INTERNATIONAL
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CORPORATION

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40-8681

June 22, 2001

VIA EXPRESS COURIER

Mr. Melvyn Leach, Branch Chief
Fuel Cycle Licensing Branch
Mail Stop T-8A33
Office of Nuclear Material Safety and Safeguards
U.S. Nuclear Regulatory Commission
2 White Flint North
11545 Rockville Pike
Rockville, MD 20852-2738

Re: June 15, 2000 Amendment Request to Process an Alternate Feed Material from the Maywood FUSRAP Site at the White Mesa Uranium Mill
Source Material License No. SUA-1358

Dear Mr. Leach:

International Uranium (USA) Corporation ("IUSA") hereby transmits the enclosed supplemental information for the subject Amendment Request to authorize receipt and processing of a uranium-bearing alternate feed material from the Maywood FUSRAP site (the "Maywood Amendment Request"). As noted in the Maywood Amendment Request, IUSA's independent consultant has prepared a "Review of Chemical Contaminants in Maywood Site Uranium Material to Determine Potential Presence of RCRA Listed Hazardous Waste" (the "RCRA Review") on the RCRA status of the Maywood Site Uranium Material. A copy of the RCRA Review is enclosed.

As noted in Section 1.3 of the Maywood Amendment Request, IUSA plans to accept only that portion of the Maywood Alternate Feed Material that meets specific cut-off criteria designed to ensure a minimum level for estimated uranium content. IUSA is currently developing the specific details of those criteria and procedures for its application to the Uranium Material and intends to submit that approach to the NRC on or about June 29, 2001.

NMSS/Public

Should you have any questions regarding this transmittal or any other portions of the Maywood Amendment request, I can be reached at (303) 389-4131.

Sincerely,

Michelle R. Rehmann
Environmental Manager

MRR/

Attachments

cc: William von Till/NRC
Ron F. Hochstein
Harold R. Roberts
David C. Frydenlund
William N. Deal
Ronald E. Berg
William Sinclair/UDEQ
Don Verbica/UDEQ

MEMORANDUM

To: Michelle R. Rehmann

From: Jo Ann Tischler

Date: June 15, 2001

Subject: Review of Chemical Contaminants in Maywood Uranium Materials to Determine the Potential Presence of RCRA Characteristic or RCRA Listed Hazardous Waste

This report describes the results of my review of the materials (the "Uranium Materials") to be excavated from the Maywood Formerly Utilized Sites Remedial Action Program ("FUSRAP") site, to determine whether or not the Uranium Materials contain any listed or characteristic hazardous waste as defined by the Resource Conservation and Recovery Act ("RCRA"). International Uranium (USA) Corporation ("IUSA") has applied for an amendment (the "Request for Amendment") to its White Mesa Uranium Mill (the "Mill") Source Material License SUA-1358 to permit the processing of Uranium Material as an alternate feed material at the Mill.

1.0 Site History and Background

The Maywood Site encompasses 88 properties located in the northern New Jersey communities of Maywood, Rochelle Park, and Lodi. The regional setting of the Maywood site is shown in Drawing #1 of Attachment 1, hereto. Drawing #2 of Attachment 1 shows the specific locations of the areas to be remediated at the Maywood site.

The Maywood Chemical Works ("MCW") began operations at the Maywood Site in 1895. According to various sources enumerated below, the plant extracted cerium rare earths, produced lithium compounds, detergents, protein from leather, ionones (for colors or flavors), essential oils (such as a-pinene, and d-limonene) and alkaloids (including caffeine) from natural plant sources such as tea leaves and coca leaves.

MCW also processed monazite sands from 1916 to 1956, for extraction of thorium and rare earth elements. The primarily domestic monazite ore underwent rough mechanical concentration to remove the light sands, followed by fine separation by either gravitational, electromagnetic, or electrostatic separation techniques. Until World War II, the thorium was used for production of thorium nitrate for preparation of gas lantern mantles, as well as production of thorium sulfate, thorium carbonate, thorium dioxide, and thorium chloride. During World War II, MCW processed a portion of the monazite sands for recovery of lanthanum, for production of lanthanum oxide. The lanthanum oxide was transferred to other facilities for use in manufacture of optical lenses for the U.S. Army. The monazite sands also contained natural uranium, which was not

recovered at the site and which remains in the process residues from the thorium and rare earth extraction activities.

MCW used process residues, containing uranium and thorium, as fill in a low-lying portion of the property, and later constructed additional buildings on this fill. MCW also used land areas outside of its property boundary (primarily to the west of the site) as dumping areas, and disposed of uranium and thorium-bearing residues and other process wastes (including residuals from processing tea leaves and coca leaves) on these additional areas. In 1932, New Jersey Route 17 was constructed on a portion of the off-site land containing uranium and thorium-bearing process residues. Wastes from the off-site areas were also used by nearby property owners as fill material. Uranium and thorium-bearing process residuals and other process residuals also migrated into Lodi Brook and were transported by this surface water channel, resulting in contamination of additional properties. These properties were later developed for both commercial and residential use. Between 1940 and 1983, MCW also constructed six retention ponds on site for collection of additional process tailings. Disposal of liquid tailings ceased in 1965, all free liquid has evaporated over time, and all the pond areas are currently in various states of revegetation. Between 1940 and 1983, additional uranium and thorium-bearing material was deposited in surface mounds in the northwest portion of the property adjacent to or between the former pond areas.

MCW obtained a source material license from the Atomic Energy Commission ("AEC") in 1954, for possession and processing of source material. MCW stopped production of thorium in 1956 and stopped the processing of monazite sands in 1957. The Stepan Chemical Company (the "Stepan Company"), a pharmaceutical firm, purchased the MCW operation in 1959 and renewed the AEC license in 1961. Stepan Chemical did not perform any thorium processing, and attempted to sell the existing inventories of thorium already on site. They later renewed the AEC license for continued storage of the remaining thorium product.

The Stepan Company began cleanup of the various uranium and thorium-bearing residue piles in 1963. From that date through 1968, the Stepan Company consolidated and buried over 19,000 cubic yards ("CY") of uranium and thorium-bearing residuals in three burial areas east of Route 17 known as Pits 1, 2 and 3. The AEC source material license expired in 1972. In 1976, the NRC required the Stepan Company to renew their license for management of the uranium and thorium-bearing residue pits remaining on site. The Stepan Company remained a licensee from 1976 to 1983. During that time, the presence of thorium contamination was identified at neighboring properties throughout the vicinity. In 1983 the Maywood site was added to the National Priorities List and the U.S. Department of Energy ("USDOE") was assigned responsibility for cleanup. At that time USDOE and the U.S. Environmental Protection Agency ("EPA") negotiated a Federal Facilities Agreement ("FFA") governing remediation of the Maywood site.

USDOE began cleanup of the site and vicinity residential properties in 1984, and purchased a portion of the Stepan Company property for storage of material excavated during removal actions. Material removed from 25 of the vicinity properties was stored

in an engineered cell referred to as the Maywood Interim Storage Site ("MISS"). In 1995, USDOE published an Engineering Evaluation/Cost Assessment ("EE/CA") for the remainder of the removal actions needed at the site and vicinity properties. In 1997, responsibility for the FUSRAP program, including the Maywood Site, was transferred from USDOE to USACE. All actions by the USACE at the Maywood Site are being conducted subject to the administrative, procedural, and regulatory provisions of the Comprehensive Environmental Response Compensation and Liability Act ("CERCLA") and a revised FFA renegotiated between USACE and EPA.

As determined by the FFA, the overall site remediation is being addressed through separate Remedial Investigation/Feasibility Study ("RI/FS") Reports for the Maywood Site and the Stepan Site. USDOE and USACE have conducted a Remedial Investigation ("RI") for the radioactive contamination at the Maywood Site. The Maywood Site RI divided the site into the following four operable units ("OUs"):

1) Portions of the Stepan Site
2) The Maywood Interim Storage Site ("MISS") including two sub-areas:
   - the interim storage pile (the "MISS Pile"), and
   - other contaminated media at MISS ("MISS onsite soils" or "onsite soils")
3) Residential Vicinity properties
4) Governmental and Commercial Vicinity properties

The Stepan Company conducted an RI addressing non-radioactive chemical contamination from Stepan Company, Sears, and adjacent properties. The activities of both programs are being supervised and coordinated by EPA Region II.

USDOE issued a Final RI Report for the Maywood Site in 1992 (USDOE, December 1992). The Stepan Company issued a Final RI Report for the chemical contamination areas of the site in 1994 (Stepan Chemical Company, November 1994). As a result, sufficient characterization information on the nature and extent of contamination is already available to assess the composition and sources of the Uranium Material to be excavated from the site for potential delivery to the White Mesa Mill (the "Mill"). It is known, according to information provided by the USACE contractor in the 2001 Request for Proposal for Transportation and Disposal Services for the Maywood Site, that USDOE found no RCRA hazardous waste during the sampling and analytical program for the RI, and the Maywood site contamination is limited to radioactive and rare earth mineral constituents.

A summary of activities at the Maywood and Stepan Sites is as follows:

- Pre-1895 Undeveloped land
- 1895 to 1916 MCW begins essences and pharmaceutical operations
- 1916 MCW begins processing monazite sands
- 1916 to 1932 MCW disposes uranium and thorium-bearing slurries, other uranium and thorium-bearing tailings, tea leaves, and coca leaves on site and west of site

- 1932 to 1956 MCW waste materials transported to vicinity properties for use as construction material and fill
- 1956 MCW stops production of thorium
- 1957 MCW stops processing of monazite sands
- 1959 Stepan Company buys MCW
- 1963 to 1968 Stepan Company excavates uranium and thorium-bearing residue piles and creates 3 disposal pits
- 1983 Maywood Site added to NPL, USDOE assumes responsibility under FUSRAP
- 1984 to 1995 USDOE removes material from 3 disposal pits and 25 vicinity properties and consolidates them in the MISS
- 1997 USACE assumes responsibility for FUSRAP
  Maywood Site split in to 4 OUs
- 2001 Uranium Material remains in the MISS pile, MISS soils, Stepan soils, and additional offsite properties

The RI Reports for the Stepan and Maywood sites, a Soil Characterization Report for the MISS pile, and other available data have been reviewed in preparing this report. Although Feasibility Study Reports and Records of Decision for the OUs have not yet been prepared by USACE, extensive characterization information on the nature and extent of contamination was already available in the documents enumerated above as well as others listed below. This information has been reviewed and was sufficient for assessing the composition and sources of Uranium Material to be excavated, and for performing a RCRA evaluation of the Uranium Material.

2.0 Basis and Limitations of this Evaluation

The following contamination evaluation is based on:

1. Chemical Data presented in *the Remedial Investigation Report for Maywood Site* (USDOE, December 1992).

2. Additional Site History in *the Engineering Evaluation/Cost Assessment for the Maywood Site* (USDOE, September 1995).

3. Chemical characterization data in the report on *Characterization of Soil Samples from the Maywood Chemical Company Site* (USEPA, March 1993)

4. Additional Site History in the *Remedial Investigation Report for the Stepan Chemical Site* (CH2MHill, November 1994)

5. IUSA *Protocol for Determining Whether Alternate Feeds Are Listed Hazardous Wastes* (IUSA, November 1999).

IUSA has developed a "Protocol for Determining Whether Alternate Feed Materials are Listed Hazardous Wastes" (November 22, 1999) ("the Protocol"). The Protocol has been

developed in conjunction with, and accepted by, the State of Utah Department of Environmental Quality ("UDEQ") (Letter of December 7, 1999). Copies of the Protocol and UDEQ letter are provided in Attachment 2 of this Report. The evaluation and recommendations in this Report were developed in accordance with the Protocol.

3.0 Application of Protocol to Uranium Material

3.1 Source Investigation

Several of the information sources enumerated above were used to perform the Source Investigation indicated in Box 1 of the flow diagram (the "Protocol Diagram") that forms part of the Protocol.

According to the Maywood RI and EE/CA, USACE has responsibility for remediation of contamination meeting any of the following conditions:

1. All radioactive contamination, whether commingled or not, occurring on the MISS.

2. All radioactive contamination exceeding USDOE action levels and related to thorium processing at MCW, occurring on any vicinity property.

3. Chemical or nonradioactive contamination on vicinity properties if the contamination is mixed or commingled with radioactive contamination.

4. Chemical or nonradioactive contamination on vicinity properties if the contamination originated at the USDOE-owned MISS or if it is associated with the specific thorium activities at MCW that resulted in the radioactive contamination.

Uranium Material considered in the license amendment application and this evaluation includes material meeting conditions 1, 2, or 3, above. The purpose of the Maywood Site radiological surveys and RI, were to develop sufficient understanding of both the radiological and chemical contamination to delineate the areas of contamination that fall within USDOE/USACE responsibility. As a result, sufficient characterization information was available to make the RCRA assessment in this Report.

The following sections describe the status of the Uranium Material relative to RCRA Listed Hazardous Waste regulations, and relative to the specific parameters identified in the IUSA/UDEQ hazardous Waste Protocol. A summary of the RCRA evaluation findings for every organic chemical parameter at each operable unit is provided in Table 1 of this Report. This Report also addresses the uranium material relative to RCRA characteristic waste regulations.

3.2 Determination Methods in the IUSA/UDEQ Protocol

The Protocol describes additional steps IUSA will take to assess whether contaminants associated with any potential RCRA waste listings are present in the Uranium Material, and the likelihood that they resulted from RCRA listed hazardous wastes or RCRA listed processes. These include tabulation of all potential listings associated with each known chemical contaminant at the site, and the review of chemical process and material/waste handling history at the site to assess whether the known chemical contaminants in the material resulted from listed or non-listed sources. This evaluation is described in Box 8 and Decision Diamonds 9 through 11 in the Protocol Diagram.

If the results of the above evaluation indicate that the contaminants are not listed waste, the Protocol specifies an additional assessment of whether the data on which this determination was made is sufficiently representative, or whether an ongoing acceptance sampling program should be implemented, and a similar evaluation performed on any new constituents identified during acceptance sampling.

4.0 Chemical Contaminants at the Maywood Site

The chemical contamination profile reported in the RI was based on nearly 400 samples from locations at the MISS pile, the MISS soils, Stepan soils, and vicinity properties. These samples were analyzed for Volatile Organic Compounds ("VOCs"), Semivolatile Organic Compounds ("SVOCs"), total metals, rare earths, pesticides, herbicides, Toxicity Characteristic Leaching Procedure ("TCLP") metals, and TCLP SVOCs.

