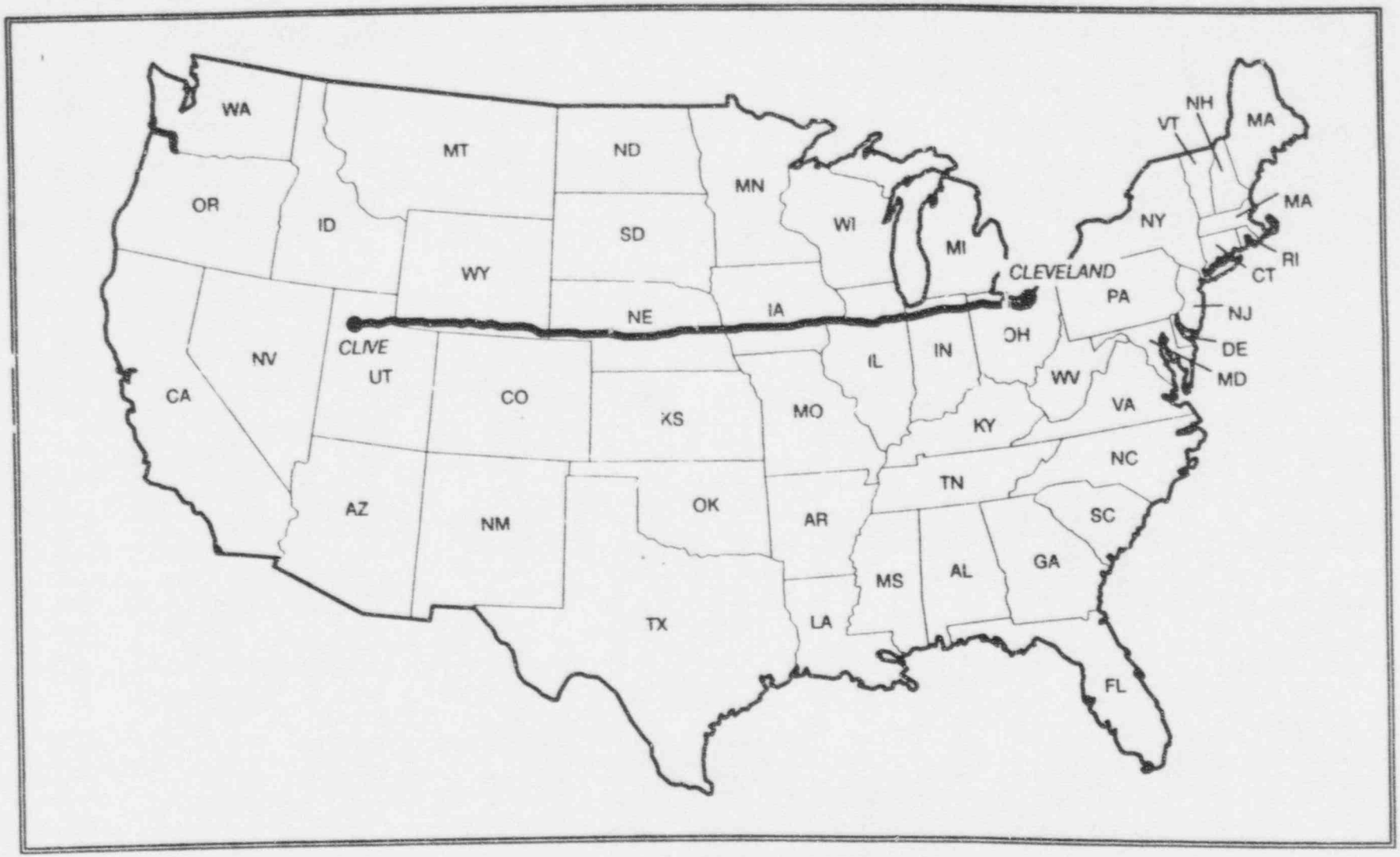

Figure 5.6 Assumed truck shipment route from Cleveland, OH, to Clive, UT.

