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NUCLEAR METALS, INC.

15 May 1994

United States Nuclear Regulatory Commission
Region I
475 Allendale Road
King of Prussia, PA 19406

Attention: Mr. John Kinneman, Chief
Site Decommissioning Section
Division of Radiation Safety and Safeguards

Reference: Mail Control Nos. 117006 and 113010

Dear Mr. Kinneman:

Subject: NRC letter dated 2 March 1994
NMI letter dated 15 April 1994

In response to your recent letter to us concerning decommissioning financial assurance, we are providing two copies of the document "Decommissioning Cost Estimate" for NMI facilities located in Concord, MA. This report has been prepared by our consultants in accordance with the guidance contained in Regulatory Guide 3.66 "Standard Format and Content of Financial Assurance Mechanisms Required for Decommissioning Under 10 CFR Parts 30,40,70 and 72". We have marked both copies Company Private and request that all information contained within this document to be withheld from public disclosure based on our application (with accompanying affidavit) dated 15 April 1994.

We indicated in our 15 April 1994 letter to you that we would address your questions regarding the Standby Trust Agreement (STA) when we submit our cost estimate. The majority of items in the STA which you have requested modification (items 2 a-f in NRC letter dated 2 March 1994) have required us to go back to the financial institution which is providing the letter of credit. We are currently working with the financial institution and expect to provide a revised STA a soon as the changes are made.

NMI is appreciative of the cooperation extended by the regional representatives. Please address any questions to the undersigned. Thank you.

117006
MAY 16 1994

2229 Main Street, Concord, Massachusetts 01742 (508) 369-5410

Enclosure/fv

Sincerely,

Frank J. Vumbaco

Frank J. Vumbaco
Vice President, Health and Safety

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DECOMMISSIONING COST ESTIMATE

Prepared For:

NUCLEAR METALS, INC.

Concord, Massachusetts

May 13, 1994

ENCLOSURES TRANSMITTED HEREWITH CONTAIN 10 CFR 2.790 INFORMATION

Prepared By:

ACI | Applied Consultants, Inc.

165 New Boston Street-Suite 279, Woburn, Massachusetts 01801

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NUCLEAR METALS, INC

CONCORD, MASSACHUSETTS

DECOMMISSIONING COST ESTIMATE

PREPARED FOR:

Nuclear Metals, Inc.
Concord, Massachusetts

PREPARED BY:

Applied Consultants, Inc.
Woburn, Massachusetts

May, 1994
Project No. 1071

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1.0 DECOMMISSIONING INFORMATION

1.1 Scope

This Decommissioning cost estimate is provided in support of the Decommissioning Funding Plan submitted in accordance with 10 CFR 40.36. This Estimate was developed using the guidance set forth in Regulatory Guide 3.66 "Standard Format and Content of Financial Assurance Mechanisms Required for Decommissioning Under 10 CFR Parts 30, 40, 70, and 72". This Estimate provides the following information: Site Overview, Decommissioning Criteria and Activities, Decommissioning Cost Estimate, and Cost Estimate Adjustment Schedule.

1.2 Site Overview

NMI today operates in an approximately 150,000 square foot facility located on 46 acres of land located at 2229 Main Street (Route 62) in Concord, Massachusetts. Current facilities and structures involved in depleted uranium processing include:

- A foundry containing ten (10) vacuum induction melting furnaces specifically designed for the melting, alloying and casting of depleted uranium.
- Billet preparation equipment supporting a 1400-ton horizontal extrusion press.
- A 250-ton vertical hydraulic forming press.
- A mezzanine area devoted primarily to the manufacture of depleted uranium penetrators. This area contains an automatic bar shear, two vacuum quench furnaces, inert atmosphere furnaces, vacuum furnaces, a pickling area, and two depleted uranium machining lines.
- Small scale vacuum heat treat furnaces designed for high vacuum heating and water quenching. These furnaces are a smaller version of several production furnaces which are used for DU penetrator production.
- Production CNC lathes for the machining of DU penetrators.
- A general purpose machine shop used for the performance of machining operations in support of production requirements.
- A quality co[illegible] laboratory for mechanical testing, non-destructive testing and dimensi[illegible] spection.

- A metallographic laboratory.
- Buildings devoted to receiving, packaging and shipment of product, raw materials and all contaminated or non-recyclable scrap for land burial.
- A dedicated, stand alone, facility for the production of DU liners. This facility has self contained heat treating, machining, inspection and storage.

The following is a detailed description of each of the major buildings at the NMI site as well as a description of processes within each that involve the use of DU.

1.2.1 Building A

The building is a two story structure measuring 216 x 80 feet and 26 feet high with a foot print of 17,250 square feet and a total gross floor area of 34,000 square feet. The building was constructed in 1958 and is framed with steel columns supported on buried concrete footings tied together at the first floor and roof line with steel joists and fabricated metal beams. There is also a 12 inch concrete block carrying wall which is supported on a footing and runs the full 216 foot length of the building. The slab on grade is 6 inch concrete capable of supporting approximately 800 pounds per square foot. The second floor is poured 3 inch concrete on corrugated metal decking supported by metal bar joists and capable of supporting 125 pounds per square foot. The side walls are supported on footings and a 3 foot above grade foundation wall faced with red brick. Above this is a row of metal framed glass windows separated from a similar second floor row of windows by painted solid panels. Similar panels span the space between the upper windows and the roof. The roof is a standard built-up construction consisting of insulation supported on metal decking and upon which are multiple plies of roofing felts which have been mopped in with tar and topped with bank run gravel.

The building interior was and is still used for office space and laboratory work although the current proportion of office space is higher than it had been. Interior corridor walls are concrete block painted with a high gloss paint designed to minimize contamination while the interior partitions are predominantly of wooden construction or dry wall. All surfaces are painted. The building is fully provided with a sprinkler system for fire protection Heat is provided by perimeter base board forced hot water and heated air. Lighting is fluorescent throughout. The floors are covered with tile and the ceilings in the office areas are hung acoustical 2 x · ˜ ot panels

Processes

Machining and Quality Control

One room is devoted to machining, coating and inspection of DU liners. Quality control performs i process and final inspection of complex shaped parts and DU liners using a coordinate measuring machine located in the DU liner room.

Research and Development

Research and development and analytical chemistry procedures are ongoing in laboratories located within Building A.

1.2.2 Building B

The building is a two story structure measuring 97 x 60 feet and 26 feet high with a foot print of 5,800 square feet and a total gross floor area of 11,130 square feet and was constructed in 1958. The outer walls and one of the two corridor walls which run the length of the building are bearing walls constructed of concrete block supported on buried poured concrete foundations. Metal bar joists span between these walls to form the structural support for the second floor and the roof. The slab on grade is 6 inch concrete capable of supporting approximately 800 pounds per square foot. The second floor is poured 3 inch concrete on corrugated metal decking supported by metal bar joists and capable of supporting 100 pounds per square foot. The outer side walls are faced with red brick and have metal formed windows at specific locations The roof is a standard built-up construction consisting of insulation supported on metal decking and upon which are multiple plies of roofing felts which have been mopped in with tar and topped with bank run gravel.

The building contains the boiler room which services the entire complex, electrical switch room, telephone entrance room, toilets and locker rooms and the company clinic. Most interior walls are painted concrete block with some dry wall construction. The building is fully provided with a sprinkler system for fire protection. Heat is provided by perimeter base board forced hot water and heated air. Lighting is fluorescent throughout.

Processes

This building is completely unrestricted with no activities related to DU processing.