The RI indicated that, except for the MISS pile itself, each OU contained areas of radiological contamination, areas of chemical contamination (organics, metals, and rare earth elements), and areas with both types present. However, the RI provided chemical characterization data for each of the OUs in sufficient detail to differentiate between those chemical contaminants that were present in the radiologically contaminated soils (which may be shipped to the Mill) and those which were identified in the non-radiologically contaminated soils (which will not be shipped to the Mill). The discussion below addresses chemical contamination that was present in the radiologically contaminated areas of each OU.

Chemical Background

The RI, which was developed with approval of EPA and the New Jersey Department of Environmental Protection and Energy ("NJDEPE"), explained how background inorganic and organic analyte concentrations were determined for comparison with Maywood site analytical results. "Background" with respect to a contaminated site consists of samples from one or more locations on- or off-site that have not been impacted by commercial, industrial, or residential contamination. Background samples typically contain metals, other inorganic elements, and radioactive elements at their naturally occurring levels, and are expected to contain no man-made organic or inorganic compounds. That is, the

natural background concentration of any synthetic organic or inorganic compound is expected to be approximately zero.

Chemical Baseline

The RI further explained that representative background sample locations could not be established with respect to organic parameters for this highly developed area of Bergen County. That is, there were no proximal locations where the concentrations of synthetic organic compounds were zero. To address this issue, the USDOE RI contractor collected samples from two municipal parks in the Bergen County area on land that historically had never been developed for any residential, commercial, or industrial use. The concentrations of organic compounds detected in soil from these park properties was used to develop the mean baseline concentration (the "baseline") for each detected organic compound. For the purposes of the RI, synthetic organic chemicals that were detected within each operable unit, but that did not exceed the established baseline mean concentration, were not considered to be contamination. Beginning in Section 4.1 below, this Report addresses those chemical analytes that were detected within the radiologically contaminated areas of any OU at levels above their respective background concentration (for inorganic elements) or baseline concentration (for organic compounds).

USDOE also concluded from the RI and background studies that:

- All the radionuclides at MISS appear to be related to the monazite/thorium activity at MCW.

- The rare earths appear to be related to the monazite/thorium activity or the lithium production activity at MCW.

- The chemical characterization indicated that there is no RCRA hazardous waste present at the Maywood Site.

4.1 Chemical Contaminants at Stepan

The primary sources of radioactive contamination at Stepan, which are included in the Uranium Material in this evaluation, are Pits 1, 2 and 3, as well as surface mounds near these ponds, former plant areas where thorium operations were conducted, and areas where thorium tailings were used as fill. USDOE conducted chemical investigations for VOCS, SVOCs, metals, and rare earth elements, primarily in the radiologically contaminated areas of this site, since the balance of chemical contamination will be remediated by Stepan Company. Twelve samples from four boreholes at Stepan were sampled for VOCS. Eleven samples from five boreholes were analyzed for SVOCs.

SVOCs

Thirteen PAH compounds were detected above baseline at Stepan, as follows: acenaphthene; anthracene; benzo (a) anthracene; benzo (b) fluoranthene; benzo (k)

fluoranthene; benzo (g,h,i) perylene; benzo (a) pyrene; chrysene; dibenzofuran; fluoranthene; indeno (1,2,3 c,d) pyrene; phenanthrene; and pyrene.

The presence of this broad spectrum of PAHs is an indication of either:

a) plant surfaces currently or previously paved with road tar or asphalt;
b) disposal of used crankcase oil or other heavy machine oils;
c) both a) and b), including locations where spilled waste oil may have dissolved and mobilized asphalt components; or
d) natural degradation of plant or organic matter

It is known that the Stepan property has undergone asphalt paving, demolition, and reconstruction several times in its history. Some portions of Stepan used for disposal, particularly the pond areas, were lowland marsh with considerable natural vegetation. It is known that residual organic matter from the processing of tea leaves and other alkaloid-bearing plants was disposed on portions of the Stepan site. Vegetative decay is also a producer of PAH compounds. The PAHs most likely derived from leaching or natural degradation of the asphalt paving materials used repeatedly at the site, or from decay of disposed or natural vegetative matter.

They may also have derived, to a lesser extent, from used oil currently or previously used in vehicles on the site. PAHs from paving materials, degradation of natural organic matter, and from used oil, are not RCRA-listed wastes.

Based on the above information, none of the PAHs are indicative of RCRA listed hazardous waste. The USDOE RI concurs that the PAHs at Stepan are the likely result of degradation of asphalt compounds or indigenous organic matter.

Di-n-butyl phthalate

Di-n-butyl phthalate was the only phthalate detected above baseline in the USDOE RI studies at Stepan.

There is no history of industrial phthalate production on the Maywood property. Di-n-butyl phthalate is a natural degradation product of the oxidation of multi-ring aromatic compounds (PAHs), which, as described above, likely originated from paving sources, or used oil sources. Phthalates derived from natural degradation of paving material and used oils are not RCRA-listed wastes. Phthalates are also common plasticizers and may contaminate samples due to their presence in vinyl, butyl and other plastic materials in sampling tools, packaging, and Personal Protective Equipment ("PPE").

Di-n-butyl phthalate may be used as a fixative (stabilizer) in perfume oils. Di-n-butyl phthalate used as a constituent of perfume products or essential oils, or present in equipment washwater from these products is not a RCRA listed waste.

Based on the above information, the presence of di-n-butyl phthalate is not indicative of RCRA listed hazardous waste.

VOCs

Three VOCs were detected above baseline concentrations at Stepan, benzene, toluene, and chloroform.

BTEX Compounds

Benzene and toluene were detected at low levels, frequently at the same locations, in a number of samples at Stepan. Benzene and toluene may each be associated with several different RCRA listings if they derive from industrial solvents or specific industrial process wastes. However, they (as well as other BTEX compounds like xylenes) are also common constituents of gasoline-based fuels.

There has been no history of benzene or toluene synthesis or use as solvent in MCW thorium operations. According to the Maywood RI, the thorium operations involved no solvent extraction steps.

Process information from the EE/CA does not indicate that either benzene or toluene are used in current chemical operations at Stepan. It is possible that either or both were used in discontinued processes at MCW. However, had the benzene and toluene derived solely from MCW pharmaceutical operations which date back nearly a century, the majority of these volatile compounds would have been volatilized or biodegraded with time, and would not likely be present at shallow depths during the 1990's field investigation.

The Stepan and Maywood Sites are located near a former gasoline underground storage tank ("UST") on a property immediately next door, and are located in an area that exhibits groundwater contamination by BTEX. The BTEX compounds likely originated from the UST, the gasoline-based fuels in the numerous vehicles and equipment used for loading operations and remediation activities at Stepan, or both.

As there is no indication that either the benzene or toluene resulted from industrial solvents or RCRA listed industrial processes, but more likely resulted from gasoline-based fuels, they are not RCRA listed hazardous wastes.

Chloroform

Based on the site history information in the RIs and EE/CA, there is no history of chlorinated solvent production at the Maywood Site. Because, according to the Maywood and Stepan RIs, and the EE/CA, the Maywood site has produced pharmaceutical products and consumer product additives for over a century, chloroform may have been used in the formulation of medicinal liquid preparations, or pharmaceutical or commercial colors and fragrances. The use of chloroform in

pharmaceutical preparations, and its use in color and fragrance bases, are not RCRA-listed processes. Some other process sources of chloroform, such as the synthesis of vinyl chloride and other chlorinated aliphatics and aromatics, are associated with RCRA listings. However, MCW and Stepan did not engage in any of the process activities associated with RCRA listings.

Disposal of off-spec, expired or spent chloroform product from solvent or degreasing use could be consistent with the RCRA solvent ("U" and "F") listings. However, there is no specific evidence of this type of activity at the site, and as stated above, the more likely source of chloroform is the variety of color, fragrance, and medicinal bases produced at MCW, Stepan, or both. For these reasons, I have concluded that any chloroform detected in the Uranium Material is not a RCRA listed hazardous waste.

Metals and Rare Earth Elements

Thirty nine samples from Stepan were analyzed for total metals and rare earth elements. According to the USDOE RI, twenty three metals were detected above background concentrations at Maywood: aluminum, antimony, arsenic, barium, beryllium, boron, cadmium, calcium, chromium, cobalt, copper, iron, lead, lithium, magnesium, manganese, nickel, potassium, selenium, sodium, thallium, vanadium, and zinc.

The metals were detected primarily in the radioactive areas of the site. Arsenic, cobalt, copper, lead, lithium, nickel, selenium and vanadium, are known to be constituents of thorium ores and uranium ores. Residuals from processing of thorium are not RCRA listed hazardous wastes.

Six of the metals, lithium, antimony, barium, boron, cadmium, and thallium, while not components of monazite ore, were also detected primarily in only the radioactive areas of the site. Aluminum, antimony, barium, boron, calcium, iron, lithium, magnesium, manganese, potassium, sodium, thallium, and zinc are not associated with any RCRA hazardous waste listings.

Beryllium may be associated with one RCRA listing if it is directly disposed of as a commercial product or off-spec product. However, this scenario is highly unlikely. There was no known beryllium production on the Stepan site. Beryllium is present as a commercial pure product in only a few industrial applications such as nuclear reactor operations, neutron source generators, solid rocket propellants, and inertial guidance systems. None of the above applications were present at the Stepan site. Hence it is unlikely that beryllium was present as a pure product or disposed as a product in a manner consistent with RCRA waste listings.

Cadmium may be associated with RCRA hazardous waste listings if it is present in leachates from multi-source landfills, or in specific wastewater and/or scrubber water sludges from the electroplating, steel, or lead smelting industries. There is no commercial multi-source landfill at the Stepan site. None of the processes associated

with cadmium listings were conducted on the Stepan site. Hence none of the potential RCRA listings for cadmium apply.

Chromium may be associated with RCRA hazardous waste listings if it is present in leachates from multi-source landfills, or in specific wastewater and/or scrubber water sludges from the electroplating, aluminum coating, wood treating, petroleum refining, steel, metal-based pigment inks, ferro-chromo-silicon, or lead smelting industries. None of the processes associated with chromium listings were conducted on the Stepan. Hence none of the potential RCRA listings for chromium apply.

Although the RI does not attribute these six metals to the monazite/thorium activity at MCW, the RI also does not attribute any of the metals to any RCRA listed process sources.

Based on all of the above information, none of the metals are indicative of RCRA listed hazardous waste.

Seven rare earth elements were detected above background concentrations at Stepan: cerium, dysprosium, lanthanum, lutetium, neodymium, samarium. Cerium, lanthanum, and dysprosium are constituents of monazite ores. The remaining four may have derived from lithium operations at MCW. None of the remaining four are associated with any RCRA hazardous waste listings.

RCRA Characteristics

The contaminated media at Stepan (uranium and thorium-contaminated soil and process residuals) are not ignitable, corrosive or reactive per the RCRA definitions of these characteristics. No organic or inorganic contaminant at Stepan exceeded its respective Toxicity Characteristic Leaching Procedure ("TCLP") threshold for RCRA toxicity characteristic. Hence, the Uranium Material at Stepan is not a RCRA characteristic hazardous waste.

4.2 Chemical Contaminants at the MISS

The MISS consists of the MISS interim storage pile, and other contaminated areas on the USDOE owned property. The interim storage pile at MISS was constructed as an interim containment for wastes removed during cleanup of vicinity properties. Most of the material in the MISS pile was transferred from the Ballod vicinity property where it had been stored in surface ponds. The MISS pile consists of a bermed, synthetically lined, covered storage pile with a leachate collection system.

The RI states that retention ponds for process effluents from several nonradiological processes were formerly located at the area currently used as the MISS. These were most likely associated with the natural essences and pharmaceutical processes at MCW.

Chemical characterization sample borings were drilled in both the MISS pile and in the MISS site soils.

4.2.1 Organic Contaminants at the MISS

SVOCs

Twenty nine samples from 18 boreholes in the MISS pile and 68 samples from 33 boreholes were analyzed for SVOCs.

Nine PAHs at the MISS pile and eleven SVOCs in MISS onsite soils were above the mean baseline concentration: benzo (a) anthracene, benzo (a) pyrene, benzo (b) fluoranthene, benzo (g,h,i) perylene, benzo (k) fluoranthen, chrysene, fluoranthene, indeno (1,2,3, c,d) pyrene, phenanthrene and pyrene.

The presence of this broad spectrum of PAHs is an indication of either:

a) plant surfaces currently or previously paved with road tar or asphalt;
b) disposal of used crankcase oil or other heavy machine oils;
c) both a) and b), including locations where spilled waste oil may have dissolved and mobilized asphalt components; or
d) natural degradation of plant or organic matter

It is known that the MISS onsite area has undergone asphalt paving, demolition, and reconstruction several times in its history, and that the MISS pile contains materials from remediation of asphalt paved vicinity properties (driveways and parking lots). It is known that residual organic matter from the processing of tea leaves and other alkaloid-bearing plants was disposed on portions of the MISS site before construction of the MISS pile. Vegetative decay is also a producer of PAH compounds. The PAHs most likely derived from leaching or natural degradation of the asphalt paving materials used repeatedly at the site, or from decay of disposed or natural vegetative matter.

They may also have derived, to a lesser extent, from used oil from currently or previously used in vehicles on the site. PAHs from paving materials, degradation of natural organic matter, and from used oil, are not RCRA-listed wastes.

Based on the above information, none of the PAHs is indicative of RCRA listed hazardous waste. The USDOE RI concurs that the PAHS at Stepan are the likely result of degradation of asphalt compounds or indigenous organic matter.

Di-n-butyl phthalate

Di-n-butyl phthalate was the only phthalate detected above baseline in the USDOE RI studies at the MISS.

There is no history of industrial phthalate production on the Maywood property. Di-n-butyl phthalate is a natural degradation product of the oxidation of multi-ring aromatic compounds (PAHs), which, as described above, likely originated from paving sources, or used oil sources. Phthalates derived from natural degradation of paving material and used oils are not RCRA-listed wastes. Phthalates are also common plasticizers and may contaminate samples due to their presence in vinyl, butyl and other plastic materials in sampling tools, packaging, and PPE.

Di-n-butyl phthalate may be used as a fixative (stabilizer) in perfume oils. Di-n-butyl phthalate used as a constituent of perfume products or essential oils, or present in equipment washwater from these products is not a RCRA listed waste.

Based on the above information, the presence of di-n-butyl phthalate is not indicative of RCRA listed hazardous waste.

