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Title:	The Role of Acceptable Knowledge in Transuranic Waste Disposal Operations - 11117
Author(s):	Christopher J. Chancellor Los Alamos National Laboratory, EES-12, Carlsbad Operations Roger Nelson U.S. Department of Energy
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The Role of Acceptable Knowledge in Transuranic Waste Disposal Operations - 11117

Christopher J. Chancellor
Los Alamos National Laboratory,
EES-12, Carlsbad Operations
115 N. Main St., MS A141, Carlsbad, New Mexico 88220

Roger Nelson
U.S. Department of Energy
P.O. Box 3090, Carlsbad, New Mexico 88221

ABSTRACT

The Acceptable Knowledge (AK) process plays a key role in the delineation of waste streams destined for the Waste Isolation Pilot Plant (WIPP). General Electric's Vallecitos Nuclear Center (GEVNC) provides for an ideal case study of the application of AK in a multiple steward environment. In this review we will elucidate the pivotal role Acceptable Knowledge played in segregating Department of Energy (DOE) responsibilities from a commercial facility.

The Acceptable Knowledge process is a necessary component of waste characterization that determines whether or not a waste stream may be considered for disposal at the WIPP site. This process may be thought of as an effort to gain a thorough understanding of the waste origin, chemical content, and physical form gleaned by the collection of documentation that concerns generator/storage site history, mission, and operations; in addition to waste stream specific information which includes the waste generation process, the waste matrix, the quantity of waste concerned, and the radiological and chemical make up of the waste. The collection and dissemination of relevant documentation is the fundamental requirement for the AK process to work.

Acceptable Knowledge is the predominant process of characterization and, therefore, a crucial part of WIPP's transuranic waste characterization program. This characterization process, when conducted to the standards set forth in WIPP's operating permit, requires confirmation/verification by physical techniques such as Non-Destructive Examination (NDE), Visual Examination (VE), and Non-Destructive Assay (NDA). These physical characterization techniques may vary in their appropriateness for a given waste stream; however, nothing will allow the substitution or exclusion of AK.

Beyond the normal scope of operations, AK may be considered, when appropriate, a surrogate for the physical characterization techniques in a procedure that appeals to concepts such As Low As Reasonably Achievable (ALARA) and budgetary savings. This substitution is referred to as an Acceptable Knowledge Sufficiency Determination. With a Sufficiency Determination Request, AK may supplant the need for one or all of the physical analysis methods. This powerful procedure may be used on a scale as small as a single container to that of a vast waste stream. Only under the most stringent

requirements will an AK Sufficiency Determination be approved by the regulators and, to date, only six such Sufficiency Determinations have been approved.

Although Acceptable Knowledge is legislated into the operational procedures of the WIPP facility there is more to it than compliance. AK is not merely one of a long list of requirements in the characterization and verification of transuranic (TRU) waste destined for the WIPP. Acceptable Knowledge goes beyond the regulatory threshold by offering a way to reduce risk, cost, time, and uncertainty on its own laurels. Therefore, AK alone can be argued superior to any other waste characterization technique.

INTRODUCTION

WIPP has safely operated as the United States of America's first and only deep geologic nuclear waste repository for almost a dozen years. It was authorized by 1979 defense authorization legislation, and its regulatory compliance operating envelope was established by 1992 legislation known as the Waste Isolation Pilot Plant Land Withdrawal Act. The WIPP Land Withdrawal Act [1] limits waste that may emplaced within its man-made salt caverns to defense-related transuranic (TRU) waste materials. Provisions laid out in the WIPP Waste Acceptance Criteria (WIPP-WAC) [2] under the authority of Title 40 CFR §194.24(c) [3] define transuranic waste as a payload container containing more than 100 nanocuries per gram (3700 Bq/g) of alpha-emitting elements of atomic numbers greater than that of Uranium (92) and with half-lives greater than 20 years. As an example of this, TRU waste typically contains the defense-critical element Plutonium (94), more specifically the isotope Pu-239, which has a half life of 24,110 years and specific activity 0.062 Ci/g (2.30×10^9 Bq/g) of radioactivity.