1.2.3 Building C

The building is a high bay one story building with a mezzanine at mid height. The building measures 200 x 130 feet and is 26 feet high with a foot print of 26,000 square feet. The mezzanine extends the 200 foot length and covers 50 feet of the building's 130 foot width This building was built along with Buildings A and B in 1958 and is used for manufacturing functions. The style of construction is steel columns supported on buried footings and tied together at the roof elevation with fabricated open beams. The columns have additional lateral support provided with mid height fabricated girders running in the north/south direction. The mezzanine deck and roof structure are supported by metal bar joists which span the beams The slab on grade is poured 6 inch thick concrete which is capable of supporting 800 pounds per square foot. The mezzanine is poured concrete on metal decking, supported by the bar joists and has a load carrying capacity of 200 pounds per square foot which in some areas has been reduced to as low as 80 because of other dead loads in the immediate area The east wall consists of a 3 foot block foundation wall which is faced with red brick and metal-framed windows and solid panels above. The exposed side of the west wall and some of the south wall are of similar construction and with the remaining walls abutting other buildings All interior wall surfaces and building steel are painted. The roof is a standard built-up construction consisting of insulation supported on metal decking and upon which are multiple plies of roofing felts which have been mopped in with tar and topped with bank run gravel.

The building is fully provided with sprinklers for fire protection. Lighting is fluorescent lamp hung at the underside of the bar joists and heat is provided by steam heated unit heaters and steam heated make-up air.

Processes

Foundry Operations-Melting and Casting

A DU melt typically consists of one (1) DU derby weighing approximately 600 kg, approximately 200 kg depleted uranium recycle and titanium metal sponge. As an option a melt charge may consist of 100% approved DU recycle. The charge is melted under vacuum in a zirconia coated graphite crucible. The coating prevents reaction between the molten uranium and graphite. Following a hold at 1400° C to uniformly distribute the titanium in the alloy, the melt is poured into yttria coated molds. One melt produces nine ingots. Upon removal from the molds, ingots are inspected for surface quality and length.

Major equipment used in this process includes induction furnaces, cleaning stations and various sawing equipment.

Billet Assembly

Ingots are assembled into air tight copper cans and evacuated prior to extrusion. Each ingot is checked for surface condition, ingot to can fit and melt lot identification. The ingots are then slipped into lengths of copper tube blocked at one end. A copper end plate equipped with an evacuation tube is welded onto the open end. The evacuation tube is then connected to a vacuum system and each billet assembly is evacuated. The evacuation tube is then crimp sealed to form a leak tight assembly.

Extrusion Operations

Extrusions are accomplished in a 1400 ton Loewy extrusion press. Billets are loaded into ovens and maintained at 600° C for one hour minimum prior to extrusion, dies and liner assemblies are preheated to 370° C The die is lubricated and the billets are pushed though the die at a constant ram speed Extruded bar diameters play a critical role in yield and machining scrap generation. Immediately upon exiting the extrusion press, each rod is automatically transferred to a forced air/water mist cooling bed. Rod stock exiting this system is cool to the touch and distortion is kept to a minimum.

Major equipment used in this process includes a 1400 ton press, billet and tooling furnaces and a bar handling system.

1.2.4 Building D

The building is a high bay one story building which measures 280 x 160 feet and is 26 feet high. The building was constructed in 1978 and occupies a footprint of 44,800 square feet. It is framed with steel columns supported on buried concrete footings at 40 foot column spacings in either direction. The column tops are framed with solid metal and fabricated open metal girders. These girders are spanned with bar joists to form the roof structure. The slab on grade is 6 inch poured concrete with standard construction and isolation joints at the 40 foot column lines and control joints provided at mid column distances All floor joints were filled with joint filler prior to occupancy. The slab carrying capacity is 800 pounds per square foot. The walls are concrete block which are painted on the inner surface and faced on the outer surface with red brick along with insulated metal wall panels which predominate above the 8 foot elevation Some three foot wide vertical windows are incorporated into the wall structure. The roof is a standard built-up construction consisting of insulation supported on metal decking and upon which are multiple plies of roofing felts which have been mopped in with asphalt and topped with bank run gravel. Heating is provided by steam heated unit heaters and steam heated make-up air units. Lighting is provided by fluorescent lamps hung close to the underside of the bar joists.

The building is used for manufacturing purposes and is predominantly open spaced, however, there are some interior walls which are painted concrete block Contained within the building is a suite of preconstructed offices located on an elevated platform providing about 1500 square feet of additional space in support of manufacturing. It is constructed of smooth plastic coated wall panels, aluminum framed windows, tiled floor and hung ceiling.

Processes

Copper Removal/Pickling Operation

The copper sheath on the extruded bars is removed by acid digestion in a sulfuric acid-hydrogen peroxide solution. NMI has installed this closed loop system as part of the holding basin remediation effort. The acid solution is pumped to Building E where it is regenerated by electrowinning of the copper and precipitation of uranium as UO_4.

The closed loop pickling system is the only major component used in this operation.

Long Rod Straightening

After removal of the copper sheath, extruded rods are straightened using a Sutton two roll straightener to facilitate subsequent cutting operations. The straightener guides and rolls are set such that the workpiece transits along the "pass line" and that proper deflection is provided to achieve the desired straightened end product. The rod stock is cut into blanks of appropriate length by sawing. After an initial crop to remove front extrusion imperfections, a front chemistry sample is cut and identified. Blanks are cut and identified in sequence until finally no material remains of sufficient length to yield a blank. A rear chemistry sample is then cut and identified.

The major piece of equipment used in this process is a Sutton Rotary Straightener

Outgas/Solution Heat Treatment

Solution heat treatment of DU blanks is carried out in a multi-step operation:

1. Outgas
2. Rotary Straighten
3. Solution/Quench

4. Rotary Straighten

Blanks up to 32 inches in length can be vacuum outgassed in one of NMI's AVS vacuum solution heat treat furnaces which has been modified for this purpose. The blanks are heated to 850° C under vacuum and held for sufficient time to ensure a hydrogen content of less than one part per million. The blanks are then cooled under vacuum into the alpha temperature range and then rapidly cooled to ambient temperature.

Some distortion occurs during outgassing. To facilitate the next induction heat treat step, each blank is rotary straightened under minimal stress conditions. Induction solution heat treatment is accomplished in NMI's vertical induction unit. Blanks are fed at a controlled rate though an induction coil where they are heated to a surface temperature in air of 950 - 1000° C. The blanks are then progressively quenched into agitated water. Additionally an automated horizontal induction furnace is in place which will ensure a continuous flow of parts as production quantities increase. Having been quenched into water, some distortion of the blanks will have occurred. All blanks are again rotary straightened under constant predetermined parameters.

Major equipment used in this process includes outgassing furnaces, a rotary straightener, degreaser and horizontal induction unit

Aging

All DU blanks are aged in NMI's recirculating inert gas furnaces. Time-temperature parameters are selected to achieve the mechanical properties required.

Two aging furnaces are used in this operation.

Premachining

Finish machining requires a precision premachined blank with a uniform diameter and flat ends perpendicular to the bar axis. These requirements are met by centerless grinding to the desired finished diameter. The ends are faced flat and perpendicular to the bar axis.

Finish Machining

DU penetrator blanks are turned to their final configuration on CNC lathes. All feeds, speeds and depths of cut are commensurate with production requirements.

Quality Control

Quality Control inspectors support large caliber DU penetrator programs in Building D through a number of processes including selection of mechanical test bars after aging runs, laser marking of DU bars and finished penetrators, in-process measurement and inspection of DU bars, and final inspection of finished penetrators.

Equipment utilized during QC operations include a laser marker, various comparators, gauges, run-out fixtures and ancillary support equipment.

