FINAL

HISTORICAL SITE ASSESSMENT OF THE DEFENSE NATIONAL STOCKPILE CENTER NEW HAVEN DEPOT

NEW HAVEN, INDIANA

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ACRONYMS AND ABBREVIATIONS

AEC	U.S. Atomic Energy Commission
amsl	above Mean Sea Level
AR	Army Regulation
bgs	below ground surface
CABRERA	Cabrera Services, Inc.
cm	centimeter
cm^2	square centimeter
DCGL	derived concentration guideline level
DLA	Defense Logistics Agency
DNSC	Defense National Stockpile Center
dpm	disintegrations per minute
DQO	Data Quality Objective
ft	foot
GSA	General Services Administration
gal	gallon
HSA	Historical Site Assessment
HVAC	heating, ventilation, and air conditioning
IDEM	Indiana Department of Environmental Management
IDNR	Indiana Department of Natural Resources
JMC	U.S. Army Joint Munitions Command
IN	Indiana
In	inch
l	liter
MARSSIM	Multi-Agency Radiation Survey and Site Investigation Manual
NOAA	National Oceanic and Atmospheric Administration
NRC	U.S. Nuclear Regulatory Commission
NUREG	Nuclear Regulatory Guides
ORPP	Occupational Radiation Protection Program
pCi	pico-curies
RAM	Radioactive Materials
RCOPC	Radiological Contaminants of Potential Concern
RSO	Radiation Safety Officer
sq. ft.	square feet
SU	survey unit
USDOA	Department of the Army
USDOE	Department of Energy
USDoD	Department of Defense
USEPA	U.S. Environmental Protection Agency
USGS	U. S. Geological Survey
UST	underground storage tank
yd^3	cubic yards

1.0 EXECUTIVE SUMMARY

The New Haven Depot is located at 15411 Dawkins Road (State Route 14) in New Haven, Indiana, approximately 2.3 miles east of US Highway 469. The geographic coordinates are approximately 41° 04' 31'' North latitude and 84° 56' 36'' West longitude. New Haven is located in the central part of Allen County, Indiana, directly east of the city of Fort Wayne.

The Defense National Stockpile Center (DNSC) of the Defense Logistics Agency (DLA) is in the process of closing its depots across the country and is seeking to terminate its U.S. Nuclear Regulatory Commission (NRC) license. This Historical Site Assessment (HSA) is being conducted to specifically address buildings and areas at New Haven Depot where NRC-licensed radioactive materials were handled or stored. In accordance with the Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM; USEPA, 2000), the decommissioning process follows a stepped approach that starts with the HSA, followed by other surveys that lead to the final status survey. The HSA is an investigation to collect existing information describing a site's complete history from the start of site activities to the present time, as it relates to the use, storage, or disposal of radioactive materials (RAM). This HSA will also be used to determine actions necessary to permit the release of storage depot warehouses and property for unrestricted use at New Haven.

Historical information was reviewed to determine if there is sufficient data to determine impact in accordance with MARSSIM methodology. In addition, the HSA included a visual inspection of all buildings and areas where RAM was used or stored and interviews with individuals knowledgeable of RAM handling, storage, and disposal.

The primary radiological contaminants of potential concern (RCOPC) at New Haven Depot are those associated with the receipt, storage, and shipment of ores containing natural uranium and thorium, both in secular equilibrium with their daughter (or decay) products.

Historically, the Depot's primary mission has been storage of metallurgical ores and materials necessary for manufacturing defense and/or strategic materials. Throughout the system of warehouses and outdoor areas at New Haven Depot, the DNSC has stored columbium/tantalum ores and concentrates, tungsten ores and concentrates, zirconium ore, rare earth sodium sulfate, monazite, tungsten metal scrap, and bastnasite, all containing sufficient amounts of natural uranium and thorium to require licensing under NRC rules. The DNSC stored these materials under the authority of NRC License STC-133. Three outdoor areas contain piles of fluorspar and some warehouse bays (indoor sections) currently contain packaged materials (e.g. tungsten, columbium/tantalum, and fluorspar) with small amounts of naturally occurring uranium and thorium (not licensable quantities). These stockpiled ores emit ambient gamma radiation which could interfere with potential radiation surveys to be conducted as part of Site closure. According to the most recent Occupational Radiation Protection Program (ORPP) Annual Survey, all licensed RAM have been removed from the Site; however, contamination may still remain (Skruck, 2006).

Residual contamination is confirmed for one area. In October 2000, DNSC sold zirconium ore (i.e., baddeleyite) stored in Piles 111 and 111A at Area 7A. The ore was loaded into rail cars at the location of the piles by a front-end loader. The rail cars were then moved to the rail scale where the amount of ore in the car was adjusted to maintain an acceptable weight. After achieving the optimum weight, the cars were moved to an area where the tops were shrink-wrapped to preclude loss of the ore during transit. The areas potentially affected during this process were the railway and roadways used for the transport of the ore, the rail scale area, and the building used for shrink wrapping the rail cars.

Results of a Scoping Survey performed by ERS Solutions in October 2001 indicated that significant levels of residual radioactivity from the baddeleyite ore remained at the former storage pile locations in Area 7A. Remediation efforts were conducted by ERS Solutions in May 2002, focusing on established survey units to remove the residual ore from the soil. All debris removed was placed in a storage area within Area 7A, with final removal of the debris to be performed at a later date (ERS, 2002a). The Final Status Survey (FSS) Report for selected outdoor survey areas was submitted to the NRC. The Survey Report, dated December 2002, recommended release for unrestricted use in all survey units, except for the debris storage area in 7A. This release application was submitted to NRC, but was voided, pending a request for more information. In 2004, Pangea Group completed removal of 2,503 cubic yards of contaminated soil by rail, but the affected areas did not have a MARSSIM FSS performed to demonstrate closure.

Six outdoor storage areas, including Area 7A discussed above, and ten current or former buildings have been identified as areas where licensed RAM may have been stored or handled, based on review of records and interviews as outlined herein. These locations are presented in Table 6-1 and Table 6-2 and depicted in Figure 5-1.

Based on documentation reviewed and interviews conducted, the following areas are considered Impacted: Buildings 136, 141, 145, 146, 210, 211, 212, 213, 214, and 215 and outdoor areas including Area 7A, the rail scale, sections of railroad tracks, and access roads along tracks, as indicated in Figure 6-1 and Tables 6-1 and 6-2. A characterization survey design is in development to determine the nature and extent of radiological contamination in these areas and buildings to further substantiate the conclusions of the HSA.

2.0 INTRODUCTION AND OBJECTIVES

Cabrera Services, Inc. (CABRERA) has prepared the following Historical Site Assessment (HSA) for New Haven Depot, located in northeast Indiana in Allen County. This work was accomplished in accordance with Phase I of the U.S. Army Joint Munitions Command (JMC) Statement of Work entitled *Final Status Survey Investigation and Decontamination Part 2, Phases 1-4, Defense National Stockpile Center, March 24, 2006,* under the terms and conditions of Contract No. W52P1J-05-D-0043-0002, between JMC and CABRERA. This work is being conducted for the Defense National Stockpile Center (DNSC), part of the Defense Logistics Agency (DLA).The *Multi-Agency Radiation Survey and Site Investigation Manual* (MARSSIM; NUREG-1575 Rev. 1/EPA 402-R-97-016 Rev. 1/DOE/EH-0624, Rev. 1) was the primary guidance document for conducting this HSA (Appendix A).

2.1 Program Objectives

The Defense National Stockpile Center (DNSC) of the Defense Logistics Agency (DLA) is in the process of closing its depots across the country and is seeking to terminate its U.S. Nuclear Regulatory Commission (NRC) license. This HSA is being conducted to specifically address buildings and areas at New Haven Depot where NRC-licensed radioactive materials were handled or stored. In accordance with MARSSIM (USEPA, 2000), the decommissioning process follows a stepped approach that starts with the HSA, followed by other surveys that lead to the final status survey. The HSA is an investigation to collect existing information describing a site's complete history from the start of site activities to the present time, as it relates to the use, storage, or disposal of radioactive materials (RAM). This HSA will also be used to determine actions necessary to permit the release of storage depot warehouses and property at New Haven for unrestricted use. These actions will include removal, characterization, packaging, transport, and disposal of radioactive waste, if necessary.

2.2 Specific Objectives of this HSA

This HSA is being conducted as part of an overall effort to ensure that New Haven Depot can be turned over for redevelopment or reuse. Specifically, this HSA is the first step in the process of NRC license termination and ultimate release of all warehouses and areas at New Haven Depot for unrestricted use. Such release will be sought from NRC as appropriate for RAM, according to NRC License STC-133 (Appendix B). In accordance with the MARSSIM (USEPA, 2000), this HSA should accomplish the following:

- Identify potential sources of radiological contamination;
- Determine which areas of the depot are potentially impacted (and non-impacted) by previous operations involving RAM;
- Classify areas as impacted or non-impacted as defined in MARSSIM;
- Identify any data gaps with respect to impacted areas; and
- Provide input into decisions to perform radiological scoping and characterization surveys.

2.3 Data Quality Objectives

Data Quality Objectives (DQOs) are qualitative and quantitative statements that clarify the study objective, define the most appropriate type of data to collect, determine the most appropriate conditions for collecting data, and specify limits on decision errors (USEPA, 2000). DQOs define the performance criteria that limit the probabilities of making decision errors by considering the purpose of collecting the data, defining the appropriate type of data needed, and specifying tolerable probabilities of making decision errors. Project-specific DQOs are developed using the seven-step DQO Process. The DQOs for this HSA are:

Step 1 – State the Problem
Does sufficient information exist to define the nature and extent of radioactive materials at the New Haven Depot Site and support the decision that areas have or have not been impacted by radiological activities at the Site? The decision makers for this HSA are JMC and DLA, specifically the Defense National Stockpile Center. Other stakeholders include the NRC, the General Services Administration (GSA), the Indiana Department of Natural Resources (IDNR), and local communities in the New Haven, IN area.

Step 2 – Identify the Decision
The principal study question is: Have areas at the New Haven Depot Site been impacted by radiological activities at the Site? Potential actions include: additional investigation of radiologically impacted areas *(i.e.*, additional review of existing data, collection of additional environmental data, or additional remediation) or release of non-impacted areas from radiological controls. Impacted areas have a possibility of containing residual radioactivity in excess of natural background (USEPA, 2000). Non-impacted areas have no reasonable possibility of residual radioactivity. All areas are either impacted or non-impacted.

