DKK

New York State Department of Environmental Conservation
Division of Environmental Remediation
Bureau of Technical Support, 11th Floor
625 Broadway, Albany, New York 12233-7020
Phone: (518) 402-9553 • **FAX:** (518) 402-9577
Website: www.dec.state.ny.us

Erin M. Crotty
Commissioner

MEMORANDUM

TO: Ed Belmore, NYSDEC - DER Remedial Bureau D
Gary Litwin, NYSDOH - DEHI Bureau of Environmental Exposure Investigation
Martin Doster, NYSDEC - Region 9
Anthony Quartararo, NYSDEC - DEE Superfund and Voluntary Cleanup Bureau
Christina Dowd, NYSDEC - DFWMR Bureau of Habitat

FROM: Kelly Bologna, NYSDEC - DER Bureau of Technical Support Kelly A Bologna

SUBJECT: Voluntary Cleanup Program Application
Excelsior Steel Ball Company, V-00685-9

DATE: OCT 30 2003

The attached Voluntary Cleanup Program Application for remedial work at the subject site has been forwarded to you for your records and/or processing according to the established Voluntary Cleanup Program procedures. If you require additional copies or the complete series of the related application's attachments, please contact me at 518-402-9553.

The Time and Activity Code for the subject site is: D952.

Attachment(s)

Distribution
Original (with all attachments) to:
Ed Belmore, NYSDEC - DER Remedial Bureau D
Copy (with all attachments) to:
Gary Litwin, NYSDOH - DEHI Bureau of Environmental Exposure Investigation
Martin Doster, NYSDEC - Region 9
Copy (without attachments) to:
Anthony Quartararo, NYSDEC - DEE Superfund and Voluntary Cleanup Bureau
Christina Dowd, NYSDEC - DFWMR Bureau of Habitat

County of Erie

JOEL A. GIAMBRA
COUNTY EXECUTIVE

DEPARTMENT OF ENVIRONMENT & PLANNING

LAURENCE K. RUBIN
COMMISSIONER

September 24, 2003

Gerald F. Mikol, Regional Director
New York State Department of
Environmental Conservation
Region 9
270 Michigan Avenue
Buffalo, New York 14203-2999

Re: Excelsior Steel Ball Company Site
Voluntary Cleanup Program Application

Dear Mr. Mikol:

On behalf of Erie County and the Town of Tonawanda, I am pleased to submit a joint application under the Department of Environmental Conservation's Voluntary Cleanup Program. The site to be remediated is the Excelsior Steel Ball Property in the Town of Tonawanda.

This two-acre brownfield site is located at 303 Woodward Avenue in the Town of Tonawanda and has been the site of a steel ball bearing manufacturing operation for close to one hundred years. Manufacturing at the site ceased several years ago leaving behind vacant, derelict buildings and equipment. This application package describes proposed activities associated with site remediation and restoration to bring the site back into productive reuse.

The attached application should provide you with the necessary information for entry into the program. If there are any questions, please contact the County or Town as shown on the application.

Very truly yours,

LAURENCE K. RUBIN

C: Hon. Ronald H. Moline, Supervisor

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

VOLUNTARY CLEANUP PROGRAM APPLICATION

NYSDEC identification no.: V00685 (rev. 2/98)

Laurence K. Rubin

STATEMENT OF CERTIFICATION

WE, I, Ronald H. Moline, do hereby certify and attest that the information included in this Voluntary Cleanup Program application, including any attachments, is, to the best of my knowledge and belief, accurate and complete; and that the applicant has the necessary funds allocated to undertake the activities proposed to be implemented under this application, if approved.

Date 9/23/03 9/24/03 X Signature

TYPE OF VOLUNTARY AGREEMENT: Investigation ____ Remediation ____

I. SITE NAME AND LOCATION

SITE NAME (legal, common, or descriptive): EXCELSIOR STEEL BALL COMPANY
SITE LOCATION: Street or Route No.: 30 Woodward Avenue
CITY/TOWN: Tonawanda COUNTY: Erie ZIP: 14150
LATITUDE: 42°58'28.65" N LONGITUDE: 78°53'25.8" W

II. CURRENT OWNER/OPERATOR INFORMATION

Current owner's name, address, and phone no.:

EXCELSIOR STEEL BALL COMPANY
303 Woodward Avenue
Tonawanda, NY 14150

Current operator's name, address, and phone no.:

NONE

III. VOLUNTEER IDENTIFICATION

Volunteer's name, address, and phone no.:

Erie County
95 Franklin St.
Buffalo, NY 14202

Town of Tonawanda
2919 Delaware Ave.
Kenmore, NY 14217

Volunteer's contact's name, address, and phone no.:

Kenneth J. Swanekamp (716) 858-6170
Robert Morris (716) 877-8805

Describe Volunteer's relationship, if any, to current owner and current operator (subsidiary, shareholder, partner, etc.). If no relationship, put "none":

NONE

IV. PROPERTY'S ENVIRONMENTAL HISTORY OVER PAST 50 YEARS

A. To the extent that existing information/studies/reports/ are readily available to the applicant attach:
- a description of the environmental history of the site which includes previous uses of the property, types of operation, chemicals used on the property, by-products or wastes produced by previous activities on-site, and a list of any orders, decrees, or other legal documents regarding violations of the Environmental Conservation Law or equivalent federal environmental statutes;
- a list of previous owners with names, last known addresses and telephone numbers (describe Volunteer's relationship, if any, to each previous owner listed. If no relationship, put "none"); and
- a list of previous operators with names, last known addresses and telephone numbers (describe Volunteer's relationship, if any, to each previous operator listed. If no relationship, put "none").

[OVER]

B. Is the site listed as Class 1 or 2 in New York State's Registry of Inactive Hazardous Waste Sites? YES ___ NO X

C. Did the volunteer generate, transport or dispose of, arrange for or cause the generation, transportation or disposal of hazardous substance on the property? YES ___ NO X

D. Is the site a treatment, storage, or disposal facility (TSDF) subject to corrective action or closure under permit or order issued under the Department's hazardous waste management regulatory ("RCRA") program? YES ___ NO X

E. Is the site a TSDF operating under interim status under the RCRA program that is subject to enforcement action leading to the issuance of an order containing a corrective action schedule? YES ___ NO X

V. INTENDED SITE USE

Briefly describe below the intended use of the site following cleanup.