1.2.5 Building E

The building is a high bay one story building which measures 200 x 223 feet and is 26 feet high. The building was constructed in 1984 and occupies a foot print of 39,300 square feet and is in the configuration of a blunted "L". It is framed with steel columns supported on buried concrete footings at 40 X 30 foot column spacing. The column tops are framed with solid metal girders. These girders are spanned with bar joists to form the roof structure. The slab on grade is 6 inch poured concrete with standard construction and isolation joints at the column lines and control joints provided at mid column distances. All floor joints were filled with joint filler prior to occupancy. The slab carrying capacity is 800 pounds per square foot. The walls are concrete block which are painted on the inner surface and faced on the outer surface with red brick along with insulated metal wall panels which predominate above the 8 foot elevation. Some three foot wide vertical windows are incorporated into the wall structure The roof is a standard built-up construction consisting of insulation supported on metal decking and upon which are multiple plies of roofing felts which have been mopped in with asphalt and topped with bank run gravel. Heating is provided by two filtered and steam heated recirculation and make-up air units through ducting distributed around the perimeter of the building. Lighting is provided by fluorescent lamps hung close to the under side of the roof bar joists. The building also incorporates a mechanical penthouse at a mezzanine level which houses the heating units and some process filtered vents.

The building is used for accessory uses in support of manufacturing and is predominantly open spaced, however, there are some interior walls which are painted concrete block. Contained within the building is a two story suite of preconstructed offices and laboratory space occupying about 3600 square feet of floor space. It is constructed of smooth plastic coated wall panels, aluminum framed windows, tiled floor and hung ceiling. It is used by the Quality Control department. The building also houses toilets and locker rooms constructed of painted concrete block.

__Processes__

Closed Loop Pickling, Resource Recovery Area

Copper-clad is removed from extruded uranium rod stock by etching in a 5% (by volume) sulfuric acid solution using hydrogen peroxide as the oxidant in Building D. After the copper is removed from the rod stock, the solution is transferred to electrowinning in Building E for electrolytic recovery of copper and con-current regeneration of sulfuric acid value. The acid solution is then recycled back for more copper removal after addition of hydrogen peroxide. Periodically, the copper bearing solution is partially neutralized with lime and then uranium is precipitated with hydrogen peroxide to remove residual uranium The slurry, containing gypsum and precipitated uranyl peroxide, is separated by filtration and then disposed of in an approved land burial site. The filtrate, containing the copper, is transferred to electrowinning for copper recovery and recycle

Waste Treatment and Recovery.

Waste liquors, which consist of floor wash water, steam cleaning water, Closed Loop Pickling rinse water and other waste process waters, are collected in two tanks for storage. The waste waters are then transferred to the Waste Water Treatment Area where lime and acid are added to agglomerate residual oils and adjust the pH of the solution to 5. The resultant slurry is allowed to thicken and is then filtered to remove the solids. The liquid is then oxidized with hydrogen peroxide and neutralized to above pH 7 (between pH 7 and 7.5). The neutralized liquor is then evaporated in the Pulse Combustion Dryer, where the steam produced is exhausted to atmosphere after solids separation and HEPA filtration. The solids (including the filter cake) are collected and packaged for disposal in an approved burial site.

Acid Splitting

Oil bearing aqueous liquors, such as machine coolant and steam cleaning water, are treated by adding sulfuric acid and aluminum sulfate. The liquor is then allowed to settle and the oil fraction, which floats to the surface, is removed. The liquor is neutralized to pH 8.5 to allow the aluminum to react to form aluminum hydroxide which agglomerates any residual oil remaining in the liquor. After settling, the aqueous phase is removed and the agglomerated solids are removed. The oils and agglomerated solids are then transferred to Waste Processing for solidification and subsequent disposal.

Coolant Recovery

Machine coolant is treated to remove tramp oil and solids by allowing it to settle and then separating the oil and fine solids by centrifuge. The oil is transferred to Acid Splitting and the solids transferred to Waste Processing for disposal. The treated coolant is monitored to ensure high quality and additions of coolant concentrated pH adjusters and other additives are made as required. The coolant is then recycled back to machining.

Quality Control

The Quality Control laboratory, calibration lab, Bond Room holding area, final inspection, and offices are located in Building E. The first floor of the QC lab contains inspection equipment for powder analyses, hardness testing, tensile testing, compression testing, dye penetrant testing, radiography, helium leak

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testing and all form of final inspection. Outside of the main QC lab are equipment for performing ultrasonic inspection and hardness testing of DU bars. The QC calibration lab is contained in an environmentally controlled enclosure. Adjacent to the calibration lab is a fenced in area for the QC Bond Room, where non-conforming material is temporarily stored. This area is also used for refurbishing DU aircraft counterweights.

Waste Processing

Decontamination systems and Waste Processing systems are located in Building E. Decontamination systems include a water blasting booth (composed of a skid mounted 20,000 psig, 100HP unit, with walk-in booth 16' L x 12' W x 8' H) for concrete surface cleaning and cutting, surface coating removal, and with abrasive slurry, cutting of up to 2 inch thick .etal plate. Other systems include a detergent cleaning tank (4' L x 4' W x 3' H, 1/2 HP centrifugal pump with spray bars, locally fabricated, for less aggressive cleaning of small parts), an acid etching tank (120 gallon capacity, used with H_2SO_4 and H_2O_2 solution, locally fabricated, for aggressive cleaning of metal objects, inaccessible surfaces, e.g., threaded holes, etc.), a steam cleaner (for light cleaning, oil and grease removal, etc.), and a portable scarifyer (for light cleaning of concrete slabs and asphalt). Other Waste Processing equipment includes a cutting and grinding booth, 8' L x 8' W x 9' H, fully ventilated to HEPA filtration system, locally fabricated. A band saw and acetylene cutting torch are also utilized for initial preparation and sizing of scrap materials. The dry active waste is processed utilizing a dual drive shredder and various compactors. Machine coolants and oils are processed by use of a solidification pan type mixer with ventilation at the reaction chamber and a five gallon capacity. The processing of pyrophorics via encapsulation is accomplished utilizing a ring mill pulverizer (with spray bars, reservoir and pumping), a cement mixer (with 40 cubic foot capacity), a skip hoist, and dust control unit. The encapsulation line also utilizes an unbagging station (for opening sand and cement bags and cement molds, cylindrical split-form type designed by NMI) as well as a cement vibrator and portable cement mixer In addition to standard waste packaging techniques this area also houses a bulk bag filling station with dust control venting.

1.2.6 Butler Buildings

There are four pre-engineered insulated metal buildings used for various support purposes on the NMI site. These "Butler Buildings", numbered 1 through 4 occupy footprints of 1800, 1800, 4800, and 2400 square feet, respectively. These structures are all slab on grade.

Processes

Butler # 3 is used for storage of DU components. Butlers #1, 2 and 4 are unrestricted and used for non-DU related purposes, although Butler #1 had previously been used for packing and storage of DU components.

1.2.7 Tank House

This structure, constructed in 1958 is a two level, slab on grade, 1200 square foot wooden building with asphalt shingles and a sloped roof.

Processes

The tank house is used for receipt of contact process water which is received and then gravity fed to two 3700 gallon, dyked wooden cypress tanks. This process contact water is ultimately pumped to the resource recovery unit in Building E.

1.2.8 Process Exhausts

Uranium process exhaust units are generally of a typical configuration at NMI. All except one unit are located on the building roofs at a roof elevation of about 26 feet above grade. Typically, the top of the exhaust stacks are about 15 feet above the roof line. The units are configured with an inlet duct in a size range from 10 to 30 inches which extends through the roof and to the filter housing. The housings range in size from approximately 2x4x4 feet to 6x10x10 feet and are fabricated from painted sheet metal with welded or caulked and fastened seams. The housings contain HEPA filters for emission control and may contain pre-filters for extending the life of HEPA filters. A short duct length connects the filter housing to the exhaust blower which maintains the housing under negative pressure. The blower discharges the filtered air to the exhaust duct which incorporates a noise silencer that is generally in the size range of 1.5x2 to 3 feet square x 5 to 10 feet long. They are constructed of galvanized sheet metal and fiberglass with internal longitudinal channels.

