

W-B4 BASICS OF HAZARDOUS WASTE ANALYSIS PLANS

March 2025

Geoff Knight and Mike Dudasko

Yorke[®]

ENGINEERING, LLC

www.YorkeEngr.com

*Specializing in Air Quality
and EH&S Services*

Yorke Engineering, LLC

- Yorke assists Industrial and Government clients with environmental, air quality, and safety/industrial hygiene (IH) regulations issued by the local, state, and federal agencies
- Founded in 1996 and has worked for over 2,000 customers at well over 3,000 facilities
- Over 10,000 air, water, waste, and safety/IH projects completed



Geoff Knight



- Over 30 years experience providing variety of environmental compliance, permitting, and management systems development to industry and government
- Many years doing hazardous waste characterization and management in California (plus WA, MA, NY, and numerous other states)
- DTSC-approved Violation Scoring Procedure (VSP) auditor for California-permitted TSDFs
- Developed sampling plans and performed field sample collection at RCRA Corrective Action, NPL, UST, and many other contaminated sites

What's a Waste Analysis Plan?

- Depending on the exact need, a waste analysis plan (WAP) is a document designed to:
 - Ensure accurate and defensible **characterization** of hazardous waste
 - Accurate/defensible characterization supports accurate/defensible **classification** of waste in accordance with federal and state criteria
 - Fulfill a regulatory requirement to have a written WAP
 - A WAP's objective is similar to other environmental sampling plans: produce representative data to support environmental risk management

Why Write a WAP?

- Hazardous waste characterization and classification is complicated!
- Significant regulatory/financial risk if wastes are not accurately characterized and classified
- A set of well thought-out and reviewed procedures can be essential to consistently applying complex concepts in waste sampling, analysis and classification

Why Write a WAP?

Waste analysis, therefore, is the pivotal activity for properly ensuring that your facility (and any subsequent handlers) complies with the applicable regulations for proper waste treatment, storage, or disposal.



Solid Waste And
Emergency Response
(5303P)

EPA 530-R-12-001
April 2015
<http://www.epa.gov>

Waste Analysis at Facilities that Generate, Treat, Store, and Dispose of Hazardous Wastes - Final

Who Is Required (or Should) Develop a WAP?

1. **Hazardous waste generators**

- Generators (SQGs and LQGs) need to manage their cradle-to-grave responsibilities for the wastes they generate
- Also need to manage costs and liabilities related to waste generation and disposal

Generator Requirements for a WAP

- Other than related to generator treatment, there is no federal/state requirement for a written WAP
- **However**, persons who generate a solid waste are obligated under 40 CFR 262.11 and 22 CCR 66262.11 to determine if their wastes are hazardous

Generators May Not Always Benefit From a WAP

- Many generators have relatively uncomplicated waste determination
 - Some wastes, such as listed wastes, used oil, etc. are defined as hazardous or must be managed that way
 - Some wastes, such as universal wastes, are rarely cost-effective to actually test – e.g., electronic wastes or batteries

Generators May Not Always Benefit From a WAP

- Generator knowledge is a legitimate basis for waste classification and well-tested assumptions may apply, e.g., that certain waste organic liquids (gasoline, solvents, etc.) are ignitable
- Conversely, there's little reason to test an inorganic or high water-content waste for ignitability or test organic liquids for corrosivity

When Should a Generator Develop a WAP?

- New processes generating unfamiliar or “new” wastes
- Waste stream variability based on process variables (chemical formulations, etc.)
- “Unknown” wastes, i.e., waste provenance, is poorly understood (e.g., a remediation waste)

When Must a Generator Develop a WAP?

- Most common situation where a WAP is a generator requirement is found in California's Tiered Permitting program under the Permit By Rule (PBR) tier
- 22 CCR 66265.13(b) as referenced by 67450.3 that a WAP is required for TTUs and FTUs operating under PBR
- GIR junkies take note of 66265 reference!

When Must a Generator Develop a WAP?