SEE ATTACHED

VOLUNTARY CLEANUP PROGRAM APPLICATION

EXCELSIOR STEEL BALL COMPANY
TOWN OF TONAWANDA

Project Description

The investigation, remediation and restoration of 2.19 acres of land located at 303 Woodward Avenue in the Town of Tonawanda, Erie County, New York.

Purpose and Scope of Project

The Excelsior Steel Ball Company site is located at 303 Woodward Avenue, Tonawanda, west of Military Road in the Town of Tonawanda. (Please see Attachment 1, Location Map) The site is a former steel ball bearing manufacturing facility which dates back to 1887. Activities at the site, typical of metal working facilities, ceased in the 1990's.

The abandoned parcel is 2.19 acres in size (SBL 65.12-1-1) and is characteristic of brownfield sites in that the structures and equipment associated with the past manufacture of steel ball bearings remain on site. The buildings are in disrepair and have been condemned by the Town of Tonawanda. The property is delinquent in tax payments and the site is no longer secure, posing both a safety and fire hazard. The property is surrounded on three sides by Praxair, a major employer within the Town, and represents the only urban blight parcel in what is otherwise a significant and stable industrial/commercial corridor within the Town of Tonawanda.

Currently, there are three structures on the site. The main structure is the manufacturing facility which houses metalworking equipment, machine shop area, heat treating equipment, inventory storage, shipping and office areas. The area of the main structure is approximately 25,000 square feet. There are two auxiliary structures on site located to the north and east of the main structure. They appear to have been used for facility maintenance and storage. The auxiliary buildings are approximately 6,400 and 1,400 square feet in area.

The purpose of the project is to implement a site clean up, including building demolition, environmental investigation, remediation and restoration to accommodate reuse of the property. An environmental investigation would precede other necessary site activities to identify all, if any, environmental concerns that would require remediation. Building demolition would likely follow if it was found necessary to remove existing structures to complete a sub-surface investigation of the site. A Sub-surface investigation would include identification and sampling of any suspect underground storage tanks. Building contents would be properly disposed or scrapped for recycling wherever possible. An asbestos survey of the structures and possibly asbestos removal would be needed prior to demolition.

Specific aspects of the environmental remediation, based on the results of the site investigation, could include demolition, asbestos abatement, off-site soil disposal, on-site soil cover/containment, and off-site disposal of miscellaneous drums, transformer carcasses and possible PCB electrical equipment and asbestos containing

material. The final site remediation would also likely require the implementation of institutional controls, specifically a soils management plan and deed restriction for future use of the site.

Environmental History of the Property

The site has been inactive for several years. There are no known air emission, water discharge or underground storage tank permits issued for the site according to New York State DEC records. The site is not a listed hazardous waste site or on any EPA NPL listing. The site is located adjacent to the Praxair (Linde) facility in the Town of Tonawanda and, as such, has been investigated by the US Department of Energy for possible radioactive surface contamination originating from the Manhattan Engineering District (MED) activities as part of the Formerly Utilized Sites Remedial Action Program (FUSRAP). A report issued by Oak Ridge National Laboratory in 1997 states that "all radionuclide concentrations and radioactivity levels found on the property are below current guidelines". There have been no other previous environmental investigations or remedial efforts initiated at the site.

Proposed Future Use of the Property

As stated previously, the site is located in an industrial/commercial corridor within the Town of Tonawanda with a number of established firms located adjacent and near the property. The future use of the site could only be projected to be commercial/industrial in nature.

Current adjacent property owners include Praxair, which surrounds the Excelsior Steel Ball Company site on three sides, to the north, west and south. East of the site is a Niagara Mohawk R.O.W. paralleling an active rail R.O.W. The nearest residential area is to the east of Military Road, approximately one-quarter mile from the site.

Investigative and Remedial Activities

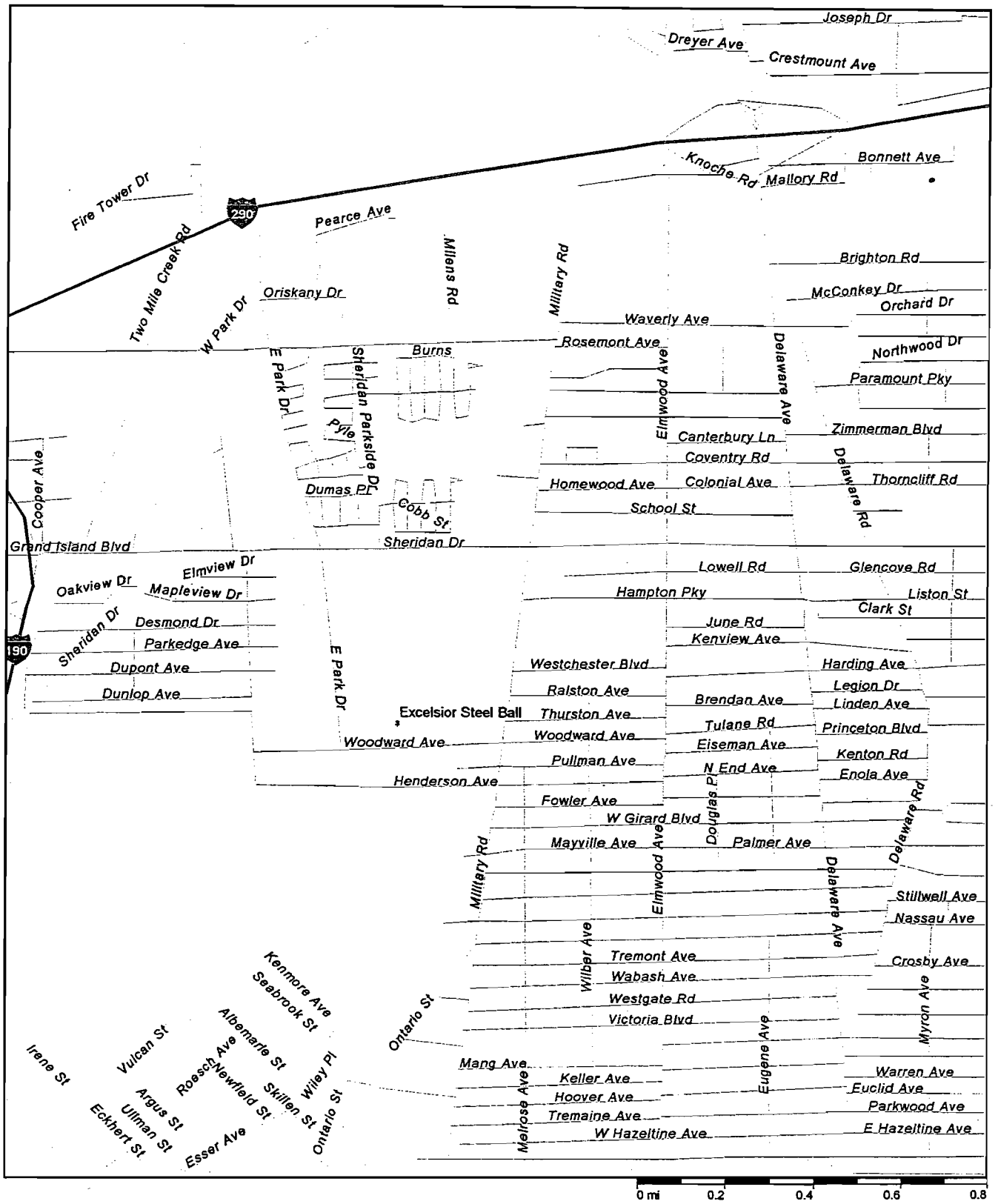
The objectives of the proposed investigation include the identification of any potentially hazardous or contaminated site debris, materials or soils to expedite the remedial process. An environmental consultant will be secured to develop a remedial investigative work plan. A walkover will be completed to identify any building materials, equipment, soils, or product/feedstock remnants that may be hazardous, contaminated or contain asbestos. An investigative sampling plan will include, at a minimum, surface and subsurface soils, drum contents, transformer carcasses, roofing, siding, insulation, window glazing, and the contents of one underground and one above ground storage tank. A review of the sample analytical results will provide guidance for proper disposal of the buildings and contents.