VOCs

Twenty eight soil samples from eighteen boreholes at the MISS pile and seventy three soil samples from thirty three boreholes in the MISS onsite soils were analyzed for VOCs. Carbon disulfide, toluene, and trichloroethene ("TCE") were detected at low levels in the MISS pile. Carbon disulfide, toluene, and 2 butanone were detected at very low levels in MISS on-site soils.

Carbon disulfide

According to the EPA "Chemfacts" database, carbon disulfide is used in the manufacture of rayon, cellulose, rubber, and adhesives, and as an agent (for preparation, plating, or passivating) in metal treatment and finishing. It was also historically used for the synthesis of carbon tetrachloride. None of the above processes have been operated on or adjacent to the MISS site.

Carbon disulfide has also been used as an agricultural fumigant, and an extractant for olive oil production. Since MCW is known to have produced oils from natural sources, it is possible that carbon disulfide was used as an extractant or solvent.

However, carbon disulfide is most commonly present in the environment as a degradation product of natural decay of animal material and other organic matter. The MISS contains material excavated from former lowland areas filled with thorium tailings, and sludges from coca and tea leaves, and which have contained cattails, marsh grasses, and weeds. Therefore, the most likely source of carbon disulfide is the natural decay of the indigenous plant materials and the leaf-processing wastes. Neither of these are RCRA listed hazardous waste sources.

Toluene

As described above, the Stepan and Maywood Sites are located near a former gasoline underground storage tank, and are located in an area that exhibits groundwater contamination by BTEX. At least one reasonable source of toluene is gasoline-based fuel from either the UST, gasoline powered vehicles on the site, or both. Neither of these are RCRA listed waste sources.

Trichloroethene ("TCE")

TCE was detected at MISS at very low concentrations, only slightly above the established baseline. TCE may be associated with RCRA waste listings if it is disposed of as spent solvent, or commercial product or off spec product, or resulted from the manufacture of chlorine, chlorinated aliphatics, or chlorinated aromatics. There is no evidence that TCE was used as a solvent or pure product either in past operations at MCW or recent operations at Stepan. There is no history of chlorinated aliphatics production at MCW or Stepan. No source for TCE has been identified in either the Maywood Site RI or the Stepan Chemical RI.

TCE is a common contaminant in most industrialized areas. It may be used in a number of applications and enter the environment in a number of ways that are not associated with RCRA waste listings. It is used in spray cleaning and drying of electronic parts, as a cutting fluid and coolant in metal machining, as a refrigerant and heat exchange fluid, and as a constituent in many commonly used surfacing materials such as paints, adhesives, and correction fluid ("Liquid Paper"). TCE entering the environment from spills or leaks from these processes or end uses is not a RCRA listed waste. The Bergen County, New Jersey area is a highly industrialized region in which some properties have been in continuous commercial use for nearly two centuries. Since the introduction of TCE in the twentieth century, many of these properties have undergone multiple changes of ownership and multiple uses. Although specific history is not known for every adjacent and every proximal property, any number of these properties may have been used for operations involving the non-listed uses of TCE, such as metal cutting, coolants, paints and adhesives, as well as the solvent or other RCRA listed waste uses. In addition, according to the RIs and EE/CA, there is evidence that MCW used fill from one or more regional sources for grading and leveling of the site sometime during its history. As a result of the multiple nearby industries, and the influence of fill introduced from area sources, it is impossible to determine the actual source(s) of the TCE detected at MISS.

Based on EPA guidance for determining whether a solid waste is or contains RCRA listed waste, if sufficient information is not available to determine conclusively that a contaminant or waste is derived from a RCRA-listed source, the waste is to be considered not a RCRA listed waste[1]. It is impossible to determine the actual source of the TCE due

[1] Memorandum, Timothy Fields, Office of Solid Waste and Emergency Response to RCRA/ CERCLA Senior Policy Makers (October 14, 1998); Preamble to NCP, 55 Fed. Reg. 8758 (March 8, 1990); Preamble to HWIR, 61 Fed. Reg. 18805 (April 29, 1996); Preamble to LDR Phase IV Rule, 63 Fed. Reg.

to both the fact that the region is highly developed and that TCE is present in the baseline itself. Since the origin of TCE at the commercial/governmental vicinity properties cannot be determined, it should not be considered to be a RCRA listed waste.

2 Butanone

There is no history of manufacture or use of 2 butanone (also known as "methyl ethyl ketone" or "MEK") at former MCW or current Stepan operations. Ketones, including 2 butanone, are extremely volatile, water soluble and biodegradable, and as a result, have a very short life span in the environment. This compound is also present in a number of commonly used supplies in labs and field sampling programs, including marker pens, label adhesives, and cleaners. Extensive experience at other FUSRAP sites indicates that ketones, including 2 butanone, which are common laboratory solvents and analytical standards, are consistently present due to laboratory influences or field sample contamination, and are often not actually site contaminants.

None of the VOC compounds identified to date at MISS are indicative of RCRA listed hazardous waste at MISS.

4.2.2 Metals and Rare Earth Elements at the MISS

Seventy soil samples from thirty four MISS onsite boreholes were analyzed for metals. Twenty two metals were detected above background in MISS on site soils: aluminum, antimony, arsenic, barium, beryllium, boron, cadmium, calcium, chromium, cobalt, copper, iron, lead, lithium, magnesium, manganese, nickel, potassium, selenium, sodium, vanadium, and zinc. Eight metals, arsenic, cobalt, copper, lead, lithium, nickel, selenium and vanadium, are known to be constituents of thorium ores and uranium ores. Residuals from processing of thorium are not RCRA listed hazardous wastes.

The remaining fourteen metals may be due to lithium production or other operations at MCW.

Aluminum, antimony, barium, boron, calcium, iron, lithium, magnesium, manganese, potassium, sodium and zinc are not associated with any RCRA waste listings.

Beryllium may be associated with one RCRA listing if it is directly disposed of as a commercial product or off-spec product. However, this scenario is highly unlikely. There was no known beryllium production on the MISS site. Beryllium is present as a commercial pure product in only a few industrial applications such as nuclear reactor operations, neutron source generators, solid rocket propellants, and inertial guidance systems. None of the above applications were present at the MISS site. Hence it is

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28619 (May 26, 1998); and Memorandum from John H. Skinner, Director, Office of Solid Waste (January 6, 1984).

unlikely that beryllium was present as a pure product or disposed as a product in a manner consistent with RCRA waste listings.

Cadmium may be associated with RCRA hazardous waste listings if it is present in leachates from multi-source landfills, or in specific wastewater and/or scrubber water sludges from the electroplating, steel, or lead smelting industries. There is no commercial multi-source landfill at the MISS site or the vicinity properties which were the source of the MISS pile soils. None of the processes associated with cadmium listings were conducted on the MISS site or the vicinity properties which were the source of the MISS pile soils. Hence none of the potential RCRA listings for cadmium apply.

Chromium may be associated with RCRA hazardous waste listings if it is present in leachates from multi-source landfills, or in specific wastewater and/or scrubber water sludges from the electroplating, aluminum coating, wood treating, petroleum refining, steel, metal-based pigment inks, ferro-chromo-silicon, or lead smelting industries. None of the processes associated with chromium listings were conducted on the MISS site or vicinity properties which were the source of the MISS pile soils. Hence none of the potential RCRA listings for chromium apply.

The RI did not attribute any of the metals to a RCRA listed hazardous waste source.

Based on all of the above information, the presence of these metals at MISS is not indicative of RCRA listed hazardous waste at MISS.

Seventy soil samples from 34 boreholes were analyzed for rare earth elements. Five were identified above background: cerium, lanthanum, neodynium, samarium, and tellerium. Since there was a high correlation between the location of rare earth detections and radioactivity detections, the RI has concluded that the rare earths were all due to thorium-related activities at MCW. Residuals from thorium extraction are not associated with any RCRA hazardous waste listings.

RCRA Characteristics

The contaminated media at MISS (uranium and thorium-contaminated soil and process residuals) are not ignitable, corrosive or reactive per the RCRA definitions of these characteristics. No organic or inorganic contaminant at Stepan exceeded its respective TCLP threshold for RCRA toxicity characteristic. Hence, the Uranium Material at MISS is not a RCRA characteristic hazardous waste.

4.3 Chemical Contaminants at Vicinity Residential Properties

Eight additional residential properties were characterized during the RI.

4.3.1 Organic Contaminants at Vicinity Residential Properties

Samples from Residential Vicinity Properties were not analyzed for VOCs and SVOCs because it was assumed that the only significant synthetic organic chemicals at these properties (if any) would be those found at, and originating at, the Stepan or MISS operable units.

A potential secondary source of trace organic chemicals at residential properties is the application of consumer product chemicals (such as paints, pesticides, and fertilizer) on buildings, lawns, and landscaping. Residential use of house and garden chemicals carries no RCRA hazardous waste listings.

4.3.2 Metals and Rare Earth at Vicinity Residential Properties

Eighteen metals were identified above background levels: aluminum, antimony, arsenic, barium, beryllium, cadmium, calcium, chromium, copper, iron, lead, magnesium, manganese, nickel, potassium, selenium, sodium, vanadium, and zinc. Seven are common in northeastern soils and their presence was expected: aluminum, calcium, iron, magnesium, manganese, potassium, and sodium. None of these seven are associated with any RCRA waste listings. The remaining eleven were all associated with monazite sands or are uranium analog metals.

The RI did not associate any of the metals with RCRA hazardous waste.

Based on all of the above information, none of the metals are indicative of RCRA listed hazardous waste.

Four rare earth elements were identified above background at the residential vicinity properties: cerium, lanthanum, lutetium, and neodynium. All were located in the radioactive contamination areas and are associated with the rare earth processing at MCW. Residuals from rare earth processing are not RCRA listed hazardous waste.

RCRA Characteristics

The contaminated media at the residential vicinity properties (uranium and thorium-contaminated soil) are not ignitable, corrosive or reactive per the RCRA definitions of these characteristics. No inorganic contaminant at these properties exceeded its respective TCLP threshold for RCRA toxicity characteristic. Any organic constituents potentially present would be expected to be at trace levels and incapable of generating a TCLP leachate with any constituent in excess of its respective TCLP characteristic threshold. Hence, the Uranium Material from the residential vicinity properties is not a RCRA characteristic hazardous waste.

4.4 Chemical Contaminants at Vicinity Commercial and Government Properties

Three commercial/governmental vicinity properties were characterized during the RI.

4.4.1 Organic Contaminants at Vicinity Commercial and Government Properties

Three VOC compounds were detected above baseline in these vicinity properties: xylene at 113 Essex Street, and 2 butanone and TCE at 200 Route 17.

Xylenes

Xylenes may be associated with several different RCRA listings if they derive from industrial solvents or specific industrial process wastes. However, they (as well as other BTEX compounds like benzene and toluene) are also common constituents of gasoline-based fuels.

There has been no history of xylene synthesis or use as solvent at any of the vicinity properties. The commercial/governmental vicinity properties are located near a former gasoline underground storage tank ("UST"), and are located in an area that exhibits groundwater contamination by BTEX. The xylene compounds likely originated from the UST, the gasoline-based fuels in the numerous vehicles and equipment used for loading operations and remediation activities at the vicinity properties, or both. None of these sources are associated with RCRA hazardous waste listings.

2 Butanone

There is no history manufacture or use of 2 butanone at former MCW or current Stepan operations. Ketones, including 2 butanone, are extremely volatile, water soluble and biodegradable, and as a result, have a very short life span in the environment. This compound is also present in a number of commonly used supplies in labs and field sampling programs, including marker pens, label adhesives, and cleaners. Extensive experience at other FUSRAP sites indicates that ketones, including 2 butanone, which are common laboratory solvents and analytical standards, are consistently present due to laboratory influences or field sample contamination, and are often not actually site contaminants.

TCE

No source for TCE has been identified in either the Maywood Site RI or the Stepan Chemical RI.

TCE may be associated with RCRA waste listings if it is disposed of as spent solvent, or commercial product or off spec product, or resulted from the manufacture of chlorine, chlorinated aliphatics, or chlorinated aromatics. There is no evidence that TCE was used as a solvent or pure product at these vicinity properties. There is no history of chlorinated aliphatics production at these vicinity properties. No specific source for TCE has been identified at these locations.

As described in Section 4.2.1, above, TCE is a common contaminant in most industrialized areas. It may be used in a number of applications and enter the environment in a number of ways that are not associated with RCRA waste listings. It is used in spray cleaning and drying of electronic parts, as a cutting fluid and coolant in metal machining, as a refrigerant and heat exchange fluid, and as a constituent in many commonly used surfacing materials such as paints, adhesives, and correction fluid ("Liquid Paper"). TCE entering the environment from spills or leaks from these processes or end uses is not a RCRA listed waste. The Bergen County, New Jersey area is a highly industrialized region in which some properties have been in continuous commercial use for nearly two centuries. Since the introduction of TCE in the twentieth century, some of the commercial/governmental vicinity properties have undergone multiple changes of ownership and multiple uses. Although specific history is not known for every vicinity property, any number of these properties may have been used for operations involving the non-listed uses of TCE, such as metal cutting, coolants, paints and adhesives, as well as the solvent or other RCRA listed waste uses. As a result, it is impossible to determine the actual source(s) of the TCE detected at these properties.

Based on EPA guidance for determining whether a solid waste is or contains RCRA listed waste, if sufficient information is not available to determine conclusively that a contaminant or waste is derived from a RCRA-listed source, the waste is to be considered not a RCRA listed waste[2]. Since the origin of TCE at the commercial/governmental vicinity properties is unknown, it should not be considered RCRA listed sources at this time.

SVOCs

Two PAH compounds were detected above baseline on these properties: fluoranthene and pyrene.

The presence of PAHs is an indication of either:

a) plant surfaces currently or previously paved with road tar or asphalt;
b) disposal of used crankcase oil or other heavy machine oils;
c) both a) and b), including locations where spilled waste oil may have dissolved and mobilized asphalt components

It is known that these three properties were partly or completely developed and paved and received vehicular traffic. The PAHs most likely derived from leaching or natural degradation of the asphalt paving. They may also have derived, to a lesser extent, from used oil from currently or previously used vehicles on the site. PAHs from paving materials and used oil, are not RCRA-listed wastes.

Based on the above information, none of the PAHs is indicative of RCRA listed hazardous waste. The USDOE RI concurs that the PAHS at these vicinity properties are the likely result of degradation of asphalt compounds or machine oils.

[2] Refer to previous footnote 1.