- There is also requirement in federal regulations at 40 CFR 268.40 requiring a WAP for generators managing and treating waste to the LDR standards
- This would be very, very uncommon in California because the federal waste treatment exemption is not available

Generator WAPs

- Even if a written WAP is not required, it is highly advisable when:
 - Waste volume/costs are significant
 - Waste may be subject to concentration variation over time
 - Regulatory risk is elevated due to these or other factors
 - Appendix X “presumed hazardous”

Who Is Required (or Should) Develop a WAP?

2. TSDFs

- All TSDFs have a specific requirement for a WAP covering waste acceptance; incoming waste fingerprinting; and treatment verification.
- The WAP must be submitted with TSDF's permit application and subject to approval via permit

TSDf WAPs

- TSDf WAPs pose some unique challenges:
 - Cover a wide range of processes – basic waste acceptance, incoming waste fingerprinting, verification of treatment performed...
 - ...for a wide range of wastes

TSDF WAPs

- WAP becomes part of the TSDF's Operations Plan – any deviation from the WAP can be a permit violation
- Tension between the need for appropriate characterization control and a level of detail that becomes difficult to manage

Who Is Required (or Should) Develop a WAP?

- 22 CCR 66265.13(b) as referenced by 67450.3 is again the operative set of requirements
- Essentially identical to the federal regulations
- Let's look at these standards...

WAP Standards – Generators and TSDFs

Must specify the parameters for which each waste will be analyzed and the rationale for the selection

- Sounds straightforward...but...
 - Ignitability – how does the alcohol exclusion get worked in? How about the hand sanitizer emergency regulation?

WAP Standards – Generators and TSDFs

- Corrosivity – is the California standard for corrosive solids part of the WAP?
- TCLP parameters – how will these be selected for each waste streams? Metals? Organics? Volatile vs. Semi-Volatile?
- TTLC/STLC – asbestos, PCBs, CAM 17 metals?

WAP Standards – Generators and TSDFs

- How about California aquatic toxicity?
- For TSDFs, there may be additional considerations
 - Compatibility issues, e.g., reactive sulfides or cyanides
 - Permit-specific requirements (PCBs and chlorine for used oil)

WAP Standards – Generators and TSDFs

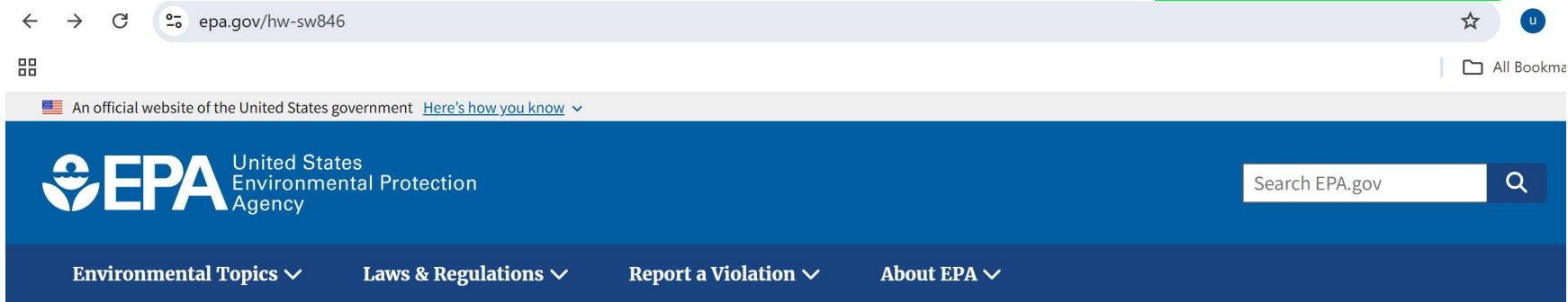
- Generator knowledge remains an important consideration
- The source of generator knowledge needs to be considered – particularly for TSDF, where generators (customers) are often not experts in waste characterization
- Waste profile information is important but has to be carefully considered