The initial focus of the remedial program will entail decontamination, if necessary, and disposal of building contents. Once any suspect hazardous or contaminated building contents have been removed and disposed off site, information from the asbestos survey will allow for building demolition. Demolition will likely be required as part of the site investigation to complete characterization of any sub-surface areas of concern. Any underground storage tank removal will also be incorporated into the building demolition/site investigation phase.

The removal of the structures on site will allow for subsequent sampling of surface and subsurface soils. This final sampling phase will determine the disposal or containment requirements for the on-site soils for closure.

The objectives of the remedial activities will be to complete a site cleanup that will minimize the potential for exposure to site contaminants subsequent to site closure. Soils that are found to be hazardous will be excavated and removed for off site disposal at a licensed hazardous waste disposal facility. The final phase of the site cleanup will likely include the removal and/or cover/containment of any remaining non-hazardous contaminated soils. Clean soils would likely be stockpiled on site for use as cover or in site redevelopment.

Finally, the site remediation will likely require the implementation of institutional controls including deed restrictions to insure commercial/industrial use of the site along with a soil management plan to protect the soil cover and eliminate exposure to site contaminates for future site workers.



MICROSOFT AUTOMAP

Streets Plus

Excelsior Steel Ball

Tonawanda, New York

EXHIBIT 1

Excelsior Steel Ball Company
303 Woodward Avenue
Tonawanda, NY 14150
Paul B. Kranz, P.E. (716) 858-7897
Richard R. Rutkowski (716) 858-6085

