

**FINAL REPORT  
DETECTION AND RESPONSE TO RADIOACTIVE MATERIALS  
AT MUNICIPAL SOLID WASTE LANDFILLS**

**ASTSWMO RADIATION FOCUS GROUP**

**July 18, 2001**

**Introduction**

In June 1999, the ASTSWMO Radiation Focus Group developed a problem statement regarding the detection and response to radioactive materials at municipal solid waste landfills. The issue was that in their attempts to exclude all radioactive materials from these landfills, the management practices involving detected radioactive materials had the potential to create greater exposure hazards than simply accepting and burying the material as part of the trash. The group planned to develop information and guidance on radioactive waste handling and associated topics.

Prior to initiating development of this guidance, the ASTSWMO Solid Waste Subcommittee recommended that the Radiation Focus Group assess State needs for such a document. The Focus Group developed a survey, which was administered to all States through ASTSWMO. Thirty-three responses were received. A copy of the survey is included in Appendix A of this document. The responses to the questions are included below.

**Survey Analysis**

Only forty-two percent of the responding States have regulations regarding radioactive waste at solid waste landfills. Many States must rely on the internal generators to ensure, despite the fact that States believe generators are sufficiently regulated to ensure radioactive waste does not show up at landfills, utilizing the licensing system to prevent non-exempt wastes from even entering waste streams that are disposed at sanitary landfills. Despite the lack of State regulations, seventy percent of the responding States have at least some monitoring for radioactive waste at these facilities, indicating that in many cases the landfills are monitoring for their own protection, rather than as a response to regulatory requirements. However, most States do not require proper training on the use of these monitors (17 of 24 responses), and do not monitor the facilities' training programs (16 of 20 responses).

Most of the waste that is detected is short-lived medical waste. The relative occurrence of various types of radioactive waste at landfills is illustrated by actual data from a New York incinerator. Over a two-year period, radioactive alarms were tripped a total of 40 times. Of these, 23 came from residential sources, 13 from hospitals, two from nursing homes,

one from a department store, and one from construction and demolition debris. Although not all loads were described, 20 loads were described as personal hygiene items, tissues, or diapers. The isotope of concern was listed as I<sup>131</sup> nine times, Ga<sup>67</sup> once, and Tc<sup>99m</sup> twice. Obviously, the large majority of radioactive wastes tripping landfill alarms are short-lived medical wastes.

When a radiation detector alarm at a landfill goes off, most operators call a State agency or consultant for advice (32 responses). This results in scarce resources being applied to responding to the alarm; which is usually due to short-lived, low-activity waste. The truck is often isolated (8 responses) which requires operator resources to manage, and in addition, the waste is often picked through to find the source (13 responses). This practice introduces risk from physical hazards and punctures that may exceed the risks from the radioactive source. Information from the New York incinerator verifies these practices, as 31 of the 40 loads were held for decay, 8 were sent back to the hospital for decay, and one was sent to a waste broker for disposal. In some cases, the truck is sent back to the generator (2 responses). This practice can result in illegal dumping of the load, as the hauler's first priority is to free up the truck.

### **Recommendations**

Although States did not indicate that radioactive materials in municipal solid waste landfills was an issue of major importance, the Radiation Focus Group continues to believe that waste identification and handling practices can and must be improved. Current practices subject landfill operators (and investigating regulatory agencies) to unnecessary exposure risks from both radionuclides and other waste matter. In addition, scarce State resources are not well utilized in the assessment and disposition of short-lived radionuclides that do not pose a risk to human health and the environment. Below are a list of recommendations for future consideration. It should be noted that recently, the State of Pennsylvania promulgated solid waste regulations that incorporate many of these recommendations. These regulations may provide a helpful model in reducing both the resources necessary and the risks involved in responding to radiation alarms at solid waste landfills.

#### **1. Allow Landfills to Accept Radioactive Materials**

The list of radioactive materials that should be excluded from landfills should be better defined, and should include only wastes that are long-lived, and/or soluble or otherwise pose a significant hazard. Currently, prohibitions against all radioactive materials are too broad. Although significant problems such as sealed sources are rare, efforts should be made to concentrate detection and response efforts on these scenarios, especially since these are events that pose a significant health or environmental risk.