WAP Standards – Generators and TSDFs

The test methods that will be used to test for those parameters

- 22 CCR 66262.11 goes back and forth a bit but comes down to use of the U.S. EPA's SW-846 methods
- To use other methods must petition DTSC (very rare)

WAP Standards – Generators and TSDFs



Hazardous Waste Test Methods / SW-846



WAP Standards – Generators and TSDFs

Chapter Two of the SW-846 Compendium: Choosing the Correct Procedure

The purpose of this chapter is to aid the analyst in choosing the appropriate methods for sample analyses, based upon the sample matrix and the analytes to be determined. The ultimate responsibility for producing reliable analytical results lies with the entity subject to the regulation. Therefore, members of the regulated community are advised to refer to this chapter and to consult with knowledgeable laboratory personnel when choosing the most appropriate suite of analytical methods.

-  [Chapter 2: Choosing the Correct Procedure \(pdf\)](#) (1.14 MB)

WAP Standards – Generators and TSDFs

- Most methods for hazardous waste-regulated parameters are well established – there's relatively little decision making required
- Just note that laboratories can and do analyze using non-SW-846 methods, e.g., Clean Water Act methods

WAP Standards – Generators and TSDFs

- Certified laboratory use – one big difference between generators and TSDFs
 - Generators characterizing wastes must use a California ELAP-certified laboratory (H&SC 25198)
 - TSDFs are exempt from this for their own in-house lab

WAP Standards – Generators and TSDFs

- Question: Can a non-certified TSDF's laboratory results be utilized to characterize a generator's waste as hazardous or non-hazardous?
- Answer: Non-certified results constitute generator knowledge, which is an adequate basis for waste characterization.
BUT...

WAP Standards – Generators and TSDFs

Specify the sampling methods, which will be used to obtain a **representative waste sample. The sampling, planning methodology, equipment, sample processing, documentation, and custody procedures shall be in accordance with either one of the sampling methods described in Appendix I of Chapter 11 or an equivalent sampling method.**

WAP Standards – Generators and TSDFs

- This reference essentially directs back to the fundamental document: SW-846.

Chapter Nine of the SW-846 Compendium: Sampling Plans

This chapter addresses the development and implementation of a scientifically credible sampling plan for a solid waste and the documentation of the chain of custody for such a plan. The information presented in this section is relevant to the sampling of any solid waste, which has been defined by the EPA in its regulations for the identification and listing of hazardous wastes to include solid, semisolid, liquid, and contained gaseous materials.

-  [Chapter 9: Sampling Plans \(pdf\)](#) (665.99 KB)

WAP Standards – Generators and TSDFs

- A “representative sample” is one that can be expected to exhibit the average properties of the entire waste volume
- Statistical analysis of data is often used to determine whether sample results are truly representative of the waste in total, in relation to the regulation-specified concentration standard

WAP Standards – Generators and TSDFs

- There is tension between the concept of representative samples and so-called “authoritative” samples – essentially, worst-case samples
- Regulatory agencies often collect authoritative samples and use results as basis for enforcement
- “Prove the positive” vs. “prove the negative”

WAP Standards – Generators and TSDFs

CHAPTER NINE

SAMPLING PLAN

9.1 DESIGN AND DEVELOPMENT

The initial -- and perhaps most critical -- element in a program designed to evaluate the physical and chemical properties of a solid waste is the plan for sampling the waste. It is understandable that analytical studies, with their sophisticated instrumentation and high cost, are often perceived as the dominant element in a waste characterization program. Yet, despite that sophistication and high cost, analytical data generated by a scientifically defective sampling plan have limited utility, particularly in the case of regulatory proceedings.

This section of the manual addresses the development and implementation of a scientifically credible sampling plan for a solid waste and the documentation of the chain of custody for such a plan. The information presented in this section is relevant to the sampling of any solid waste, which

WAP Standards – Generators and TSDFs

- Clearly SW-846 Chapter 9 is an old document – 1980!
- Changes to SW-846 can only be made via a regulatory process.
- Analytical methods have been updated but sampling methods (Chapter 9) have not been.