Building A has three such process vent units on its roof. One of the three although does not incorporate a filter housing because it services laboratory hoods which are infrequently used.

Building B has one process vent system which services the discharge from the central house vacuum system.

Building C has nine such process vent units on its roof. All are filtered with the exception of the ones servicing the graphite room, mezzanine pickle area and 1400 ton press, respectively.

Building D has twelve exhaust units. The one that services the pickle area is unfiltered.

Building E has two exhaust units located within a mechanical penthouse.

One process vent system is located at ground level on a platform in a courtyard to the south of Building B.

There are also a total of 24 general area exhaust fans servicing controlled areas which are not included in the above process vent listing. Twenty of them do not contain HEPA filters and are generally of a dome configuration.

Lastly, there are about 27 makeup air supply units located on various roofs which service controlled areas. They are considered free of contamination by virtue of the fact that they provide fresh make-up air to the buildings.

1.2.9 Septic Systems

NMI has two underground septic systems which service the entire facility The first system was installed in 1958 when Buildings A, B and C were constructed

The second system was installed and put into use in 1984 when Building E was completed to service the toilet and locker room areas in that building.

The first system receives toilet, urinal and hand wash sink water from Buildings A, B and C into its septic tank which is located approximately 40 feet in front of (east of) Building A. The tank is constructed of concrete and has a capacity of 12,500 gallons. After digestion the liquid flows into a siphon chamber which automatically and periodically discharges its contents down an 8 inch vitrified clay pipe to the distribution box and leaching field located approximately 120 feet to the south of Building A. The leach field measures 104 x 84 feet and is composed of several 4 inch vitrified clay pipes which rest on a bed of 3/4 inch bank run gravel to distribute the liquid. The entire septic system is below ground. Based on current standards this system can service approximately 334 people.

The second system which services Building E has its septic tank located about 100 feet north east of Building D under a parking area. This concrete tank also is 12,500 gallons in capacity and contains a siphon chamber which discharges the liquid through 6 inch PVC piping to two sets of two leaching galleries made of concrete located about 150 feet further from Building D. These galleries occupy an area of approximately 40 x 200 feet. As with the septic tank, the leaching galleries are located below a parking area. This system was designed to service 577 people.

1.2.10 General Radiological Overview

A detailed site radiological characterization has not been performed at NMI as the facility remains in its operational phase. Such a study will be conducted prior to submission of a final Decommissioning Plan when termination of the NRC license is imminent. Prior to submission of the final NMI Decommissioning Plan a Site Characterization Plan will be developed. This Plan will augment the historical description, physical parameters of the site and the methods of radiological characterization presented herein. The major contribution of the conduct of site characterization planning and implementation will be the determination of the extent and concentration of contamination at or near the time of decommissioning. NMI will submit the Site Characterization Plan to the NRC for review and approval. Following NRC approval, NMI will implement the characterization and results will act as the basis for the implementation of decommissioning activities

The following information on radiological status is based on Health/Safety Department records and various environmental studies which have been conducted over the years.

Buildings A and B

These areas are unrestricted and support primarily administrative and office use. In addition, there are several laboratories and quality control functions. Routine Health/Safety surveys in these areas indicate the potential for minor contamination in some areas including the DU liner room and labs. Contamination detected in these areas ranges from none to about 5000 dpm/100cm^2 beta-gamma and 1500 dpm/100cm^2 alpha, for fixed, and 350 dpm/100cm^2 beta-gamma and 80 dpm/100cm^2 alpha, for removable.

Building C

Building C houses foundry and extrusion operations at NMI and it is within this building that the most significant levels of radiological contamination associated with DU processing operations exist. Most of this building is a restricted zone and contamination levels are routinely monitored to ensure compliance with license conditions. Contamination is most prevalent on floor and equipment surfaces in the foundry area and ranges from 80,000-1,200,000 dpm/100cm^2 beta-gamma and 20,000-250,000 dpm/100cm^2 alpha, for fixed, and 1000-20,000 dpm/100cm^2 beta-gamma and 50-1000 dpm/100cm^2 alpha, for removable. Isolated hot spots with contamination levels generally up to 2,000,000 dpm/100cm^2 beta-gamma, for fixed and 95,000 dpm/100cm^2 beta-gamma for removable also exist. Lesser contamination is evident in the remainder of the building and on upper walls, ceilings, and overhead piping and ductwork. Contamination levels in these areas range from 5000-25,000 dpm/100cm^2 beta-gamma and 1500-7000 dpm/100cm^2 alpha, for fixed and 200-2000 dpm/100cm^2 beta-gamma and 0-500 dpm/100cm^2 alpha, for removable.

Building D

Levels of radioactivity in Building D are generally in the range of 10,000- 120,000 dpm/100cm^2 beta-gamma and 2000-30,000 dpm/100cm^2 alpha, for fixed, and

100-3,000 dpm/100cm^2 beta-gamma and 100-500 dpm/100cm^2 alpha, for removable in CNC machining and Fabrication process areas.

Building E

Levels of contamination in Building E processing areas including Waste Processing and Quality Control are typically on the same order of magnitude, although slightly lower, than those within Building D described above.

Tank House and Butler Buildings

These areas have low levels of contamination ranging from 1000-8000 dpm/100cm^2 beta-gamma and 200-2000 dpm/100cm^2 alpha, for fixed, and 0-100 dpm/100cm^2 beta-gamma and 0-30 dpm/100cm^2 alpha, for removable..

Environmental

In 1982, an Environmental Survey of Nuclear Metals, Inc. was conducted by Oak Ridge Associated Universities Radiological Site Assessment Program. Over 40 measurements of uranium in soil from the site and at least 19 off the site, many of which were in close proximity to the site, were made. The study concluded that NMI's measurements of radioactive materials in effluents were adequate and that there is "no evidence that significant levels of U-238 have accumulated in the environment around NMI." In 1985, the U.S. Department of Energy's Remote Sensing Laboratory run by EG&G Energy Measurements, Inc. conducted an Aerial Radiological Survey of the NMI facility and surrounding area. That survey detected only the authorized radioactive materials present at the site. The conclusions drawn above are supported by data collected over NMI's operational life through in-house environmental health physics surveillance.

NMI site hydrogeology was characterized most recently by Goldberg-Zoino & Associates, Inc. in 1987. Both annual and semi annual sampling rounds continue to occur. Uranium concentrations in samples collected during the 1991-1992 sampling year were generally below 1 microgram per liter (ug/l) or part per billion (ppb). This data is representative of samples from most of the wells upgradient of the NMI buildings and Holding Basin, and many of the wells downgradient of the buildings. In general, the results were not appreciably different than that of recent years and are considered to be within naturally occurring background ranges.

Uranium was detected at Holding Basin wells HB-7 (71 ug/l in October, 1991 and 42ug/l in April/May, 1992), and HB-8 (112 ug/l in October and 85 ug/l in April/May). Uranium was also detected in the septic tanks (4.0 ug/l in October and 3.0 ug/l in April/May at Septic Tank 1; 3.0 ug/l in October and 13 ug/l in April/May at Septic Tank 2), and in Supply Well 2A (14 and 13 ug/l in October and April/May, respectively). No thorium-232 was detected in any groundwater samples.

Lastly, NMI throughout its history has not disposed of licensed material under the provisions of 10 CFR 20.304 and therefore no on-site burials have occurred.