Three phthalates were detected above baseline on these properties: Bis 2 ethyl hexyl phthalate, butyl benzyl phthalate, and di-n butyl phthalate.

There is no history of industrial phthalate use or production on these vicinity properties. All three phthalates are natural degradation products of the oxidation of multi-ring aromatic compounds (PAHs), which, as described above, likely originated with paving sources, or used oil sources, in these highly industrialized and repeatedly paved areas. Phthalates derived from natural degradation of paving material and used oils are not RCRA-listed wastes. Phthalates are also common plasticizers and may contaminate samples due to their presence in vinyl, butyl and other plastic materials in sampling tools, packaging, and PPE.

Based on the above information, the presence of these phthalates is not indicative of RCRA listed hazardous waste.

4.4.2 Metals at Vicinity Commercial and Government Properties

Nineteen soil samples from five boreholes on three commercial/governmental vicinity properties were analyzed for metals. Nineteen metals were detected at concentrations above mean background: aluminum, arsenic, barium, beryllium, calcium, chromium, cobalt, copper, iron, lead, magnesium, manganese, nickel, potassium, selenium, sodium, vanadium, and zinc. Seven are common in northeastern soils and their presence was expected: aluminum, calcium, iron, magnesium, manganese, potassium, and sodium. None of these seven are associated with any RCRA waste listings. Seven metals, arsenic, copper, cobalt, lead, nickel, selenium and vanadium, were associated with monazite sands or are uranium analog metals.

The source of the remaining metals—barium, beryllium, chromium, and zinc—is uncertain, since these vicinity properties were the site of a variety of industrial activities over the past century. Barium and zinc are not associated with any RCRA waste listings.

Beryllium may be associated with one RCRA listing if it is directly disposed of as a commercial product or off-spec product. However, this scenario is highly unlikely. Based on the site history information available, there was no known beryllium production on the MISS site. Beryllium is present as a commercial pure product in only a few industrial applications such as nuclear reactor operations, neutron source generators, solid rocket propellants, and inertial guidance systems. It is not likely that any of the above applications were present at the commercial/governmental vicinity properties, which were small properties used for parking, warehousing, automobile inspection stations, gas stations and similar small operations. Hence it is unlikely that beryllium was present as a pure product or disposed as a product in a manner consistent with RCRA waste listings.

Chromium may be associated with RCRA hazardous waste listings if it is present in leachates from multi-source landfills, or in specific wastewater and/or scrubber water sludges from the electroplating, aluminum coating, wood treating, petroleum refining,

steel, metal-based pigment inks, ferro-chromo-silicon, or lead smelting industries. Based on the site history information available, none of the processes associated with chromium listings were conducted on the commercial/governmental vicinity properties, which were small properties used for parking, warehousing, automobile inspection stations, gas stations and similar small operations. Hence none of the potential RCRA listings for chromium apply.

Based on all of the above information, none of the metals is indicative of RCRA listed hazardous waste.

RCRA Characteristics

The contaminated media at the commercial/governmental vicinity properties (uranium and thorium-contaminated soil) are not ignitable, corrosive or reactive per the RCRA definitions of these characteristics. No organic or inorganic contaminant at these properties exceeded its respective TCLP threshold for RCRA toxicity characteristic. Hence, the Uranium Material from the commercial/governmental vicinity properties is not a RCRA characteristic hazardous waste.

5.0 Conclusions

In summary, the following conclusions can be drawn from the Maywood site information presented above:

1. None of the PAHs or phthalates at any of the four Maywood site operable units came from RCRA listed hazardous waste sources. This determination is consistent with Box 8 and Decision Diamonds 9 through 11 in the Protocol Diagram.

2. None of the VOCs at any of the four Maywood site OUs came from RCRA listed hazardous waste sources. This determination is consistent with Box 8 and Decision Diamonds 9 through 11 in the IUSA/UDEQ Protocol Diagram.

3. None of the metals at any of the four Maywood site OUs came from RCRA listed hazardous waste sources. This determination is consistent with Box 8 and Decision Diamonds 9 through 11 in the IUSA/UDEQ Protocol Diagram.

4. None of the rare earth elements at any of the four Maywood site OUs came from RCRA listed hazardous waste sources. This determination is consistent with Box 8 and Decision Diamonds 9 through 11 in the IUSA/UDEQ Protocol Diagram.

5. In addition, characterization work at all of the OUs indicates that none of the Uranium Materials are RCRA characteristic hazardous wastes.

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cc: David C. Frydenlund

TABLE 1: REVIEW OF POTENTIAL RCRA LISTINGS FOR ORGANIC CONTAMINANTS ASSOCIATED WITH MAYWOOD SITE URANIUM MATERIALS

STEPAN	Commercial Chemicals Acutely Toxic U List	Commercial Chemicals Acutely Hazardous P List	Non-Specific Sources F List	Specific Sources K List	Data Trends and Data Qualifiers	Could Stepan Wastes Come from Use Consistent with These Listings?	Other Non-listed Sources of this Contaminant/ Why It is Not a Listed Waste
Chloroform	U044	---	F024, F025	K009, K010, K016, K019, K020, K021, K028, K029, K030, K073, K116, K149, K150, K151	Laboratory extractant for SVOC analysis (2)	U possible, however due to background influence, actual source is unknown. F not applicable. No chlorinated aliphatics production. K not applicable. No fluoromethane, vinyl chloride, carbon tetrachloride, EDC, 1,1,1 TCA, TCE, PCE, TDI, chlorotoluene, or benzoyl chloride production on site.	Surgical anaesthetic, component of phenobarbitol product solutions, color, and fragrance bases, uranium flotation enhancer. (3)
Benzene	U019	---	F005, F024, F025, F037, F038	K141-K145, K147	Groundwater is known to be contaminated from one or more leaking gasoline underground storage tanks ("USTs")	U unlikely. More likely due to fuel sources. F not applicable. No refinery oil water separators, no chlorinated aliphatics production, no coking operation.	Spills from fuel gasoline UST. Spills from fuel tanks, fuel transfer lines, vehicles. Detected in background at similar or higher concentrations.
Toluene	U220	---	F005, F015, F024, F025, F038	K015, K036, K037, K149, K151	Detected in background at comparable levels. Groundwater is known to be contaminated from one or more leaking gasoline USTs.	U unlikely. May be due to fuel sources. Also, due to background influence, actual source is unknown. F not applicable. No refinery oil water separator or chlorinated aliphatics, production. K not applicable. No refinery oil water separator or hydroprocessing, benzyl chloride, or disulfoton production.	Aqueous decant and vessel washdown from toluene extraction of pharmaceuticals. (3) Spills from fuel gasoline UST. Spills from fuel tanks, fuel transfer lines, vehicles. Detected in background at similar concentrations.
Fluoranthene	U120	---	F034	K001, K022, K035		U not applicable. Not used or stored as a reagent or product. F not applicable. No creosote or wood treating operations. K not applicable. No wood treating, creosote, coking or phenol/acetone operations.	No listings are applicable. Present in coal, coal tar, coal slag, road asphalt, and roofing tar.
Pyrene	---	---	F034	K001, K022, K035		F not applicable. No creosote or wood treating operations. K not applicable. No wood treating, creosote, coking or phenol/acetone operations.	No listings are applicable. Present in coal, coal tar, coal slag, road asphalt, and roofing tar.
Chrysene	U050	---	F037	K022		U not applicable. Not used or stored as a reagent or product. F not applicable.. No refinery oil water separator. K not applicable. No phenol/acetone operations.	No listings are applicable. Present in coal, coal tar, coal slag, road asphalt, and roofing tar.

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TABLE 1: REVIEW OF POTENTIAL RCRA LISTINGS FOR ORGANIC CONTAMINANTS ASSOCIATED WITH MAYWOOD SITE URANIUM MATERIALS

Benzo (a) pyrene	U022	---	F034, F037, F038	K001, K022, K035, K141-145, K147, K148		U not applicable. Not used or stored as a reagent or product. F not applicable. No creosote or wood treating operations, no refinery oil water separator. K not applicable. No wood treating, creosote, coking, coal tar or phenol acetone operations.	No listings are applicable. Present in coal, coal tar, coal slag, road asphalt, and roofing tar.
Benzo (a) anthracene	---	---	F032, F034	K001, K022, K035, K141-145, K147, K148		F not applicable. No creosote or wood treating operations, no refinery oil water separator. K not applicable. No wood treating, creosote, coking, coal tar, or phenol/acetone operations.	No listings are applicable. Present in coal, coal tar, coal slag, road asphalt, and roofing tar.
Benzo (k) fluoranthene	---	---	F032, F034	K001, K022, K035, K141-145, K147, K148		F not applicable. No creosote or wood treating operations, no refinery oil water separator. K not applicable. No wood treating, creosote, coking, coal tar, or phenol/acetone operations.	No listings are applicable. Present in coal, coal tar, coal slag, road asphalt, and roofing tar.
Benzo (b) fluoranthene	---	---	F032, F034	K001, K022, K035, K141-145, K147, K148		F not applicable. No creosote or wood treating operations, no refinery oil water separator. K not applicable. No wood treating, creosote, coking, coal tar or phenol/acetone operations.	No listings are applicable. Present in coal, coal tar, coal slag, road asphalt, and roofing tar.
Benzo (g,h,i) perylene	---	---	F034	K001, K022, K035		F not applicable. No creosote or wood treating operations. K not applicable. No wood treating, creosote, coking, or phenol/acetone operations.	No listings are applicable. Present in coal, coal tar, coal slag, road asphalt, and roofing tar.
Indeno (1,2,3 c,d) pyrene	U137	---	F032, F034	K001, K022, K035, K141-145, K147, K148		U not applicable. Not used or stored as a reagent or product. F not applicable. No creosote or wood treating operations, no refinery oil water separator. K not applicable. No wood treating, creosote, coking, coal tar or phenol/acetone operations.	No listings are applicable. Present in coal, coal tar, coal slag, road asphalt, and roofing tar. .
Anthracene	---	---	F034	K001, K022, K035		F not applicable. No creosote or wood treating operations. K not applicable. No wood treating, creosote, coking or phenol/acetone operations.	No listings are applicable. Present in coal, coal tar, coal slag, road asphalt, and roofing tar.
Dibenzofuran	---	---	F034	K001, K035		F not applicable. No creosote or wood treating operations. K not applicable. No wood treating, creosote, or coking operations.	No listings are applicable. Present in coal, coal tar, coal slag, road asphalt, and roofing tar.

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TABLE 1: REVIEW OF POTENTIAL RCRA LISTINGS FOR ORGANIC CONTAMINANTS ASSOCIATED WITH MAYWOOD SITE URANIUM MATERIALS

Acenaphthene	---	---	F034	K001, K035, K060, K087		F034, K001, K035 not applicable. No known production of creosote or wood treating operations.	Present in coal, coke, road asphalt, and roofing tar.
Di-n-butyl phthalate	U069					U unlikely. Unlikely to have been disposed of as a commercial chemical, intermediate, off-spec product, or spent solvent. Could have been present as plasticizer in a number of common materials disposed on site or in protective equipment used in field sampling or lab.	Common plasticizer in lacquers, elastomers, explosives, nail polish, rocket fuels. Solvent and fixative in perfume oils. Used in printing inks, paper coatings, adhesives, insect repellant. Present in protective equipment and other materials used in field sampling and analytical labs. Likely present as plasticizer in tubes, hoses, gaskets, PPE, and/or as perfume oil fixative at this site.
Naphthalene	U165	---	F024, F025, F034	K001, K022, K035, K060, K087		U not applicable. Not used or stored as a reagent or product. F not applicable. No creosote or wood treating operations, no chlorinated aliphatics production. K not applicable. No wood treating, creosote, coking, chlorinated aliphatics or phenol/acetone operations.	No listings are applicable. Present in coal, coal tar, coal slag, road asphalt, and roofing tar.

MISS PILE	**Commercial Chemicals Acutely Toxic U List**	**Commercial Chemicals Acutely Hazardous P List**	**Non-Specific Sources F List**	**Specific Sources K List**	**Data Trends and Data Qualifiers**	**Could MISS Pile Wastes Come from Use Consistent with These Listings?**	**Other Non-listed Sources of this Contaminant/ Why It is Not a Listed Waste**
Carbon disulfide	---	P002	F005	---		F005, P002 Unlikely. Unlikely to have been disposed of as spent solvent or commercial carbon disulfide chemical product. Also, due to consolidation of vicinity materials, actual source is unknown. (4)	Product of biodegradation or natural organic matter. Manufacture of rayon; cellulose, rubber and adhesives. Preparation, plating, or passivating agent in metal treatment. Synthesis of carbon tetrachloride. MISS soils were consolidated from former open areas and vicinity properties where natural plant and animal matter accumulate and decay. Most likely resulted from natural degradation of organic matter.
Toluene	U220	---	F005, F015, F024, F025, F038	K015, K036, K037, K149, K151	Detected in background at comparable levels. Groundwater is known to be contaminated from one or more leaking gasoline USTs.	U, F005, unlikely. Likely derived from fuel related sources. F not applicable. No refinery oil water separator or chlorinated aliphatics production. K not applicable. No refinery oil water separator hydroprocessing, benzyl chloride, or disulfoton production. Also, due to background influence, actual source is unknown. (4)	Bench, pilot, full scale ore extraction, scintillation (radiation) counters. Aqueous decant and vessel washdown from toluene extraction of pharmaceuticals. (3) May have resulted from fuel spill from on-site vehicles or leaking gasoline USTs

TABLE 1: REVIEW OF POTENTIAL RCRA LISTINGS FOR ORGANIC CONTAMINANTS ASSOCIATED WITH MAYWOOD SITE URANIUM MATERIALS

Trichloroethene (TCE)	U228	---	F001, F002, F024, F025	K018, K019, K020, K030, K073, K150, K151		U possible, however due to background influence, actual source is unknown. (4) F not applicable. No chlorinated aliphatics, production. K not applicable. No ethyl chloride, chlorine, EDC, vinyl chloride, TCE, or PCE production.	Spray cleaning and drying of electronic parts, metal cutting fluid and coolant, refrigerant and heat exchange fluid, component of paints, adhesives, and correction fluid ("Liquid Paper") washdown water from imaging solution process vessels. Electronic parts and metal machining very likely in one or more nearby properties. Presence in paints, adhesives, and correction fluids common in all commercial settings.
Benzo (a) pyrene	U022	---	F034, F037, F038	K001, K022, K035, K141-145, K147, K148		U not applicable. Not used or stored as a reagent or product. F not applicable. No creosote or wood treating operations, no refinery oil water separator. K not applicable. No wood treating, creosote, coking, coal tar or phenol/acetone operations.	No listings are applicable. Present in coal, coal tar, coal slag, road asphalt, and roofing tar.
Benzo (a) anthracene	---	---	F032, F034	K001, K022, K035, K141-145, K147, K148		F not applicable. No creosote or wood treating operations, no refinery oil water separator. K not applicable. No wood treating, creosote, coking, coal tar, or phenol/acetone operations.	No listings are applicable. Present in coal, coal tar, coal slag, road asphalt, and roofing tar.
Benzo (k) fluoranthene	---	---	F032, F034	K001, K022, K035, K141-145, K147, K148		F not applicable. No creosote or wood treating operations, no refinery oil water separator. K not applicable. No wood treating, creosote, coking, coal tar, or phenol/acetone operations.	No listings are applicable. Present in coal, coal tar, coal slag, road asphalt, and roofing tar.
Benzo (b) fluoranthene	---	---	F032, F034	K001, K022, K035, K141-145, K147, K148		F not applicable. No creosote or wood treating operations, no refinery oil water separator. K not applicable. No wood treating, creosote, coking, coal tar or phenol/acetone operations.	No listings are applicable. Present in coal, coal tar, coal slag, road asphalt, and roofing tar.
Chrysene	U050	---	F037	K022		U not applicable. Not used or stored as a reagent or product. F not applicable. No refinery oil water separator. K not applicable. No phenol/acetone operations	No listings are applicable. Present in coal, coal tar, coal slag, road asphalt, and roofing tar.
Fluoranthene	U120	---	F034	K001, K022, K035		U not applicable. Not used or stored as a reagent or product. F not applicable. No creosote or wood treating operations. K not applicable. No wood treating, creosote, coking or phenol/acetone operations.	No listings are applicable. Present in coal, coal tar, coal slag, road asphalt, and roofing tar.