WAP Standards – Generators and TSDFs

There is 2002 Draft Guidance, but it does not have legal authority.

United States
Environmental Protection
Agency

Solid Waste and
Emergency Response
(5305W)

EPA530-D-02-002
August 2002
www.epa.gov/osw

Office of Solid Waste



RCRA Waste Sampling Draft Technical Guidance

Planning, Implementation,
and Assessment

WAP Standards – Generators and TSDFs

- Both SW-846 and the Guidance go pretty deep and address a number of statistical concepts. But note...

Do the RCRA regulations require statistical sampling?

Some RCRA regulations *require* the use of statistical tests (e.g., to determine if there has been a release to ground water from a waste management unit under 40 CFR Subpart F), whereas, other RCRA regulations *do not* require the use of statistical tests (such as those for determining if a solid waste is or is not a hazardous waste or determining compliance with LDR treatment standards). Even where there is no regulatory obligation to conduct sampling or apply statistical tests to evaluate sampling results, statistical methods can be useful in interpreting data and managing uncertainty associated with waste classification decisions.

WAP Standards – Generators and TSDFs

frequency with which the initial analysis of the waste will be reviewed or repeated to ensure that it is accurate and current.

- This requirement may be extremely important or not important at all
- One-time disposal events or continuous, high-volume events?

WAP Standards – Generators and TSDFs

- How variable is the waste-generating process?
- Can variability be predicted such that waste analysis can be adjusted as things change?
- Or is it necessary to analyze “all parameters all the time”?

WAP Standards – Generators and TSDFs

the methods which will be used to meet the additional waste analysis requirements for specific waste management methods

- Primarily addresses TSDF needs
 - Is waste appropriate for specified treatment method?
 - Do treatment residuals meet specified standards?

WAP Standards – Generators and TSDFs

- Generators may be affected if performing waste treatment:
 - Eligibility for certain Tiered Permitting tiers depend on parameter concentrations (e.g., aqueous waste with organics 10% or 1% thresholds)
 - May need to verify treatment effectiveness, e.g. pH control to validate sewer discharge ability

WAP Standards – Generators and TSDFs

For compliance with air emission standards

- Air emissions standards for hazardous waste management are important for TSDFs and some generators e.g., biotech, refining, chemical industries. **LQGs only!**

WAP Considerations for RCRA Subparts AA/BB/CC

- AA/BB/CC address air emissions from hazardous wastes – 22 CCR Chapter 15 Articles 27, 28, and 28.5 are identical
- No written WAP requirement, but...
- Tests are less standard than typical hazardous waste tests – VOC content
- Sampling methods, containers may also be different than typical samples
- Multiple samples may be specified

WAP Considerations for RCRA Subparts AA/BB/CC

- Subpart AA, process vents
 - Threshold is 10 ppmw organics. Do you really need a WAP for this?
 - If so, define the targeted test.

Subpart BB – More Specific Tests Needed

- Percent organics (10% threshold)
 - For mixtures with water, how will you make the determination?
 - Direct measurement of organic content less common test
 - If contains water, suggest Karl-Fischer Titration (EPA SW-846 Method 9000) to get water content (organic content is different, so anything with more than 90% water is not subject to standard)
 - Total Organic Carbon test (EPA 9060) also possible for screening

44

Subpart BB – More Specific Tests Needed

- Can also sum speciated organics using
 - EPA 624/625
 - EPA 8260/8270
 - EPA 1624/1625

Subpart BB – More Specific Tests Needed

■ Vapor Pressure

- Needed for determining “in light liquid service”
- ASTM D6378 not common to environmental labs
- Instead can determine by summing organic constituents in the material that are > 0.3 kilopascals (2.25 mm Hg) at 20°C (68°F) – are they equal to or greater than 20% by weight