Figure 1-1 depicts known or potentially contaminated building areas at NMI which are shaded for reference. It should also be noted that due to the nature of past and present operations and the residual surface contamination created by said operations within the facility, unusual incidents which may have occurred during operational life of the facility have not resulted in the potential to further impact the health and safety aspects of the decommissioning project.

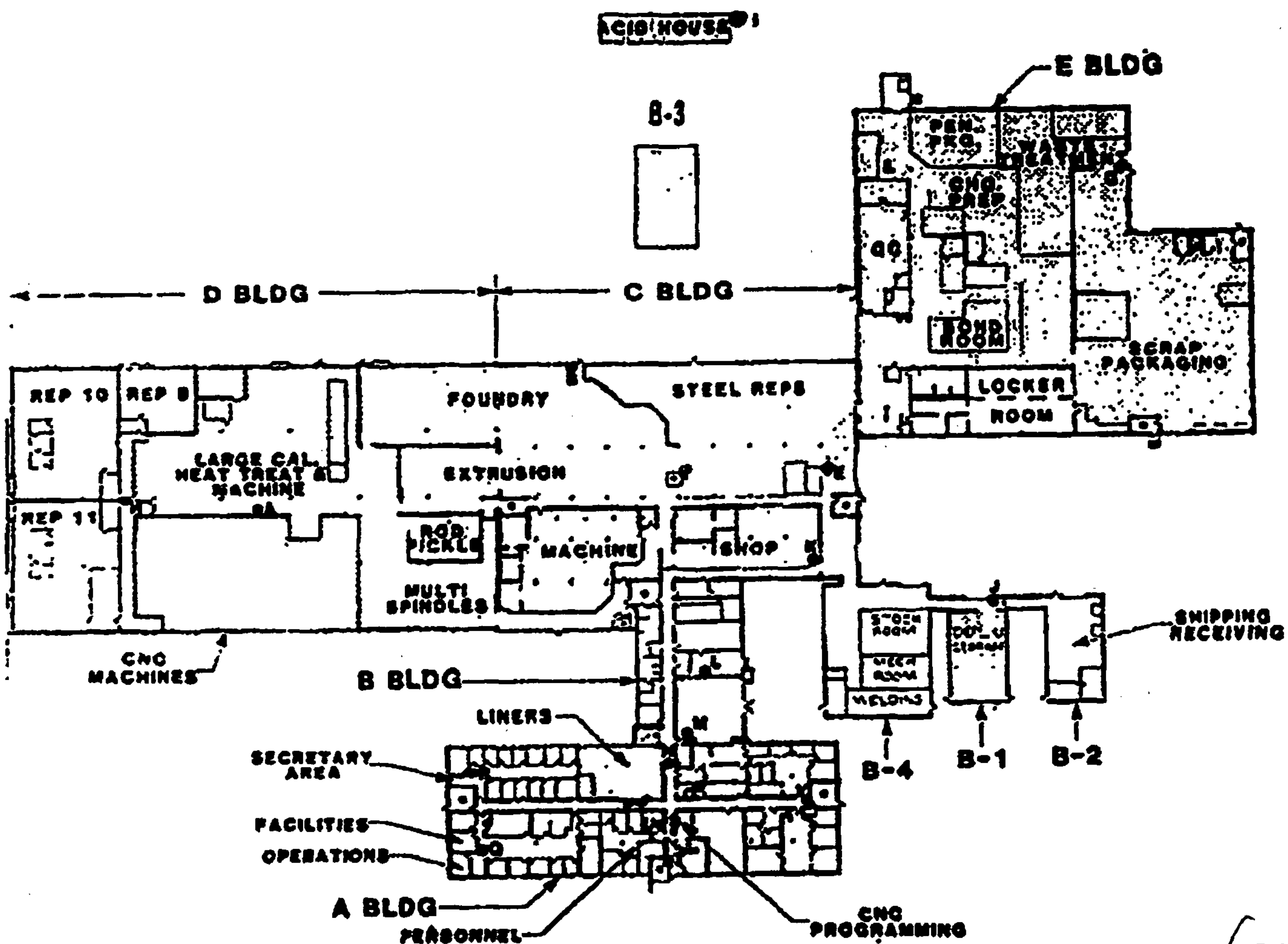

Figure 1-1
Affected Area Floor Plan

1-19

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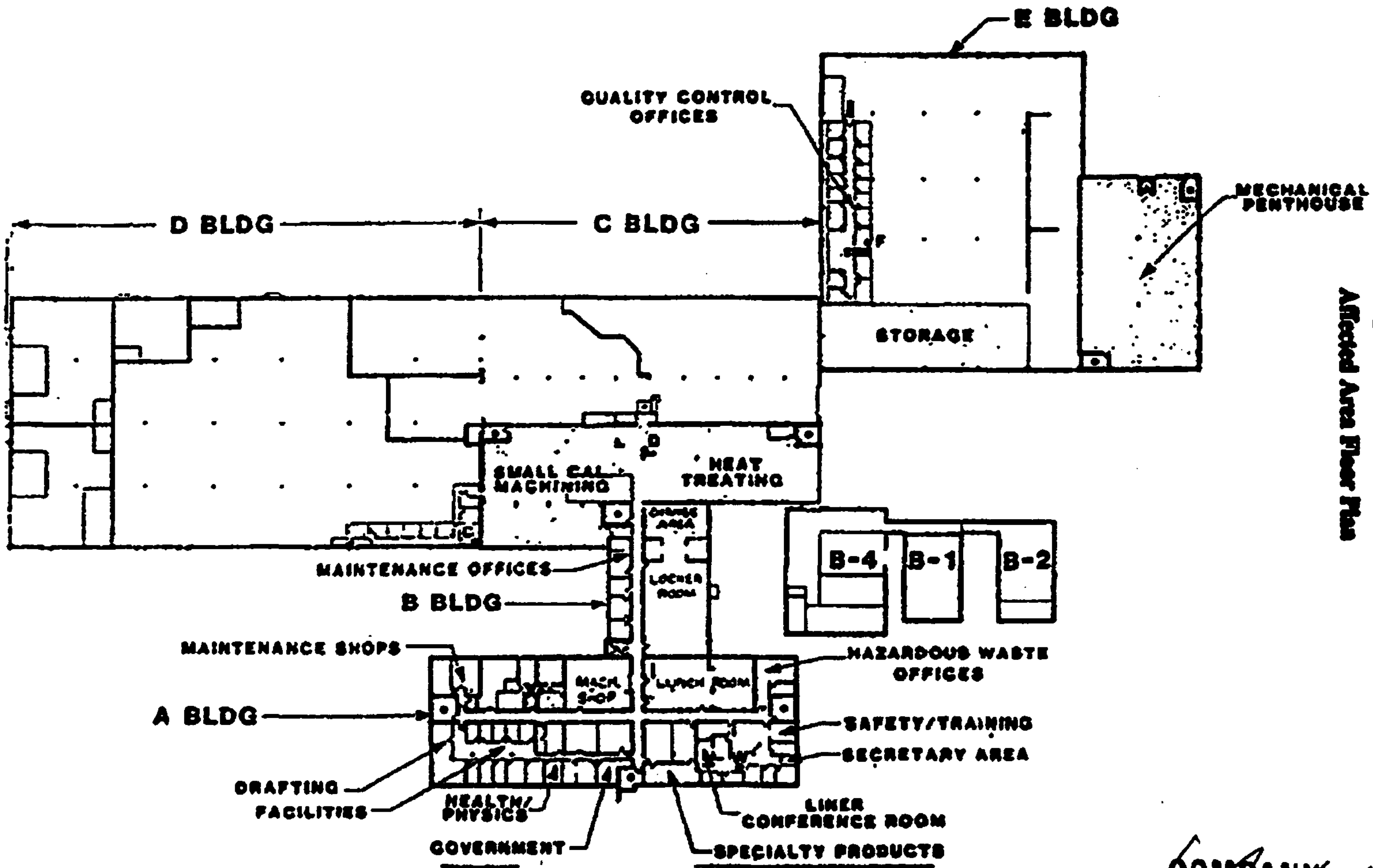

Figure 1-1 (Continued)
Affected Area Floor Plan

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1.3 Decontamination Criteria

The proposed decontamination criteria are based on the NRC and ANSI guides and standards.