Acceptable Knowledge (AK) is a significant component of the characterization of TRU waste destined for WIPP. Its use is a requirement of the WIPP Waste Analysis Plan (WIPP-WAP) [5] and it can offer the ability to characterize waste in concert with or in lieu of a chemical sampling and analysis program.

ACCEPTABLE KNOWLEDGE

The WIPP Hazardous Waste Facility Permit (WIPP-WAP) authorizes the use of Acceptable Knowledge to delineate waste streams and to characterize hazardous waste [5]. WAP AK requirements are addressed and implemented through CCP-PO-001, CCP Transuranic Waste Characterization Quality Assurance Project Plan. WAC AK requirements are addressed through CCP-PO-002 [6], CCP Transuranic Waste Certification Plan [7].

Acceptable Knowledge may be thought of as the collection of documentation that concerns generator/storage site history, mission, and operations; in addition to waste stream specific information which includes the waste generation process, the waste matrix, the quantity of waste concerned, and the radiological and chemical make up of

the waste. The collection and dissemination of relevant documentation is a fundamental requirement for the AK process to work. This is the role of the Acceptable Knowledge Expert (AKE).

Adherence to the regulatory requirements is laid down in the implementation of the Waste Analysis Plan (WAP) [5]. The implementation of the WAP ensures regulatory compliance and the proper management of the TRU mixed wastes. More specifically, Resource Conservation and Recovery Act (RCRA) regulations are addressed to satisfy compliance requirements. According to the WAP, Acceptable Knowledge is to be used in TRU mixed waste characterization in the following five ways:

1) To delineate TRU mixed waste streams
2) To assess whether TRU mixed wastes comply with the Treatment, Storage, and Disposal Facility Waste Acceptance Criteria (TSDF-WAC)
3) To assess whether TRU mixed wastes exhibit a hazardous characteristic (20.4.1.200 NMAC, incorporating 40 CFR §261 Subpart C)
4) To assess whether TRU mixed wastes are listed (20.4.1.200 NMAC, incorporating 40 CFR §261 Subpart D)
5) To estimate waste material parameter weights

Should any of these five characterizations be absent the waste stream would be out of compliance with the regulatory framework and not eligible for disposal in WIPP. The strict enforcement of the regulatory requirements through the procedures dictated in the WAP is why WIPP enjoys its good reputation and continued operation to this day.

About the Resource Conservation and Recovery Act (RCRA)

RCRA was signed into Federal law in 1976 in order to give the Environmental Protection Agency (EPA) the authority to regulate hazardous solid waste from cradle to grave. All hazardous solid waste activities including generation, transportation, storage, treatment, and disposal fall within its scope. RCRA regulates the hazardous waste component, but not the radioactive portion, of the mixed waste destined for WIPP. Furthermore, RCRA was written so as to allow the states to enforce RCRA regulations if their programs have been authorized by the EPA resulting in one law with many enforcers.

The EPA developed two approaches for designating a solid waste as hazardous. The first approach created the concept of "characteristic" waste concerned with generic chemical or physical properties that made it a hazard to human health or the environment. These hazards were broken down into four "characteristics" and assigned hazardous waste numbers (HWNs). The waste characteristics are recognized as ignitability (D001), corrosivity (D002), reactivity (D003), and toxicity (all other D codes) [14].

The second approach was the creation of a concept of "listed" waste in which waste streams or unused chemicals EPA already knew to be a threat to human health and the environment were listed under HWNs. Both approaches are used in conjunction in the

regulation of solid wastes. WIPP is beholden to this regulation and this provides for another application of AK [14].

GENERAL ELECTRIC'S VALLECITOS NUCLEAR CENTER (GEVNC)

An excellent case example of the use of Acceptable Knowledge is found in CCP-AK-GEV-500, Central Characterization Project Acceptable Knowledge Summary Report for General Electric Vallecitos Nuclear Center waste stream: GEVNC.01 – Hot Cell Debris Waste. CCP-AK-GEV-500 provides for an ideal case study of the application of AK in discerning responsibility and waste characterization in a multiple steward environment. In this report, AK played the pivotal role in segregating DOE responsibilities from a commercial facility. Many of the crucial details of the AK report are reproduced in the following discussion [8].