Step 3 – Identify Inputs to the Decision
Inputs to the decision are archival documents and information provided by the New Haven Depot staff, as well as archival documents provided by the staff at the DLA-DNSC Headquarters at Fort Belvoir in Virginia. Pertinent information includes radioactive material use licenses and inventories for various New Haven Depot areas where receipt, shipment, storage, and/or use of radiological materials may have occurred.

Step 4 – Define the Boundaries of the Study
Temporal boundaries for the study are defined by the period of use of radiological materials at New Haven Depot. Spatial boundaries are defined by the locations of historical radiological materials storage and use.

Step 5 – Develop a Decision Rule
If there is reasonable probability or conclusive evidence that an area was impacted (*i.e.*, contaminated) by Site activities (*i.e.*, storage, use, disposal) at the New Haven Depot Site, then the area will be considered radiologically impacted and additional investigations will be performed in that area. All other areas will be considered non-impacted (*i.e.*, non-disturbed); however, additional investigations may be performed in these areas.

Step 6 – Specify Tolerable Limits on Decision Errors
Decision errors occur when an incorrect action based on the decision rules is recommended. Decision errors occur primarily as a result of uncertainty in the data. Most HSA data collected are qualitative or require professional judgment to be interpreted meaningfully, which makes it difficult to assign a quantitative value for decision error rates. All available information, including historical decision errors used to define impacted and non-impacted areas of the Site, have been considered to limit decision errors in the HSA.

Step 7 – Optimize the Design for Collecting Data
The Main Office at New Haven Depot provided access to their archival records maintained in accordance with their NRC licenses and facility requirements. These records, as well as additional documents provided by the DLA-DNSC Headquarters at Fort Belvoir were reviewed and evaluated to decide if radiological activities have or have not impacted any Site areas. Information on impacted areas was also evaluated for completeness to identify data gaps and support development of additional investigations.

2.4 Organization

The New Haven Depot HSA is organized into the following Sections:

- Section 3.0 of the HSA provides a description of the Site's location and environmental setting, including geology, hydrogeology, surface water, meteorology, seismicity, and cultural resources;
- Section 4.0 summarizes the HSA methodology, including document review, personnel interviews, historical and current photo documentation, and Site walkdowns;
- Section 5.0 summarizes the New Haven Depot Site history from its initial construction to the present day condition, and includes a description of activities in specific Site areas that could have affected its radiological status;
- Section 6.0 discusses the findings of this HSA, discussing impacted or potentially impacted areas, non-impacted areas, and regulatory issues;
- Section 7.0 provides a summary of conclusions reached during the HSA; and
- Section 8.0 presents the list of references consulted while preparing the HSA.

3.0 PROPERTY IDENTIFICATION

The following is a brief physical description of the subject property location and setting.

3.1 Physical Characteristics

3.1.1 Location

The New Haven Depot is located at 15411 Dawkins Road (State Route 14) in New Haven, Indiana, approximately 2.3 miles east of Interstate Highway 469. The geographic coordinates are approximately 41° 04’ 31’’ North latitude and 84° 56’ 36’’ West longitude. New Haven is located in the central part of Allen County, Indiana, directly east of the city of Fort Wayne.

The current Depot Site encompasses 268 acres. Figure 3-1 depicts the current layout of the site and adjoining properties. The Site is roughly trapezoidal in shape, and extends approximately 7,500 ft along its maximum east-west axis, and approximately 2,500 ft along its maximum north-south axis. The Site is bordered to the south by the main line of the Norfolk Southern Railroad and Dawkins Road (State Route 14) and to the north by Edgerton Road and a small industrial park (formerly part of the Depot property). Farmland and an industrial facility border the western portion of the Site, while undeveloped property owned by Jefferson Township borders the east side of the Site. The nearest residential properties are along the south side of Dawkins Road, across from the main entrance to the Site.

A railroad siding off of the Norfolk Southern main line crosses the Site with a series of east-west trending rail spurs, converging at the Sites’ southwestern and southeastern corners. Vehicular access to the Site is from Dawkins Road near the southwestern corner of the Site where access is monitored and maintained from a manned Security Post. The Depot is completely surrounded by a 6-ft fence topped with three-strand barbed wire. Other gates exist at the entrance/egress points for the rail spurs; these gates are kept closed and locked except when rail cars are actually arriving or leaving the facility (Parsons, 1999).

FIGURE 3-1: AERIAL VIEW OF NEW HAVEN DEPOT

3.1.2 Topography

The New Haven Depot site is located in northeastern Indiana, in an area that underwent intense glaciation during the most recent ice advance. Surface topography in Allen County reflects the nature of remnant glacial landforms, with the area including the Depot situated on the remnants of the ancestral Lake Erie lake bottom (Bleuer and Moore, 1978). As a result, the land surface at New Haven Depot exhibits little relief, ranging in elevation from approximately 770 ft above mean sea level (amsl) along Dawkins Road (southern boundary) to approximately 764 ft amsl along Edgerton Road (northern boundary). Figure 3-2 depicts a portion of the USGS topographical map including New Haven Depot and the surrounding areas. There is a gentle regional surface slope to the northwest from the Site; towards the axis of the Maumee River valley, although small rises and plains are located north, south, and west of the site, representing dune fields and beach ridges related to the former glacial lake (Bleuer and Moore, 1978). Given the lack of surface relief, the nature of the surficial deposits, and the history of use of this area for agricultural purposes, natural surface drainage networks have been augmented by a series of dug ditches. This network extends to the Depot Site, and is discussed in more detail in Section 3.2.3.

Three former sand and gravel pits were located at the Depot Site (Parsons, 1999; Bleuer and Moore, 1978). Although they were reportedly located near Fluorspar Pile 91 in Open Area 325, in the southeastern part of the Site (Parsons, 1999), no visual evidence of the pits was noted during the visual inspection conducted for this HSA.

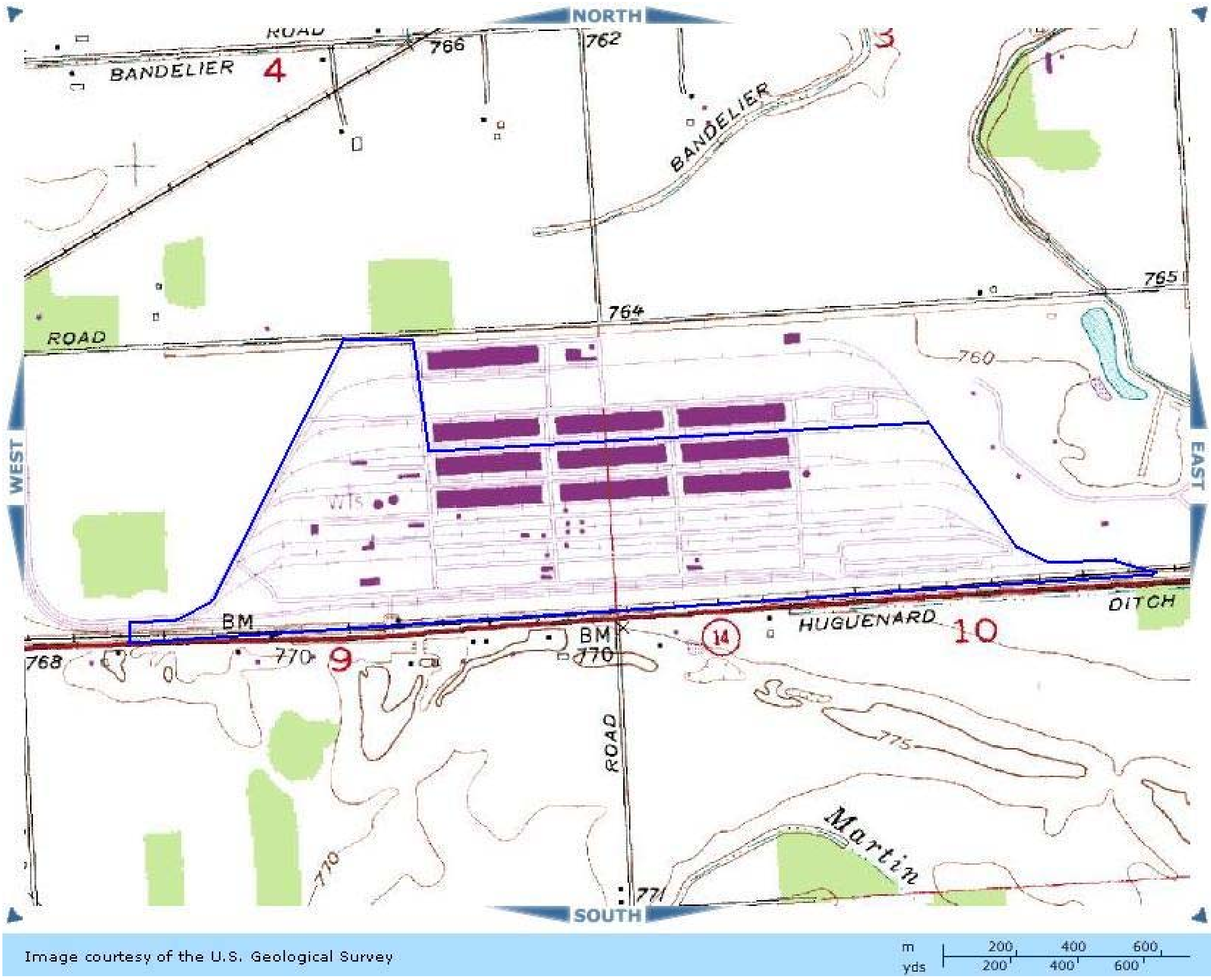

FIGURE 3-2: TOPOGRAPHIC DETAIL OF NEW HAVEN DEPOT AND SURROUNDING AREA

3.2 Environmental Setting

3.2.1 Geology

The Site is located near the western margin of the Maumee Lake Plain unit of the Central Lowland Physiographic Province (Fleming, 1994). The Maumee Lake Plain is flat and poorly drained, and was developed in fine grained lacustrine deposits (fines sands, silts, and clay). Surficial soils in the area of the Site belong to the Hoytville-Napanee Association, which are described as deep, somewhat poorly drained to very poorly drained, nearly level, and medium-textured to finely-textured soils on uplands.