April 15, 2003

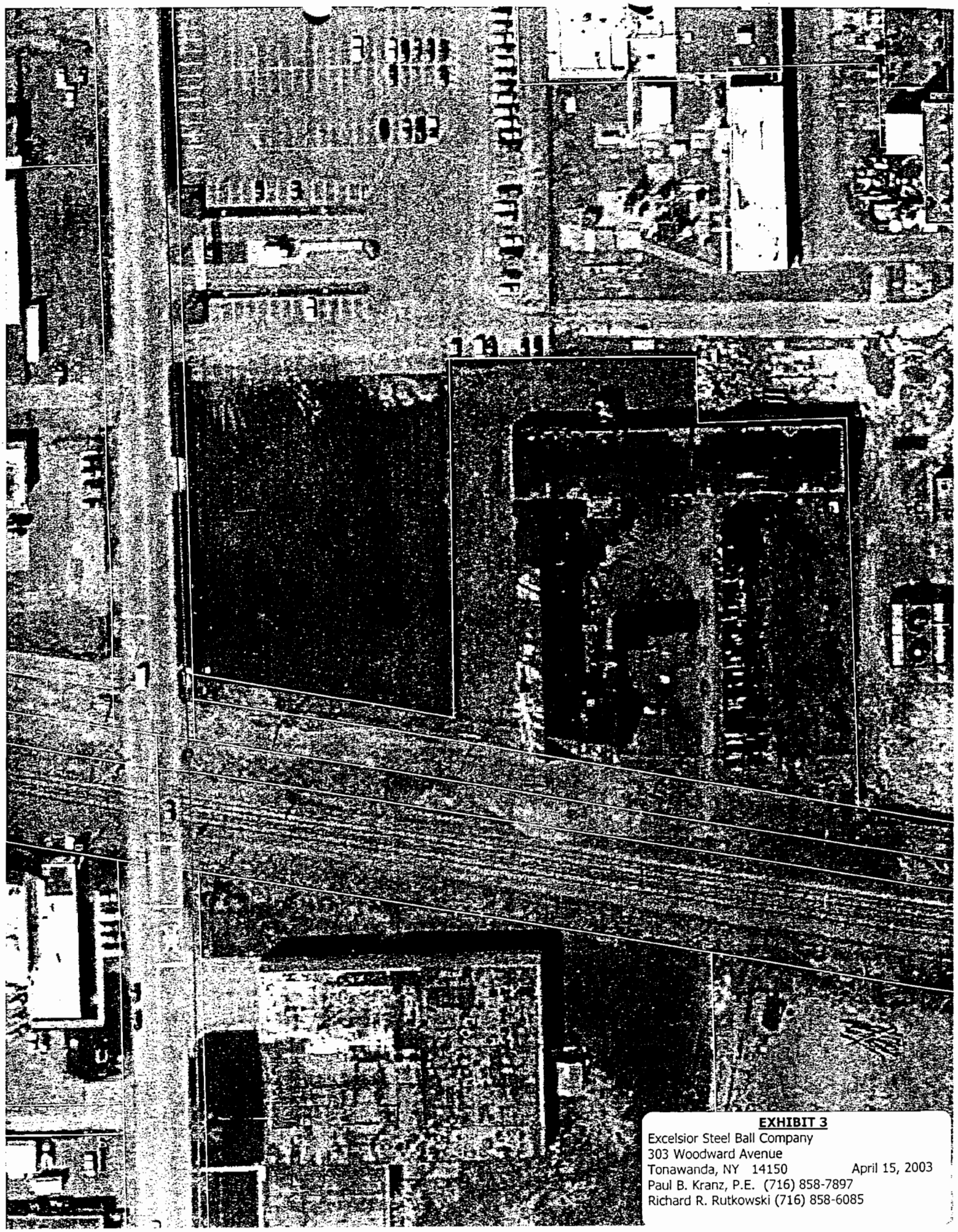


EXHIBIT 3

Excelsior Steel Ball Company
303 Woodward Avenue
Tonawanda, NY 14150 April 15, 2003
Paul B. Kranz, P.E. (716) 858-7897
Richard R. Rutkowski (716) 858-6085

ornl

ORNL/RASA-97/11

OAK RIDGE
NATIONAL
LABORATORY

LOCKHEED MARTIN

Results of the Radiological Survey of the Excelsior Steel Ball Company, Tonawanda, New York (TNY005)

S. P. McKenzie
K. S. Brown

MANAGED AND OPERATED BY
LOCKHEED MARTIN ENERGY RESEARCH CORPORATION
FOR THE UNITED STATES
DEPARTMENT OF ENERGY

ORNL/RASA-97/11

LIFE SCIENCES DIVISION

Department of the Army - Corps of Engineers
(Activity No. W0M11202; DAG)

Results of the Radiological Survey of the Excelsior Steel Ball Company, Tonawanda, New York (TNY005)

S. P. McKenzie and K. S. Brown

Report Issued -July 1998

Investigation Team
R. D. Foley – Measurement Applications and Development Manager
S. P. McKenzie – Survey Team Leader

Survey Team Members

R. C. Gosslee	D. E. Rice
V. P. Patania	D. A. Roberts

Work performed by the
MEASUREMENTS APPLICATIONS AND DEVELOPMENT GROUP

Prepared by the
OAK RIDGE NATIONAL LABORATORY
Oak Ridge, Tennessee 37831-6285
managed by
LOCKHEED MARTIN ENERGY RESEARCH CORP.
for the
U. S. DEPARTMENT OF ENERGY
under contract DE-AC05-96OR22464

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ACKNOWLEDGMENTS

This project was sponsored by the Office of Environmental Restoration, U.S. Department of Energy, under contract DE-AC05-84OR21400 with Martin Marietta Energy Systems, Inc., and DE-AC05-96OR22464 with Lockheed Martin Energy Research Corp. The authors wish to acknowledge the contributions of R. L. Coleman, M. E. Murray, R. E. Rodriguez, V. P. Patania and M. S. Uziel of the Measurement Applications and Development Group, Oak Ridge National Laboratory, for sample preparation and participation in the analyses, editing, and reporting of data for this survey.

ABSTRACT

At the request of the U.S. Department of Energy (DOE), a team from Oak Ridge National Laboratory conducted two radiological surveys of property belonging to the Excelsior Steel Ball Company, which is surrounded on three sides by the former site of the Linde Uranium Refinery, Tonawanda, New York. The surveys were performed in September 1997 and February 1998. The purpose of the first survey was to determine if radioactive residuals were present from previous activities at the former Linde site. The Linde Air Products Division of Union Carbide Corporation, Tonawanda, New York, had used radioactive materials at that location for work performed under government contract from 1942 through 1948. The purpose of the second survey was to collect additional biased samples from an area of the site where biased sample results showed slightly elevated levels of thorium-232.

The surveys were performed in response to the DOE's Formerly Utilized Sites Remedial Action Program (FUSRAP) requirements. These requirements dictate that the radiological status of certain vicinity properties shall be assessed and documented according to prescribed procedures prior to certification of the property for release for unrestricted use. Such release can only be granted if the property is found to be within current applicable authorized limits.

The first survey included a surface gamma scan in accessible areas inside and outside the buildings, and the collection and radionuclide analysis of soil samples. The second survey included collection and analysis of seven additional biased samples and a piece of terra-cotta roofing material. A comparison of these data to the current DOE guidelines shows that all radionuclide concentrations and radioactivity levels found on the property are below the current guidelines. Therefore, this property should not be included in the FUSRAP program for remediation.

Results of the Radiological Survey of the Excelsior Steel Ball Company, Tonawanda, New York (TNY005)*

INTRODUCTION

From 1942 through approximately 1948, the Linde Air Products Division of Union Carbide Corporation, Tonawanda, New York, was one of many companies performing work associated with the development of nuclear energy for defense-related projects. This work was conducted under government contract to the Manhattan Engineer District (MED) and the Atomic Energy Commission (AEC). During the first 3 years, pitchblende ore from the Belgian Congo and concentrates fiom the Colorado Plateau ore were converted to U_3O_8. A second process yielding UO_2 was conducted for about a year, and a third process, converting UO_2 to green salt (UF_4), operated during World War II and the following 2 years. Linde also developed and produced barrier material for the Oak Ridge Gaseous Diffusion Plant. Other contracts have been identified, but the exact nature of the work involved is unknown.[1]

As a result of these and similar activities, equipment, buildings, and land at some of the sites became radiologically contaminated resulting in low levels of contamination on the properties. At contract termination, sites used by contractors were decontaminated in accordance with the standards and survey methods in use at that time. Since the original assessments, radiological criteria and guidelines for the release of such sites for unrestricted use have become more stringent. In some instances, records documenting decontamination efforts cannot be found, and the final radiological conditions of the site cannot be adequately determined. As a result, the Formerly Utilized Sites Remedial Action Program (FUSRAP) was established in 1974 to identify these formerly used sites and to reevaluate their radiological status.' The radiological assessment showing the presence of radioactive residuals at the Linde site had been performed in 1978.[2]

Occasionally, nearby private and commercial properties also became contaminated through migration or redistribution of the radioactive residuals from the original site.[3] The radiological survey detailed in this report was performed under the FUSRAP program as a follow-up to earlier investigations and as a precaution to ensure that no residual radioactive materials exceeding current U.S. Department of Energy (DOE) guidelines were present on the Excelsior Steel Ball Company property. The Excelsior Steel Ball Company manufactures specialized steel ball bearings. The property is surrounded on three sides by the former Linde site.