General Electric's Vallecitos Nuclear Center is a commercial facility in Sunol, CA at which government sponsored work was performed in one of its hot cells. Experiments in Hot Cell 4 were largely tied to DOE, DOE predecessor agencies, and other government agency activities. No decontamination activities occurred in the hot cell between projects leading to an unavoidable co-mingling of the materials contained within. Based on a review of the AK record it was determined that Hot Cell 4 decontamination was the responsibility of the DOE.

Hot Cell 4 was used for government-sponsored work from 1965 until 1982 when DOE-associated work in the hot cell ceased. During that time frame the record attributed Hot Cell 4 activities to DOE operations. Between 1965 and 1967, the hot cell was decontaminated in order to install a stainless-steel enclosure necessary to allow work with plutonium and mixed oxide (MOX) fuel. From the late 1960s through the 1970s, research was conducted on MOX fuel from the Liquid Metal Fast Breeder Reactor (LMFBR) program. Hot Cell 4 was designed and utilized to accommodate nondestructive examinations (NDEs) and destructive examinations on fuel rods. The manufacture of radioactive sources and experiments on waste stabilization were also performed within this hot cell. Since 1982, Hot Cell 4 has been infrequently used to manufacture sources.

The delineation of waste stream GEVNC.01

A waste stream is defined as waste material generated from a single process or from an activity that is similar in material, physical form, and hazardous constituents [5]. Waste stream GEVNC.01 was generated during the decontamination of Hot Cell 4, located in Building 102 of the GEVNC. The waste stream was composed primarily of debris materials resulted from the decontamination activities conducted on behalf of the DOE. Debris items included High Efficiency Particulate Air (HEPA) filters, hot cell equipment, materials used during fuel examinations, and materials generated during the decontamination activities (e.g., wipes). GEVNC.01 was not comprised of greater than 50 percent debris of any one material type (e.g., metal, inorganic nonmetal, and organic materials). Therefore, Waste Matrix Code S5400, Heterogeneous Debris, was assigned

to Waste Stream GEVNC.01. The waste categorization was verified during packaging with a certified physical characterization method that required direct observation of the waste materials through the hot cell window or a video feed. This physical characterization method of direct observation is referred to as visual examination (VE).

The compliance of waste stream GEVNC.01 with Waste Acceptance Criteria

Acceptable Knowledge is effective at discerning whether the composition of the waste fits into the Waste Acceptance Criteria (WAC). Documentation from activities in Hot Cell 4 was used to determine the acceptability of the waste stream for disposal in WIPP.

The Waste Acceptance Criteria requires that a waste stream include transuranic elements and the waste payloads exceed 3700 Bq/g. The Acceptable Knowledge documentation identified plutonium-based reactor fuels and sources based on Am-241 and Cf-252 to have been present in Hot Cell 4. Estimates on the level of contamination of the hot cell were documented based on 11 samples of surface contamination sampled in 1982. The AK for this waste stream justified it as TRU waste. The presence and concentration of the radionuclides was verified with a gamma spectrometer and conversion of the data using a Dose-to-Curie (DTC) estimation method.

Compliance with the WAC also requires than the TRU waste streams destined for WIPP meet the definition of a TRU defense waste. Based on the Acceptable Knowledge documentation, GEVNC.01 is indeed defense waste based on Hot Cell 4's use in the manufacture of sources for the Navy, SYNROC-D studies of a ceramic waste form for immobilizing defense high-level waste conducted by Lawrence Livermore National Laboratory, and post-irradiation examinations (PIEs) of fuels from reactors with defense missions. AK is the only characterization technique that can qualify the defense determination.