The Site is underlain by a sequence of wave scoured, lake bottom till. This till is part of the New Holland Member of the Lagro Formation, and is composed of lacustrine deposits described as massive, firm, pale brown to light gray clayey silt to silty clay, with clay content of up to 60% (Fleming, 1994). Local lenses of sand and plastic clay may exist. The Lagro Formation overlies the Trafalgar Formation (Bleuer and Moore, 1978). The Trafalgar tills are described as dark grey sandy silt, and represents outwash of an earlier ice advance. The Trafalgar overlies the bedrock surface (approximately 70 ft below ground surface at the Site; Fleming, 1994).

To the west and directly south of the Site are thin sand and gravel deposits overlying the till that developed along the ancient lake margin. These thin deposits, representing sand dune fields or beach ridge complexes are generally not sources of water supply.

The bedrock surface elevation beneath New Haven Depot is approximately 700 ft amsl (i.e., approximately 60 ft bgs). Bedrock consists of Devonian limestone and dolomite mapped as the Traverse and Detroit River Formations. Approximately 35 feet of Traverse Formation overlying 35 feet of Detroit River Formation are exposed in a rock quarry approximately one mile east of the site (Fleming, 1994).

3.2.2 Hydrogeology

Regional groundwater flow is believed to flow to the northwest in the vicinity of the Depot, towards the axis of the Maumee River Valley. The potentiometric surface at the Site has been mapped as approximately 750 ft amsl (Fleming, 1994), which is approximately 10 to 20 feet below ground surface. The local aquifer is the underlying bedrock, meaning that groundwater flows upward from bedrock into the overlying tills, and may exist under artesian conditions. The bedrock surface in the area of the Site is reported to tilt slightly to the northwest.

The unconsolidated sediments of the Maumee Lake Plain that underlie the Site are very fine grained with low permeability, and are not suitable for development of sustainable water supply wells.

There are no records of water supply wells at the New Haven Depot site. The City of New Haven’s water department purchases their water supply from the City of Fort Wayne. Fort Wayne derives their potable water source solely from the St. Joseph River. No groundwater wells are utilized as a secondary water source. It is likely that there are private water supply wells on farms and nearby industrial properties, however, all local wells are completed in productive bedrock aquifers located hundreds of feet below ground surface (Bleuer and Moore, 1978).

3.2.3 Hydrology

Given the low surface relief, and relatively fine-grained nature of surface deposits, natural surface water drainage has been augmented by dug ditches to support agricultural use of the land. Surface water drainage on the Site is directed by a series of open swales, ditches, and underground storm sewers. Most surface water is diverted to the north of the Site via two north-south oriented drainage ditches located in the western and the eastern portions of the Site. One of these ditches is located near Area 7A. These north-south trending ditches connect to an east-west oriented surface water ditch located along the south side of Edgerton Road. Flow in this ditch is from west to east. Stormwater sewers around the facility warehouses converge at a manhole located near the northern Site boundary, adjacent to the industrial park. These discharged to open ditches (possible leach field?), up to the Edgerton Road ditch. The Edgerton Road ditch discharges to the Lomont Ditch, which is shown on Figure 3-2, near the eastern edge of the figure. The Lomont Ditch flows into the head of Gar Creek, which discharges to the Maumee River approximately 3 stream miles north of the Site. Other man-made ditches connect to the Lomont Ditch and Gar Creek, downstream from the Site.

Ashley Lake (unlabeled but visible on Figure 3-2) is a small recreational lake located to the northeast of the Site on Township-owned property which had been part of the depot facility at one time. This lake was built after the depot was constructed, apparently resulting from borrow operations conducted in the area. There is no surficial hydrological connection between this small lake and the Lomont Ditch under normal conditions; however, during flood conditions an overland connection may occur.

Reference to three small pond areas near Flourspar pile 91 was made in the Parsons 1999 environmental site assessment report. No visual evidence of these ponds was noted during the inspection conducted as part of this HSA.

3.2.4 Climate and Meteorology

Meteorological data for Fort Wayne, IN is summarized in Table 3-1.

TABLE 3-1: AVERAGE METEOROLOGICAL DATA – FORT WAYNE AREA

	January	February	March	April	May	June	July	August	September	October	November	December
High Temp (°F)	31	35	47	60	72	81	84	82	75	63	49	36
Low Temp (°F)	16	19	29	38	49	59	63	60	53	42	33	22
Precipitation (inches)	2	2	3	4	4	4	4	4	3	3	3	3
Snow (Inches)	10	8	5	1	-	-	-	-	-	1	3	8

Source: (NOAA, 2006)

The climate is influenced by Lake Michigan and, to a lesser extent, Lake Erie. Temperature differences between daily highs and lows average about 20°. The average occurrence of the last freeze in the spring is late April and the first freeze in the autumn in mid-October.

Annual precipitation is well distributed with somewhat larger amounts in late spring and early summer. Measurable precipitation typically falls on 132 days of the year. Mid-winter through early spring is the wettest time of year, with autumn the driest. Except for considerable cloudiness during the winter months, sunshine averages about 75%. There in an average of 39 thunderstorm days per year at Fort Wayne with most occurring from May to August. Winter thunderstorms occur about twice per year. Snowfall averages 32.4 inches per year, with the majority falling in December, January, and February. Six inch or greater snowfalls usually only occur once per season. Snow depth on the ground at any one time rarely exceeds 10". Freezing precipitation events are not uncommon, but major storms are usually several years apart.

Dense fog is relatively infrequent, but most common in the spring when warm air masses ride over melting snow.

Tornadoes are not common but funnel clouds are sighted more regularly. Most tornadoes produce F0 to F1 damage with more devastating types rare. Prevailing wind for the year is 9.9 mph from the southwest.

Flash floods and urban and small stream floods are not uncommon in late spring and summer. Serious flash floods are rarer. Flooding occurs several times per year on area rivers but dangerously high floods that cause major damage and threats to life are not common (NOAA, 2006).

3.2.5 Seismicity

The history of this area shows a moderate to low probability of an earthquake of sufficient magnitude to cause damage to structures. The United States Geological Survey reports that the most severe earthquake ever observed in Indiana occurred on September 9, 1909, in the Wabash River Valley, near Terre Haute, Indiana, about 200 miles away from New Haven Depot. Shocks were felt as far away as Arkansas, Illinois, Iowa, Kentucky, Ohio, and Tennessee. A magnitude of 5.10 on the Richter scale and a maximum intensity of VII on the Modified Mercalli Scale were observed (USGS, 2006).

4.0 HISTORICAL SITE ASSESSMENT METHODOLOGY

This section summarizes the methodology and decision criteria for the New Haven Depot HSA.

4.1 Approach and Rationale

This HSA is being conducted as part of an overall effort to decontaminate and remediate radiologically affected areas of New Haven Depot and conduct a Final Status Survey of the entire depot, with the intent of releasing the property back to GSA for unrestricted use. The purpose of the radiological HSA is to collect and organize information describing radiological activities at New Haven Depot from the onset of the first radioactive material license until cessation of operations. This HSA reviews historical information to determine if there is sufficient data to declare buildings as "Impacted" or "Non-Impacted" in accordance with MARSSIM methodology (Table 4-1; USEPA, 2000). The HSA also evaluates potential migration of contamination in the environment and makes recommendations for future surveys. To achieve this goal, a systematic approach was developed for screening the New Haven Depot facilities, as outlined in Figure 4-1.

TABLE 4-1: HSA RADIOLOGICAL RISK CATEGORIES

Impacted[1] **(MARSSIM Class 1 and 2)**	Areas with moderate to high probabilities of potential contamination. Typical areas include: areas where commodity repair, maintenance, cannibalization, demilitarization, demolition of previously contaminated structures, areas of prior remediation, disposal, or other operations potentially compromising non-dispersible commodity design occurred.
Impacted **(MARSSIM Class 3)**	Areas with very low potential for contamination but with insufficient information to justify a non-impacted classification. Typical areas include areas where commodities were received, stored, and shipped, but without integrity impacts such as commodity repair or maintenance.
Non-Impacted[1] **(No Survey Needed)**	Areas with no potential for residual contamination. HSA records do not indicate presence of any radioactive materials more than smoke detectors or exit signs with sealed sources, or those areas that had radioactive materials, but have survey records documenting decontamination and/or free release of the area.

[1]*In addition to "Impacted" or "Non-Impacted" from a radiological perspective, the survey areas are identified using the methodology presented in the flow chart (Figure 4-1).*

In order to answer the questions in the referenced decision tree, the following information was reviewed:

- New Haven Depot operating history, including radioactive materials licenses, permits, and use authorizations and protocols;
- Surveys for radioactive materials present at New Haven Depot;
- Physical tours of the New Haven Depot facilities expected to be impacted due to both current and former RAM usage;
- Documents from DLA-DNSC Headquarters at Fort Belvoir, VA; and

- Interviews with current New Haven Depot personnel, including staff responsible for ongoing site control and surveys, operators and training personnel, and personnel who have performed previous radiological surveys. Completed interview forms are included in Appendix C.