These postulated accidents do not have the potential for onsite or offsite radiation doses that exceed the minimum Protective Action Guide level of 1 rem, recommended by EPA (Reference 28), or above 10 CFR Part 20 limit of 0.05 Sv (5 rem/yr) for routine occupational exposure.

5.1.5 Impacts on Low-Level Waste Disposal Site Operations

The volume of wastes estimated to be disposed of at licensed low-level waste disposal facilities is up to 420 m^3 (15,000 ft^3). This represents a relatively small percentage of the total volume of wastes disposed of at low-level waste disposal sites. Radiological impacts on workers and the public from waste disposal operations are considered in the approvals for low-level waste disposal site licenses and will be consistent with the performance objectives in 10 CFR Part 61, Subpart C, and the applicable State regulations.

5.2 Nonradiological Impacts

5.2.1 Socioeconomic Impacts

The decommissioning project will require heightened construction activities over a 9-month to 1 1/2-year period. Most of the workers are expected to be drawn from the local labor market. As a short-term project, the decommissioning is not expected to significantly create or eliminate jobs in the local area. Through the use of local labor and purchases of locally provided equipment and supplies, the project is expected to have a minor, but positive, impact on the local economy. Assuming that 40 percent of the total cost of the $5.3 million project is spent locally, and assuming a total impact multiplier of 1.2 to 1.3 for a site on the fringe of a metropolitan area (Reference 29), the income impact from the project on the local area will be about $2.5 to $2.8 million.

5.2.2 Air Quality Impacts

Air quality impacts will result from dust and equipment exhaust from construction and waste emplacement operations. These impacts will be of short duration and are expected to be minor.

5.2.3 Land and Water Use

No new land will be used except for a small strip of land in the southeast corner of the Bert Avenue site that will be used to support construction activities. The disposal cells will be constructed on land that is currently contaminated.

Following the emplacement of the wastes and completion of the disposal cell at the Bert Avenue site, McGean-Rohco, Inc., the owner of the Bert Avenue site, indicated that the property will be made available to the Village of Newburgh Heights for its use. The Village has indicated that it may use the property as a park restricted for recreational use.

Construction operations may require the use of additional domestic water. This additional water use should be minimal and have no significant impact.

5.2.4 Environmental Justice

The staff evaluated impacts associated with the proposed activities on minority and low-income communities. Section 3.3 discusses the demographics of the Newburgh Heights and Cuyahoga Heights areas. Within Newburgh Heights, the minority population is 0.7 percent of the village population. Within Cuyahoga Heights the minority population is 1.2 percent of the village population. Therefore, there is no significant minority population in these communities.

The median income level in Newburgh Heights is $24,621 and in Cuyahoga Heights is $30,234. These median income levels are higher than in the City of Cleveland ($17,822) and similar to the median income levels in Cuyahoga County ($28,595) and the State of Ohio ($28,706). The median income levels are also substantially higher than the 1992 poverty income level ($14,335) for a nonfarm family of four (Reference 30).

Within the Village of Newburgh Heights, 237 (24 percent) of 970 households have income levels less than the poverty level. All minority households have incomes between $25,000 and $34,999. Within the Village of Cuyahoga Heights, 43 (17 percent) of 259 households have income levels less than the poverty level. All minority households have income levels between $15,000 and $24,999.

Within Cuyahoga County, 150,548 (27 percent) of 563,303 households have income levels less than the poverty level. There are 64,226 minority households (11 percent) with income levels below the poverty level.

Within the State of Ohio, 1,026,292 (25 percent) of 4,089,312 households have income levels less than the poverty level. There are 212,552 minority households (5.2 percent) with income levels below the poverty level.

Based on the very low minority populations in Newburgh Heights and Cuyahoga Heights and income statistics that show no significant low-income populations compared with those in Cuyahoga County and in the State of Ohio, there are no significant minorities and low-income households that will be exposed to impacts from the proposed activities in Newburgh Heights and Cuyahoga Heights. Because there are no significant impacts from the proposed activities, there will be no environmental justice impacts.