The WAC explicitly states that the waste shall contain no liquid waste, residual liquids containing PCBs, sealed containers greater than 4-liters, pyrophoric materials, non-mixed hazardous waste, characteristic waste (ignitable, corrosive, or reactive), incompatible materials, or compressed gases. No source of PCBs was identified in the AK documentation. The GEVNC decontamination packaging procedure prohibited the materials listed above from being incorporated into the GEVNC.01 waste stream during waste packaging operations. This was verified with visual examination (VE) of the waste during packaging.

The assessment of hazardous characteristics in waste stream GEVNC.01

Potentially ignitable (HWN D001), corrosive (HWN D002), and reactive chemicals (HWN D003) were prohibited during the decontamination and packaging of the TRU waste in Hot Cell 4. Wastes exhibiting any of the previously mentioned hazardous characteristics are expressly prohibited at the WIPP.

Acceptable Knowledge documentation identified many components of the waste that were potentially ignitable including: acetone, aliphatic petroleum spirits in a commercial product, hexane, toluene, various alcohols, and xylene. These chemicals may exhibit the characteristic of ignitability in their liquid form but based on the AK record liquids were not expected. This was verified / remedied with visual examination (VE) / treatment of the waste during packaging.

AK identified several components of the Hot Cell 4 waste that were potentially corrosive including: chromic acid, hydrochloric acid, hydrofluoric acid, hydrogen peroxide, nitric acid, sodium hydroxide, and sulfuric acid. These chemicals may exhibit the characteristic of corrosivity in their pure forms but, again, based on the AK record liquids were not expected. This was verified / remedied with visual examination (VE) / treatment of the waste during packaging.

The documentation reviewed during the AK process identified a few materials that were potentially reactive including: dibenzoyl peroxide, hydrogen peroxide, sodium metal, and sodium-potassium alloy. These chemicals may exhibit the characteristic of reactivity in their pure form but based on the AK record these materials were all reacted prior to disposal. This was verified / remedied with visual examination (VE) / treatment of the waste during packaging.

The assessment of listed constituents in waste stream GEVNC.01

To assign EPA Hazardous Waste Numbers (HWNs), AK sources, including procedures, personnel interviews, logbooks, and material safety data sheet (MSDS) information for commercial products noted in the AK record, were reviewed to determine potential waste material inputs and possible chemical contaminants associated with the historic hot cell operations, including chemical use in support areas surrounding the hot cells, if procedures would have allowed the use of those chemicals inside the cell. An inventory of chemicals found in the Radioactive Materials Laboratory, after Hot Cell 4 was idled, was compiled in 1990. This list was reviewed to identify chemicals that may have been used in Hot Cell 4. The appropriate HWNs were conservatively assigned to all the containers in the waste stream for compounds used in the hot cells, due to the lack of analytical evidence quantifying the concentration of RCRA toxicity contaminants in the waste matrix. The EPA HWNs assigned are summarized in Table 1, Waste Stream GEVNC.01 Hazardous Waste Characterization Summary.

Table 1. Waste Stream GEVNC.01 Hazardous Waste Characterization Summary

EPA Hazardous Waste Number	Constituent
Toxicity Characteristic Metals	

EPA Hazardous Waste Number	Constituent
D007	Chromium
D008	Lead
D009	Mercury
Toxicity Characteristic Organics	
	None
F-List Organic Solvents	
F002	Methylene chloride
F002	1,1,2-trichloro-1,2,2-trifluoroethane
F005	Isobutanol (isobutyl alcohol)
F005	Toluene

According to the available documentation chromic acid (D007) was used as an etching agent, lead (D008) was used as sealing tape component, shielding (e.g., pigs) and brick material, and mercury (D009) was used in mercury vapor lamps and thermometers.

Since analytical data was not available to demonstrate the concentrations of metal components of this debris waste stream are less than the toxicity characteristic regulatory levels, EPA hazardous waste numbers D007, D008, and D009 were assigned to waste stream GEVNC.01.

The AK sources did not identify the use of any organic toxicity characteristic compounds in the hot cell.