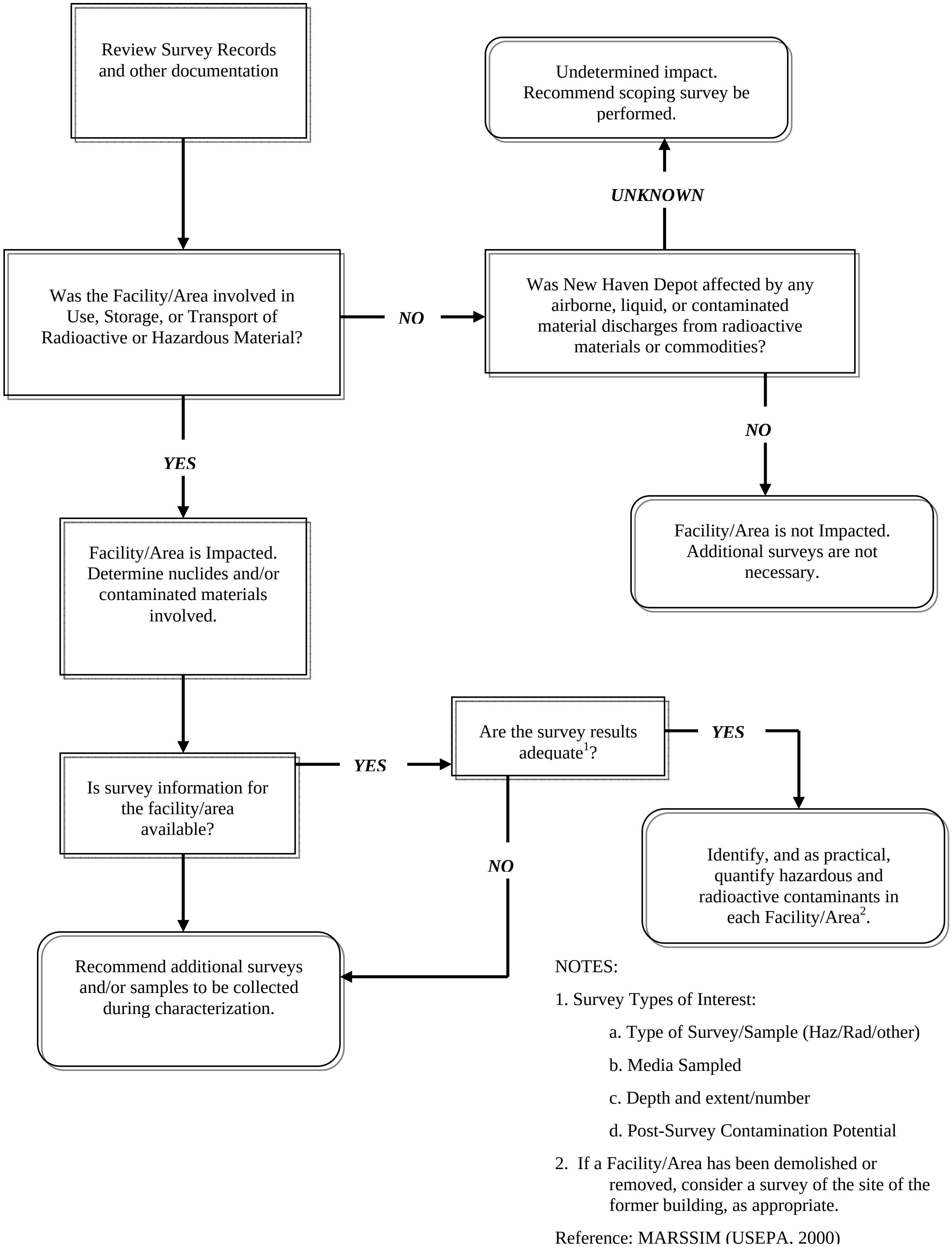

FIGURE 4-1: FLOWCHART OF HSA RADIOLOGICAL DECISION METHODOLOGY

4.2 Documents Reviewed

4.2.1 Government Supplied Information

The majority of the records available were stored at the New Haven Depot Main Office, administered by Mr. John Olszewski and assisted by Ms. Lois Huddlestun. Ms. Huddlestun supplied file reports and information pertinent to the site visit and investigation. Additional records were available at the DLA-DNSC Headquarters at Fort Belvoir in Virginia, administered by Mr. Kevin Reilly and assisted by Mr. Mike Pecullan. Mr. Pecullan supplied additional file reports and information pertinent to the site visit and investigation, as well as NRC license information. Most documents dated from the 1970s up to 2006.

Key documents reviewed for preparation of this HSA include:

- DLA DNSC NRC License No. STC-133;
- Parsons Engineering Preliminary Assessment/Site Investigation Reports (Parsons, 1999 and 2001);
- ERS Solutions FSS Report (ERS, 2002a);
- US NRC Reply to DLA DNSC License Amendment Application (NRC, 2003);
- Pangea Group Remediation Closure Report, (Pangea, 2005).

Appendix D contains copies of site maps and building plans. Appendix E includes a complete listing of all references reviewed during completion of this HSA.

4.2.2 Internet Review

Internet searches were conducted to determine if there was any pertinent information not available through other sources. General information was available describing the New Haven Depot history and facilities, but no additional information pertinent to this HSA was identified.

4.2.3 NRC Document Repositories

Because an updated file of all NRC licenses, amendments, and requests was available, no records pertaining to New Haven Depot's licenses or inspection reports were directly obtained from the NRC during the preparation of this HSA.

4.2.4 Other Document Repositories

No other document sources were consulted during completion of this HSA.

4.3 Property Inspections

Review of the documentation provided, as well as review of other background information, resulted in a list of areas and warehouses that have stored and/or currently store radioactive materials. Each of these areas/warehouses was toured, if accessible, to gain specific information relevant to assigning risk categories and planning of future MARSSIM-related activities. Photographs were taken in areas approved by depot personnel and are included in Appendix E.

4.4 Personnel Interviews

CABRERA personnel worked closely with depot personnel, including Mike Pecullan and Lois Huddlestun, during a site visit conducted from August 21 through 25, 2006. CABRERA personnel also worked closely with personnel at DLA-DNSC Headquarters at Fort Belvoir, including Mike Pecullan and Kevin Reilly, during a visit conducted on July 18 and 19, 2006.

Interviews were also conducted with current Site personnel listed in Table 4-2. Appendix C contains all completed interview forms.

TABLE 4-2: NEW HAVEN SITE INTERVIEWS

Interviewee	Position at New Haven Depot
Mike Pecullan	DNSC Deputy Manager of the Occupational Radiation Protection Program
John Olszewski	New Haven Depot Manager
Lois Huddlestun	General Supply Specialist
Nikki Horther	General Supply Specialist
Richard Whitman	General Supply Specialist
Dale Arnos	General Supply Specialist
Warren Flood	General Supply Specialist

5.0 NEW HAVEN DEPOT HISTORY AND CURRENT USAGE

5.1 Depot History

Information on the operational history and current activities of New Haven Depot, particularly with respect to RAM storage and handling, is summarized in this section. This information was derived largely through interviews and from the Preliminary Assessment prepared by Parsons in 1999.

Historically, the Site's main purpose has been storage of metallurgical ores and materials necessary for manufacturing defense and/or strategic materials. Construction of the New Haven Depot began in April 1942 and was completed in March 1943. The depot was originally assigned to the Ordnance Department and designated the New Haven Ordnance Depot. It was renamed the Casad Ordnance Depot in April 1943. The depot operated during World War II as a Class II Installation. It was deactivated in 1947 and assigned to the Corps of Engineers, which maintained the facility in a stand-by fashion. In April 1948, the facility was re-designated as the Casad Engineer Depot, and operated as an inactive Class II Installation for storing strategic and critical materials for the National Stockpile. In February 1951, the facility was re-designated as an active Class II Installation, and given the added mission of assembling troop supplies. Specifically, engineer sets including equipment for camouflage, carpentry, fire fighting, blacksmithing, pipe fitting, surveying, welding, and field mapping were assembled. The facility was reportedly used as an Army Engineer Training Area until 1955. The Corps of Engineers declared the Site as excess land in 1955. In 1958, control of the Site was given to the GSA. In 1959, 130 acres comprising the original western portion of the Site were sold (See Figure 5-1). In 1972, parcels which comprised the north-central and eastern parts of the original Site property were sold to various local government and private entities. This included property north of the existing warehouses which was developed into a small industrial park, and properties containing Lake Ashley in the northeast portion of the original Site property, as well as the pistol range, fire practice area, and burning area (See Figure 5-1). In the early 1980s, the National Defense Stockpile Center under the GSA assumed management responsibility for the Site. In 1988, the stockpile program was transferred from GSA to the DLA, and re-named the Defense National Stockpile (DNS). A summary of this history is provided in Table 5-1.

TABLE 5-1: OPERATING HISTORY OF NEW HAVEN DEPOT

Time Period	Significant Events
1940s	• April 1942 – Depot construction begins • March 1943 – Depot begins operations as New Haven Ordnance Depot • April 1943 – Renamed as Casad Ordnance Depot • 1947 – Depot deactivated and assigned to Corps of Engineers to be maintained as a stand-by facility • April 1948 – Re-designated as Casad Engineer Depot
1950s	• February 1951 – Site begins functioning as Army Engineer Training Area • 1955 – Corps of Engineers declares Site as excess land • 1958 – GSA given control of the Site • 1959 – Sale of 130 acres in western portion of Site
1960s	• *No significant events discovered during records review*
1970s	• 1972 – Sale of parcels in north-central and eastern parts of property
1980s	• National Defense Stockpile Center (under GSA) assumed Site management • 1988 – Stockpile program transferred from GSA to DLA
1990 – present	• Removal of all licensed radioactive material; Site seeking release for unrestricted use

Source: (Parsons, 1999)

5.2 Overview of Radiological Operations

5.2.1 Summary of Depot Operations

The Site's main purpose has been storage of metallurgical ores and materials necessary for manufacturing defense and/or strategic materials. There are six storage buildings (Warehouses T-210 through T-215, each 180 ft. x 960 ft.) with wood, concrete, or concrete block structural framing supporting wood roof decks, having an aggregate indoor storage capacity of approximately 1,037,000 sq. ft. The warehouses are subdivided into four equal 180 ft. by 240 ft. sections. Each section is accessed through four overhead roll-up metal doors. Each section is divided into 79 storage bays (each approximately 25 ft. by 20 ft.). The materials containing licensable quantities of thorium and uranium were packaged (in either wooden boxes or drums) and stacked in various bays throughout the warehouse series, as well as in Buildings 136, 141, 145, and 146. The licensed radioactive materials were never removed from their containers, except during some sampling and overpackaging programs. Outdoor open former storage areas include several rail spurs and vacant pads. According to the most recent Occupational Radiation Protection Program (ORPP) Annual Survey, all licensed radioactive materials have already been removed from the Site; however, contamination may still remain in certain areas (Skruck, 2006). Any contents remaining in each warehouse are in the process of being consolidated into Warehouse 214 for ultimate removal.

Additionally, various sections of the warehouses once contained stores of raw asbestos and the interior building surfaces of Sections 1 and 4 of Warehouse 214 have had an encapsulant applied. In addition, at the time of this HSA Site inspection (August 2006), DNSC was in the process of applying a two-part epoxy coating on the floors of Sections 1, 2, and 3 in Warehouse 214. Airborne levels of asbestos during work activities inside some warehouse sections are not expected to exceed the permissible exposure limit of 0.1 fibers/cc (29 CFR 1910.1001(c) (1)) (DLA/DNSC, 2006).