5.2.5 Other Impacts

The relatively small scale of the proposed construction activities will produce no significant impact of local traffic patterns. Construction noise impacts could be significant for the residents who live immediately adjacent to the Bert Avenue site. These activities, however, will routinely be performed only during daytime hours.

The shipment of wastes to the Envirocare facility in Utah is estimated to produce 2.3E-4 occupational and 1.5E-3 public fatalities from traffic accidents and 4.1E-6 occupational and 1.4E-4 public fatalities from rail shipment accidents. These impacts are based on non-radiological rail and

medium-to-heavy truck accident fatality risk data from Reference 31. These impacts are not significant relative to truck and rail shipments of other commodities.

The staff has identified no species of plants nor animals of concern on the Bert Avenue site that will be adversely affected by the proposed activities.

There are no known historical or archeological sites at the Bert Avenue site or in the local area.

6 ALTERNATIVES TO PROPOSED ACTION

6.1 No Action

The no-action alternative would leave the contamination at the Bert Avenue site as it currently is, without remediation. Because of the presence of depleted uranium in concentrations that exceed the current criteria for unrestricted use, it would be unacceptable to allow termination of the license and release of the site for unrestricted use. Because of the 4.5×10^9 year half-life of U-238, radioactive decay can not be relied on to reduce existing contamination to levels acceptable for unrestricted use.

6.2 Delayed Action

The delayed-action alternative would result in no significant radioactive decay and lower doses to workers or the public. It would result in limited migration of radionuclides, higher costs for maintaining control of the site, higher costs for future remediation and waste disposal, and a substantially increased level of frustration from local residents, especially those who live in the immediate vicinity of the Bert Avenue site.

6.3 Alternative Decommissioning Methods

6.3.1 Disposal at an Existing Low-Level Waste Disposal Site

Under this alternative, all contamination exceeding 1.3 Bq/gm (35 pCi/gm) would be excavated and shipped to a licensed disposal site. This alternative would allow the site to be released for unrestricted use. However, assuming disposal of the wastes at the Envirocare facility in Clive, Utah, with an estimated excavation, transportation, and disposal cost of \$1060 to 1400/m^3 (\$30 to 40/ft^3), the estimated remediation cost would be about \$15,000,000 to 20,000,000 for the offsite shipment of 14,000 m^3 (497,000 ft^3) of wastes. An additional \$2,300,000 is estimated to be needed to close the site to meet OEPA requirements for the solid wastes that remain. Appropriate radiological controls would be implemented to control doses to workers and the public. No significant radiological nor non-radiological impacts would be expected in this alternative.

6.3.2 Waste Volume Reduction

Under this alternative, contaminated soils and rubble would be treated using physical separation and chemical separation techniques to remove depleted uranium. These techniques have been used in limited, site-specific cases that depend on the chemistry and physical nature of the contamination. It is assumed that both physical and chemical separation techniques would be needed to process contaminated soils and building rubble wastes from the Harvard and Bert Avenue sites, that the costs would be in the range of \$350 to 530/m^3 (\$10 to \$15/ft^3), and the total volume of wastes could be reduced by 75 percent. It is also assumed that the remaining 25 percent of the total waste volume would be shipped offsite for disposal. The estimated cost for this option would be \$9,000,000 to \$12,000,000. An additional \$2,300,000 is estimated to be needed to close the site to meet OEPA requirements for the solid wastes

that remain. Appropriate radiological controls would be implemented to control doses to workers and the public. No significant radiological nor non-radiological impacts would be expected in this alternative.

6.3.3 Onsite Disposal

Under this option, contaminated materials less than the Option 2 limits in the 1981 BTP, "Disposal or Onsite Storage of Thorium or Uranium Wastes from Past Operations," (Reference 1) would be disposed of onsite under 10 CFR 20.2002. Contaminated materials exceeding the Option 2 limit would be disposed of at a licensed low-level waste disposal site. This alternative is the approach proposed by Chemetron. The estimated cost of this remediation approach would be approximately $5,300,000. Appropriate radiological controls would be implemented to control doses to workers and the public. No significant radiological nor non-radiological impacts would be expected in this alternative.