In order to appropriately exclude only those materials that create a true health or environmental risk, efforts should be made to more specifically define those radioactive materials that should be excluded from solid waste management facilities. Also,

regulations or guidance could be revised to provide clearer direction to landfill operators. The use of guidance rather than regulation may be important since many States do not regulate the use of radiation monitors, although their regulations prohibit the acceptance of radioactive materials. The survey indicates that landfills are largely self-regulating on this issue.

The Focus Group believes that there is too much effort and resources expended to address small, short-lived sources. The large majority of radioactive material entering landfills are small, short-lived sources, and some agencies are frustrated with the amount of effort needed to respond to alarms, when the risk of radiation exposure posed by this material is minimal. Further, the environmental risks from these materials are minimal. This leads the Focus Group to the conclusion that most of these materials should not be excluded from landfill disposal.

## **2. Utilize Current Technology to Screen Radioactive Wastes**

Following number 1 above, the Focus Group believes that disposal of short-lived radionuclides that do not pose a threat to human health or the environment should be allowed in solid waste landfills. Once the appropriate guidance is developed regarding the wastes that are allowed, it is important that a safe and efficient way of identifying these wastes be utilized. One of the primary mechanisms to accomplish this is to take advantage of improved detection technology. The use of multi-channel analyzers, which are currently much more portable and affordable than they were in the past, could easily identify short-lived radionuclides in the truckload, without the need segregate the truck and search through the load. This would improve both the efficiency and safety of the current process. Current technology may be outstripping regulations, and States should reevaluate their regulations to determine whether practices that are currently forbidden might be safe, given the current technology.

## **3. Allow For Immediate Disposal of Short-Lived Radionuclides**

Short-lived radionuclides that do not pose a threat to human health or the environment should be disposed of in the landfill immediately, without the current practice of segregating the load or sending the load back to allow for decay. This practice would minimize both the resources and the risks involved in materials segregation and handling, and would assure protection of human health and the environment. It would also remove the possibility that the operator of the vehicle would dump the load illegally rather than returning it to the generator.

#### **4. Develop Guidance**

There is a need to balance ease of disposal with the creation of practices with sufficient controls to stop improper disposal. This would result in lower potential exposures, lower resource demands on State agencies, and lower costs to landfill operators (i.e., avoiding the cost of sorting through trash to find radioactive source). Future efforts, possibly by organizations such as CRCPD, should work more closely with the landfill operators to determine needs and solutions.

Although States do not want to set a “Below Regulatory Concern” level, this is occurring on a de facto basis every time an alarm level is set. According to the Survey, only five States mandated a certain alarm level, and none of the five States had the same level. Other States let the facilities decide on the alarm level. The Focus Group believes that developing guidance on the appropriate alarm level(s) would be beneficial. If possible, the standard for alarm levels should be set by using data on what is going into the landfills, and then modeling what would happen with changes in alarm levels. Alarm levels could then be set that allow the short-lived, low activity waste to pass, while catching most sealed sources and other long-lived or higher activity waste.