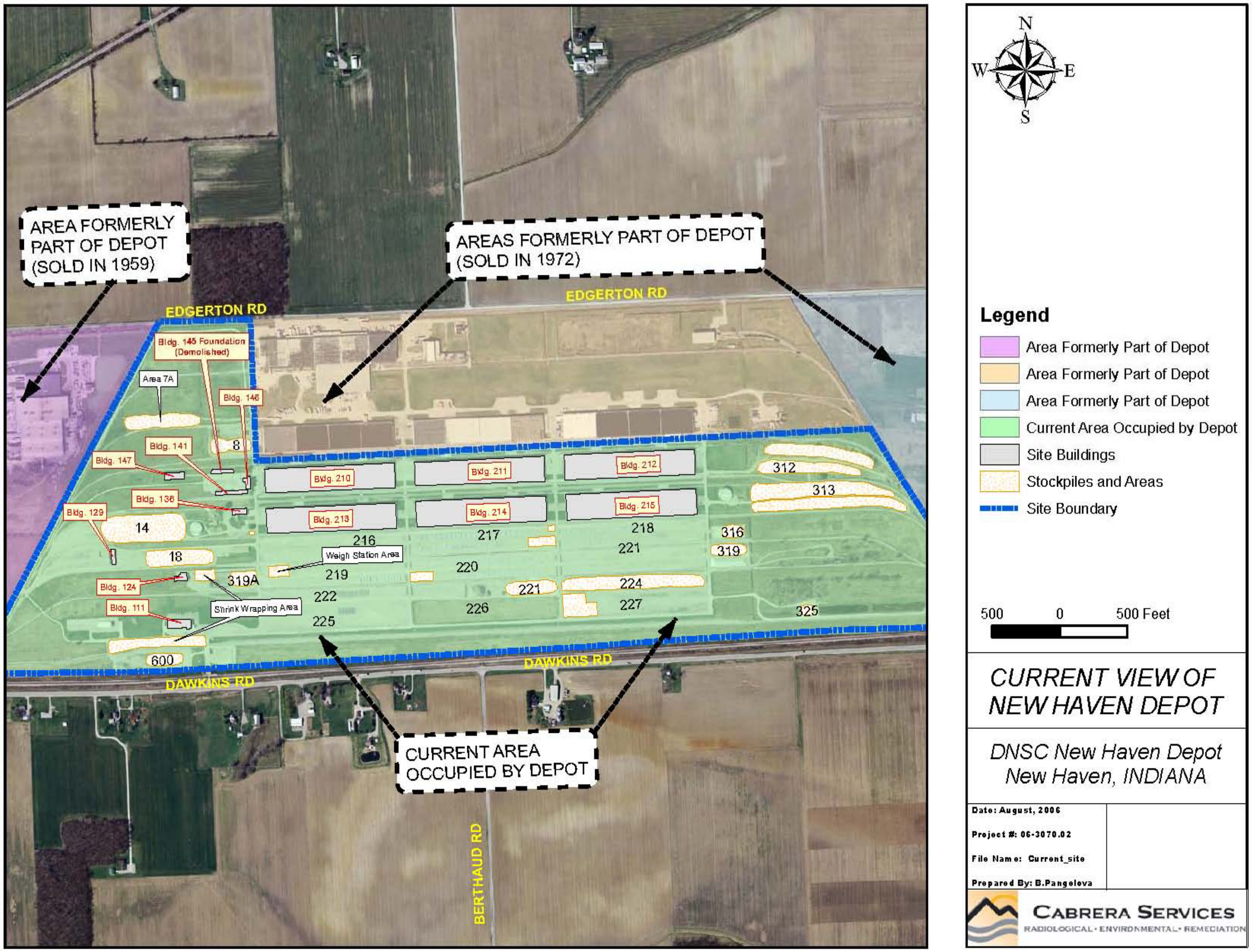

FIGURE 5-1: CURRENT VIEW OF NEW HAVEN DEPOT

Standards of radioactive material control are more stringent today as compared to the 1940s, 1950s, 1960s, and 1970s. There is a potential for spread of contamination from materials being moved onsite, being prepared for shipping, and from decontamination. For this reason, the DLA-DNSC has implemented the ORPP, whereby routine monitoring surveys are conducted to minimize the potential for contamination and to ensure the safety of workers.

5.2.2 Former RAM Operations

Throughout the system of warehouses and outdoor areas at New Haven Depot, the DNSC has stored columbium/tantalum ores and concentrates, tungsten ores and concentrates, zirconium ore, rare earth sodium sulfate, monazite, tungsten metal scrap, and bastnasite, all containing sufficient amounts of natural uranium and thorium to require licensing under NRC rules.

In October 2000, DNSC sold the zirconium ore stored in piles 111 and 111A at Area 7A. The ore was loaded into rail cars at the location of the piles by a front-end loader. The rail cars were then moved to the rail scale where the amount of ore in the car was adjusted to maintain an acceptable weight. After achieving the optimum weight, the cars were moved to an area where the tops were shrink-wrapped to preclude loss of the ore during transit. The areas affected during this process were the railway and roadways used for the transport of the ore, the rail scale area, and the building used for shrink wrapping the rail cars.

Three outdoor areas contain piles of fluorspar and some indoor sections currently contain packaged stockpile materials (e.g. tungsten, columbium/tantalum, fluorspar) having small amounts of naturally occurring uranium and thorium (not in licensable quantities) emitting ambient gamma radiation which could interfere with the required surveys (DLA/DNSC, 2006).

5.2.3 Permits and Licenses

NRC License STC-133 (Appendix B) is held by the DLA-DNSC at Fort Belvoir, VA for use at DNSC-Curtis Bay Depot, DNSC-Hammond Depot, DNSC-New Haven Depot, DNSC-Somerville Depot, DNSC-Binghamton Depot, and DNSC-Scotia Depot. Mr. Pecullan is the designated Radiation Safety Office (RSO) for this license. This license allows for the possession of 2,000,000 kg total of natural uranium and thorium mixtures as ores, concentrates, and solids. Uses authorized by this license include storage, sampling, repackaging, transfer, and remediation as necessary for activities of the National Defense Stockpile. This license has several pending amendments; however, at the time of publication of this HSA, the most current version is Amendment #26, accepted as of August 23, 2006. The current license expires on February 28, 2010.

5.2.4 Routine Radiological Monitoring

Documentation discovered during the records review demonstrating routine monitoring includes:

- Annual Radiological Survey Findings, in accordance with the ORPP protocols;
- Monitoring Radiation Reports;
- Notifications of Stockpile Inspections; and
- Environmental Compliance Assessments.

Due to the Site's primary usage as a storage depot, radioactive waste was typically not generated during day-to-day operations. However, during special sampling rounds, as part of the ORPP, waste was often generated in the form of potentially contaminated Tyvek, gloves, wipes, bags, and other storage containers (Till, 2003).

After surveying, samples were returned to their respective storage containers, and potentially contaminated equipment and supplies were placed on a plastic-lined table for surveying, with wipes hanging on a rack above the table. Any waste showing a reading of 200 disintegrations per minute (dpm) or more would have been disposed of as possible radioactive waste, contained in a 5-gal plastic bucket contained within a 50-gal drum, labeled as "Possible Radioactive Waste." Any waste showing less than 200 dpm would be disposed of in a 50-gal drum lined with plastic and labeled as "Possible Contaminated Waste" (Till, 2003).

According to information obtained from personnel interviews, incidents, such as spills, occurred very infrequently, but were handled quickly and efficiently. One incident occurred where a drum containing rare earth sodium sulfate fell and spilled. The supervisor was notified immediately and the supervisor notified DLA headquarters, and headquarters gave approval and directions to go ahead and clean it up. After the area had been cleaned, headquarters sent quality assurance personnel to the area to perform monitoring scans to ensure the area had been sufficiently cleaned (Cabrera, 2006c).

5.3 Summary of Previous Radiological Investigations

5.3.1 Radiological Scoping Survey – October 2001

ERS Solutions performed a radiological scoping survey in October 2001 after transfer of the baddeleyite ore to another entity in 2000. The results of this survey indicated that significant levels of residual radioactivity remained at former storage piles 111 and 111A in Area 7A. The identified contamination was discovered at the pile footprint and in small, discrete locations around the former stockpiles, indicative of spills during loadout of the ores. The contamination observed did not appear to be homogeneous in nature (Reese, 2001b).

5.3.2 Spot Remediation and Partial Final Status Survey – May 2002

ERS Solutions also performed a spot remediation effort and partial FSS in May 2002 in and around areas presumed to be impacted from handling and loading of baddeleyite ore at the New Haven facility. Remediation efforts focused on removing ore spillage that occurred during loading and shrink-wrapping activities along the Site railbeds, ore handling facilities, and other haul routes on the Site. Area 7A was not included in this scope of work. It was reported that 33 cubic yards (yd^3) was removed by backhoe with survey units (SU) 3A and 4, as defined by ERS. Spot remediation by hand was also performed in other established SUs. All waste materials removed were placed in a defined storage area within Area 7A, with final removal of the debris to be performed at a later date (ERS, 2002a).

The FSS Report for the above investigation, dated December 2002, was submitted to the US NRC for review. The FSS Report recommended release for unrestricted use all survey units investigated as part of the ERS FSS, except for the debris storage in Area 7A. The US NRC voided DLA's application for license amendment in April 2003, pending a request for more information.

5.3.3 Area 7A Remedial Action – September 2004

In 2004, the Pangea Group completed the removal of 2,503 yd^3 of contaminated soil from Area 7A, the eastern access road, and the railroad truck bed. (Pangea, 2005) Pangea was originally scoped to remove 6 in of soil and debris from the surface of all areas deemed to be impacted within these areas. Radiological support surveys performed during the excavation showed that contamination actually was present at depths from 9 in to 3 ft in certain areas. Pangea excavated the contaminated areas down to a satisfactory condition of two-times background, as defined for the project. All wastes were loaded into 39 gondola railcars and shipped to the US Ecology radioactive waste facility in Grandview, Idaho. No FSS activities or license amendment applications to the NRC were performed as part of this remedial action.

6.0 FINDINGS

A review of the documentation described in Section 4.0, as well as interviews with personnel familiar with RAM practices and procedures at the depot, suggests that there are potentially impacted areas at New Haven Depot due to the use or storage of RAM. The following sections describe the findings of this HSA, including radiological contaminants of potential concern (RCOPC), potentially impacted buildings and outside areas, potential regulatory issues, and potential safety/industrial hygiene concerns. Some of the areas appear to have been at least partially remediated in the past, but have not undergone complete closure via MARSSIM FSS.

