CLASS 2 - PATHOLOGICAL WASTES

Patients...and other medical procedures...

CLASS 1 - CULTURES AND STOCKS

Regulations (CFR) Part 279 and include:

Description of specific classes of medical...such as any

II. WASTE CHARACTERISTICS

10. INTRODUCTION
CLASS 3 - HUMAN BLOOD AND BLOOD PRODUCTS
Table 1.1 Medical Waste Types Appropriate For Treatment By Technology

<table>
<thead>
<tr>
<th>TECHNOLOGY</th>
<th>CLASS 1</th>
<th>CLASS 2</th>
<th>CLASS 3</th>
<th>CLASS 4</th>
<th>CLASS 5</th>
<th>CLASS 6</th>
<th>CLASS 7</th>
<th>RADIOACTIVE</th>
<th>HAZ AND CYTOTOXIC</th>
</tr>
</thead>
<tbody>
<tr>
<td>INCINERATION</td>
<td>X</td>
<td></td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X(^1)</td>
</tr>
<tr>
<td>STEAM AUTOCLAVE</td>
<td></td>
<td>X(^2)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X(^1)</td>
</tr>
<tr>
<td>CHEMICAL TREATMENT</td>
<td>X</td>
<td></td>
<td>X(^2)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MICROWAVE</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RADIOFREQUENCY</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GAMMA IRRADIATION</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>

1 The treatment of radioactive antineoplastic and hazardous waste which are mixed with medical wastes can be treated with incineration, however, special permits are usually required for this type of treatment. Additionally, incineration does not inactivate radioactive waste. Thus the ash from these processes may be radioactive and/or contain hazardous constituents.

2 Technology not recommended for treatment of body parts because the density of the waste may prevent adequate treatment. Grinding the waste may increase treatment efficacy however, the grinding process may present aesthetically unacceptable results.
1.2.1 Level 1 Microbial Inactivation

Microbial inactivation is described in the following subsections.

1.2.2 Level 2 Microbial Inactivation

Level 2 microbial inactivation is described in the following subsections.
### Table 1.2 Evaluation of Level of Microbial Inactivation Achieved by Medical Waste Treatment Technologies

<table>
<thead>
<tr>
<th>WASTE TREATMENT TECHNOLOGIES</th>
<th>MICROBIAL INACTIVATION</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Level I(^a)</td>
</tr>
<tr>
<td>STEAM AUTOCLAVE</td>
<td></td>
</tr>
<tr>
<td>Lab Test Results(^1)</td>
<td>yes</td>
</tr>
<tr>
<td>Field Test Results(^2)</td>
<td>yes</td>
</tr>
<tr>
<td>MICROWAVE</td>
<td></td>
</tr>
<tr>
<td>Field Test Results(^3)</td>
<td>NT</td>
</tr>
<tr>
<td>RADIO FREQUENCY</td>
<td></td>
</tr>
<tr>
<td>Field Test Results(^4)</td>
<td>NT</td>
</tr>
<tr>
<td>CHEMICAL</td>
<td></td>
</tr>
<tr>
<td>Lab Test Results(^5)</td>
<td>yes</td>
</tr>
<tr>
<td>Field Test Results(^6)</td>
<td>yes</td>
</tr>
</tbody>
</table>

\(^a\) Inactivation of $10^5$ vegetative bacteria, and fungi
\(^b\) Inactivation of $10^5$ mycobacteria
\(^c\) Inactivation of at least $10^4$ B. subtilis (heat); or at least $10^4$ B. stearothermophilus (chemical)
\(^d\) Inactivation of at least $10^5$ B. stearothermophilus $10^5$ or greater

\(^1\) Benchtop and gravity displacement autoclaves, 121°C, 15 psi
\(^2\) Prevacuum system, 136°C, 30 psi; Double door gravity system, 163°C, 80 psi
\(^3\) Microwave treatment system (6 units at 2450 MHz each)
\(^4\) Short wave RF system, 11 - 13 MHz
\(^5\) Chemical only, sodium hypochlorite 1000 ppm and 3000 ppm FAC, prolonged exposure ($\geq$ 3 hrs)
\(^6\) Chemical/mechanical systems, sodium hypochlorite 1000, 2000, 3000 ppm FAC

NT: Not tested

* Dependent on Prolonged exposure ($\geq$ 3 hrs)
* * Not achieved under normal operating conditions ($<$ 3 hrs exposure)
For treatment technologies that rely on chemical inactivation of microorganisms:

- At the level of maturity, AVCC 17980, AVCC 10149 (B. stearothermophilus) can be used to verify level III microbial inactivation and AVCC 6673 (P. fluorescens, mycobacterium) will also be inactivated.