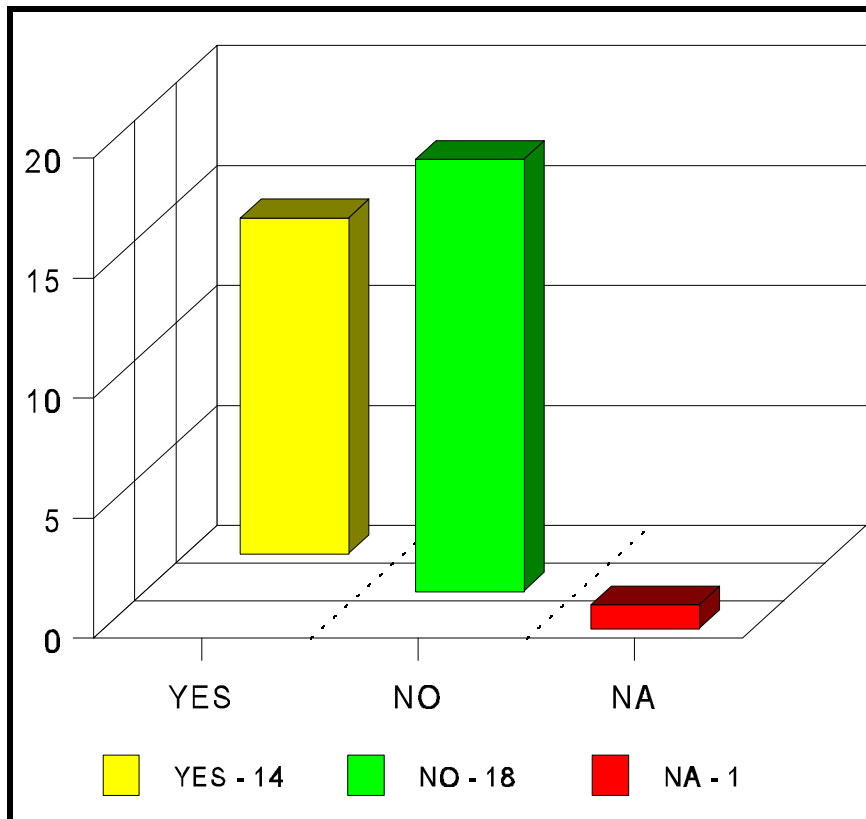
#### **5. Ensure Operator Training**

Landfill operators need to reevaluate the use of radiation monitoring. Operators must be informed regarding the implications of installing this equipment, in terms of costs, maintenance, calibration, employee training, and the impacts on operations when a load sets off the alarm. States should provide support by requiring proper training (possibly even offering it), and overseeing landfill operations to ensure that the operators are knowledgeable in radiation safety and monitoring. States should seek to foster a process where they can expend minimal resources in overseeing a simple and safe practice (better detection and immediate disposal) that can be effectively implemented by the operator.

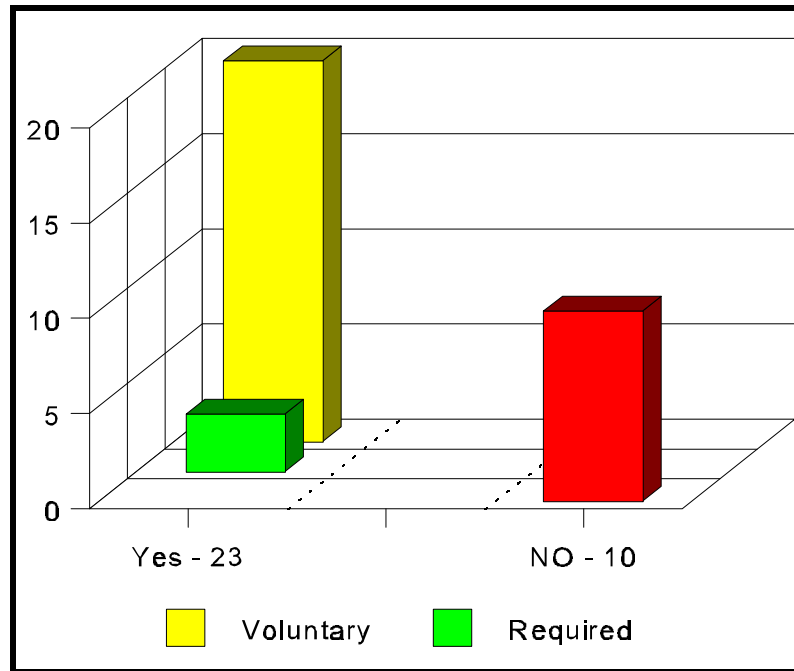
Should you have any questions regarding the survey analysis, please contact any of the following Radiation Focus Group members:

Chair, Jeff Deckler, CO	(303) 692-3387
Larry Erickson, MO	(573) 751-6838
Joan M. Jones, ME	(207) 287-7879
Graham E. Mitchell, OH	(937) 285-6018
Dale Rector, TN	(865) 481-0995
Ronnie Wascom, LA	(225) 765-0102
Barbara Youngberg, NY	(518) 457-225