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*The survey was performed by members of the Measurement Applications and Development Group of the Life Sciences Division at *Oak* Ridge National Laboratory under DOE contract DE-AC05-84OR2 1400.

In September 1997 and February 1998, radiological surveys were conducted at the Excelsior Steel Ball Company property by personnel from Oak Ridge National Laboratory at the request of DOE. Results of that survey are presented in this report. The general location of the property in relation to the former Linde site is shown in Fig. 1.

SCOPE OF THE SURVEYS

The radiological survey of September 1997 included a surface gamma scan of accessible areas inside and outside three buildings, systematic measurements with a FIDLER (field instrument for detection of low-energy radiation) inside the buildings, a scan of accessible floor surfaces with a floor monitor probe, and a scan of less accessible areas with a beta/gamma pancake probe. Systematic and biased soil samples were collected for radionuclide analysis. Systematic samples were collected in a fixed order without regard to radiation level; biased soil samples were collected at locations of slightly elevated gamma levels. The survey of February 1998 included collection and analysis of seven additional biased samples and a piece of terra-cotta roofing material.

SURVEY METHODS

A comprehensive description of the methods and instrumentation used in this survey and in the laboratory analyses is given in *Procedures Manual for the ORNL Radiological Survey Activities (RASA) Program,* ORNL/TM-8600 (April 1987)[4] and *Measurement Applications and Development Group Guidelines,* ORNL-6782 (January 1995).[5]

A grid was established over the entire property to define the precise location of measurements and samples. Grid blocks measured ten meters by ten meters. The southwestern corner of the property was designated as 0N, 0E. A sample was then located by number of meters directly north and then directly east of the southwest corner.

GAMMA RADIATION MEASUREMENTS

Gamma radiation levels were determined using portable N d gamma scintillation meters. Because N d gamma scintillators are energy dependent, measurements of gamma radiation levels in counts per minute are normalized to pressurized ionization chamber (PIC) measurements to estimate gamma exposure rates in μR/h.

The FIDLER was used to measure the relative gamma fluence at the interior floor surface with the purpose of detecting gamma-emitting radionuclide contamination beneath floor surfaces. The FIDLER is a NaI(Tl) scintillation probe that is designed to be particularly sensitive to low-energy gamma and x-ray radiation. The sensitive volume is 5 in. in diameter by 0.0063 in. thick, and the instrument is very efficient at measuring gamma

fluence rates entering perpendicular to the entrance window. Systematic measurements in counts per 30 seconds were taken with two different instruments and then converted to counts per minute and normalized so observed values would appear to come from only a single detector.

Bicron miniscaler/ratemeters with Geiger-Mueller (GM) pancake detectors were used to detect beta-gamma radiation. Radiation levels in counts per minute (cpm) were converted to disintegrations per minute (dpm) per 100 cm^2.

Floors were surveyed with the Ludlum Model 239-1F gas flow proportional detector system ("floor monitor"), which includes a Ludlum Model 2221 scaler/ratemeter connected to a Ludlum Model 43-37 detector probe mounted on a roll-around cart. The monitor was set in the "beta" mode, where it is primarily used to detect beta radiation.

SOIL SAMPLING AND ANALYSES

Systematic soil samples were taken from the ground between and adjacent to the three buildings on the property, and biased samples were taken from an area of soil with slightly elevated gamma levels at the northwest corner of the property. Samples were analyzed by gamma spectrometry. Sampling locations are shown on Fig. 2.

SURVEY RESULTS

DOE guidelines are summarized in Table 1. Typical background radiation levels for the Tonawanda, New York, area are presented in Table 2. These data are provided for comparison with survey results presented in this section. Gamma radiation levels are presented in gross microroentgen per hour and FIDLER measurements in gross counts per minute. Similarly, background concentrations have not been subtracted from radionuclide concentrations measured in soil samples.

GAMMA EXPOSURE RATE MEASUREMENTS

Gamma exposure rates on the property generally ranged from 7 to 11 μR/h. These values are similar to typical background radiation levels in the Tonawanda area (8 to 11 μR/h, Table 2). The highest gamma exposure measurements found at four biased sampling locations ranged from 13 to 18 μR/h at the ground surface and from 11 to 13 μR/h at 1 m above the surface, and may be attributed to natural radioactive substances present in the cinders and outcroppings of slag scattered throughout the Tonawanda area.

OTHER RADIATION MEASUREMENTS

FIDLER measurements of floors in the three buildings and the scan of interior areas with a floor monitor probe and beta/gamma pancake probe showed no elevated radiation levels above background levels.

SYSTEMATIC AND BIASED SOIL SAMPLES

Systematic and biased soil sample locations are shown in Fig. 2, and results of analyses are listed in Table 3. Concentrations of ^{238}U and ^{226}Ra in surface soil (0–15 cm) ranged from 0.1 to **5.4** pCi/g and from 0.25 to 3.4 pCi/g, respectively. Because slag, cinders, and other similar materials scattered throughout the Tonawanda–Niagara Falls area contain naturally occurring radionuclides that may cause slight elevations in radionuclide concentrations, the biased samples are considered to be within typical background levels for ^{238}U and ^{226}Ra in the Tonawanda area (Table 2). Naturally occurring uranium contains roughly equal amounts of ^{226}Ra and ^{238}U.