All of the necessary information to complete this HSA came from documentation and sources as summarized in Section 4.0.

6.1 Summary of Potential Radiological Contaminants

The primary RCOPC at New Haven Depot are those associated with the receipt, storage, and shipment of material containing natural uranium and thorium, both in secular equilibrium with their daughter (or decay) products.

6.2 Summary of Potential Contaminated Areas

Eight outdoor storage areas and ten current or former buildings have been identified as areas where RAM were stored or handled, based on review of records and interviews as outlined herein. A summary of these areas and buildings are provided in Table 6-1 and Table 6-2, respectively. Where possible, specific bays or sections of buildings considered potentially impacted are listed. Detailed findings are included in Section 6.3.

TABLE 6-1: NEW HAVEN DEPOT OUTDOOR AREAS WITH LICENSED RAM HISTORY

Outdoor Areas	Radioactive Materials Use/Storage	Current Condition(s)
7A	Open storage area formerly containing 2 piles (111 and 111A) of zirconium ore	Field overgrown with vegetation; footprint of piles remains
Rail Scale (Weigh Station Area)	Rail cars and trucks hauling materials sometimes spilled in this area	Present and functional; area reportedly has been cleaned, but potential for residual contamination exists.
Entry Road and Paved Road to Rail Scale	Baddelyite ore was transported from Area 7A to the rail scale along the entry road, and then along the paved road by a front-end loader.	Road still in use; area reportedly has been cleaned, but potential for residual contamination exists.
Railroad Tracks Used for Shrink-Wrapping	Rail Car Shrink Wrapping Area	Present, good condition, yet appear to no longer be in use; Area reportedly has been cleaned, but potential for residual contamination exists.
Railroad Tracks Used for Storage or Transport	Rail cars filled with zirconium ore were either stored or transported here before being sent offsite	Present, good condition, yet appear to no longer be in use; Area reportedly has been cleaned, but potential for residual contamination exists.

TABLE 6-2: NEW HAVEN DEPOT BUILDINGS WITH LICENSED RAM HISTORY

Building (or footprint of former structure)	Former Radioactive Materials Use/Storage	Current Condition(s)
136	Former Office Building; likely contained Bastnasite, Monazite, Rare Earth Sodium Sulfate, and Zirconium in contained sample form	Building present, but in poor condition – not in use
141	Storage of Zirconium ore	Building present, but in poor condition – not in use
145 (Footprint)	Zirconium ore storage	Demolished (Foundation remains)
146	Zirconium ore storage	Building present, but in poor condition – not in use
210	Section 1: Storage of columbium tantalum (In **Bays 1, 2, 13, 14, 21-27, 31, 41, 44, 51, 61, and 71-75**) and tungsten (In various bays)	Building has already been returned to GSA
	Section 2: Storage of columbium tantalum (In **Bays 2, 11, and 21**), monazite (In various bays), and tungsten (In various bays)	
	Section 3: Storage of tungsten (In various bays)	
	Section 4: Storage of columbium tantalum (In **Bays 2-5, 8, 9, 12-14, 32-33, 35, 43, 45, 46, 48, 52-54, 56, 58, and 76**)	
211	Section 1: Storage of columbium tantalum and tungsten (In various bays)	Building present, all stored commodities removed
	Section 2: Storage of columbium tantalum and tungsten (In various bays)	
212	Section 1: Storage of columbium tantalum (In **Bays 11, 31, 37, 41, 51, 61, and 71**)	Building present, all stored commodities removed
	Section 2: Storage of columbium tantalum (In **Bays 11, 12, and 21**)	
213	Section 1: Storage of bastnasite, columbium tantalum, tungsten, and zirconium (In various bays)	Building present and in use; as of August 2006, commodities are being removed, floors are being cleaned, and epoxy sealant/encapsulant is being applied in Section 2
	Section 2: Storage of monazite (In **Bays 12, 13, 15, and 16**)	
	Section 3: Storage of columbium tantalum (In **Bays 11, 19, 21, and 29**)	

	Section 4: Storage of columbium tantalum (In **Bays 1, 9, 11, 15, 21, 31, 38, 39, 41, 51, 59, 67, 69, 75, 78, and 79**) and zirconium (In various bays)	
214	Section 1: Storage of bastnasite and tungsten (In various bays)	Building present and in use; all materials from other warehouses are being consolidated to 214 for ultimate removal; floors are being cleaned and epoxy sealant/encapsulant is being applied in all sections
	Section 2: Storage of columbium tantalum, monazite, and tungsten (In various bays)	
	Section 3: Storage of bastnasite (In **Bay 3**), columbium tantalum (In **Bays 9, 13-16, 17, 18, 26-28, 34, 37-38, 41-44, and 77**), rare earth sodium sulfate (In **Bays 3-6, 8, 12, 13, 15-18, 22-28, 31-33, 35-38, 48, 56, 57, and 75**), and tungsten (In **Bay 36**)	
	Section 4: Storage of columbium tantalum (In **Bays 41-43, 45, 51, 59, 61, 69, and 75-79**) and tungsten (In various bays)	
215	Section 1: Storage of bastnasite (In **Bays 2-4, 12, and 13**), monazite (In **Bays 11, 22, 23, 25-29, 34-37**, **41, 44, and 45**), and rare earth sodium sulfate (In **Bays 43, 62, and 73-75**)	Present, all contents have been removed; warehouse contains acid-grade fluorspar storage bin; fluorspar has been removed, however, wind-blown remnants remain on floors, beams, walls, and rafters
	Section 2: Storage of rare earth sodium sulfate (In **Bays 36, 41, 42, 46, 52-54, 62, and 63**)	
	Section 4: Storage of bastnasite (In **Bays 15, 19, 29, 51-56, 61-65, 68, and 71-79**)	

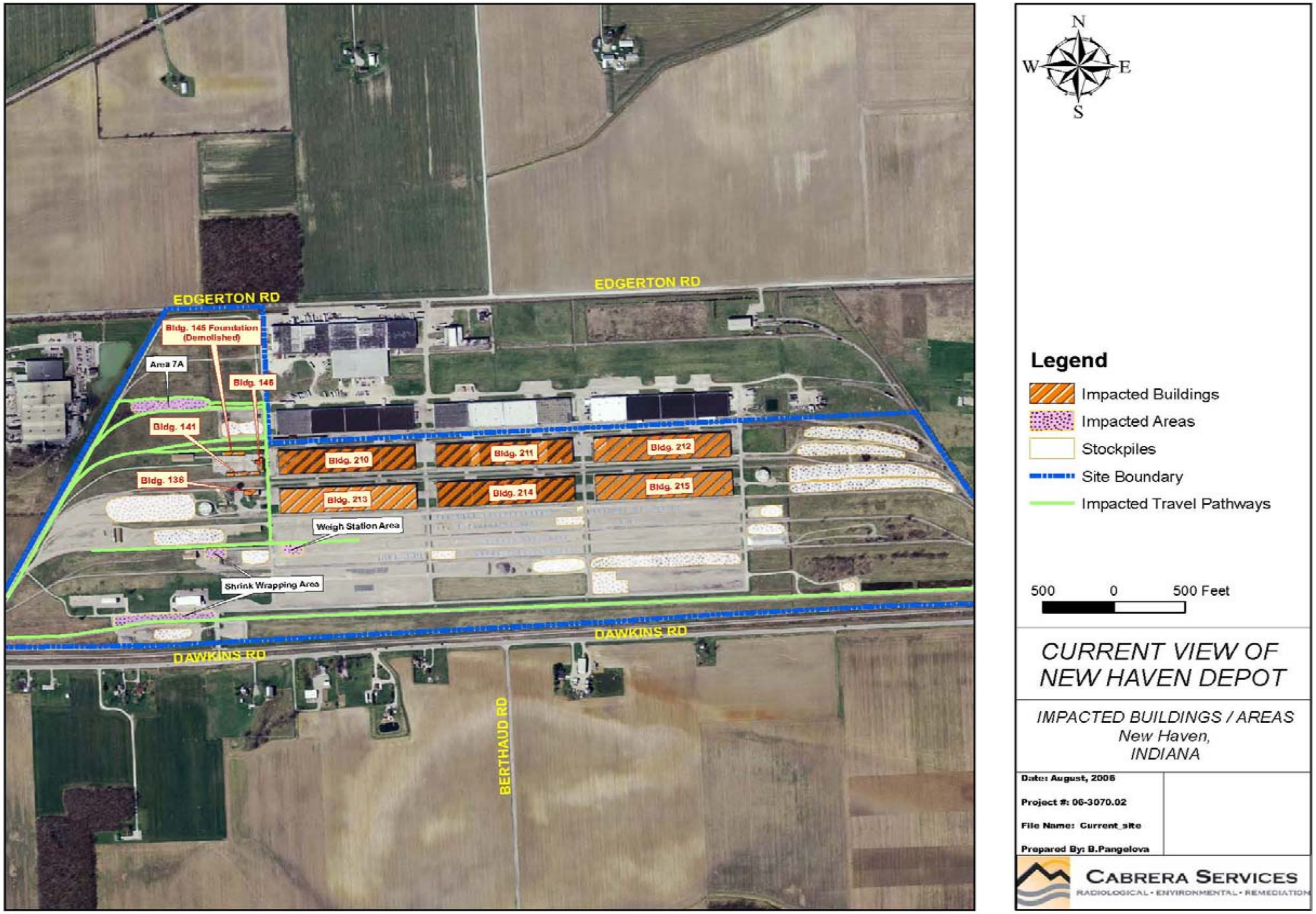

FIGURE 6-1: LOCATIONS OF IMPACTED BUILDINGS/AREAS OF INTEREST AT NEW HAVEN DEPOT

6.3 Location-Specific Findings

6.3.1 Outdoor Areas

Area 7A: This open storage area formerly contained two stockpiles (111 and 111A) of zirconium ore (baddeleyite) near the northwest boundary of the Site. It is bounded by the entry road on the east, the railroad tracks to the west and south, and the drainage ditch to the north. Pile 111 contained the ore itself, and Pile 111A contained soil contaminated with the ore from its transfer from other DNSC depots (Jeffersonville, Indiana and Columbus, Ohio) in 1988. Pile 111 was 296 ft by 60 ft and pile 111A was 104 ft by 50 ft. The ore occurred in the form of stones, rocks, or pebbles.