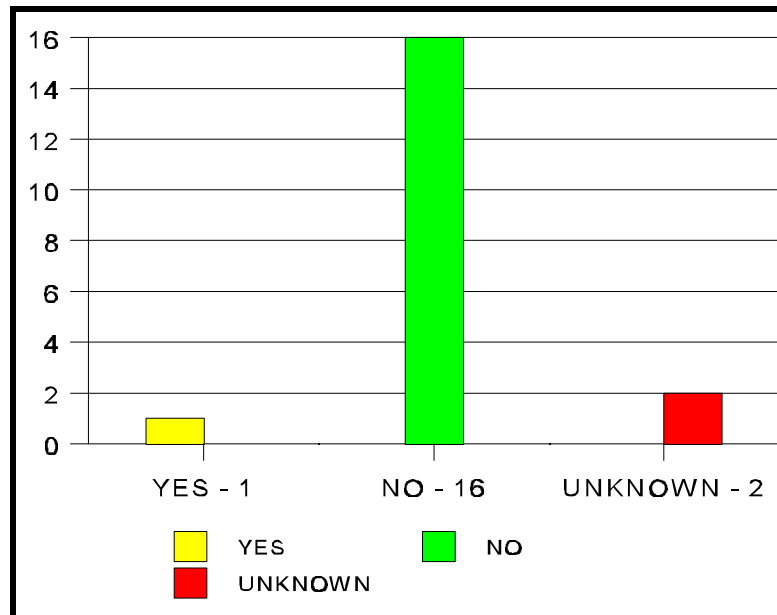
1. Does your State have any regulation or guidance regarding radioactive waste at solid waste facilities (municipal solid waste landfills, incinerators, transfer stations)?