F-listed solvents that the AK determined may be present include Freon (1,1,2-Trichloro-1,2,2-trifluoroethane), isobutyl alcohol, and methylene chloride. Based on headspace gas results on the first lot of drums generated for the waste stream, toluene was conservatively identified as a potential F005-listed solvent even though a specific source for this chemical was not identified in the AK record.

The flammable F003-listed solvents mentioned in the relevant AK documentation include: acetone, butyl alcohol, methanol, and xylene. However, F003-listed solvents are listed solely because these solvents are ignitable in the liquid form. Waste stream GEVNC.01 did not exhibit the characteristic of ignitability because it was not liquid waste; therefore, HWN F003 was not assigned.

The estimation of waste material parameter weights in waste stream GEVNC.01

The waste material parameters (WMPs) for the waste stream were based on visual observation of the debris material as seen through the Hot Cell 4 viewing windows and from WMP estimates for similar debris waste streams at other DOE hot cell laboratory facilities. The WMP weight percent range for this waste stream was estimated using the

range of values cited in the AK reports for other DOE hot cell waste streams (Idaho National Laboratory [INL], Argonne National Laboratory-East [ANL-E], Los Alamos National Laboratory [LANL], and Battelle Columbus Laboratories Decommissioning Project [BCLDP]). The GEVNC estimated average weight percent was calculated by averaging the values for the four mentioned waste streams. The results of the assessment are presented below in Table 2, Waste Stream GEVNC.01 Waste Material Parameter Estimates.

Table 2. Waste Stream GEVNC.01 Waste Material Parameter Estimates

Waste Material Parameter	Estimated Weight Percent	Weight Percent Range
Iron-based Metals/Alloys	60.7 %	0 – 98 %
Aluminum-based Metals/Alloys	6.9 %	0 – 72 %
Other Metals	6.2 %	0 – 66 %
Other Inorganic Materials	6.2 %	0 – 56 %
Cellulosics	9.6 %	0 – 100 %
Rubber	2.1 %	0 – 65 %
Plastic (waste materials)	6.2 %	0 – 58 %
Organic Matrix	1.4 %	0 – 31 %
Inorganic Matrix	0.7 %	0 – 27 %
Total Organic Waste Ave.	**19.3 %**	
Total Inorganic Waste Ave.	**80.7 %**	

Any single container could vary widely from the WMPs identified; however, no individual container in this waste stream will contain less than 50 percent heterogeneous waste materials. The evaluation of the data used to construct the WMP weights of waste stream GEVNC.01 was documented by an AKE in a memorandum as required by CCP-TP-005 [4]. Again, Acceptable Knowledge demonstrates its versatility as a characterization method.

The conclusion of waste stream GEVNC.01

Waste stream GEVNC.01 demonstrated the use of Acceptable Knowledge as the dominant technique for characterization of the waste. In some cases such as defense determination, AK is the only technique that may be applied. As seen in CCP-AK-GEV-500, AK supplements or replaces the alternative physical characterization techniques such as waste material parameters and chemical composition.

The beauty of Acceptable Knowledge is the amount of information that may be extracted defining the waste without ever "getting one's hands dirty." The physical characterization techniques available each require specialized training for an operator and an analyst along with whatever additional personal are required by a Quality Assurance (QA) program. Additionally, these methods require specialized instruments, personal protection equipment (PPE), involve some risk to personal, as well as may generate some

additional waste as part of their processes. AK is the truly superior characterization technique in regards to its breadth of characterization information, exclusive in details regarding ownership, cheap in capitol and labor expenses, and it provides no opportunity for exposure by personnel (e.g., ALARA).

The conclusion of waste stream GEVNC.01 occurred in March of 2010 when the final shipment of remote-handled (RH) waste departed the General Electric Vallecitos Nuclear Center in an RH-72b transport cask destined for WIPP. A new waste stream designated GEVNC.02 was created for the purpose of removing the remaining contact-handled (CH) waste that did not fit radiological requirements of the previous waste stream. DOE remediation responsibilities ended with the GEVNC on June 2010 when the last drums of hot cell decontamination waste were hauled from the commercial facility. Through the use of Acceptable Knowledge, DOE's decontamination effort was focused on and limited to its responsibilities, and without making the taxpayer bear the costs of a commercial activity cleanup.