The Nuclear Metals, Inc. (NMI) proposed guides for decontamination comply with surface contamination levels which should limit external radiation exposure to less than ten mrem per year above the background. These guides are in keeping with proposed regulatory criteria and the concept of As Low As Reasonably Achievable (ALARA).

1.3.1 Surface Contamination

The specific decontamination criteria are taken from "Guidelines for Decontamination of Facilities and Equipment Prior to Release for Unrestricted Use or Termination of Licenses for Byproduct, Source or Special Nuclear Material", prepared by the NRC. Table 1-1 presents acceptable surface contamination limits taken from this guide. The specifically applicable criteria are as follows:

- Removable contamination, determined by smearing with a dry filter: 1,000 dpm/100 cm^2, alpha and beta/gamma.
- Average, based on a maximum area of 1 m^2: 5,000 dpm/100 cm^2, alpha and beta/gamma.
- Maximum, based on an area of not more than 100 cm^2: 15,000 dpm/100 cm^2, alpha and beta/gamma.

The decontamination efforts will attempt to reduce contamination levels to ALARA.

1.3.2 External Gamma Exposure Rate

The net residual external gamma exposure rate should be less than 10 mrem/year, or 5 uR/hr above background, based on regulatory criteria and ALARA. The verification of this crite.ia will be based on gamma exposure rate measurements with calibrated micro R survey meters.

1.3.3 Dispersed Contamination

Several agencies have issued guides or standards for concentrations of radionuclides dispersed in soil or other materials. The guidelines set forth in this Plan and those which are most applicable to the NMI facility are the Nuclear Regulatory Commission (NRC) guides for thorium or uranium from past operations (US81). Other guides include Department of Energy (DOE) guides for the release of sites (DOE85), and U.S. Environmental Protection Agency guidance. The NRC guidelines are the most conservative and will be adhered to in this effort. The NRC Option 1 criterion for completely unrestricted use specifies a limit of 35 pCi/g of depleted uranium (total of uranium-234, -235 and -238). This is based on potential radiation dose being equal to or less than those of the EPA proposed Federal Guidance for plutonium transuranics (US77).

The Option 1 criterion are for completely unrestricted land use and apply to material on the surface. Since the area and depth of material is not specified, the averaging specifications of the EPA for uranium mill tailings standards (US83) (i.e., average over 100 m^2 area and 15 cm depth) are considered to be acceptable.

The specific criterion to be utilized is 35 pCi/g of uranium. For implementation, this will be applied as 30 pCi/g of U-238 (based on isotopic composition of DU). The criterion will be applied for average depth intervals of six inches (15 cm) as stipulated by the EPA in 40 CFR 192 (US83).

1.3.4 Release of Waste Materials for Disposal by Sanitary Landfill

All wastes from direct contaminated materials (e.g., scarification, metals, solids, powders and mixtures) will be packaged for disposal as low-level radioactive waste (LLW). However, structural material, pipe, and equipment that is not contaminated or that can be adequately cleaned will be released for disposal by sanitary landfill. Written documentation will be required for any materials to be released for unrestricted disposal. Workers will be instructed to maintain a written record of the origin of the waste and the measured levels of contamination. Materials that do not comply with the stated criteria will not be released.

Table 1-1
Acceptable Surface Contamination Levels

Nuclide[1]	Average[3][4][6]	Maximum[3][4][6]	Removable[3][4][5]
U-nat, U-235, U-238 and associated decay products	5,000 dpm α/100 cm²	15,000 dpm α/100 cm²	1000 dpm α/100 cm²
Transuranics, Ra-226, Ra-228, Th-230, Th-228, Pa-231, Ac-227, I-125, I-129	100 dpm α/100 cm²	300 dpm α/100 cm²	20 dpm α/100 cm²
Th-nat, Th-232, Sr-90, Ra-223, Ra-224, U-232, I-126, I-131, I-133	1000 dpm α/100 cm²	3,000 dpm α/100 cm²	200 dpm α/100 cm²
Beta-gamma emitters (nuclides with decay modes other than alpha emission or spontaneous fission) except SR-90 and others noted above.	5,000 dpm β-γ/100 cm²	15,000 dpm β-γ 100/cm²	1000 dpm β-γ 100/cm²

1/ Where surface contamination by both alpha and beta-gamma emitting nuclides exists, the limits established for alpha and beta-gamma emitting nuclides should apply independently.

2/ As used in this table, dis/min (disintegration's per minute) means the rate of emission by radioactive material as determined by correcting the counts per minute observed by an appropriate detector for background, efficiency, and geometric factors associated with the instrumentation.

3/ Measurements of average contaminant should not be averaged over more than 1 square meter For objects of less surface area, the average should be derived for each such object.

4/ The maximum contamination level applies to an area of not more than 100 cm².

5/ The amount of removable radioactive material per 100 cm² of surface area should be determined by wiping that area with dry filter or soft absorbent paper, applying moderate pressure, and assessing the amount of radioactive material on the wipe with an appropriate instrument of known efficiency When removable contamination on objects of less surface area is determined, the pertinent levels should be reduced proportionally and the entire surface should be wiped.

6/ The average and maximum radiation levels associated with surface contamination resulting from beta-gamma emitters should not exceed 0.2 mrad/h at 1 cm and 1 0 mrad/h at 1 cm, respectively, measured through not more than 7 milligrams per square centimeter of total absorber.

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1.3.5 Release of Uncontaminated Facilities

The disposition of uncontaminated equipment and facilities is not within the scope of this plan, provided that such facilities are verified to meet unrestricted release criteria.

1.3.6 Records of the Decommissioning Procedures and Survey Results

The records of any future decommissioning related activities such as procedures and radiation survey data will be preserved for the duration required by the current regulations at the time of decommissioning.

1.3.7 Decommissioning Assumptions

Operational Life

The NMI licensed activities and associated manufacturing conducted at the Concord, Massachusetts site are expected to continue into the indefinite future. Facilities and manufacturing technology at NMI are in a state of continual modernization and change such that disposition of obsolete equipment and renovation of facility components are a dynamic process. Since NMI processes and facilities do not represent a single aging asset with a defined useful life, such as with as a nuclear reactor complex, ultimate decommissioning of NMI cannot be viewed as a near term or an inevitable process.

At the time of decommissioning, NMI intends to utilize its own in-house staff for conduct of all decommissioning related activities. As an operational unit, the decommissioning will be managed in accordance with respective NRC licenses.

Equipment

Much of the production equipment and machinery at the NMI site are the property of the U.S. Government or have been used to process Government Furnished Material (GFM). The primary GFM used at the NMI site has been depleted uranium. 70 % of all contaminated process equipment is expected to be dispositioned through metal melting at established bulk rates shown in Section 3.

Radioactive Material and Site Use

NMI posseses two NRC licenses. These licenses provide for the use and possession of radionuclides other than DU, however NMI has not processed these materials nor does it intend to process these materials in the future. These radionuclides have been placed in the respective licenses to allow for future business opportunities. Should these materials ultimately be used at the NMI site the quantity will likely be limited and strictly controlled. The scope of this Plan only addresses those materials (i.e., depleted uranium) and contaminants discussed in the remainder of this document. If these circumstances change in the future, this Plan will be modified accordingly.