**2. Are gates at solid waste facilities monitored for radioactive waste?**



**3. Do you think that lack of monitoring for radioactive contamination in solid waste has caused any problems?**

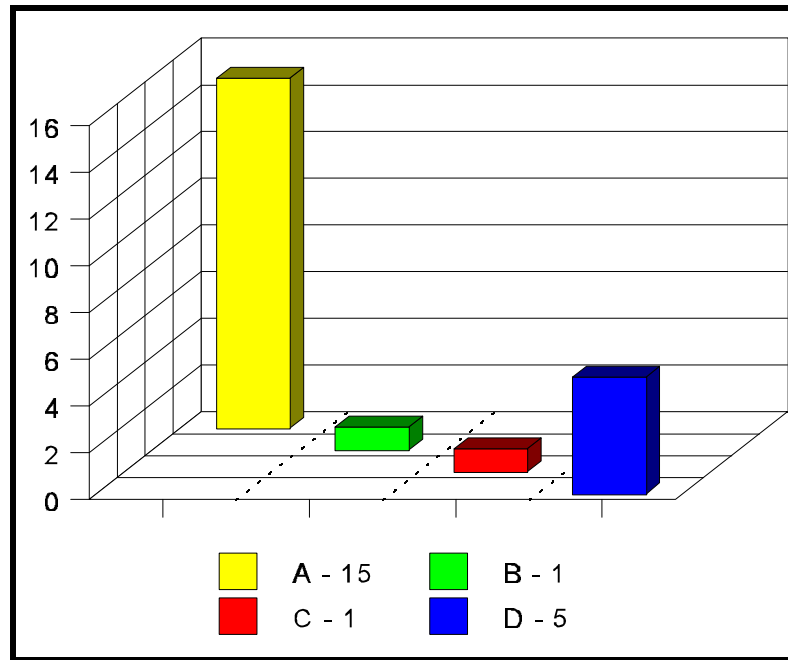


**WHY?**

<b>Louisiana</b>	Most RAM reaching landfills are short lived or very low in concentration.
<b>Maryland</b>	Lack of monitoring does not cause the problem. Monitoring for radiation actually identifies situations where radioactive materials are released into the general public in an uncontrolled manner. Lack of monitoring creates uncertainty as to the potential location or adverse effects of lost or stolen radioactive materials.
<b>Nebraska</b>	Waste screening procedures and the State's special waste program are designed to exclude all types of hazardous wastes from landfills.
<b>Nevada</b>	Although MSWLFs have not checked for radioactive wastes there is no evidence of radioactive waste in landfills. Generators are regulated.
<b>New Hampshire</b>	N/A - We have not experienced recurring problems with radioactive materials.
<b>North Carolina</b>	The operating personnel at facilities equipped for detection stated that their facilities have experienced no instances of improper disposal of radioactive materials. Their "hits" have all been very low level, very short half life material such as iodine 131.
<b>Ohio</b>	Don't have much info due to small number of sites using monitoring. Those that do monitor seem to trigger on minor issues or false alarms.
<b>South Carolina</b>	SC has a low-level rad waste landfill
<b>Tennessee</b>	If it isn't monitored, there is no way of knowing what was disposed nor what the associated risk was.
<b>Wisconsin</b>	The NRC does a pretty good job of tracking licensed material to ensure proper disposal. Most NORM waste is low-level and, even if it is set off, a detector would be within acceptable limits for disposal in a MSWLF.

**4. To the best of your knowledge, the reason your State does not require monitoring is:**

- A. A decision that this is not a problem or priority
- B. Lack of resources to regulate
- C. Unacceptable to owners and/or operators
- D. Other