AK SUFFICIENCY

Based on the available data from the generator site, it is possible to determine whether AK alone is sufficient for characterization of a waste stream. Should this be the case a sampling and analysis program can be deemed unnecessary and an AK Sufficiency Determination is sought. The Sufficiency Determination Request may take one of the following forms [5]:

Scenario 1 Radiography or visual examination (VE) of the waste stream is not required, and chemical sampling and analysis is not required;

Scenario 2 Radiography or VE of the waste stream is not required, but chemical sampling and analysis of a representative sample of the waste stream is required; or

Scenario 3 Chemical sampling and analysis is not required, but radiography or VE of 100% of the containers in the waste stream is required.

In scenario 1, the Acceptable Knowledge is sufficiently thorough to understand the chemical make up, the physical characteristics, and recognize the absence of prohibited items in the waste stream.

In scenario 2, the Acceptable Knowledge is sufficiently thorough to understand the physical characteristics of the waste and verify the absence of prohibited items in the waste stream. The chemical nature of the waste is not fully understood so sampling is required.

In scenario 3, the Acceptable Knowledge is sufficiently thorough to understand the chemical composition of the waste stream. The physical characteristics of the waste are not known with certainty nor are the absence of prohibited items so examination of the waste is required.

The Central Characterization Program (CCP) evaluates the AK Sufficiency Request submitted by the generator/storage site based on the following criteria:

a) The Determination Request must include all information specified in Permit Attachment B4, Section B4-3d [Attachment 1].
b) The AK Summary must identify relevant hazardous constituents, and must correctly identify all toxicity characteristic and listed hazardous waste numbers.
c) All hazardous waste number assignments must be substantiated by supporting data and, if not, whether this lack of substantiation compromises the interpretation.
d) Resolution of data discrepancies between different AK sources must be technically correct and documented.
e) The AK Summary must include all the identification of waste material parameter weights by percentage of the material in the waste stream, and determinations must be technically correct.
f) All prohibited items specified in the TSDF-WAC should be addressed, and conclusions drawn must be technically adequate and substantiated by supporting information.
g) If the AK record includes process control information specified in Permit Attachment B4, Section B4-3b [Attachment 1], the information should include procedures, waste manifests, or other documentation demonstrating that the controls were adequate and sufficient.
h) The site must provide the supporting information necessary to substantiate technical conclusions within the Determination Request, and this information must be correctly interpreted.

Comment [ran1]: You can expect your reader to know that VE/RTR is required to tally MPW on a container basis, so you owe them an explanation of why MPW on a waste stream basis is needed in the AK beforehand.

Comment [22]: I believe you meant to refer to WMP and a more thorough discussion is available in the discussion of GEVNC.01.

It is important to note that the "site" is explicitly identified as the supplier of supporting information. This requirement was a conscious division of responsibilities -- maintaining the CCP as a verifying organization independent of the site's desire for an expedient path forward to disposal at WIPP. The well-defined separation of roles between CCP and the site are designed to prevent "a fox guarding the henhouse" situation in which CCP is more driven to quickly ship waste from a site than scrutinize whether it is appropriate for WIPP.

Once the CCP is satisfied with the completeness and technical accuracy of the AK Sufficiency Determination Request it is submitted to the New Mexico Environmental Division (NMED) for approval/rejection. The requesting of an AK Sufficiency is not an easy, expedient process and as of the writing of this paper only two sites, Los Alamos National Laboratory (LANL) and Savannah River Site (SRS), have been granted an AK Sufficiency Determination for a total of six waste streams [9-13].