Thorium-232 concentrations in samples taken during the survey trip of September 1997 ranged from 0.15 to 7.0 pCi/g. Sample results for biased samples B1A and B1B are 5.1 and 3.9 pCi/g, respectively. Sample results for biased samples B2A and B2B are 7.0 and 5.1 pCi/g, respectively. Sample results from the survey trip of February 1998 ranged from 1.4 to 7.3 pCi/g. The concentrations of ^{232}Th in these biased samples exceed typical background ^{232}Th levels from the Tonawanda area (Table 2), but do not exceed DOE guideline values for surface and subsurface soil when averaged over 100 m^2 in accordance with Table 1.

DEBRIS SAMPLE

A sample of terra-cotta roofing debris was taken in the vicinity of the biased sampling area on the survey trip of February 1998. Results of radionuclide analysis of the material were negligible.

SIGNIFICANCE OF FINDINGS

A survey was conducted at the request of the Department of Energy to document the radiological status of the Excelsior Steel Ball Company property, Tonawanda, New York. All radionuclide concentrations and radioactivity levels found on the property are below current guidelines. Therefore, this property should not be included in the FUSRAP program for remediation.

REFERENCES

1. U.S. Department of Energy, *A Background Report for the Formerly Utilized Manhattan Engineer District/Atomic Energy Commission Sites Program,* DOE/EV-0097, September 1980.

2. Oak Ridge Natl. Lab., *Radiological Survey of the Former Linde Uranium Refinery, Tonawanda, Nay York,* DOE/EV-005/5, UC-70, U.S. Department of Energy, Division of Environmental Control Technology, Formerly Utilized MED/AEC Sites Remedial Action Program, May 1978.

3. R. E. Rodriguez, M. E. Murray, and M. S. Uziel, *Results of the Radiological Survey at the Town of Tonawanda Landfill, Tonawanda, New York (TNY001),* ORNL/RASA-92/12, Martin Marietta Energy Systems, Inc., Oak Ridge Natl. Lab., October 1992.

4. T. E. Myrick, B. A. Berven, W. D. Cottrell, W. A. Goldsmith, and F. F. Haywood, *Procedures Manual for the ORNL Radiological Survey Activities (RASA) Program,* ORNL/TM-8600, Martin Marietta Energy Systems, Inc., Oak Ridge Natl. Lab., April 1987.

5. *Measurement Applications and Development Group Guidelines,* ORNL-6782, Martin Marietta Energy Systems, Inc., Oak Ridge Natl. Lab., January 1995.

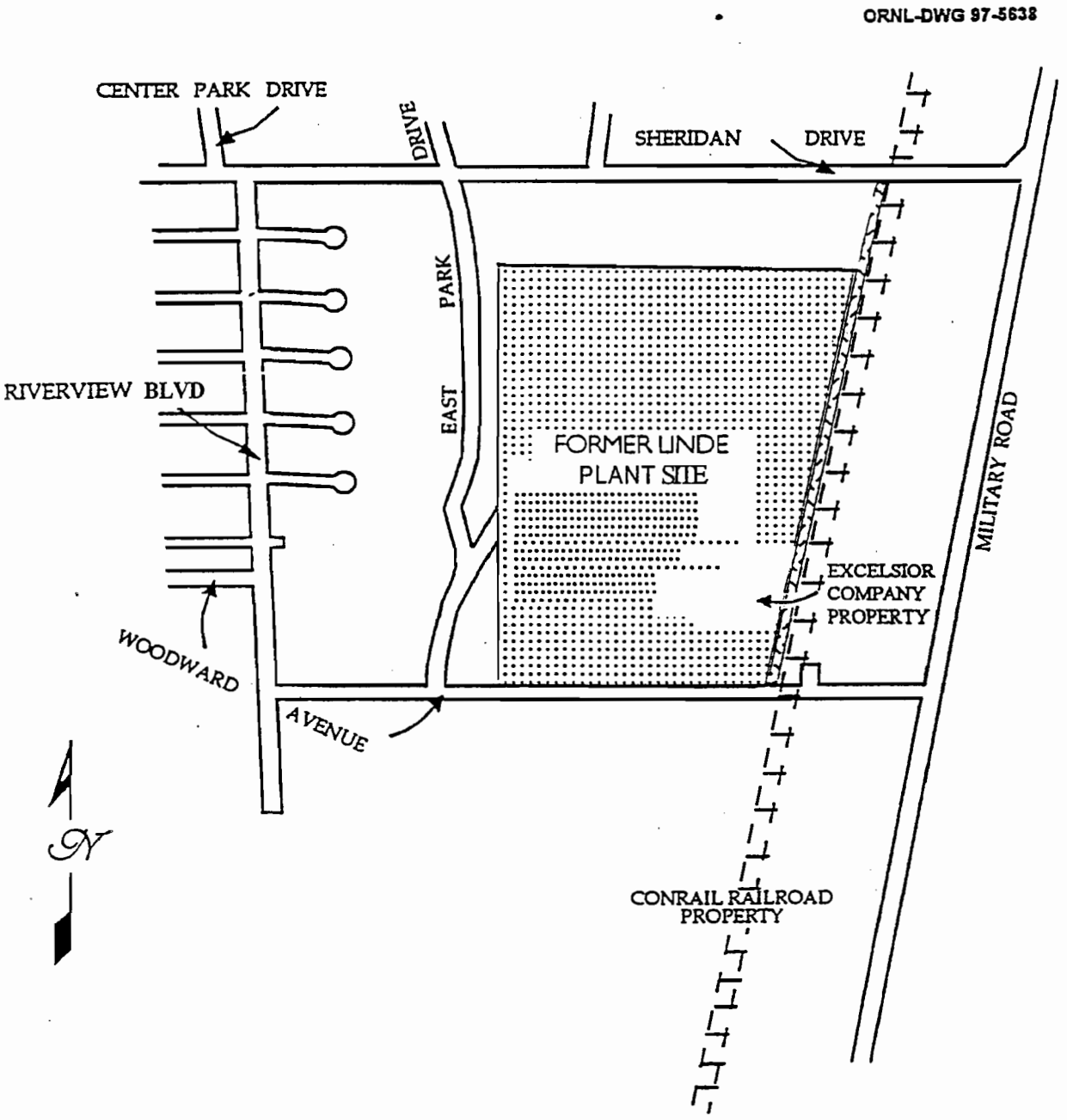
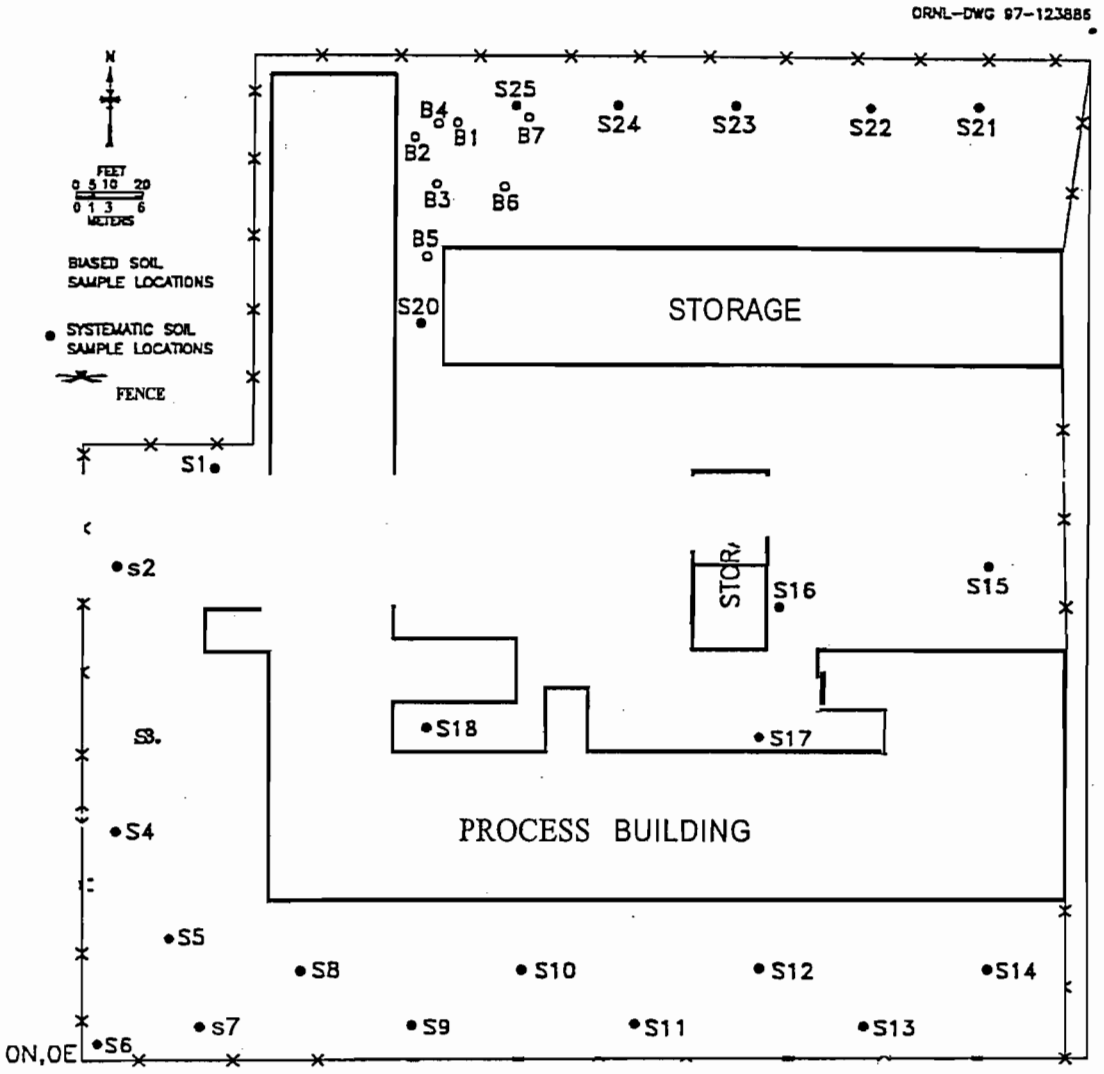