**OTHER:**

**California** - State radiation and RCRA site regulators are working together

**Florida** (see attachment)

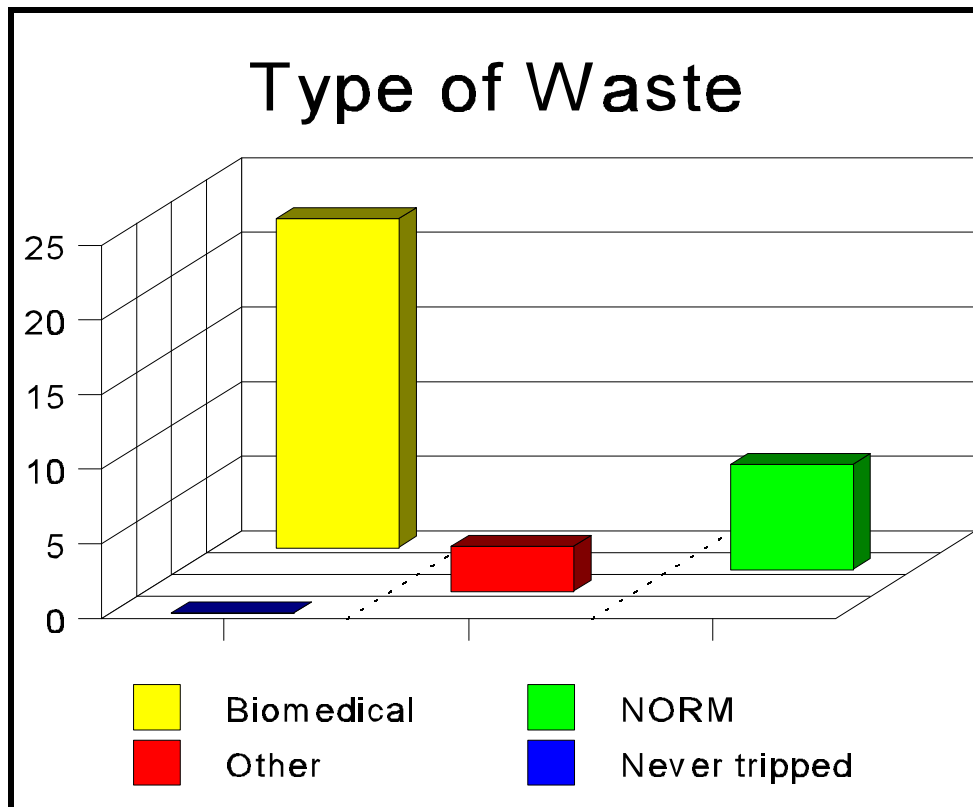
**New Hampshire** - N/A

**Tennessee** - regulations don't require it

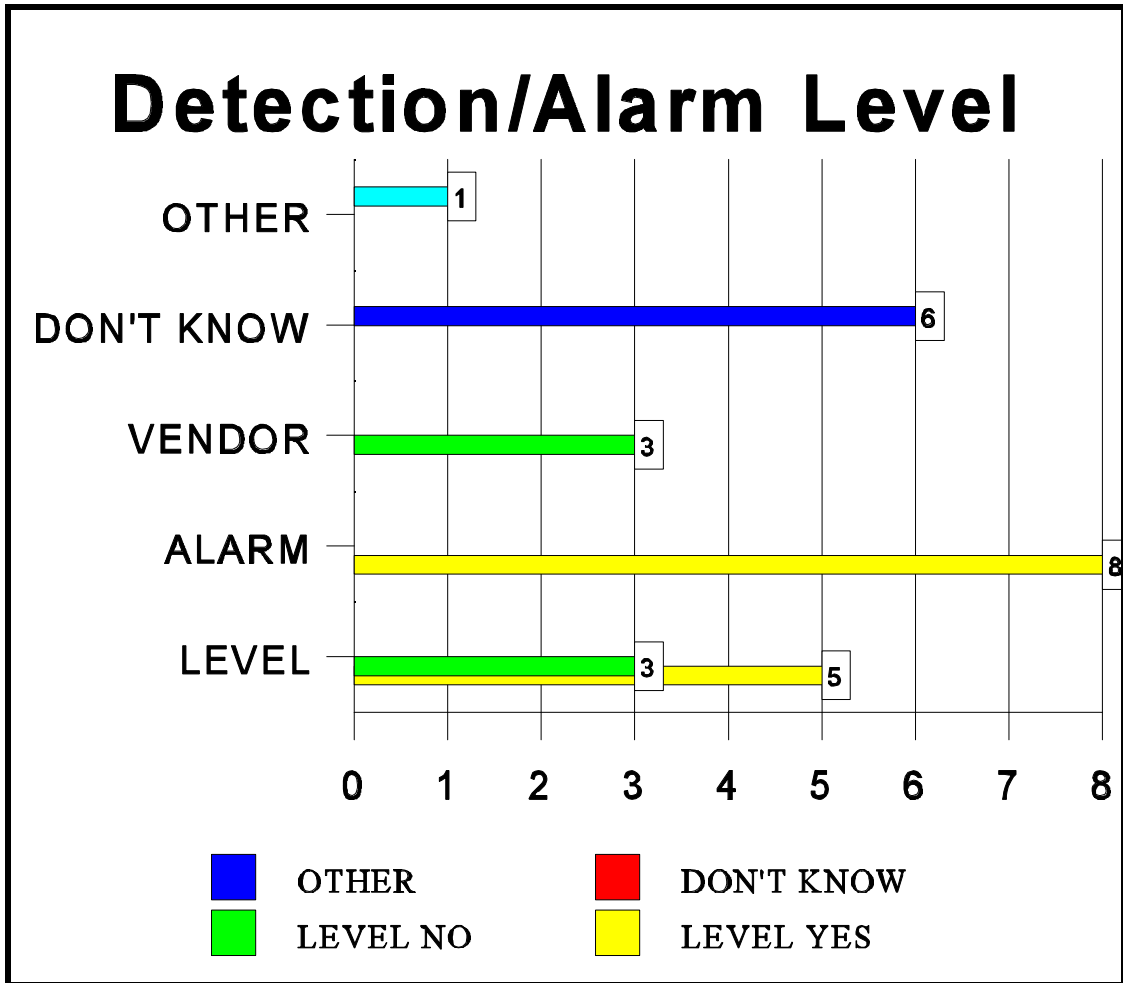
**Virginia** - not required by Federal Standards for MSW facilities

5. What type of waste most frequently trips detectors (sets off alarm)?

<b>Biomedical - 22</b>	AZ, CA, CO, CT, FL, HI, KS, LA, MD, MA, MI, MO, NJ, NH, NC, NY, ND, SC, TN, TX, UT, VA
<b>NORM - 7</b>	AZ, CA, CO, FL, OH, TN, TX
<b>Other - 3</b>	AZ (scrap metal, old radium clocks), CO (improperly disposing of gauges), VA (smoke detectors)
<b>Detectors never tripped - 0</b>	