The process of sufficiency determination request is an onerous process. It has taken on average roughly one year from the submission of a determination request to NMED to provisional approval. An example of the difficulties involved can be observed in the AK Sufficiency Determination Request submitted for the SRS waste stream SR-BCLDP.001.001. NMED issued a Notice of Deficiency (NOD) four months after the application questioning the adequacy of the available information and accusing CCP of orchestrating the determination request without the site's involvement. It took six additional months for SRS and CCP to craft an appropriate response to the NOD that NMED considered "adequate" after an additional two months of reviewing the response. The result of excessive time required to invest in a sufficiency determination is an obvious disuse of the capability due the time-pressures that must be addressed. The near abandonment of sufficiency determination guarantees that more personnel risk exposure due to the "hands on" requirements of the other available characterization techniques.

CONCLUSIONS

The use of AK is not merely one of a long list of requirements in the characterization and verification of TRU waste destined for the WIPP. Acceptable Knowledge can be considered the primary characterization technique available for waste certification, and in some cases such as a Defense Determination it is the only method available. Acceptable Knowledge is the predominant process of characterization and, therefore, a crucial part of WIPP's transuranic waste characterization program. This characterization process may require confirmation/verification by physical techniques; however, no other characterization will allow the substitution or exclusion of AK -- it must be used. From this one may reasonably conclude that Acceptable Knowledge is not a verification of other characterization techniques but it is the other way around: physical techniques such as NDE, VE, and NDA confirm the AK.

Acceptable Knowledge can be used to go beyond individual containers and understand the entire waste stream. Since the definition of a waste stream concerns a common process and the similarity in material, physical form, and hazardous constituents an average of waste containers can be used to represent the whole. As is the case in the Sufficiency Determination, the use of AK in waste streams can reduce worker exposure. In the case of using a waste stream to represent all the containers beholden to it, only a sampling of waste containers need be characterized to represent the whole. The result is fewer man-hours, fewer breached containers, and fewer opportunities for exposure: faster, cheaper, and safer.

AK, when used to its full potential, serves as the greatest proponent of ALARA (As Low AS Reasonably Achievable) and fiscal responsibility in terms of waste characterization. The ability to understand the waste destined for disposal without breaching a waste container not only stands for the best interests of human health and the environment, but may offer the potential for savings in reduced man-hours, equipment costs, and generation of secondary wastes.

REFERENCES

1. US Congress Public Law 102-579: Waste Isolation Pilot Plant Land Withdrawal Act, 1992.
2. DOE/WIPP-02-3122: Transuranic Waste Acceptance Criteria for the Waste Isolation Pilot Plant Revision 6.4, 12/10/2009.
3. 40CFR194 – Title 40 – Protection of Environment, Part 194 – Criteria for the Certification and Re-Certification of the Waste Isolation Pilot Plant's Compliance with the 40 CFR Part 191 Disposal Regulations, 1998.
4. CCP-TP-005, CCP Acceptable Knowledge Documentation, U.S. DOE Carlsbad.
5. WIPP Waste Analysis Plan, 04/01/2010, U.S. DOE Carlsbad.
6. CCP-PO-001, CCP Transuranic Waste Characterization Quality Assurance Project Plan, U.S. DOE Carlsbad.
7. CCP-PO-002, CCP Transuranic Waste Certification Plan, U.S. DOE Carlsbad.
8. CCP-AK-GEV-500, CCP Acceptable Knowledge Summary Report For General Electric Vallecitos Nuclear Center, Waste Stream GEVNC.01, Carlsbad, New Mexico, Washington TRU Solutions, LLC.
9. CCP-AK-LANL-500, CCP Acceptable Knowledge Summary Report For 16 Canisters of Remote-Handled Transuranic Debris Waste From Los Alamos National Laboratory Chemistry and Metallurgy Research Facility, Waste Stream LA-MHD03.002, Carlsbad, New Mexico, Washington TRU Solutions, LLC.
10. CCP-AK-SRS-510, Central Characterization Project, Acceptable Knowledge Summary Report For Battelle Columbus Laboratories Decommissioning Project (BCLDP) Remote-Handled Transuranic Waste from the Building JN-1 Hot Cell Laboratory Pressure Wash and Laundry Operations, Waste Streams: SR-BCLDP.001.001 and SR-BCLDP.001.002, Carlsbad, New Mexico, Washington TRU Solutions, LLC.
11. CCP-AK-SRS-520, Central Characterization Project Acceptable Knowledge Summary Report For Battelle Columbus Laboratories Decommissioning Project (BCLDP) Remote-Handled Homogeneous Transuranic Waste from the Building JN-1 Hot Cell Laboratory, Waste Stream: SR-BCLDP.002, Carlsbad, New Mexico, Washington TRU Solutions, LLC.
12. CCP-AK-SRS-530, Central Characterization Project Acceptable Knowledge Summary Report For Battelle Columbus Laboratories Decommissioning Project (BCLDP) Remote-Handled Homogeneous Transuranic Waste from the Building JN-1 Hydraulic Room, Waste Stream: SR-BCLDP.003, Carlsbad, New Mexico, Washington TRU Solutions, LLC.
13. CCP-AK-SRS-540, Central Characterization Project, Acceptable Knowledge Summary Report For Battelle Columbus Laboratories Decommissioning Project (BCLDP) Remote-Handled Transuranic Waste from the Building JN-1 Hot Cell Laboratory Transfer and Storage Pool, Waste Streams: SR-BCLDP.004.002 and SR-BCLDP.004.003, Carlsbad, New Mexico, Washington TRU Solutions, LLC.
14. McCoy's RCRA Unraveled, 2010 Edition, McCoy and Associates, Inc.