TABLE 1: REVIEW OF POTENTIAL RCRA LISTINGS FOR ORGANIC CONTAMINANTS ASSOCIATED WITH MAYWOOD SITE URANIUM MATERIALS

Indeno (1,2,3 c,d) pyrene	U137	---	F032, F034	K001, K022, K035, K141-145, K147, K148		U not applicable. Not used or stored as a reagent or product. F not applicable. No creosote or wood treating operations, no refinery oil water separator. K not applicable. No wood treating, creosote, coking, coal tar or phenol/acetone operations.	No listings are applicable. Present in coal, coal tar, coal slag, road asphalt, and roofing tar.
Pyrene	---	---	F034	K001, K022, K035		F not applicable. No creosote or wood treating operations. K not applicable. No wood treating, creosote, coking or phenol/acetone operations.	No listings are applicable. Present in coal, coal tar, coal slag, road asphalt, and roofing tar. No listings are applicable.

MISS ONSITE	**Commercial Chemicals Acutely Toxic U List**	**Commercial Chemicals Acutely Hazardous P List**	**Non-Specific Sources F List**	**Specific Sources K List**	**Data Trends and Data Qualifiers**	**Could MISS Onsite Wastes Come from Use Consistent with These Listings?**	**Other Non-listed Sources of this Contaminant/ Why It is Not a Listed Waste**
2 butanone	U159	---	F005	---	Common laboratory solvent and standard. Ketones consistently appeared at other FUSRAP sites due solely to laboratory influences.	U159, F005 unlikely. Unlikely to have been disposed of as a commercial chemical, intermediate, off-spec product, or spent solvent.	Present in materials commonly used in workplace environments, such as marker pens, inks, liquid cements and glues, wood care products, cleaning solvents, and office supplies. Readily possible for MEK to have contaminated samples in the field, laboratory or both.
Carbon disulfide	---	P002	F005	---	.	F005, P002 Unlikely. Unlikely to have been disposed of as spent solvent or commercial carbon disulfide chemical product.	Product of biodegradation or natural organic matter. Manufacture of rayon, cellulose, rubber, and adhesives. Preparation, plating, or passivating agent in metal treatment. Synthesis of carbon tetrachloride. Onsite soils are in open areas including former ponds, where natural plant and animal matter accumulate and decay. Most likely resulted from natural degradation of organic matter.
Toluene	U220	---	F005, F015, F024, F025, F038	K015, K036, K037, K149, K151	Detected in background at comparable levels. Groundwater is known to be contaminated from one or more leaking gasoline USTs.	U possible, however due to background influence, actual source is unknown. May also be due to fuel related sources from vehicles and heavy equipment, or gasoline USTs. F, K not applicable.	Bench, pilot, full scale ore extraction, scintillation (radiation) counters. Aqueous decant and vessel washdown from toluene extraction of pharmaceuticals. (3) May have resulted from fuel spill from on-site vehicles or nearby gasoline USTs.

TABLE 1: REVIEW OF POTENTIAL RCRA LISTINGS FOR ORGANIC CONTAMINANTS ASSOCIATED WITH MAYWOOD SITE URANIUM MATERIALS

Benzo (a) anthracene	---	---	F032, F034	K001, K022, K035, K141-145, K147, K148		F not applicable. No creosote or wood treating operations, no refinery oil water separator. K not applicable. No wood treating, creosote, coking, coal tar, or phenol/acetone operations.	No listings are applicable. Present in coal, coal tar, coal slag, road asphalt, and roofing tar.
Benzo (a) pyrene	U022	---	F034, F037, F038	K001, K022, K035, K141-145, K147, K148		U not applicable. Not used or stored as a reagent or product. F not applicable. No creosote or wood treating operations, no refinery oil water separator. K not applicable. No wood treating, creosote, coking, coal tar or phenol/acetone operations.	No listings are applicable. Present in coal, coal tar, coal slag, road asphalt, and roofing tar. Detected in background at similar or higher concentrations.
Benzo (b) fluoranthene	---	---	F032, F034	K001, K022, K035, K141-145, K147, K148		F not applicable. No creosote or wood treating operations, no refinery oil water separator. K not applicable. No wood treating, creosote, coking, coal tar or phenol/acetone operations.	No listings are applicable. Present in coal, coal tar, coal slag, road asphalt, and roofing tar. .
Benzo (g,h,i) perylene	---	---	F034	K001, K022, K035		F not applicable. No creosote or wood treating operations. K not applicable. No wood treating, creosote, coking, or phenol/acetone operations.	No listings are applicable. Present in coal, coal tar, coal slag, road asphalt, and roofing tar.
Chrysene	U050	---	F037	K022		U not applicable. Not used or stored as a reagent or product. F not applicable. No refinery oil water separator. K not applicable. No phenol/acetone operations.	No listings are applicable. Present in coal, coal tar, coal slag, road asphalt, and roofing tar. Detected in background at similar or higher concentrations.
Di-n-butyl phthalate	U069					U unlikely. Unlikely to have been disposed of as a commercial chemical, intermediate, off-spec product, or spent solvent. Could have been present as plasticizer in a number of common materials disposed on site or in protective equipment used in field sampling or lab.	Common plasticizer in lacquers, elastomers, explosives, nail polish, rocket fuels. Solvent and fixative in perfume oils. Used in printing inks, paper coatings, adhesives insect repellant. Present in protective equipment and other materials used in field sampling and analytical labs. Likely present as plasticizer in tubes, hoses, gaskets, PPE, and/or as perfume oil fixative at this site.
Fluoranthene	U120	---	F034	K001, K022, K035		U not applicable. Not used or stored as a reagent or product. F not applicable. No creosote or wood treating operations. K not applicable. No wood treating, creosote, coking or phenol/acetone operations.	No listings are applicable. Present in coal, coal tar, coal slag, road asphalt, and roofing tar.

TABLE 1: REVIEW OF POTENTIAL RCRA LISTINGS FOR ORGANIC CONTAMINANTS ASSOCIATED WITH MAYWOOD SITE URANIUM MATERIALS

Indeno (1,2,3 c,d) pyrene	U137	---	F032, F034	K001, K022, K035, K141-145, K147, K148		U not applicable. Not used or stored as a reagent or product. F not applicable. No creosote or wood treating operations, no refinery oil water separator. K not applicable. No wood treating, creosote, coking, coal tar or phenol/acetone operations.	No listings are applicable. Present in coal, coal tar, coal slag, road asphalt, and roofing tar.
Phenanthrene	---	---	F034	K001, K035, K060, K087	Equivalent or higher levels also detected in RI data for Linde area, not associated with refining activities.	U unlikely. Not a lab or process chemical. F034, K001, K035 not applicable. No known production of creosote or wood treating operations at these sites. K060, K087 not applicable. No coker operations at MISS or Stepan.	Present in coal, coal tar, coal slag, road asphalt, and roofing tar
Pyrene	---	---	F034	K001, K022, K035		F not applicable. No creosote or wood treating operations. K not applicable. No wood treating, creosote, coking or phenol/acetone operations.	No listings are applicable. Present in coal, coal tar, coal slag, road asphalt, and roofing tar.

RESIDENTIAL VICINITY	**Commercial Chemicals Acutely Toxic U List**	**Commercial Chemicals Acutely Hazardous P List**	**Non-Specific Sources F List**	**Specific Sources K List**	**Data Trends and Data Qualifiers**	**Could Residential Vicinity Wastes Come from Use Consistent with These Listings?**	**Other Non-listed Sources of this Contaminant/ Why It is Not a Listed Waste**
No organic compounds were reported.	---	---	---	---	---	---	---

GOVERNMENTAL/ COMMERCIAL VICINITY	**Commercial Chemicals Acutely Toxic U List**	**Commercial Chemicals Acutely Hazardous P List**	**Non-Specific Sources F List**	**Specific Sources K List**	**Data Trends and Data Qualifiers**	**Could Governmental/Commercial Vicinity Wastes Come from Use Consistent with These Listings?**	**Other Non-listed Sources of this Contaminant/ Why It is Not a Listed Waste**
2 butanone	U159	---	F005	---	Common laboratory solvent and standard. Ketones consistently appeared at other FUSRAP sites due solely to laboratory influences.	U159, F005 unlikely. Unlikely to have been disposed of as a commercial chemical, intermediate, off-spec product, or spent solvent.	Present in materials commonly used in workplace environments, such as marker pens, inks, liquid cements and glues, wood care products, cleaning solvents, and office supplies. Readily possible for MEK to have contaminated samples in the field, laboratory or both.

TABLE 1: REVIEW OF POTENTIAL RCRA LISTINGS FOR ORGANIC CONTAMINANTS ASSOCIATED WITH MAYWOOD SITE URANIUM MATERIALS

Trichloroethene (TCE)	U228	---	F001, F002, F024, F025	K018, K019, K020, K030, K073, K150, K151		F001, F002, U possible, however due to background influence, actual source is unknown. (4) F024, 025 not applicable. No chlorinated aliphatics, production. K not applicable. No ethyl chloride, chlorine, EDC, vinyl chloride, TCE, or PCE production.	Spray cleaning and drying of electronic parts, metal cutting fluid and coolant, refrigerant and heat exchange fluid, component of paints, adhesives, and correction fluid ("Liquid Paper") washdown water from imaging solution process vessels. Electronic parts and metal machining very likely in one or more nearby properties. Presence in paints, adhesives and correction fluids common in all commercial settings.
Xylenes	U239	---	F003	---		F003, U239 unlikely. Unlikely to have been disposed of as spent solvent or commercial chemical products containing xylenes.	Constituents of crude petroleum, gasoline, and diesel fuels. Most likely originated from fuels used at commercial/government sites.
Bis (2 ethyl hexyl) phthalate	---	---	---	---		This contaminant does not appear in RCRA U, P, F, or K lists.	Used in liquid vacuum pumps.
Butyl benzyl phthalate	---	---	---	---		This contaminant does not appear in RCRA U, P, F, or K lists.	Common plasticizer in vinyllic and cellulosic resins. Present in gloves and protective equipment and other materials used in field sampling and analytical labs.
Di-n-butyl phthalate	U069	---	---	---		U unlikely. Unlikely to have been disposed of as a commercial chemical, intermediate, off-spec product, or spent solvent. Could have been present as plasticizer in a number of common materials disposed on site or in protective equipment ued in field sampling or lab.	Common plasticizer in lacquers, elastomers, explosives, nail polish, rocket fuels. Solvent and fixative in perfume oils. Used in printing inks, paper coatings, adhesives insect repellant. Present in protective equipment and other materials used in field sampling and analytical labs
Fluoranthene	U120	---	F034	K001, K022, K035		U not applicable. Not used or stored as a reagent or product. F not applicable. No creosote or wood treating operations. K not applicable. No wood treating, creosote, coking or phenol/acetone operations.	No listings are applicable. Present in coal, coal tar, coal slag, road asphalt, and roofing tar.
Pyrene	---	---	F034	K001, K022, K035		F not applicable. No creosote or wood treating operations. K not applicable. No wood treating, creosote, coking or phenol/acetone operations.	No listings are applicable. Present in coal, coal tar, coal slag, road asphalt, and roofing tar. No listings are applicable.

TABLE 1: REVIEW OF POTENTIAL RCRA LISTINGS FOR ORGANIC CONTAMINANTS ASSOCIATED WITH MAYWOOD SITE URANIUM MATERIALS

NOTES TO TABLE 1

1. The following metals and inorganic elements, detected at one or more operable units of the Maywood site, are not associated with any RCRA hazardous waste listings: aluminum, antimony, barium, boron, calcium, iron, lithium, magnesium, manganese, potassium, sodium, thallium, and zinc. The RIs and EE/CA determined that the following metals originated in the uranium and thorium-bearing ores and process residuals: arsenic, cobalt, copper, lead, lithium, nickel, selenium and vanadium. All other metals detected at the Maywood site are addressed in the RCRA Report text preceding this table.