NMI throughout its history has not disposed of licensed material under the provisions of 10 CFR 20.304 and therefore no on-site burials have occurred.

The NMI site is zoned as a Limited Industrial Park and therefore structures remaining following decommissioning may be used only for commercial and/or industrial purposes.

Holding Basin

A portion of the NMI site is currently subject to decommissioning activities under the NRC SDMP program. This area is the formerly used holding basin and although this area is subject to committments and schedules imposed by the SDMP program for near term activities, costs associated with this effort have been incorporated into this cost estimate.

1.4 Decommissioning Activities

1.4.1 Radiological Assessment

Survey efforts that will be applied to any future decontamination and decommissioning activities wi'l vary according to the area's radiological status and history. The emphasis of any initial surveys performed will be to better define the extent of the decontamination effort required in each building or area. Additionally, as part of the radiation work permit program, prior to beginning of decontamination related activities, a pre-job survey will be conducted. Following completion of decontamination efforts, these areas will be surveyed in accordance with the final status survey plan to demonstrate that they meet the criteria listed in Table 1-1.

1.4.2 Decontamination and Decommissioning Activities

This section details the decontamination activities planned for the areas known to be within the scope of this project (Figure 1-1).

The areas found to be contaminated in excess of the criteria listed in Table 1-1 and section 1.3, either through prior knowledge, radiological characterization or the surveys referenced above, will be decontaminated as required and will be surveyed in accordance with the final status survey plan to demonstrate that it meets the established criteria. The following further describes planned activities and tasks for various portions of the NMI site.

<u>Interior Prefabricated Rooms or Offices</u>

These areas will be dismantled to allow for more efficient decontamination of the materials comprising the actual building and to assure better access to building structures during the final status survey. Removed materials containing residual radioactivity will be decontaminated and surveyed to demonstrate that they meet the criteria listed in Table 1-1. When survey results demonstrate that these criteria have been met, the materials will be free released and made available for unrestricted use.

<u>Plumbing and Electrical Equipment</u>

This equipment will be removed as it becomes accessible. Removal of these items will allow improved access to building structures for decontamination and for the final status survey. Removed materials will be decontaminated and surveyed to demonstrate that they meet criteria listed in Table 1-1. When survey results demonstrate that these criteria have been met, the materials will be free released and made available for unrestricted use.

Ventilation Ductwork

This will be removed when it is no longer required to maintain essential services. Removal of these items will allow better access to building structures for decontamination and the final status survey. Removed materials will be decontaminated and surveyed to demonstrate that they meet the criteria listed in Table 1-1. When survey results demonstrate that these criteria have been met, the materials will be free released and made available for unrestricted use.

Contaminated Subsurface Piping and Piping Connecting Buildings C, D, and E to the Tank House

Piping will be removed from the ground and decontaminated. The septic system lines running from Buildings A and E to the septic tank and leach field will be surveyed at normal access points. If survey results meet the values listed in Table 1-1, piping will be left in place. If survey results indicate contamination in excess of the values listed in Table 1-1, efforts will be made to decontaminate these in place. If decontamination efforts are not successful, the piping will be removed, decontaminated and surveyed to demonstrate that they meet the criteria listed in Table 1-1. When survey results demonstrate that these criteria have been met, the materials will be free released and made available for unrestricted use.

Structural Materials and Components

These will be decontaminated as required to meet the criteria listed in Table 1-1 Materials and equipment remaining after cessation of manufacturing operations will be decontaminated to meet the criteria listed in Table 1-1 or will be removed from the facility and dispositioned through metal melting. Most process equipment is expected to be dusositioned in this manner. Floor and wall surfaces will be decontaminated to meet the criteria listed in Table 1-1. As much of the physical plant will be left intact as practicable. When survey results demonstrate that material, equipment, and structures meet the criteria listed in Table 1-1, they will be free released and made available for unrestricted use.

Pre-Engineered Metal (Butler) Buildings

These have been used to store both packaged and unpackaged radioactive materials, any contamination present is expected to be of a low level. These buildings will be surveyed in accordance with the final status survey plan to demonstrate that they meet the criteria listed in Table 1-1 and decontaminated if required. When survey results demonstrate that these criteria have been met, the building will be free released and made available for unrestricted use.

External Surfaces of Buildings and Adjacent Ground Areas

These areas may have been subject to storm water runoff and/or ventilation effluent fallout. These areas have been sampled as part of the environmental surveillance program and based on the results do not appear to be contaminated. They will be surveyed in accordance with the final status survey plan to demonstrate that they meet the criteria listed in Table 1-1. When survey results demonstrate that these criteria have been met, they will be free released and made available for unrestricted use.

Roof Areas

Potential contamination on the roof will be characterized after any decontamination or removal of ventilation systems has been accomlished. If these activities result in the need to decontaminate the roof, this area will be surveyed in accordance with the final status survey plan to demonstrate that it meets the criteria listed in Table 1-1. When survey results demonstrate that these criteria have been met, the area will be free released and made available for unrestricted use.

Holding Basin

This area is currently included in the NRC's SDMP Program. The holding basin itself has been capped to prevent precipitation and surface runoff from percolating through the sludge material. Decontamination will be performed in accordance with previous commitments made through the SDMP program Contaminated basin material will be excavated to various depths. When survey results demonstrate concentrations meet criteria of section 1.3.3 or as otherwise established under SDMP, the area will be free released and made available for unrestricted use.

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2.0 DECOMMISSIONING COST ESTIMATE

The estimated cost for decommissioning is $13,707,324.00, which includes a 25% contingency factor. The following tables provide a detailed breakdown of this cost estimate formatted to provide the information as called for in Regulatory Guide 3.66.

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Site Decommissioning

Table 1

Cost Estimate Summary

Task	Labor	Materials	Waste Disposal	Restoration	Total Cost
Planning, Administration, and Project Management	$224,055	NA	NA	NA	$224,055
Buildings A and B	$70,019	$9,000	$45,588	$5,000	$129,604
Building C	$1,077,783	$130,000	$722,238	$20,000	$1,950,021
Building D	$1,164,947	$130,000	$784,474	$20,000	$2,099,421
Building E	$1,121,365	$130,000	$777,940	$20,000	$2,049,305
Holding Basin	$1,134,516	$500,000	$2,331,829	$110,000	$4,076,344
Ancillary Facilities and Land Areas	$278,230	$30,000	$118,879	$10,000	$437,108
SUBTOTAL	$5,070,914	$929,000	$4,780,945	$185,000	$10,965,859
CONTINGENCY @25%	$1,267,729	$232,250	$1,195,236	$46,250	$2,741,465
TOTAL ESTIMATED COST	$6,338,643	$1,161,250	$5,976,181	$231,250	$13,707,324

NOTES:

1. All costs are in 1994 U.S. Dollars

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Table 2

Unit Cost For Workers

Position	Basic Salary ($/yr)	Burden ($/yr)	Cost ($/yr)	Hourly Cost ($/hr)
Supervisor/Foreman	$55,765	$14,000	$69,765	$34
Engineer	$56,243	$14,000	$70,243	$34
Technician	$34,070	$14,000	$48,070	$23
Health Physicist	$63,502	$14,000	$77,502	$37
Laboror	$31,325	$14,000	$45,325	$22
Clerical	$25,147	$14,000	$39,147	$19
Other	$37,856	$14,000	$51,856	$25

NOTES:

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Table 3

Dimensions of Contaminated Facilities and Equipment

Area	Dimensions	Units
Amount of Floor Space	13741	m2
Amount of Wall Space	15999	m2
Amount of Piping	17411	m
Amount of Ventilation Ductwork	9433	m
Amount of Contaminated Soil	100	m3
Amount of Contaminated Material (Holding Basin)	3523	m3
Amount of Contaminated Process Equipment	2083000	lbs.