ATTACHMENT 1

WIPP Waste Analysis Plan, 04/01/2010, U.S. DOE Carlsbad.

B4-3d AK Sufficiency Determination Request Contents

Generator/storage sites may submit an AK Sufficiency Determination Request (**Determination Request**) to meet all or part of the waste characterization requirements. The Determination Request shall include, at a minimum:

- Identification of the scenario for which the approval is sought (Permit Attachment B, Section B-0b).

- A complete AK Summary that addresses the following technical requirements:

  - Executive Summary;

  - Waste Stream Identification Summary, including a demonstration that the waste stream has been properly delineated and meets the Permit definition of waste stream (Permit Attachment B, Introduction);

  - Mandatory Program Information (including, but not limited to, facility location and description, mission, defense waste assessment, spent nuclear fuel and high-level waste assessment, description of waste generating processes, research/development [as necessary], facility support operations [as applicable], types and quantities of TRU waste generated, correlation of waste streams to buildings/processes, waste identification and categorization, physical form identifiers);

  - Mandatory Waste Stream Information (including, but not limited to, Area and Building of Generation, waste stream volume/period of generation (including, for newly generated waste, the rate and quantity of waste to be generated), waste generating activities, types of waste generated, material input related to physical form and identification of percentage of each waste material parameter in the waste stream, chemical content information including hazardous constituents and hazardous waste identification, prohibited item content (including documented evidence that the waste meets the TSDF-WAC Permit Conditions II.C.3.a-h), waste packaging, presence of filter vents, number of layers of confinement);

  - Types of supporting information gathered;

  - Container specific data (if available and relevant); and

  - A complete reference list including all mandatory and supporting information.

- An AK roadmap (defined as a cross reference between mandatory programmatic and mandatory waste stream information, with references supporting these requirements).

- A complete reference list including all mandatory and supporting documentation.
- Relevant supporting information for the required programmatic and waste stream data addressed in the AK Summary, examples of which are presented in Permit Attachment B4, Section B4-2c.
- Identification of any mandatory requirements supported only by upper tier documents (i.e., there is insufficient supporting data).
- Description or other means of demonstrating that the AK process described in the Permit was followed (for example, AK personnel were appropriately trained; discrepancies were documented, etc).Information showing that the generator/storage site has developed a written procedure for compiling the AK information and assigning hazardous waste numbers as required in Permit Attachment B4-3b.
- Information showing that the generator/storage site has assessed the AK process (e.g. internal audits, Permit Attachment B4-3b).

The Permittees shall evaluate the Determination Request for completeness and technical adequacy as specified in Permit Attachment B.