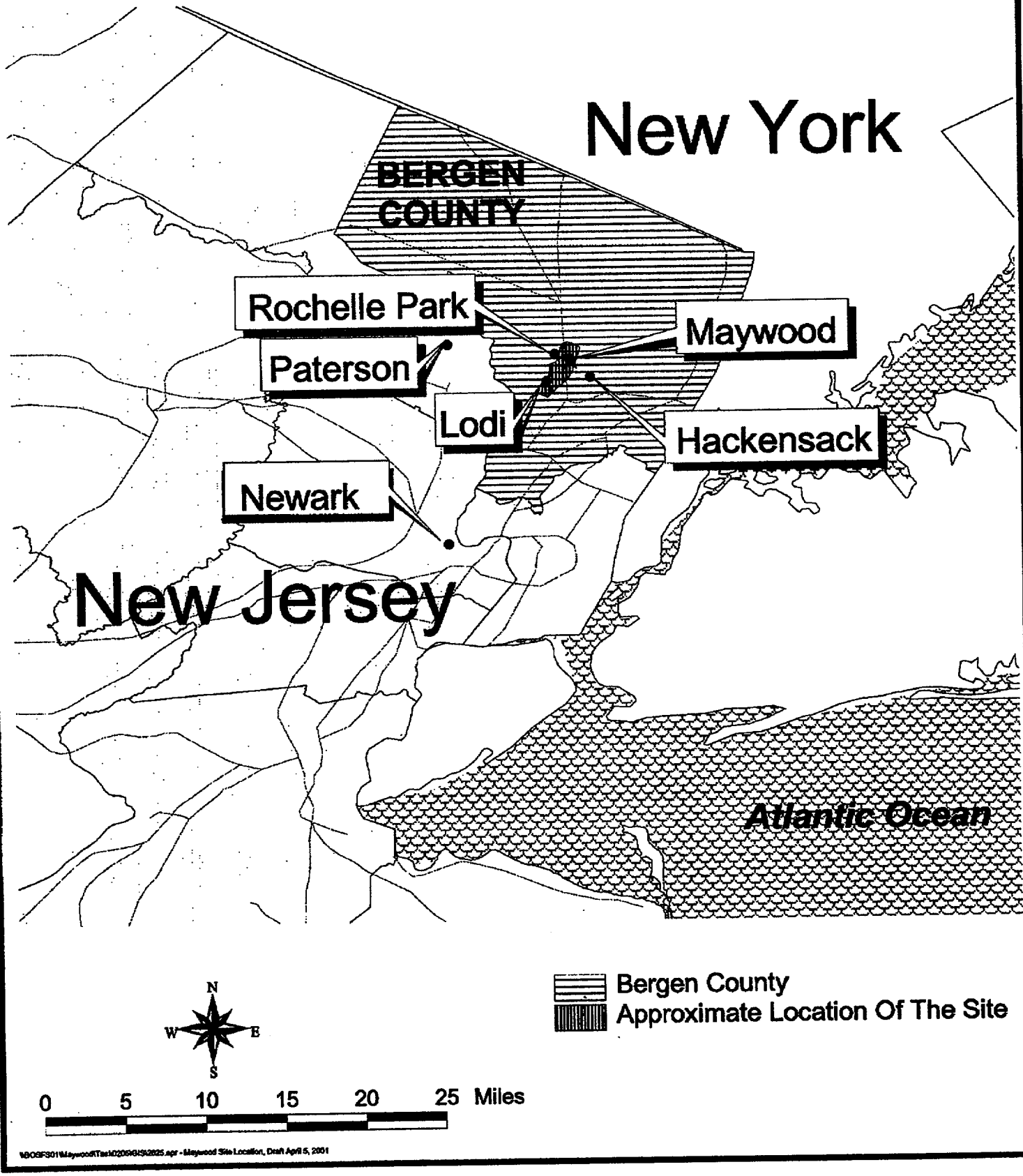
2. Based on analytical results from Maywood RI, Stepan RI and MISS soil characterization studies. Some detected parameters may be due to laboratory influences (extraction solvents, instrument standards, matrix spikes).

3. Some of the primary products from the Maywood and Stepan facilities were medical/pharmaceutical products, and essences/fragrances purified via liquid-liquid extractions. The nature of these operations is multiple small quantity batch synthesis and purification runs. Quality control standards, product quality regulations, and change of batches mandate frequent washdown of vessels and equipment. The facility likely generated a large amount of floor drain and wash water for a plant its size. Traditional ceramic/clay piping customarily used in batch plant sewers from the 1900's to the 1970's constantly leaked or seeped organic contaminants into surrounding soils. According to EPA guidance: 1) aqueous wastes generated from liquid-liquid extraction are not RCRA-listed wastes, even if they are contaminated with extraction solvents that would otherwise meet RCRA solvent listings, and 2) other process wastes containing solvents are not included in the solvent listings. See 50 FR 251 (December 31, 1985); RCRA/Superfund Hotline Report (March, 1989); RCRA/Superfund Hotline Report (June 28, 1989); RCRA/Superfund Hotline Report (June 1986); RCRA/Superfund Hotline Report (June 10, 1983).

4. Based on EPA guidance for determining whether a solid waste is or contains RCRA listed waste, if sufficient information is not available to determine conclusively that a contaminant or waste is derived from a RCRA-listed source, the waste is to be considered not a RCRA listed waste. See Memorandum, Timothy Fields, Office of Solid Waste and Emergency Response to RCRA/ CERCLA Senior Policy Makers (October 14, 1998); Preamble to NCP, 55 Fed. Reg. 8758 (March 8, 1990); Preamble to HWIR, 61 Fed. Reg. 18805 (April 29, 1996); Preamble to LDR Phase IV Rule, 63 Fed. Reg. 28619 (May 26, 1998); and Memorandum from John H. Skinner, Director, Office of Solid Waste (January 6, 1984). In each case where RCRA listing is possible but source is unknown, this table has documented one or more plausible unlisted sources which are, based on site knowledge and environmental chemical behavior, likely sources or contributors to its presence.

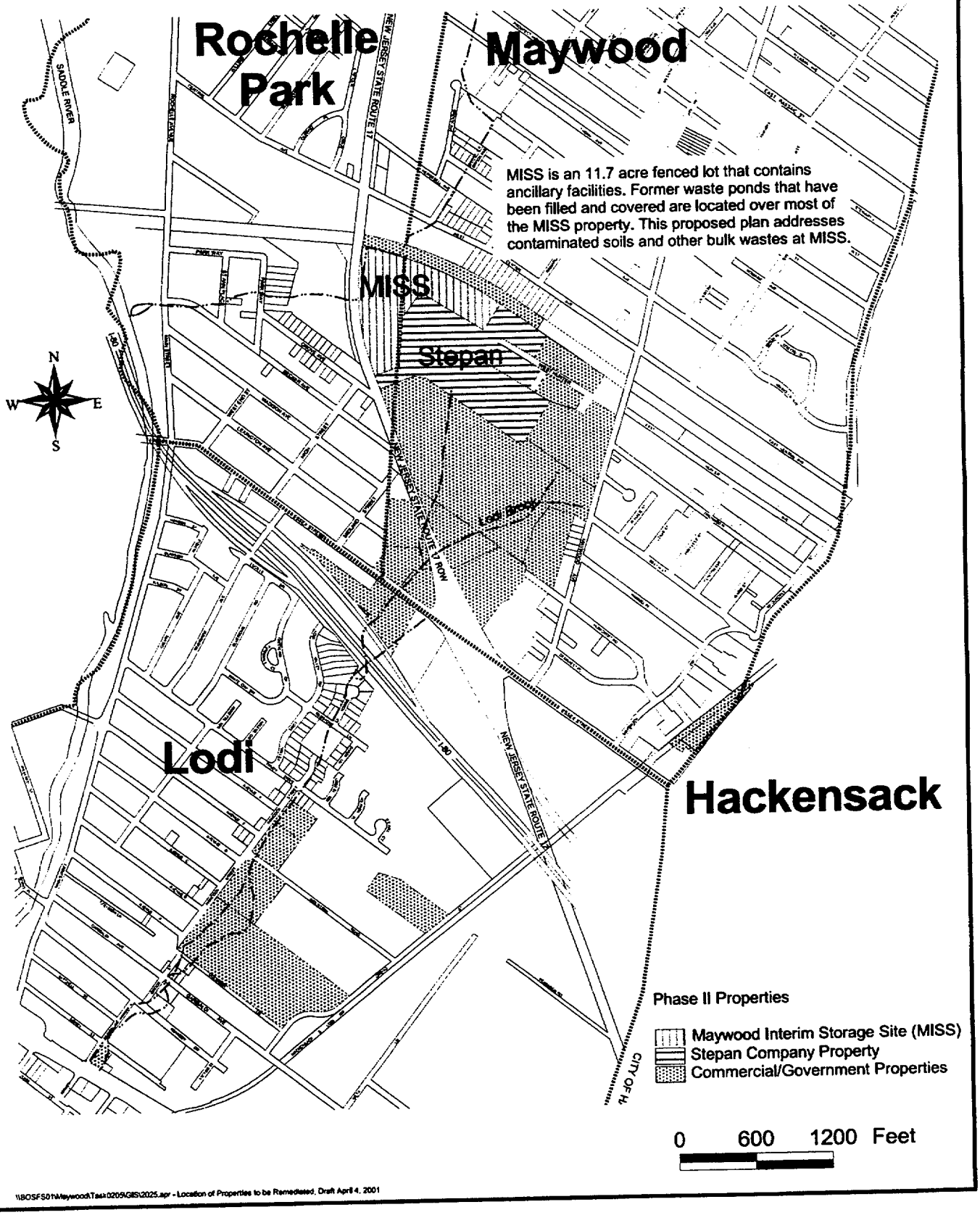
ATTACHMENT 1

DRAWING #1
MAYWOOD SITE LOCATION



N:\DOSFS01\Maywood\Tasks\0205\GIS\2625.apr - Maywood Site Location, Draft April 5, 2001

DRAWING # 2
LOCATION OF PROPERTIES TO BE REMEDIATED



\\BOSFS01\Maywood\Task\0205\GIS\2025.apr - Location of Properties to be Remediated, Draft April 4, 2001

ATTACHMENT 2

Parsons
Behle &
Latimer

A PROFESSIONAL
LAW CORPORATION

One Utah Center
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Suite 1800
Post Office Box 45898
Salt Lake City, Utah
84145-0898
Telephone 801 532-1234
Facsimile 801 536-6111

November 22, 1999

Don Verbica
Utah Division of Solid & Hazardous Waste
288 North 1460 West
Salt Lake City, Utah

Re: Protocol for Determining Whether Alternate Feed Materials are Listed Hazardous Wastes

Dear Don:

I am pleased to present the final protocol to be used by International Uranium (USA) Corporation ("IUSA") in determining whether alternate feed materials proposed for processing at the White Mesa Mill are listed hazardous wastes. Also attached is a red-lined version of the protocol reflecting final changes made to the document based on our last discussion with you as well as some minor editorial changes from our final read-through of the document. We appreciate the thoughtful input of you and Scott Anderson in developing this protocol. We understand the Division concurs that materials determined not to be listed wastes pursuant to this protocol are not listed hazardous wastes.

We also recognize the protocol does not address the situation where, after a material has been determined not to be a listed hazardous waste under the protocol, new unrefutable information comes to light that indicates the material is a listed hazardous waste. Should such an eventuality arise, we understand an appropriate response, if any, would need to be worked out on a case-by-case basis.

Thank you again for your cooperation on this matter. Please call me if you have any questions.

Very truly yours,

Parsons Behle & Latimer

M. Lindsay Ford

cc: (with copy of final protocol only)
Dianne Nielson
Fred Nelson
Brent Bradford
Don Ostler
Loren Morton
Bill Sinclair
David Frydenlund
David Bird
Tony Thompson

PROTOCOL FOR DETERMINING WHETHER ALTERNATE FEED MATERIALS ARE LISTED HAZARDOUS WASTES[1]

NOVEMBER 16, 1999

1. SOURCE INVESTIGATION.

Perform a good faith investigation (a "Source Investigation" or "SI")[2] regarding whether any listed hazardous wastes[3] are located at the site from which alternate feed material[4] ("Material") originates (the "Site"). This investigation will be conducted in conformance with EPA guidance[5] and the extent of information required will vary with the circumstances of each case. Following are examples of investigations that would be considered satisfactory under EPA guidance and this Protocol for some selected situations:

- Where the Material is or has been generated from a known process under the control of the generator: (a) an affidavit, certificate, profile record or similar document from the Generator or Site Manager, to that effect, together with (b) a Material Safety Data Sheet ("MSDS") for the Material, limited profile sampling, or a material composition determined by the generator/operator based on a process material balance.

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1 This Protocol reflects the procedures that will be followed by International Uranium (USA) Corporation ("IUSA") for determining whether alternate feed materials proposed for processing at the White Mesa Mill are (or contain) listed hazardous wastes. It is based on current Utah and EPA rules and EPA guidance under the Resource Conservation and Recovery Act ("RCRA"), 42 U.S.C. §§ 6901 et seq. This Protocol will be changed as necessary to reflect any pertinent changes to RCRA rules or EPA guidance.

2 This investigation will be performed by IUSA, by the entity responsible for the site from which the Material originates (the "Generator"), or by a combination of the two.

3 Attachment 1 to this Protocol provides a summary of the different classifications of RCRA listed hazardous wastes.

4 Alternate feed materials that are primary or intermediate products of the generator of the material (*e.g.*, "green" or "black" salts) are not RCRA "secondary materials" or "solid wastes," as defined in 40 CFR 261, and are not covered by this Protocol.

5 EPA guidance identifies the following sources of site- and waste-specific information that may, depending on the circumstances, be considered in such an investigation: hazardous waste manifests, vouchers, bills of lading, sales and inventory records, material safety data sheets, storage records, sampling and analysis reports, accident reports, site investigation reports, interviews with employees/former employees and former owners/operators, spill reports, inspection reports and logs, permits, and enforcement orders. *See e.g.*, 61 Fed. Reg. 18805 (April 29, 1996).

- Where specific information exists about the generation process and management of the Material: (a) an affidavit, certificate, profile record or similar document from the Generator or Site Manager, to that effect, together with (b) an MSDS for the Material, limited profile sampling data or a preexisting investigation performed at the Site pursuant to CERCLA, RCRA or other state or federal environmental laws or programs.
- Where potentially listed processes are known to have been conducted at a Site, an investigation considering the following sources of information: site investigation reports prepared under CERCLA, RCRA or other state or federal environmental laws or programs (*e.g.*, an RI/FS, ROD, RFI/CMS, hazardous waste inspection report); interviews with persons possessing knowledge about the Material and/or Site; and review of publicly available documents concerning process activities or the history of waste generation and management at the Site.
- If material from the same source is being or has been accepted for direct disposal as 11e.(2) byproduct material in an NRC-regulated facility in the State of Utah with the consent or acquiescence of the State of Utah, the Source Investigation performed by such facility.

Proceed to Step 2.