Subpart CC – More Specific Tests Needed

- VOC Content for Applicability – 500 ppmw
 - Identified Test Method 25D – difficult to find lab
 - Alternative is to run speciated organics using
 - EPA 624/625
 - EPA 8260/8270
 - EPA 1624/1625
 - Then, summing those constituents compare against list in Appendix I to Article 28.5 (Henry's Law) (Use one-half detection limits for each analyte in Appendix I)

Subpart CC – More Specific Tests Needed

- Must assess Subpart CC compliance at “Point of Generation”
- Regulations state based on four samples within 1 hour
- Resample as needed when conditions or waste changes

WAP Standards – Generators and TSDFs

- Emerging issue – generators and remediation waste under the GIR?
- Remediation waste is routinely generated and (hopefully) well-characterized by generators...or their contractors...

WAP Standards – Generators and TSDFs

- Generator improvement rule at 66262.17(a)(8) specifies closure standards for container central accumulation areas (CAA) at LQGs and facility closure for RCRA waste LQGs
- Includes closure notifications to...CUPA?

WAP Standards – Generators and TSDFs

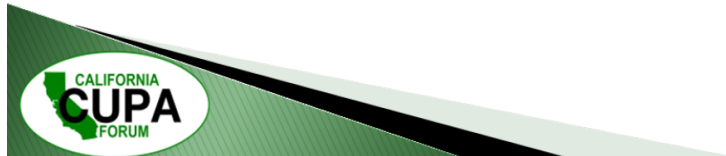
- Enhanced closure requirements will likely increase generation of decontamination and remediation waste
- Characterizing these wastes may be slightly different than ongoing process wastes

Reading Lab Reports



Hazardous Waste Sampling & Interpreting Lab Results

Arleen Gurfield, Supervising EHS – San Diego County CUPA
M-B1
February 26, 2024



26th California Unified Program
Annual Training Conference
February 26-29, 2024

Reading Lab Reports

“**CONGRATULATIONS!**
You’ve collected your sample and sent it to the lab. The lab has completed your requested tests and sent you the analytical report....”

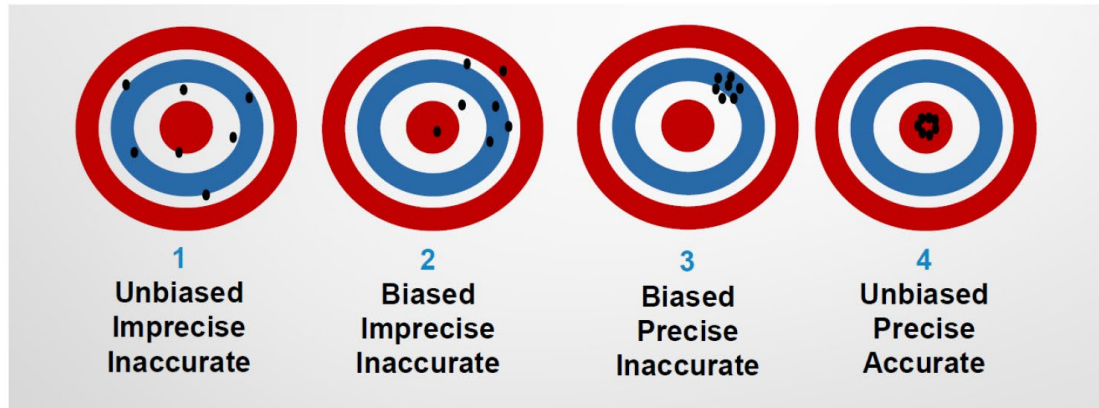


Reading Lab Reports

Data Quality

Sample results are only as good as the quality of the data

Data quality are supported by quality control samples that evaluate bias, precision, and accuracy



Reading Lab Reports

Why Data Quality Matters

Qualifiers

GC/MS VOA

Qualifier	Qualifier Description
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