In 1999, DNSC sampled the piles of baddeleyite to determine the percent abundance of thorium and uranium. The analysis showed that the percent abundance of thorium and uranium for the piles met the criteria established by the NRC to require licensing. Pile 111 contained 0.091% thorium and 0.204% uranium by weight. Pile 111A contained 0.081% thorium and <0.004% uranium by weight. The ore was shipped offsite during remediation efforts from August through September 2004. The piles have been removed; however, the area still shows radioactivity readings above background, and random soil sampling results show that RAM may still exist.

After the removal of the ore piles, soil was excavated to a depth of 15-30 cm. A layer of clay exists beneath the soil; however, neither the exact depth, nor lateral extent of the layer is known for certain. Remediation efforts were not completed to satisfaction of DNSC. Currently, the field is overgrown with vegetation, but footprints of the piles remain. A pile of coke containing a minor amount of natural radioactivity, yet not a high enough activity to require licensing, formerly existed near this area as well (leftover from when coke was used as a heating material at the depot).The coke has been removed as well; however, remnants of the pile are present. This area reportedly has a high potential for residual contamination.

Area 7A is shown in Figure 6-2.

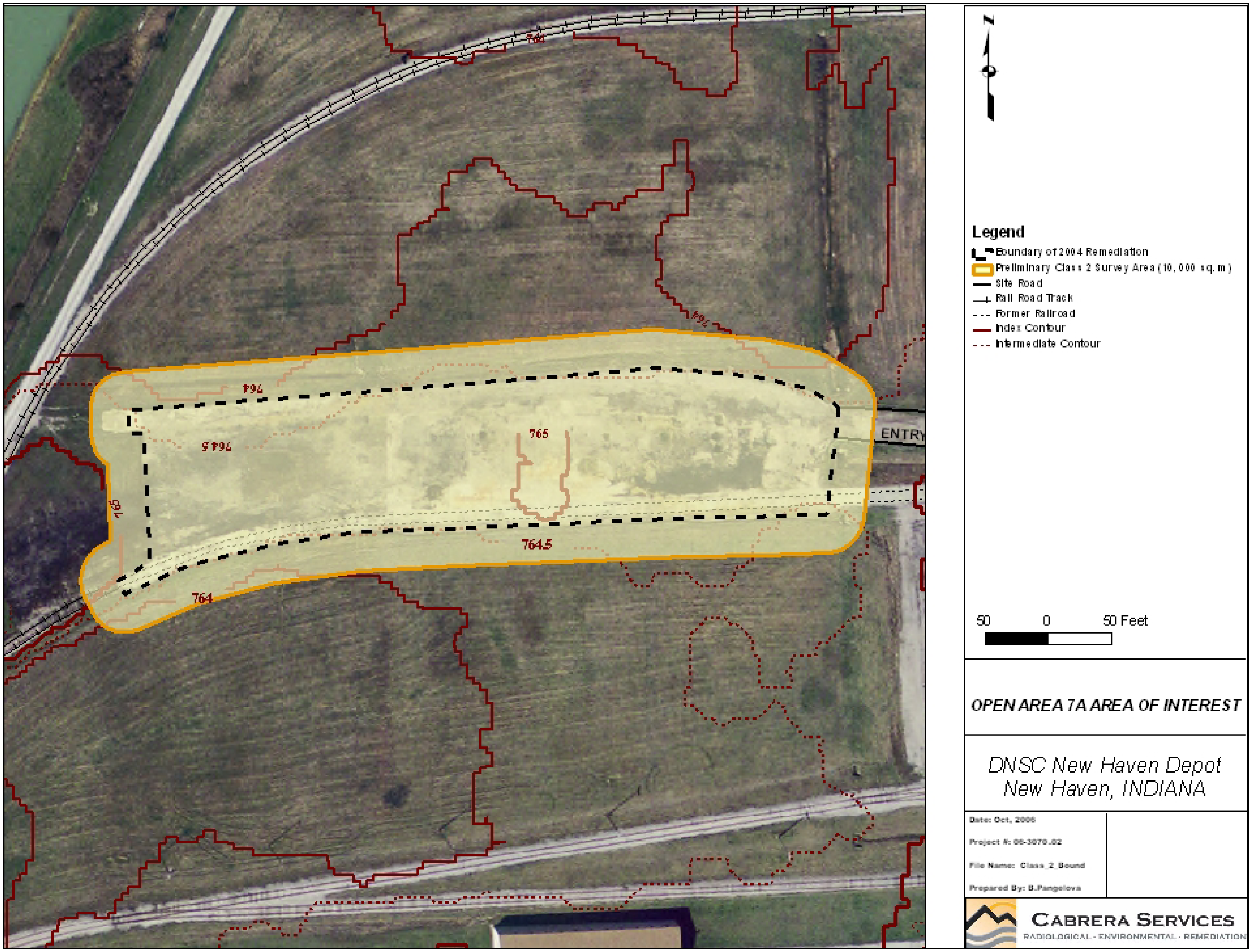

FIGURE 6-2: OPEN AREA 7A - AREA OF INTEREST

Entry Road and Paved Road to Rail Scale: This area includes the entry road to the Open Area 7A and the paved road to the east of Open Area 7A continuing south to the rail scale. During the removal of the baddelyite pile, the ore was transported from Open Area 7A to the rail scale along the entry road, and then along the paved road by a front-end loader. This area has reportedly already been cleaned, and therefore, has a low potential for residual radioactive contamination.

Rail Scale (Weigh Station Area): This area contains a truck scale as well as a rail car scale. This area includes the rail scale area west of the paved road leading from Area 7A and extends to the railroad tracks on the east and includes the adjacent drive area to the south. As debris was being taken away from the Site, the trucks and rail cars had to go through the weigh station before going off-site. If a load ended up being too heavy, some of the material would have been off-loaded onto the weigh station area, to be picked up (via front-loader) by the next vehicle with an underweight load. Rail cars and trucks hauling materials also sometimes spilled in this area. The weigh station is still present and functional. A small scale house (Building 219a) exists in this area as well. Visually, it appears that the area has been cleaned of debris; however, due to the nature of activities conducted in this area, there is still a potential for residual radioactive contamination.

Railroad Tracks Used for Shrink-Wrapping: These areas include the railroad tracks at the southern end of the depot in front of Building 111 (with dimensions of 640 ft long by 20 ft wide) and a rail spur at the southern end of the Depot in front of Building 124. These areas were used for shrink-wrapping the rail cars filled with zirconium ore prior to transport. There was a possibility of spillage of ore during the shrink-wrapping process. These areas are still present, and in good condition, yet do not seem to be used anymore. There is no evidence of any RAM activity in either Building 111 or Building 124. Visually, it appears that the areas have been cleaned of debris; however, due to the nature of activities conducted in this area, there is still a potential for residual radioactive contamination.

Railroad Tracks Used for Storage or Transport: This area consists of railroad tracks along which rail cars filled with zirconium ore were either stored or transported before being sent offsite. It includes the railroad tracks along the western end of the depot. This area was used to transport rail cars from the storage area, to the rail scale and finally to the shrink-wrap area. It also includes a rail spur at the southern end of the Depot behind Building 124. These lines were used to stage loaded and shrink wrapped cars prior to final shipment. Finally, this area also consists of rail lines across the southern face of the depot. These tracks were used to stage rail cars loaded and unloaded waiting for either weighing at the rail scale or filling with ore from the storage area. There is a low potential for residual radioactive contamination in this area.

6.3.2 Buildings

Building 136: This building is a 4315 sq. ft. one-story wooden building, formerly used to house the main administrative office. It has been listed in site records as containing bastnasite, monazite, Rare Earth sodium sulfate, and zirconium; however, it was never used as a storage area, so any materials would likely have been present in sealed sample form. The building is still present, but it has been abandoned, and it appears to be in very poor condition. There is no electricity, lighting, or HVAC. There is a low potential for residual radioactive contamination in this building.

<u>*Building 141*</u>: This building is a 5765 sq. ft. wood structure, formerly used as a storage warehouse. Records indicate zirconium ore was stored here. The building is still present, but it has been abandoned, and it appears to be in very poor condition. There is no electricity, lighting, or HVAC. There is a low potential for residual radioactive contamination in this building.

<u>*Former Building 145*</u>: Records indicate zirconium ore was stored here. The building has been demolished, but the foundation still remains. There is a low potential for residual radioactive contamination on the footprint of this former building.

<u>*Building 146*</u>: This building is a 4236 sq. ft. one-story wooden building. Records indicate zirconium ore was stored here. The building is still present, but it has been abandoned, and it appears to be in very poor condition. There is no electricity, lighting, or HVAC. There is a low potential for residual radioactive contamination in this building.

<u>*Building 210*</u>: This building has functioned as a warehouse used for storage of materials. The warehouse is still present, but it has not been maintained and it is in very poor condition. Debris is scattered all throughout the warehouse, and the ceiling appears to be falling in. There is no electricity, lighting, or HVAC.

Historical radioactive material storage is as follows: Section 1 – columbium tantalum (in Bays 1, 2, 13, 14, 21-27, 31, 41, 44, 51, 61, and 71-75) and tungsten (in various bays); Section 2 – columbium tantalum (in Bays 2, 11, and 21), monazite (in various bays), and tungsten (In various bays); Section 3 – tungsten (in various bays); and Section 4 – columbium tantalum (in Bays 2-5, 8, 9, 12-14, 32-33, 35, 43, 45, 46, 48, 52-54, 56, 58, and 76). Entrances and exits into the various sections may also be affected due to transport issues. There is a low potential for residual radioactive contamination in this building. The building has been transferred back to GSA, but based on its history of use, it should be evaluated as part of this closeout.

<u>*Building 211*</u>: This building has functioned as a warehouse used for storage of materials. The building occupies 180 ft. x 960 ft. for a total indoor storage capacity of approximately 172,800 sq. ft., with wood, concrete or concrete block structural framing supporting wood roof decks.

This area is subdivided into four equal 180 ft. by 240 ft. sections. Each section is divided into 79 storage bays (each approximately 25 ft. by 20 ft.). Each section is accessed through four overhead roll-up metal doors. The warehouse is still present, but all contents have been removed.

Historical radioactive material storage is as follows: Section 1 – columbium tantalum and tungsten (in various bays); Section 2 – columbium tantalum and tungsten (in various bays). Entrances and exits into the various sections may also be affected due to transport issues. There is a low potential for residual radioactive contamination in this building.