2. SPECIFIC INFORMATION OR AGREEMENT/DETERMINATION BY RCRA REGULATORY AUTHORITY THAT MATERIAL IS NOT A LISTED HAZARDOUS WASTE?

a. Determine whether specific information from the Source Investigation exists about the generation and management of the Material to support a conclusion that the Material is not (and does not contain) any listed hazardous waste. For example, if specific information exists that the Material was not generated by a listed waste source and that the Material has not been mixed with any listed wastes, the Material would not be a listed hazardous waste.

b. Alternatively, determine whether the appropriate state or federal authority with RCRA jurisdiction over the Site agrees in writing with the generator's determination that the Material is not a listed hazardous waste, has made a "contained-out" determination[6] with respect to the Material or has concluded the Material or Site is not subject to RCRA.

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6 EPA explains the "contained-out" (also referred to as "contained-in") principle as follows:

> In practice, EPA has applied the contained-in principle to refer to a process where a site-specific determination is made that concentrations of hazardous constituents in any given

(footnote continued on next page)

If yes to either question, proceed to Step 3.

If no to both questions, proceed to Step 6.

3. PROVIDE INFORMATION TO NRC AND UTAH.

a. If specific information exists to support a conclusion that the Material is not, and does not contain, any listed hazardous waste, IUSA will provide a description of the Source Investigation to NRC and/or the State of Utah Department of Environmental Quality, Division of Solid and Hazardous Waste (the "State"), together with an affidavit explaining why the Material is not a listed hazardous waste.

b. Alternatively, if the appropriate regulatory authority with RCRA jurisdiction over the Site agrees in writing with the generator's determination that the Material is not a listed hazardous waste, makes a contained-out determination or determines the Material or Site is not subject to RCRA, IUSA will provide documentation of the regulatory authority's determination to NRC and the State. IUSA may rely on such determination provided that the State agrees the conclusions of the regulatory authority were reasonable and made in good faith.

Proceed to Step 4.

4. DOES STATE OF UTAH AGREE THAT ALL PREVIOUS STEPS HAVE BEEN PERFORMED IN ACCORDANCE WITH THIS PROTOCOL?

Determine whether the State agrees that this Protocol has been properly followed (including that proper decisions were made at each decision point). The State shall review the information provided by IUSA in Step 3 or 16 with reasonable speed and advise IUSA if it believes IUSA has not properly followed this Protocol in determining

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(footnote continued from previous page)

> volume of environmental media are low enough to determine that the media does not "contain" hazardous waste. Typically, these so-called "contained-in" [or "contained-out"] determinations do not mean that no hazardous constituents are present in environmental media but simply that the concentrations of hazardous constituents present do not warrant management of the media as hazardous waste. ...
>
> EPA has not, to date, issued definitive guidance to establish the concentrations at which contained-in determinations may be made. As noted above, decisions that media do not or no longer contain hazardous waste are typically made on a case-by-case basis considering the risks posed by the contaminated media.

63 Fed. Reg. 28619, 28621-22 (May 26, 1998) (Phase IV LDR preamble).

that the Material is not listed hazardous waste, specifying the particular areas of deficiency.

If this Protocol has not been properly followed by IUSA in making its determination that the Material is not a listed hazardous waste, then IUSA shall redo its analysis in accordance with this Protocol and, if justified, resubmit the information described in Step 3 or 16 explaining why the Material is not a listed hazardous waste. The State shall notify IUSA with reasonable speed if the State still believes this Protocol has not been followed.

If yes, proceed to Step 5.

If no, proceed to Step 1.

5. MATERIAL IS NOT A LISTED HAZARDOUS WASTE.

The Material is not a listed hazardous waste and no further sampling or evaluation is necessary in the following circumstances:

- Where the Material is determined not to be a listed hazardous waste based on specific information about the generation/management of the Material OR the appropriate RCRA regulatory authority with jurisdiction over the Site agrees with the generator's determination that the Material is not a listed HW, makes a contained-out determination, or concludes the Material or Site is not subject to RCRA (and the State agrees the conclusions of the regulatory authority were reasonable and made in good faith) (Step 2); or
- Where the Material is determined not to be a listed hazardous waste (in Steps 6 through 11, 13 or 15) and Confirmation/Acceptance Sampling are determined not to be necessary (under Step 17).

6. IS MATERIAL A PROCESS WASTE KNOWN TO BE A LISTED HAZARDOUS WASTE OR TO BE MIXED WITH A LISTED HAZARDOUS WASTE?

Based on the Source Investigation, determine whether the Material is a process waste known to be a listed hazardous waste or to be mixed with a listed hazardous waste. If the Material is a process waste and is from a listed hazardous waste source, it is a listed hazardous waste. Similarly, if the Material is a process waste and has been mixed with a listed hazardous waste, it is a listed hazardous waste under the RCRA "mixture rule." If

the Material is an Environmental Medium,[7] it cannot be a listed hazardous waste by direct listing or under the RCRA "mixture rule."[8] If the Material is a process waste but is not known to be from a listed source or to be mixed with a listed waste, or if the Material is an Environmental Medium, proceed to Steps 7 through 11 to determine whether it is a listed hazardous waste.

If yes, proceed to Step 12.

If no, proceed to Step 7.

7. DOES MATERIAL CONTAIN ANY POTENTIALLY LISTED HAZARDOUS CONSTITUENTS?

Based on the Source Investigation (and, if applicable, Confirmation and Acceptance Sampling), determine whether the Material contains any hazardous constituents listed in the then most recent version of 40 CFR 261, Appendix VII (which identifies hazardous constituents for which F- and K-listed wastes were listed) or 40 CFR 261.33(e) or (f) (the P and U listed wastes) (collectively "Potentially Listed Hazardous Constituents"). If the Material contains such constituents, a source evaluation is necessary (pursuant to Steps 8 through 11). If the Material does not contain any Potentially Listed Hazardous Constituents, it is not a listed hazardous waste. The Material also is not a listed hazardous waste if, where applicable, Confirmation and Acceptance Sampling results do not reveal the presence of any "new" Potentially Listed Hazardous Constituents (*i.e.*, constituents other than those that have already been identified by the Source Investigation (or previous Confirmation/Acceptance Sampling) and determined not to originate from a listed source).

If yes, proceed to Step 8.

If no, proceed to Step 16.

8. IDENTIFY POTENTIALLY LISTED WASTES.

Identify potentially listed hazardous wastes ("Potentially Listed Wastes") based on Potentially Listed Hazardous Constituents detected in the Material, *i.e.*, wastes which are listed for any of the Potentially Listed Hazardous Constituents detected in the Material, as

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7 The term "Environmental Media" means soils, ground or surface water and sediments.

8 The "mixture rule" applies only to mixtures of listed hazardous wastes and other "solid wastes." *See* 40 CFR § 261.3(a)(2)(iv). The mixture rule does not apply to mixtures of listed wastes and Environmental Media, because Environmental Media are not "solid wastes" under RCRA. *See* 63 Fed. Reg. 28556, 28621 (May 26, 1998).

identified in the then most current version of 40 CFR 261 Appendix VII or 40 CFR 261.33(c) or (f).[9] With respect to Potentially Listed Hazardous Constituents identified through Confirmation and/or Acceptance Sampling, a source evaluation (pursuant to Steps 8 through 11) is necessary only for "new" Potentially Listed Hazardous Constituents (*i.e.*, constituents other than those that have already been identified by the Source Investigation (or previous Confirmation/Acceptance Sampling) and determined not to originate from a listed source).

Proceed to Step 9.

9. WERE ANY OF THE POTENTIALLY LISTED WASTES KNOWN TO BE GENERATED OR MANAGED AT SITE?

Based on information from the Source Investigation, determine whether any of the Potentially Listed Wastes identified in Step 8 are known to have been generated or managed at the Site. This determination involves identifying whether any of the specific or non-specific sources identified in the K- or F-lists has ever been conducted or located at the Site, whether any waste from such processes has been managed at the Site, and whether any of the P- or U-listed commercial chemical products has ever been used, spilled or managed there. In particular, this determination should be based on the following EPA criteria:

Solvent Listings (F001-F005)

Under EPA guidance, "to determine if solvent constituents contaminating a waste are RCRA spent solvent F001-F005 wastes, the [site manager] must know if:

- The solvents are *spent* and *cannot be reused without reclamation* or cleaning.
- The solvents were *used exclusively for their solvent properties.*
- The solvents are spent *mixtures and blends that contained, before use, a total of 10 percent or more (by volume) of the solvents* listed in F001, F002, F004, and F005.

If the solvents contained in the [wastes] are RCRA listed wastes, the [wastes] are RCRA hazardous waste. When the [site manager] does not have guidance information on the use of the solvents and their characteristics before use, the [wastes] cannot be classified as containing a

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9 For example, if the Material contains tetrachloroethylene, the following would be Potentially Listed Wastes: F001, F002, F024, K019, K020, K150, K151 or U210. *See* 40 CFR 261 App. VII.

listed spent solvent."[10] The person performing the Source Investigation will make a good faith effort to obtain information on any solvent use at the Site. If solvents were used at the Site, general industry standards for solvent use in effect at the time of use will be considered in determining whether those solvents contained 10 percent or more of the solvents listed in F001, F002, F004 or F005.

K-Listed Wastes and F-Listed Wastes Other Than F001-F005

Under EPA guidance, to determine whether K wastes and F wastes other than F001-F005 are RCRA listed wastes, the generator "must know the *generation process information* (about each waste contained in the RCRA waste) described in the listing. For example, for [wastes] to be identified as containing K001 wastes that are described as 'bottom sediment sludge from the treatment of wastewaters from wood preserving processes that use creosote and/or pentachlorophenol,' the [site manager] must know the manufacturing process that generated the wastes (treatment of wastewaters from wood preserving process), feedstocks used in the process (creosote and pentachlorophenol), and the process identification of the wastes (bottom sediment sludge)."[11]

P- and U-Listed Wastes

EPA guidance provides that "P and U wastes cover only unused and unmixed commercial chemical products, particularly spilled or off-spec products. Not every waste containing a P or U chemical is a hazardous waste. To determine whether a [waste] contains a P or U waste, the [site manager] must have direct evidence of product use. In particular, the [site manager] should ascertain, if possible, whether the chemicals are:

- Discarded (as described in 40 CFR 261.2(a)(2)).
- Either off-spec commercial products or a commercially sold grade.
- Not used (soil contaminated with spilled unused wastes is a P or U waste).

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10 Management of Investigation-Derived Wastes During Site Inspections, EPA/540/G-91/009, May 1991 (emphasis added).

11 Management of Investigation-Derived Wastes During Site Inspections, EPA/540/G-91/009, May 1991 (emphasis added).

- The sole active ingredient in a formulation."[12]

If Potentially Listed Wastes were known to be generated or managed at the Site, further evaluation is necessary to determine whether these wastes were disposed of or commingled with the Material (Steps 10 and possibly 11). If Potentially Listed Wastes were not known to be generated or managed at the Site, then information concerning the source of Potentially Listed Hazardous Constituents in the Material will be considered "unavailable or inconclusive" and, under EPA guidance,[13] the Material will be assumed not to be a listed hazardous waste.

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12 Management of Investigation-Derived Wastes During Site Inspections, EPA/540/G-91/009, May 1991.

13 EPA guidance consistently provides that, where information concerning the origin of a waste is unavailable or inconclusive, the waste may be assumed not to be a listed hazardous waste. *See e.g.*, Memorandum from Timothy Fields (Acting Assistant Administrator for Solid Waste & Emergency Response) to RCRA/CERCLA Senior Policy Managers regarding "Management of Remediation Waste Under RCRA," dated October 14, 1998 ("Where a facility owner/operator makes a good faith effort to determine if a material is a listed hazardous waste but cannot make such a determination because documentation regarding a source of contamination, contaminant, or waste is *unavailable or inconclusive*, EPA has stated that one may assume the source, contaminant, or waste is not listed hazardous waste"); NCP Preamble, 55 Fed. Reg. 8758 (March 8, 1990) (Noting that "it is often necessary to know the origin of the waste to determine whether it is a listed waste and that, *if such documentation is lacking, the lead agency may assume it is not a listed waste*); Preamble to proposed Hazardous Waste Identification Rule, 61 Fed. Reg. 18805 (April 29, 1996) ("Facility owner/operators should make a good faith effort to determine whether media were contaminated by hazardous wastes and ascertain the dates of placement. The Agency believes that by using available site- and waste-specific information ... facility owner/operators would typically be able to make these determinations. However, as discussed earlier in the preamble of today's proposal, *if information is not available or inconclusive. facility owner/operators may generally assume that the material contaminating the media were not hazardous wastes.*"); Preamble to LDR Phase IV Rule, 63 Fed. Reg. 28619 (May 26, 1998) ("As discussed in the April 29, 1996 proposal, the Agency continues to believe that, *if information is not available or inconclusive, it is generally reasonable to assume that contaminated soils do not contain untreated hazardous wastes ...*"); and Memorandum from John H. Skinner (Director, EPA Office of Solid Waste) to David Wagoner (Director, EPA Air and Waste Management Division, Region VII) regarding "Soils from Missouri Dioxin Sites," dated January 6, 1984 ("The analyses indicate the presence of a number of toxic compounds in many of the soil samples taken from various sites. However, the presence of these toxicants in the soil does not automatically make the soil a RCRA hazardous waste. The origin of the toxicants must be known in order to determine that they are derived from a listed hazardous waste(s). *If the exact origin of the toxicants is not known, the soils cannot be*

(footnote continued on next page)

If yes, proceed to Step 10.

If no, proceed to Step 16.

10. WERE LISTED WASTES KNOWN TO BE DISPOSED OF OR COMMINGLED WITH MATERIAL?

If listed wastes identified in Step 9 were known to be generated at the Site, determine whether they were known to be disposed of or commingled with the Material?

If yes, proceed to Step 12.

If no, proceed to Step 11.

11. ARE THERE ONE OR MORE POTENTIAL NON-LISTED SOURCES OF LISTED HAZARDOUS WASTE CONSTITUENTS?

In a situation where Potentially Listed Wastes were known to have been generated/managed at the Site, but the wastes were not known to have been disposed of or commingled with the Material, determine whether there are potential non-listed sources of Potentially Listed Hazardous Constituents in the Material. If not, unless the State agrees otherwise, the constituents will be assumed to be from listed sources (proceed to Step 12). If so, the Material will be assumed not to be a listed hazardous waste (proceed to Step 16). Notwithstanding the existence of potential non-listed sources at a Site, the Potentially Listed Hazardous Constituents in the Material will be considered to be from the listed source(s) if, based on the relative proximity of the Material to the listed and non-listed source(s) and/or information concerning waste management at the Site, the evidence is compelling that the listed source(s) is the source of Potentially Listed Hazardous Constituents in the Material.