Fig. 1. Diagram showing general location of the Excelsior Steel Ball Company in relation to the former Linde site, Tonawanda, New York.



TNY005
EXCELSIOR STEEL BALL COMPANY
TONAWANDA, NEW YORK

Fig. 2. Diagram showing systematic and biased soil sampling locations on the Excelsior Steel Ball Company property.

Table 1. Applicable guidelines for protection against radiation
(Limits for uncontrolled areas)

Mode of exposure	Exposure conditions	Guideline value
Gamma radiation	Indoor gamma radiation level (above background)	20 μR/h[a]
Radionuclide concentrations in soil (generic)	Maximum permissible concentration of the following radionuclides in soil above background levels, averaged over a 100-m^2 area ^{226}Ra ^{232}Th ^{230}Th	5 pCi/g averaged over the first 15 cm of soil below the surface; 15 pCi/g when averaged over 15-cm-thick soil layers more than 15 cm below the surface
Derived concentrations	^{238}U	Site specific[b]
Guideline for non-homogeneous contamination (used in addition to the 100-m^2 guideline)"	Applicable to locations with an area ≤ 25 m^2, with significantly elevated concentrations of radionuclides ("hot spots")	$G_A = G_i(100/A)^{1/2}$, where G_A = guideline for "hot spot" of area (A) G_i = guideline averaged over a 100-m^2 area

"The 20 μR/h shall comply with the basic dose limit (100 mrem/year) when an appropriate-use scenario is considered.

[b]DOE guidelines for uranium are derived on a site-specific basis. A total uranium guideline of 60 pCi/g will be applied at the Excelsior Steel Ball Company site. This corresponds to a ^{238}U concentration of ~ 30 pCi/g.

"DOE guidelines specify that every reasonable effort shall be made to identify and to remove any source that has a concentration exceeding 30 times the guideline value, irrespective of area (adapted from *Revised Guidelines for Residual Radioactive Material at FUSRAP and Remote SFMP Sites,* April 1987).

Sources: Adapted from U.S. Department of Energy, DOE Order 5400.5, April 1990; U.S. Department of Energy, *Guidelines for Residual Radioactive Material at Formerly Utilized Sites Remedial Action Program and Remote Surplus Facilities Management Program Sites,* Rev. 2, March 1987; and U.S. Department of Energy, *Radiological Control Manual,* DOE/EH-0256T (DOE N 5480.6), June 1992.