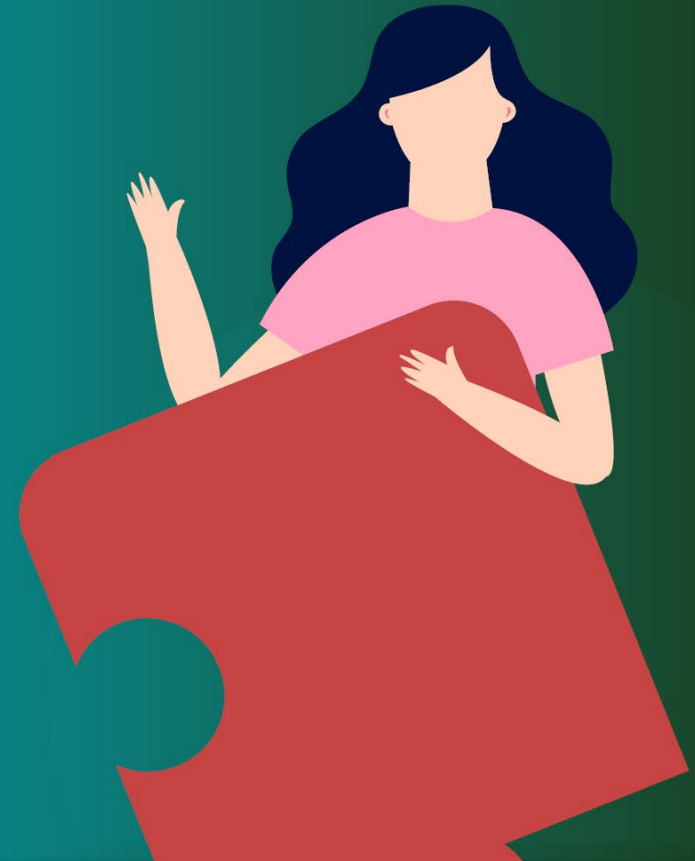
Metals

Qualifier	Qualifier Description
B	Compound was found in the blank and sample.
F1	MS and/or MSD recovery exceeds control limits.
F2	MS/MSD RPD exceeds control limits
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

Reading Lab Reports

Common Report Flags

- “U” or “ND”: compound not detected
- “J”: estimated value
- “B”: compound detected in blank
- “S, L, M”: Spike Recovery Issue
- “R”: RPD recovery issue
- “H” Hold time exceeded
- “D”: Dilution performed



WAPs for Profiling Wastes

- Arranging for hazardous waste disposal will virtually always require a written “waste profile” with disposal facility
- This certifies the waste descriptions are accurate over the life of the profile (one year or longer)
- In some cases, a WAP may be beneficial and avoid potential issues with waste rejections

WAPs Don't Have to Be Complex

3.0 WASTE ANALYSIS PLAN

In accordance with 22 CCR 66625.13(b), a written waste analysis plan (WAP), must contain the following:

- Parameters to be analyzed and rationale for selection of those parameters;
- Test methods to be used in the analyses;
- Sampling methods to be used to obtain a representative sample; and
- Frequency of analysis.

3.1 Parameters to be Analyzed

Because the influent waste to FTU-A and FTU-B are hazardous waste by virtue of the corrosivity characteristic, it will only be necessary to measure pH.

3.2 Test Methods

pH will be measured in-house using a calibrated pH meter. The calibration of the meter shall be checked before each use, and the meter shall not be used if it cannot be calibrated to within 0.05 pH units of the buffered standard. All samples collected shall be tested as soon as possible as prescribed by EPA SW-846 test method 9040C.

3.3 Sampling Methods

Grab samples shall be collected from Tank 1 on both FTU-A and FTU-B. This can be collected from the line on the bottom of the tank leading to the diaphragm pump.