<u>*Building 212*</u>: This building has functioned as a warehouse used for storage of materials. The building occupies 180 ft. x 960 ft. for a total indoor storage capacity of approximately 172,800 sq. ft., with wood, concrete or concrete block structural framing supporting wood roof decks.

This area is subdivided into four equal 180 ft. by 240 ft. sections. Each section is divided into 79 storage bays (each approximately 25 ft. by 20 ft.). Each section is accessed through four overhead roll-up metal doors. The warehouse is still present, but all contents have been removed.

Historical radioactive material storage is as follows: Section 1 – columbium tantalum (in Bays 11, 31, 37, 41, 51, 61, and 71); and Section 2 – columbium tantalum (in Bays 11, 12, and 21). Entrances and exits into the various sections may also be affected due to transport issues. There is a low potential for residual radioactive contamination in this building.

Building 213: This building has functioned as a warehouse used for storage of materials. The building formerly existed as an open shed of comparable size to the current warehouse; however, the structure was enclosed in the late 1950s. The building occupies 180 ft. x 960 ft. for a total indoor storage capacity of approximately 172,800 sq. ft., with wood, concrete or concrete block structural framing supporting wood roof decks. This area is subdivided into four equal 180 ft. by 240 ft. sections. Each section is divided into 79 storage bays (each approximately 25 ft. by 20 ft.). Each section is accessed through four overhead roll-up metal doors. The warehouse is still present and materials are still stored there; however, the materials are currently in the process of being removed or relocated. The floors are being cleaned and an epoxy sealant/encapsulant is being applied in Section 2, as a means of fixing remnant asbestos contamination.

Historical radioactive material storage is as follows: Section 1 – bastnasite, columbium tantalum, tungsten, and zirconium (in various bays); Section 2 – monazite (in Bays 12, 13, 15, and 16); Section 3 – columbium tantalum (in Bays 11, 19, 21, and 29); Section 4 – columbium tantalum (in Bays 1, 9, 11, 15, 21, 31, 38, 39, 41, 51, 59, 67, 69, 75, 78, and 79) and zirconium (in various bays). Entrances and exits into the various sections may also be affected due to transport issues. There is a low potential for residual radioactive contamination in this building.

Building 214: Building 214 is currently serving as the storage area for all other materials being relocated from other warehouses, awaiting ultimate removal off-site. This building has always functioned as a warehouse used for storage of materials. The building formerly existed as an open shed of comparable size to the current warehouse; however, the structure was enclosed in the late 1950s. The building occupies 180 ft. x 960 ft. for a total indoor storage capacity of approximately 172,800 sq. ft., with wood, concrete or concrete block structural framing supporting wood roof decks. This area is subdivided into four equal 180 ft. by 240 ft. sections. Each section is divided into 79 storage bays (each approximately 25 ft. by 20 ft.). Each section is accessed through four overhead roll-up metal doors.

The floors are being cleaned and an epoxy sealant/encapsulant is being applied in all sections, as a means of protecting against asbestos and mercury contamination. Historical radioactive material storage is as follows: Section 1 – bastnasite and tungsten (In various bays); Section 2 – columbium tantalum, monazite, and tungsten (in various bays); Section 3 – bastnasite (in Bay 3), columbium tantalum (in Bays 9, 13-16, 17, 18, 26-28, 34, 37-38, 41-44, and 77), rare earth sodium sulfate (in Bays 3-6, 8, 12, 13, 15-18, 22-28, 31-33, 35-38, 48, 56, 57, and 75), and tungsten (in Bay 36); Section 4 – columbium tantalum (in Bays 41-43, 45, 51, 59, 61, 69, and 75-79) and tungsten (in various bays). Entrances and exits into the various sections may also be affected due to transport issues. There is a low potential for residual radioactive contamination in this building.

Building 215: This building has functioned as a warehouse used for storage of materials. The building formerly existed as an open shed of comparable size to the current warehouse; however, the structure was enclosed in the late 1950s. The building occupies 180 ft. x 960 ft. for a total indoor storage capacity of approximately 172,800 sq. ft., with wood; concrete or concrete block structural framing supporting wood roof decks. This area is subdivided into four equal 180 ft. by 240 ft. sections. Each section is divided into 79 storage bays (each approximately 25 ft. by 20 ft.). Each section is accessed through four overhead roll-up metal doors. The warehouse is still present, but all contents have been removed. The warehouse had contained a bin for storage of acid-grade fluorspar (containing natural radioactivity, although not enough to be included on the license). The fluorspar has been removed, but wind-blown remnants remain on floors, beams, walls, and rafters. Historical radioactive material storage is as follows: Section 1 – bastnasite (in Bays 2-4, 12, and 13), monazite (in Bays 11, 22, 23, 25-29, 34-37, 41, 44, and 45), and Rare Earth Sodium Sulfate (In Bays 43, 62, and 73-75); Section 2 –Rare Earth Sodium Sulfate (in Bays 36, 41, 42, 46, 52-54, 62, and 63); and Section 4 – bastnasite (in Bays 15, 19, 29, 51-56, 61-65, 68, and 71-79). Entrances and exits into the various sections may also be affected due to transport issues. There is a low potential for residual radioactive contamination in this building.

Appendix D provides pictures and drawings of buildings and areas suspected to contain potential contamination.

6.4 Summary of Potential Contaminated Media

Potential contaminated media include building interiors and surfaces, including potentially contaminated floors, beams, walls, and rafters. Potential contaminated media also includes footprints of demolished buildings and footprints of former storage piles. Airborne radon in buildings/areas and groundwater is also considered, although these radioactive constituents may be entirely due to naturally occurring radioactivity in the soil and rock formations underlying the Site. In 2001, a radon study was performed throughout five warehouses, one office, and one guardhouse at New Haven Depot buildings in which detectors were deployed for 89 days. All samples were analyzed and none showed levels above the EPA recommended action level of 4 pCi/L (Smith, 2005).

6.5 Criteria for License Termination

Unrestricted use criteria and methodology considerations will be developed as part of the DQO process during subsequent phases of this investigation. The following technical documents are used by both private contractors and governmental agencies as bases for decommissioning and license termination in order to release buildings that have radiological contamination:

- "Radiological Criteria for License Termination," 10 CFR 20.1402, (NRC, 1997);
- NUREG-1757;
- NUREG-5512;
- U.S. Army Regulation, AR-11-9, "The Army Radiation Safety Program" (USDOA, 1999);

- American National Standards Institute, ANSI 13.12-1999, "Surface and Volume Radioactivity, Standards for Clearance" (ANSI, 1999);
- MARSSIM (USEPA, 2000);
- Soil Screening Guidance for Radionuclides: User's Guide (EPA, 1996)

7.0 CONCLUSIONS

This HSA summarizes the operating history, survey results, and potential pathways for radioactive and hazardous material release for New Haven Depot. Historical information reviewed, as well as information collected from personnel interviews, was significant, resulting in the ability to establish areas and structures considered Impacted, as defined in MARSSIM (USEPA, 2000). Potentially Impacted outdoor areas (total of 6) and buildings (total of 10) present at the New Haven Depot are summarized in Table 7-1 and Table 7-2. Additionally, the information obtained concerning contamination potential has allowed a preliminary determination of MARSSIM classification (Class 1, 2 or 3). This preliminary determination is also provided in Table 7-1 and Table 7-2. Impacted areas/buildings are also shown in Figure 6-1.

Based on currently available information, there are additional surveys and samples that will need to be collected for a complete characterization of radiological contamination at New Haven Depot. Detailed survey design is currently in preparation.

TABLE 7-1: PRELIMINARY FSS CLASSIFICATION OF NEW HAVEN DEPOT IMPACTED OUTDOOR AREAS

Location	Preliminary MARSSIM Classification
Area 7A	Class 1
Buffer Area around Area 7A	Class 2
Rail Scale (Weigh Station Area)	Class 2
Entry Road and Paved Road to Rail Scale	Class 3
Railroad Tracks Used for Shrink-Wrapping	Class 3
Railroad Tracks Used for Storage or Transport	Class 3

TABLE 7-2: PRELIMINARY FSS CLASSIFICATION OF NEW HAVEN DEPOT IMPACTED BUILDINGS

Building (or Footprint or Former Structure)		Preliminary MARSSIM Classification
136		Class 3
141		Class 3
145 (Footprint)		Class 3
146		Class 3
210	Section 1	Class 3
	Section 2	Class 3
	Section 3	Class 3
	Section 4: Bays 2-5, 8, 9, 12-14, 32-33, 35, 43, 45, 46, 48, 52-54, 56, 58, and 76	Class 3
211	Section 1	Class 3
	Section 2	Class 3
212	Section 1: Bays 11, 31, 37, 41, 51, 61, and 71	Class 3
	Section 2: Bays 11, 12, and 21	Class 3
213	Section 1	Class 3
	Section 2: Bays 12, 13, 15, and 16	Class 3
	Section 3: Bays 11, 19, 21, and 29	Class 3
	Section 4	Class 3
214	Section 1	Class 3
	Section 2	Class 3
	Section 3: Bays 3-6, 8, 9, 12-18, 22-28, 31-34, 36-38, 41-44, 48, 56, 57, 75, and 77	Class 3
	Section 4	Class 3
215	Section 1: Bays 2-4, 11, 12, 13, 22, 23, 25-29, 34-37, 41, 43, 44, 45, 62, and 73-75	Class 3
	Section 2: Bays 36, 41, 42, 46, 52-54, 62, and 63	Class 3
	Section 4: Bays 15, 19, 29, 51-56, 61-65, 68, and 71-79	Class 3

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APPENDIX A

MARSSIM, Multi-Agency Radiation Survey and Site Investigation Manual, NUREG-1575 Rev. 1, EPA 402-R-97-016 Rev. 1, DOE/EH-0624, Rev. 1

(Provided on Accompanying Compact Disc)

APPENDIX B

NRC License STC-133

(Provided on Accompanying Compact Disc)

APPENDIX C

PERSONNEL INTERVIEW FORMS

(Provided on Accompanying Compact Disc)

APPENDIX D

PHOTO DOCUMENTATION AND DRAWINGS

(Provided on Accompanying Compact Disc)

APPENDIX E

ELECTRONIC DOCUMENT LIBRARY

(Provided on Accompanying Compact Disc)