In the absence of the desired level of treatment, the process is expected to achieve:

Induction of resistance is used for routine efficiency testing. The organism should be chosen by the user, and when choosing a protocol (pH, buffer, mycobacterium) will also be inactivated.

1.3.1 Tier Organization Section

under neant, hipter, etc.

The system of microbial response to occur in regulated medical waste, unless otherwise specified.

1.3 Operation Evaluation

The effectiveness of the treatment may be measured by the ability of the treated material to inhibit the growth of bacterial organisms.

For treatment, one may also apply thermal death due to inactivation of the pathogenic organisms.
The waste treatment system should be tested under normal operating conditions. The test load should be placed in the system with a nominal waste load and recovered after a 1.35 test load exposure.

The total waste charge, by weight, of the organics (BOD, chemical oxygen demand, suspended solids, etc.) that comprise at least 5 percent of the total waste solids, and the received solids in the receiving reservoir should include representative organic samples. A minimum of 100 percent of the received solids should be included in the test load.

For mechanical/chemical treatment monitoring, a minimum of 100 percent of the received solids should be used for test load generation. A minimum of 75 percent of the test load is required for adequate representation of the received solids for testing.

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The test load generation should be included in the indicator organisms to be treated in a manner.

1.4 Test Load Preparation

To validate the test, the test load must be prepared in a manner consistent with the following steps:

1.4.1 Inductor Preparation

Commercially prepared inductor strips and similar suspensions are supplied with a quality assurance statement that the number of strips per set of each suspension.

1.4.2 Test Organism Preparation

1.4.3 Test Organism Generation

Maintenance requirements in the laboratory.

However, maintenance requires the use of indicator organisms because of their exclusive uses. Some viruses are not the most effective organisms for this technology. Inductor organisms for gamma sterilization treatment of medical waste have not been

1.5 Test Load Exposure

The test load exposure by weight.

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Examination of Water and Wastewater may be used in the American Public Health Association's (APHA, 1989) Standard Methods for the Examination of Water and Wastewater. Public health agencies may select those found to meet their needs. This section presents some guidance on how treatment efficiency testing is performed properly. This section presents some guidance on how treatment efficiency testing is performed properly. Quality assurance and quality control procedures are essential for ensuring reliable results.

1.3.7 Quality Control Procedures

<table>
<thead>
<tr>
<th>Technology</th>
<th>Recommended Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Radiofrequency</td>
<td>Weekly change or Bi-weekly, as needed</td>
</tr>
<tr>
<td>Microwave</td>
<td>Weekly change or Bi-weekly, as needed</td>
</tr>
<tr>
<td>Chemical Disinfection</td>
<td>Weekly change or Bi-weekly, as needed</td>
</tr>
<tr>
<td>Steam Autoclaving</td>
<td>Weekly change or Bi-weekly, as needed</td>
</tr>
<tr>
<td>Infiltration</td>
<td>Weekly change or Bi-weekly, as needed</td>
</tr>
</tbody>
</table>

Table 1.3 Recommended Frenquency of Efficiency Testing By Technology

For all at least 72 hours. B. neoformans var. gueckardi should be inoculated at 55°C, also for at least 72 hours. C. neoformans should be inoculated at 37°C for at least 24 hours.

This section describes the appropriate nutrient medium, incubation conditions, and inoculation of the inoculant. Recovery of indicator organisms should be accomplished easily. The methods used should follow the guidelines provided in this section. All procedures should be evaluated bi-weekly with the exception of disinfection. Infiltration of indicator organisms should be evaluated weekly because of the exposure to the environment. The methods used should follow the guidelines provided in this section.
6

Each measurement, acceptable temperature ranges assigned to each piece of equipment, and temperature protocols (NOT) associated with temperature correction. Temperature probe should be assigned to each measurement. Temperature probes and temperature correction devices must be traceable to National Institute of Standards.

1.3.4 Equipment

Analysis of the Association of Official Analytical Chemists (AOAC) for laboratory use. The submission of the official method of analysis must be accomplished in accordance with the provisions of the Standard Operating Procedure (SOP). The procedure for preparing and testing the samples must be followed, and the results must be recorded accurately. The laboratory must be equipped with the necessary equipment capable of performing the analyses.

1.3.7 References

13.7.2 Suppliers

Microorganisms should be purchased from reputable suppliers, and upon receipt, the log should be updated immediately. The laboratory must be equipped with the necessary equipment capable of preparing the analyses.

13.7.1 Organisms