Confirmation samples that treatment is being performed effectively to raise pH to greater than 2 for FTU-A and less than 12.5 for FTU-B are provided by the real-time pH monitor between T-1 and T-2. Samples shall be collected from the ½-inch sample port in the line between T-1 and T-2 on both FTU-A and FTU-B. Final confirmation samples of the sewer discharge will be determined by collecting a sample from the sample line between T-2 and T-3 on both FTU-A and FTU-B and measuring pH using the calibrated pH meter

3.4 Frequency of Analysis

Because the materials used in the plant are well known, collecting one sample every six months from each system will be sufficient.

WAP Standards – Generators and TSDFs

- Key Guidance Document for TSDFs



Solid Waste And
Emergency Response
(5303P)

EPA 530-R-12-001
April 2015
<http://www.epa.gov>

Waste Analysis at Facilities that Generate, Treat, Store, and Dispose of Hazardous Wastes - Final

A Guidance Manual

WAPs Can Be Complex

Content & Organization of the WAP

1. **Purpose** Recommended
 - A. Identify requirements/permit conditions for preparing and implementing a WAP at your facility.
 - B. Provide a brief outline or overview of the WAP.
2. **Facility Description (see Section 2.2)** Recommended
 - A. Identify each hazardous waste type at your facility to include on-site managed wastes, on-site generated wastes, acceptable wastes (i.e., waste codes your facility accepts), and restricted wastes (i.e., wastes your facility cannot accept).
 - B. Identify each process generating these wastes.
 - C. Provide the rationale for identifying each waste as hazardous.
 - D. Provide appropriate waste classifications (e.g., wastewater or non-wastewater).
3. **Waste Pre-Acceptance and Acceptance Processes (see Sections 1.2.1, 2.7, 2.8, 2.9.1)** Mandatory
 - A. Describe the rationale, information needs, and criteria for pre-acceptance of off-site wastestreams.
 - B. Describe the processes, policies, and procedures for evaluating incoming waste shipments for acceptance and appropriate on-site management.
4. **Rejection Policy (see Section 2.11)** Recommended

Describe the policies and procedures that your facility will use for the rejection of waste received by your facility.
5. **Discrepancy Policy (see Section 2.10)** Recommended

Describe the policies and procedures that your facility will use when there is a discrepancy between the waste designated on the manifest or profile and the waste received at your facility, including how the discrepancies will be resolved.

WAPs Can Be Complex

6. **Sampling Strategies and Frequency (see Sections 2.5, 2.8)** Mandatory

Describe how your facility selects the appropriate sampling procedure for effective waste characterization and describe the process for determining both initial sampling frequency and subsequent waste re-evaluation.
7. **Analytical Parameters and Test Methods (see Sections 2.4, 2.6)** Mandatory

Describe how your facility selects the appropriate parameters and test methods.
8. **Quality Assurance/Quality Control and Data Reporting (see Sections 2.5.5, 2.6.1)** Recommended
 - A. Describe your facility's quality assurance program and quality control procedure that ensure laboratory data are scientifically valid, defensible, and of known precision and accuracy (except for test strips and visual observations).
 - B. Describe the data records your facility maintains and how long, where, and in what format each record type will be maintained.
9. **Recordkeeping (see Section 2.12)** Recommended

Describe the records your facility maintains and how long, where, and in what format each record type will be maintained.
10. **Corrective and Preventative Action (see Section 2.13)** Recommended

Describe your facility's QA/QC corrective and preventative action program for your waste analyses, including the process for identifying deficiencies early and procedures for rectifying any deficiencies.

Questions?

- Let's WAP this up!
- Summary:
 - Know when a WAP is legally required...
 - ...but also when it is a darn good idea...
 - ...because mistakes in waste characterization can be fairly devastating in terms of cost, regulatory risk and reputational damage.
 - Use generator knowledge, but apply good environmental data collection and evaluation techniques when waste samples are collected

Final Slide

- Presentation Questions

Geoff Knight

(949) 248-8490

GKnight@YorkeEngr.com



- Other General Environmental Questions

Brian A. Yorke

Operations & Marketing

(949) 248-8490

BYorke@YorkeEngr.com