If yes, proceed to Step 16.

If no, proceed to Step 12.

12. MATERIAL IS A LISTED HAZARDOUS WASTE.

The Material is a listed hazardous waste under the following circumstances:

(footnote continued from previous page)

considered RCRA hazardous wastes unless they exhibit one or more of the characteristics of hazardous waste ...").

- If the Material is a process waste and is known to be a listed hazardous waste or to be mixed with a listed hazardous waste (Step 6),
- If Potentially Listed Wastes were known to be generated/managed at the Site and to be disposed of/commingled with the Material (Step 10) (subject to a "contained-out" determination in Step 13), or
- If Potentially Listed Wastes were known to be generated/managed at the Site, were not known to be disposed of/commingled with the Material but there are not any potential non-listed sources of the Potentially Listed Hazardous Constituents detected in the Material (Step 11) (subject to a "contained-out" determination in Step 13).

Proceed to Step 13.

13. HAS STATE OF UTAH MADE A CONTAINED-OUT DETERMINATION.

If the Material is an Environmental Medium, and:

- the level of any listed waste constituents in the Material is "de minimis"; or
- all of the listed waste constituents or classes thereof are already present in the White Mesa Mill's tailings ponds as a result of processing conventional ores or other alternate feed materials in concentrations at least as high as found in the Materials

the State of Utah will consider whether it is appropriate to make a contained-out determination with respect to the Material.

If the State makes a contained-out determination, proceed to Step 16.

If the State does not make a contained-out determination, proceed to Step 14.

14. IS IT POSSIBLE TO SEGREGATE LISTED HAZARDOUS WASTES FROM OTHER MATERIALS?

Determine whether there is a reasonable way to segregate material that is a listed hazardous waste from alternate feed materials that are not listed hazardous wastes that will be sent to IUSA's White Mesa Mill. For example, it may be possible to isolate material from a certain area of a remediation site and exclude that material from Materials that will be sent to the White Mesa Mill. Alternatively, it may be possible to increase

sampling frequency and exclude materials with respect to which the increased sampling identifies constituents which have been attributed to listed hazardous waste.

If yes, proceed to Step 15.

If no, proceed to Step 12.

15. SEPARATE LISTED HAZARDOUS WASTES FROM MATERIALS.

Based on the method of segregation determined under Step 14, materials that are listed hazardous wastes are separated from Materials that will be sent to the White Mesa Mill.

For materials that are listed hazardous wastes, proceed to Step 12.

For Materials to be sent to the White Mesa Mill, proceed to Step 16.

16. PROVIDE INFORMATION TO NRC AND UTAH.

If the Material does not contain any Potentially Listed Hazardous Constituents (as determined in Step 7), where information concerning the source of Potentially Listed Hazardous Constituents in the Material is "unavailable or inconclusive" (as determined in Steps 8 through 11), or where the State of Utah has made a contained-out determination with respect to the Material (Step 13), the Material will be assumed not to be (or contain) a listed hazardous waste. In such circumstances, IUSA will submit the following documentation to NRC and the State:

- A description of the Source Investigation;
- An explanation of why the Material is not a listed hazardous waste.
- Where applicable, an explanation of why Confirmation/Acceptance Sampling has been determined not to be necessary in Step 17.
- If Confirmation/Acceptance Sampling has been determined necessary in Step 17 , a copy of IUSA's and the Generator's Sampling and Analysis Plans.
- A copy of Confirmation and Acceptance Sampling results, if applicable. IUSA will submit these results only if they identify the presence of "new" Potentially Listed Hazardous Constituents (as defined in Steps 7 and 8).

Proceed to Step 17.

17. ARE SAMPLING RESULTS OR DATA REPRESENTATIVE?

Determine whether the sampling results or data from the Source Investigation (or, where applicable, Confirmation/Acceptance Sampling results) are representative. The purpose of this step) is to determine whether Confirmation and Acceptance Sampling (or

continued Confirmation and Acceptance Sampling) are necessary. If the sampling results or data are representative of all Material destined for the White Mesa Mill, based on the extent of sampling conducted, the nature of the Material and/or the nature of the Site (*e.g.*, whether chemical operations or waste disposal were known to be conducted at the Site), future Confirmation/Acceptance Sampling will not be necessary. If the sampling results are not representative of all Material destined for the White Mesa Mill, then additional Confirmation/Acceptance sampling may be appropriate. Confirmation and Acceptance Sampling will be required only where it is reasonable to expect that additional sampling will detect additional contaminants not already detected. For example:

- Where the Material is segregated from Environmental Media, *e.g.*, the Material is containerized, there is a high probability the sampling results or data from the Source Investigation are representative of the Material and Confirmation/Acceptance Sampling would not be required.
- Where IUSA will be accepting Material from a discrete portion of a Site, *e.g.*, a storage pile or other defined area, and adequate sampling characterized the area of concern for radioactive and chemical contaminants, the sampling for that area would be considered representative and Confirmation/Acceptance sampling would not be required.
- Where Material will be received from a wide area of a Site and the Site has been carefully characterized for radioactive contaminants, but not chemical contaminants, Confirmation/Acceptance sampling would be required.
- Where the Site was not used for industrial activity or disposal before or after uranium material disposal, and the Site has been adequately characterized for radioactive and chemical contaminants, the existing sampling would be considered sufficient and Confirmation/Acceptance sampling would not be required.
- Where listed wastes were known to be disposed of on the Site and the limits of the area where listed wastes were managed is not known, Confirmation/Acceptance sampling would be required to ensure that listed wastes are not shipped to IUSA (see Step 14).

If yes, proceed to Step 4.

If no, proceed to Step 18.

18. DOES STATE OF UTAH AGREE THAT ALL PREVIOUS STEPS HAVE BEEN PERFORMED IN ACCORDANCE WITH THIS PROTOCOL?

Determine whether the State agrees that this Protocol has been properly followed (including that proper decisions were made at each decision point). The State shall

review the information provided by IUSA in Step 16 with reasonable speed and advise IUSA if it believes IUSA has not properly followed this Protocol in determining that the Material is not listed hazardous waste, specifying the particular areas of deficiency.

If this Protocol has not been properly followed by IUSA in making its determination that the Material is not a listed hazardous waste, then IUSA shall redo its analysis in accordance with this Protocol and, if justified, resubmit the information described in Step 16 explaining why the Material is not a listed hazardous waste. The State shall notify IUSA with reasonable speed if the State still believes this Protocol has not been followed.

If yes, proceed to Step 19.

If no, proceed to Step 1.

19. MATERIAL IS NOT A LISTED HAZARDOUS WASTE, BUT CONFIRMATION AND ACCEPTANCE SAMPLING ARE REQUIRED.

The Material is not a listed hazardous waste, but Confirmation and Acceptance Sampling are required, as determined necessary under Step 17.

Proceed to Step 20.

20. CONDUCT ONGOING CONFIRMATION AND ACCEPTANCE SAMPLING.

Confirmation and Acceptance Sampling will continue until determined no longer necessary under Step 17. Such sampling will be conducted pursuant to a Sampling and Analysis Plan ("SAP") that specifies the frequency and type of sampling required. If such sampling does not reveal any "new" Potentially Listed Hazardous Constituents (as defined in Steps 7 and 8), further evaluation is not necessary (as indicated in Step 7). If such sampling reveals the presence of "new" constituents, Potentially Listed Wastes must be identified (Step 8) and evaluated (Steps 9 through 11) to determine whether the new constituent is from a listed hazardous waste source. Generally, in each case, the SAP will specify sampling comparable to the level and frequency of sampling performed by other facilities in the State of Utah that dispose of 11e.(2) byproduct material, either directly or that results from processing alternate feed materials.

Proceed to Step 7.

Attachment 1

Summary of RCRA Listed Hazardous Wastes

There are three different categories of listed hazardous waste under RCRA:

- *F-listed wastes from non-specific sources (40 CFR § 261.31(a))*: These wastes include spent solvents (F001-F005), specified wastes from electroplating operations (F006-F009), specified wastes from metal heat treating operations (F010-F012), specified wastes from chemical conversion coating of aluminum (F019), wastes from the production/manufacturing of specified chlorophenols, chlorobenzenes, and chlorinated aliphatic hydrocarbons (F019-F028), specified wastes from wood preserving processes (F032-F035), specified wastes from petroleum refinery primary and secondary oil/water/solids separation sludge (F037-F038), and leachate resulting from the disposal of more than one listed hazardous waste (F039).
- *K-listed wastes from specific sources (40 CFR § 261.32)*: These include specified wastes from wood preservation, inorganic pigment production, organic chemical production, chlorine production, pesticide production, petroleum refining, iron and steel production, copper production, primary and secondary lead smelting, primary zinc production, primary aluminum reduction, ferroalloy production, veterinary pharmaceutical production, ink formulation and coking.
- *P- and U-listed commercial chemical products (40 CFR § 261.33)*: These include commercial chemical products, or manufacturing chemical intermediates having the generic name listed in the "P" or "U" list of wastes, container residues, and residues in soil or debris resulting from a spill of these materials.[1] "The phrase 'commercial chemical product or manufacturing chemical intermediate ...' refers to a chemical substance which is manufactured or formulated for commercial or manufacturing use which consists of the commercially pure grade of the chemical, any technical grades of the chemical that are produced or marketed, and all formulations in which the chemical is the sole active ingredient. It does not refer to a material, such as a manufacturing process waste, that contains any of the [P- or U-listed substances]."[2]

Appendix VII to 40 CFR part 261 identifies the hazardous constituents for which the F- and K-listed wastes were listed.

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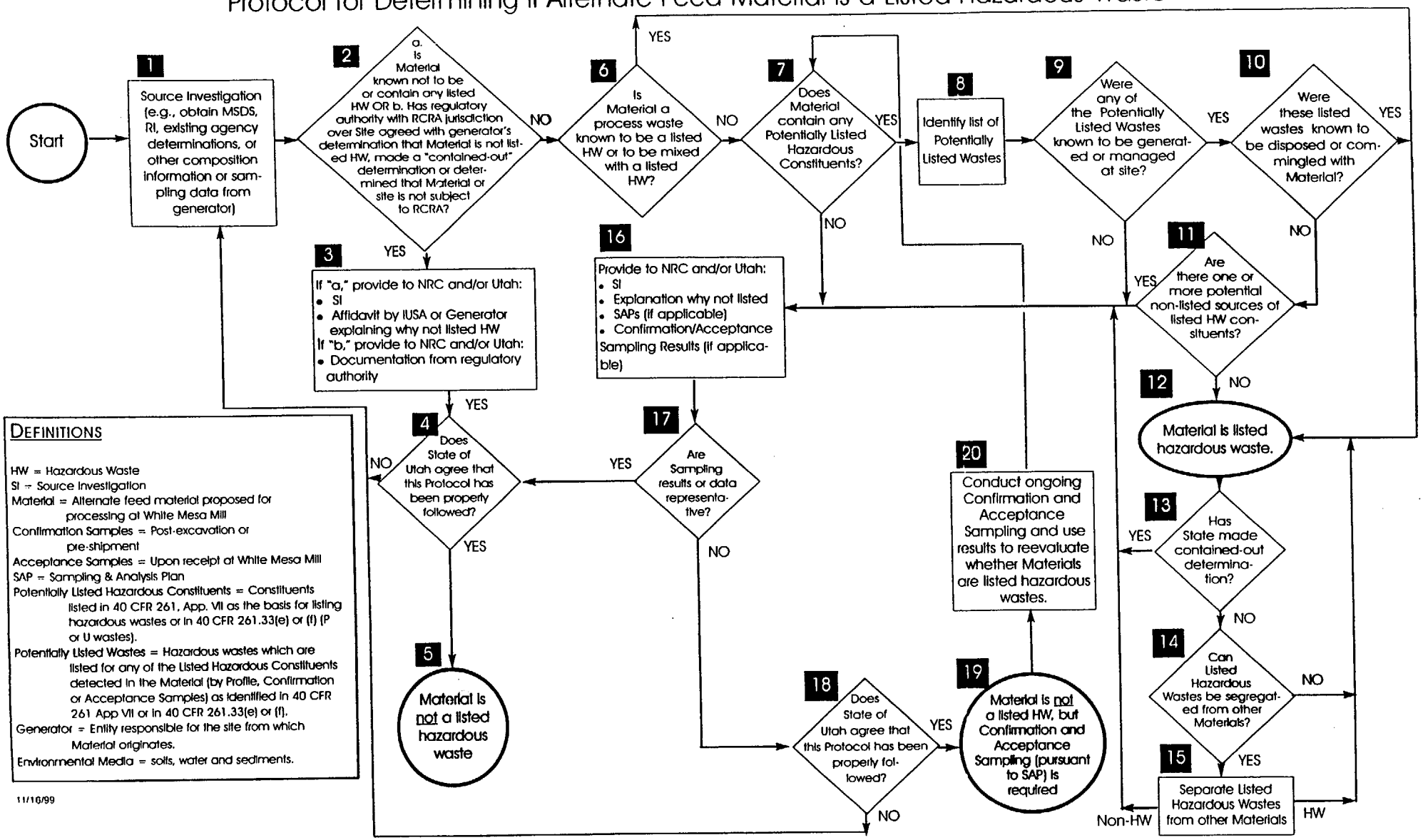
1 P-listed wastes are identified as "acutely hazardous wastes" and are subject to additional management controls under RCRA. 40 CFR § 261.33(e) (1997). U-listed wastes are identified as "toxic wastes." Id. § 261.33(f).

2 40 CFR § 261.33(d) note (1997).

Protocol for Determining if Alternate Feed Material is a Listed Hazardous Waste



DEFINITIONS

HW = Hazardous Waste
SI = Source Investigation
Material = Alternate feed material proposed for processing at White Mesa Mill
Confirmation Samples = Post-excavation or pre-shipment
Acceptance Samples = Upon receipt at White Mesa Mill
SAP = Sampling & Analysis Plan
Potentially Listed Hazardous Constituents = Constituents listed in 40 CFR 261, App. VII as the basis for listing hazardous wastes or in 40 CFR 261.33(e) or (f) (P or U wastes).
Potentially Listed Wastes = Hazardous wastes which are listed for any of the Listed Hazardous Constituents detected in the Material (by Profile, Confirmation or Acceptance Samples) as identified in 40 CFR 261 App VII or in 40 CFR 261.33(e) or (f).
Generator = Entity responsible for the site from which Material originates.
Environmental Media = soils, water and sediments.

11/16/99