6.4 Alternative Waste Transportation Methods

Waste shipments to the licensed low-level waste disposal facility in Clive, Utah, could be made by either rail or by truck. These shipments would be made in accordance with NRC and DOT transport requirements. Doses to vehicle operators and the public were computed from exposure rate levels calculated using the MICROSHIELD computer code (Reference 27) for a total depleted uranium concentration of 529 Bq/gm (14,300 pCi/gm). This concentration is the maximum concentration found at the Bert Avenue site during the site characterization. For the offsite disposal alternative, transportation impacts are estimated to be 0.0711 person-Sv (7.11 person-rem) for truck operators making 1210 shipments and 0.00462 person-Sv (0.462 person-rem) for train operators making five shipments of 60 railcars. For the volume-reduction case, transportation impacts are estimated to be 0.0179 person-Sv (1.79 person-rem) for truck operators making 304 shipments and 0.00185 person-Sv (0.185 person-rem) for train operators making two shipments of 37 railcars. For the proposed onsite disposal alternative, transportation impacts are estimated to be 0.00165 person-Sv (0.165 person-rem) for truck operators making 28 shipments and 9.3E-4 person-Sv (0.093 person-rem) for train operators making one shipment of seven railcars. Doses to the public were conservatively estimated to be less than 0.00211 mSv (0.211 mrem) to a driver of a vehicle following 2 m (6.6 ft) behind the truck for a 10-hour period, and 0.00254 mSv (0.254 mrem) to a person residing 2 m (6.6 ft) from a train stopped for a 5-hour period. These exposure levels are similar to natural background levels. These impacts are not significant and are well within NRC and DOT limits.

6.5 Analysis of Alternatives

Review of alternatives to the proposed action reasonably available to the licensee has not identified any obviously superior courses of action. Chemetron's proposed action appears to be environmentally sound and acceptable.

7 AGENCIES AND PERSONS CONSULTED, AND SOURCES USED

This EA was prepared by the staff in the Office of Nuclear Material Safety and Safeguards, Rockville, Maryland, and Region III, Lisle, Illinois. During the review of Chemetron's Final Site Remediation Plan, NRC requested comments from ODH, OEPA, and the Cuyahoga County Board of Health (CCBH).

NRC received formal comments from ODH and CCBH, and informal comments from OEPA. The principal comments received from ODH and OEPA were that NRC should require post-closure controls and monitoring, for the radiologic components in the waste, after completion of the onsite disposal cells. These controls would be consistent with the post-closure controls required by OEPA for solid waste landfills. The staff indicated that under the conditions of onsite disposal under the Option 2 limits of the 1981 BTP, "Disposal or Onsite Storage of Thorium or Uranium Wastes from Past Operations" (Reference 1) the Harvard Avenue and Bert Avenue sites could be released for unrestricted use, and doses to hypothetical intruders who might construct homes and consume groundwater and foodstuffs grown in the wastes would be acceptable. Chemetron has agreed to perform analyses for gross alpha, gross beta, and total uranium in the groundwater sampling program to be conducted as part of OEPA post-closure monitoring program.

The principal comments made by CCBH were technical comments related to the design of the proposed Bert Avenue disposal cell.

A draft environmental assessment was provided to ODH, OEPA, CCBH, and the Mayor of Newburgh Heights for comment. Other than ODH, there were no comments received. The ODH staff indicated that the State of Ohio does not wish to have a number of small low-level waste sites across the site, and it suggested that environmental monitoring be required when the project is completed. Chemetron has agreed to perform analyses for gross alpha, gross beta, and total uranium in the groundwater sampling program to be conducted as part of OEPA post-closure monitoring program.

No other sources of information were used beyond those that are referenced in the report.

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