NOTES:

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Table 4

Planning, Administration and Project Management

Task	Man Hours: Supervisor	Man Hours: Health Physicist	Man Hours: Clerical	Man Hours: Other	Total Cost
Planning and Preparation	500	500	500		[$44,811]
Administration and Project Management	2000	2000	2000		[$179,244]
TOTAL	2500	2500	2500		[$224,055]

NOTES:

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Table 5

Hours and Costs for Decomissio ·ig of Buildings A and B

Task	Man Hours				Total Cost
	Health Physicist	oreman	Technician	Laborer	
Area Preparation and Mobilization		40	160		$5,049
Equipment Rental					
Remove/Dismantle Process Equipment				1500	$32,686
Remove/Dismantle/Clean Components		40		160	$4,837
Clean Walls/Ceilings		40		160	$4,837
Clean/Scarify Flooors		40		160	$4,837
Radiation Surveys			640		$14,791
Quali / Assurance	80				$2,961
TOTAL	80	16	800	1980	$70,019

NOTES:
Assumes a duration of 4 weeks with a crew of 4 laborors, 4 technicians, and 1 foreman for facilities, following the disposition of process equipment.

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Table 6

Hours and Costs for Decomissioning of Building C

Task	Man Hours				Total Cost
	Health Physicist	Foreman	Technician	Laborer	
Area Preparation and Mobilization		80	400	400	$20,662
Equipment Rental					$20,000
Remove/Dismantle Process Equipment				23000	$501,190
Remove/Dismantle/Clean Components		1040		5200	$148,434
Clean Walls/Ceilings		480		2400	$68,606
Clean/Scarify Flooors		480		2400	$68,606
Radiation Surveys			10000		$231,106
Quality Assurance	520				$19,[illegible]76
TOTAL	520	2080	10400	33400	$1,077,783

NOTES:
Assumes a duration of 26 weeks with a crew of 10 laborors, 10 technicians, and 2 foreman for facilities, following the disposition of process equipment.

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Site Decommissioning

Table 7

Hours and Costs for Decommissioning of Building D

Task	Man Hours				Total Cost
	Health Physicist	Foreman	Technician	Laborer	
Area Preparation and Mobilization		80	400	400	($20,662)
Equipment Rental					($20,000)
Remove/Dismantle Process Equipment				27000	($588,353)
Remove/Dismantle/Clean Components		104C		5200	($148,434)
Clean Walls/Ceilings		480		2400	($68,506)
Clean/Scarify Floors		480		2400	($68,506)
Radiation Surveys			10000		($231,106)
Quality Assurance	520				($19,376)
TOTAL	520	2080	10400	37400	($1,164,947)

NOTES:
Assumes a duration of 26 weeks with a crew of 10 laborers, 10 technicians, and 2 foreman for facilities, following the disposition of process equipment.

Nuclear Metals, Inc.
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Table 8

Hours and Costs for Decomissioning of Building E

Task	Man Hours				Total Cost
	Health Physicist	Foreman	Tecnnician	Laborer	
Area Preparation and Mobilization		80	400	400	($20,662)
Equipment Rental					($20,000)
Remove/Dismantle Process Equipment				25000	($544,772)
Remove/Dismantle/Clean Components		1040		5200	($148,434)
Clean Walls/Ceilings		480		2400	($68,508)
Clean/Scarify Flooors		480		2400	($68,508)
Radiation Surveys			10000		($231,106)
Quality Assurance	520				($19,376)
TOTAL	520	2080	10400	35400	[$1,121,365]

NOTES:
Assumes a duration of 26 weeks with a crew of 10 laborors, 10 technicians, and 2 foreman for facilities, following the disposition of process equipment.

Nuclear Metals, Inc.
Site Decommissioning

Table 9

Hours and Costs for Decomissioning of Ancillary Facilities and Areas

Task	Man Hours: Health Physicist	Man Hours: Foreman	Man Hours: Technician	Man Hours: Laborer	Total Cost
Area Preparation and Mobilization		80	400	400	($20,682)
Equipment Rental					($10,000)
Remove/Dismantle/Clean Components		80		500	($13,597)
Clean Walls/Ceilings		280		1300	($37,784)
Clean/Scarify Flooors		280		1300	($37,784)
Remove Underground Piping; Excavation		280		1300	($37,784)
Radiation Surveys			4800		($110,931)
Quality Assurance	260				($9,668)
TOTAL	260	1000	5200	4800	($278,230)

NOTES:
Assumes duration of 13 weeks with a crew of 10 laborers, 10 technicians, and 2 foremen.

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Site Decommissioning

Table 10

Equipment and Supplies

Area or Building	Equipment and Supplies Needed	TOTAL ($)
Buildings A and B	$9,000	$9,000
Building C	$130,000	$130,000
Building D	$130,000	$130,000
Building E	$130,000	$130,000
Holding Basin	$500,000	$500,000
Ancillary Facilities and Land Areas	$30,000	$30,000
TOTAL	$929,000	$929,000

NOTES:

Costs are for equipment, tools and supplies necessary to complete the decommissioning. Holding basin cost includes cost of engineered enclosure.

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Site Decommissioning

Table 11

Waste Disposal

Waste Type	Volume (m3)	Disposal Containers: No. Boxes	No. Bags	Unit Cost Boxes	Unit Cost Bags	Total Cost Containers	Unit Waste Burial Cost ($/m3)	Waste Disposal Cost	Transportation	Total Cost
Contaminated Debris	510	94	300	$100	$18	$14,793	$873.33	$445,622	$90,097	$550,512
Contaminated Soil	100		118	$100	$18	$2,119	$873.33	$87,333	$17,657	$107,108
Holding Basin Material	3523		4148		$18	$74,656	$350.00	$1,233,173	$1,024,000	$2,331,829
Contaminated Process Equipment	2,083,000 lbs.						1.15/lb. melt	$1,674,495	$117,000	$1,791,495
TOTAL	4134	94	4566			$91,567				$4,780,945

NOTES:
Costs are based on an approximate 1% dimension to waste ratio for debris with disposal at Envirocare of Utah, Inc. using currently contracted rates.
Costs for contaminated process equipment are based on metal melting of 70% of process components at currently established bulk rate of $1.15/lb.
Remainder is decontaminated with labor costs as shown in tables 5-8

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Nuclear Metals, Inc. Site Decommissioning Table 12 Restoration of Contaminated Areas		
Area or Building	Painting, Backfill, and Other Restoration	TOTAL ($)
Buildings A and B	($5,000)	($5,000)
Building C	($20,000)	($20,000)
Building D	($20,000)	($20,000)
Building E	($20,000)	($20,000)
Holding Basin	($110,000)	($110,000)
Ancillary Facilities and Land Areas	($10,000)	($10,000)
TOTAL	($185,000)	($185,000)

NOTES:

Costs are for painting, backfilling, patching, and other actions necessary for restoration of previously contaminated, decommissioned areas.

3.0 COST ESTIMATE ADJUSTMENT SCHEDULE

Nuclear Metals, Inc. will review the Cost Estimate associated with the Decommissioning of facilities at the NMI site concurrently with future NRC license renewals. Factors which will be considered in the adjustment include. Inflation rate during the previous ten (10) year period, changes to NRC regulations governing decommissioning requirements, changes in NRC residual contamination limits, or other pertinent regulatory or corporate changes which may have a significant impact on the costs associated with any future decommissioning of the NMI site.

4.0 REFERENCES

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