Table 2. Background radiation levels and concentrations of selected radionuclides in soil near Tonawanda, New York

Type of radiation measurement or sample	Radiation level or radionuclide concentration	
	Range	Average
Gamma exposure rate at ground surface (μR/h)[a]	8–11	9
Concentration of radionuclides in soil (pCi/g)[a]		
^{238}U	0.8–1.1	1.0
^{226}Ra	0.7–1.1	0.9
^{232}Th	0.5–0.9	0.8

[a]Values obtained from four locations in the Tonawanda area.

Source: R. E. Rodriguez, M. E. Murray, and M. S. Uziel, *Results of the Radiological Survey at the Town of Tonawanda Landfill, Tonawanda, New York (TNY001)*, ORNL/RASA-92/12, Martin Marietta Energy Systems, Inc., Oak Ridge Natl. Lab., October 1992.

Table 3. Concentrations of radionuclides in soil samples, Excelsior Steel Ball Company, Tonawanda, New York

Sample ID"	Grid Location[a,b]	Depth (cm)	Radionuclide concentrations (pCi/g)[c]		
			^{238}U	^{226}Rn	^{232}Th
		Systematic samples[d]			
S1	55N, 11E	0-15	2.5 ± 0.4	1.5 ± 0.1	1.8± 0.2
s2	45N, 3E	0-15	1.5 ± 0.4	1.1 ± 0.1	1.1 ± 0.2
s3	30N, 8E	0-15	3.4± *0.5*	1.4± 0.1	1.4± 0.2
s4	20N, 3E	0-15	1.6± 0.4	1.1 ± 0.1	1.0± 0.2
s5	10N, 8E	0-15	0.8± 0.2	0.6± 0.1	0.4± 0.1
S6	1N, 1E	0-15	0.8 ± 0.3	0.96± 0.1	0.66 ± 0.1
s7	3N,10E	0-15	1.3 ± 0.3	1.2± 0.1	1.2± 0.2
S8	8N, 20E	0-15	1.6± 0.3	0.9 ± 0.1	0.9± 0.1
s9	3N, 30E	0-15	1.9± 0.4	1.3 ± 0.1	1.1 ± 0.2
S10	8N, 40E	0-15	1.8 ± 0.4	1.2± 0.1	1.1 ± 0.1
S11	3N, 50E	0-15	1.8 ± 0.4	1.3 ± 0.1	1.2± 0.2
S 12	8N, 60E	0-15	0.72● 0.2	0.6 ± 0.1	0.4± 0.1
S13	3N, 70E	0-15	1.0± 0.3	0.6± 0.1	0.5± 0.1
S 14	8N, 80E	0-15	1.2 ± 0.3	1.0± 0.1	0.7± 0.1
S15	45N, 80E	0-15	2.2± 0.4	1.6± 0.1	1.3± 0.2
S16	40N, 60E	0-15	2.6± 0.4	1.5± 0.1	1.2± 0.1
S17	28N, 60E	0-15	1.9± 0.4	1.5 ± 0.1	1.0± 0.2
S18	30N, 30E	0-15	2.1± 0.4	1.2± 0.1	1.1 ± 0.1
S19A	44N, 35E	0-15	1.2± 0.3	1.0 ± 0.1	0.77 ± 0.1
S19B	44N, 35E	15-30	3.0± 0.4	3.0± 0.2	2.0± 0.2
S19C	44N, 35E	30-45	3.7± 0.5	3.4± 0.2	1.8± 0.2
s20	70N, 25E	0-15	1.9± 0.4	1.5 ± 0.1	1.1 ± 0.1
s21	90N, 80E	0-15	0.13± 0.2	0.25 ± 0.03	0.15 ± 0.1
s22	90N, 70E	0-15	1.9± 0.3	1.1 ± 0.1	2.4± 0.02

Table 3. Concentrations of radionuclides in soil samples, Excelsior Steel Ball Company, Tonawanda, New York

Sample ID[a]	Grid Location[a,b]	Depth (cm)	Radionuclide concentrations (pCi/g)[c]		
			^{238}U	^{226}Rn	^{232}Th
S23	90N, 60E	0-15	1.8 ± 0.4	0.87 ± 0.1	2.1 ± 0.2
S24	90N, 50E	0-15	1.4 ± 0.4	0.85 ± 0.1	1.7 ± 0.2
S25	90N, 40E	0-15	0.88 ± 0.3	0.56 ± 0.1	1.4 ± 0.1
		Biased samples[e]			
B1A	88N, 28E	0-15	4.2 ± 0.5	1.7 ± 0.1	5.1 ± 0.4
B1B	88N, 28E	15-30	3.0 ± 0.4	1.2 ± 0.1	3.9 ± 0.3
B2A	86N, 20E	0-15	5.4 ± 0.5	2.9 ± 0.2	7.0 ± 0.5
B2B	86N, 20E	15-30	4.4 ± 0.5	2.6 ± 0.2	5.1 ± 0.4
B3A	85N, 28E	0-15	6.5 ± 0.6	2.2 ± 0.1	7.3 ± 0.5
B3B	85N, 28E	15-30	4.6 ± 0.5	2.0 ± 0.1	4.2 ± 0.3
B4	88N, 29E	0-15	3.6 ± 0.5	2.2 ± 0.1	1.4 ± 0.2
B5	79N, 29E	0-15	2.9 ± 0.5	1.4 ± 0.1	2.1 ± 0.2
B6	84N, 33E	0-15	2.6 ± 0.4	1.0 ± 0.1	3.2 ± 0.3
B7A	88N, 38E	0-15	3.7 ± 0.5	1.2 ± 0.1	4.6 ± 0.3
B7B	88N, 38E	15-30	3.0 ± 0.5	1.2 ± 0.1	3.8 ± 0.3

[a]Sample locations are shown on Fig. 2.

[b]Sample location determined by number of meters north and east of southwest corner of property.

Indicated counting error is at the 95% confidence level (±2σ). Results for other radionuclides are typical of background concentrations and are not included in the table.

[d]Systematic samples are taken at locations irrespective of gamma exposure rates.

[e]Biased samples are taken from areas with elevated gamma exposure rates. Samples B1 and B2 were taken on the survey trip of September 1997. Samples B3 through B7 were collected on the survey trip of February 1998.

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