6. Has the State mandated or otherwise defined (as in guidance) a detection/alarm level?



**Yes, at \_\_\_\_\_ level (i.e. 2x background)**

AZ 4x; MI 2-3x; NH 2mrem; NY 2-5x; TX 2x

**No, but facilities usually set the alarm at \_\_\_\_\_ level**

CO 2-3x; FL 2x; KS 2x; LA; MD 2-3x; NJ 2x; NC - sensitive; UT 2x

**No, but facilities use detection levels suggested by vendor**

CT, ND, TN

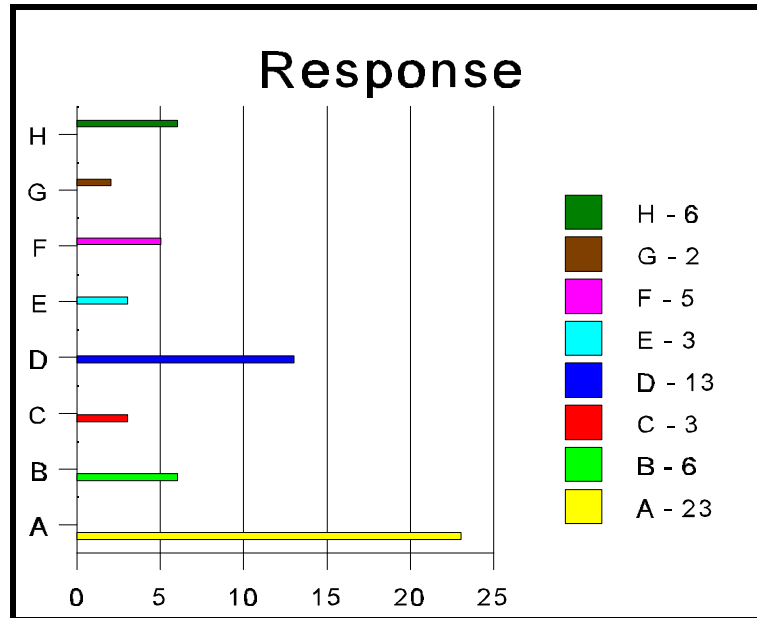
**No, and don't know what facilities use**

HI, MA, MO, OH, SC, VA

**Other**

CA - alarm levels vary per site situations

7. What is the response by the facility when an alarm goes off?



A	<b>Call State agency - 23</b>	AZ, CA (radiological health), CO, CT, FL, HI, KS, LA, MD, MA, MI, MO, NJ, NH (& emergency response contractors), NC, NY, ND, OH, SC, TN, TX, UT, VA
B	<b>Call consultant or other outside expert - 6</b>	MD, MI, MO, NC, TN, VA
C	<b>Consult with internal expert - 3</b>	LA, MD, TX
D	<b>Isolate truck and pick through to find source - 13</b>	CO, CT, MD, MA, MO, NC, NY, ND, SC, TN, TX, UT, VA
E	<b>Isolate in truck and let decay - 3</b>	CT, MD, VA
F	<b>Dump in separate area and let decay - 5</b>	CO, LA, MD, MI, NY
G	<b>Unknown - 2</b>	MI, OH
H	<b>Other - 6</b>	AZ - the operator calls the AZ Radiation Regulation Agency to obtain advice for rejecting the waste
		MI - return to originating facility
		NJ - Include draft flow diagram
		NH - see attached workshop proceedings
		ND- call generator and file report
		TX - return truck to generator

**8a. Does your State check that landfill operators are appropriately trained regarding any of the following?**

<b>Gate monitor calibration and use</b>	TN, TX
<b>Calibration and use of hand held meters</b>	TN, TX
<b>Radiation safety</b>	TN
<b>Other safety (personal injuries or contamination from waste, vehicle traffic)</b>	ME, NE, TX
<b>State does not check</b>	AZ, CT, HI, ID, LA, MD, MI, MO, NJ, NC, OH, SC, SD, UT, WI, VA (State does not check, but other agencies may check)

**Does the State Require Such Training?**

<b>YES - 7</b>	<b>NO - 17</b>
LA, MO, NY, OH, TN, TX, UT	AZ, CT, FL, HI, ID, KS, ME, MD, MI, NE, NV, NJ, NC, SC, SD, WI, WY

**8b. Do you view lack of appropriate operator training as a significant issue?**

<b>STATE</b>	<b>YES</b>	<b>NO</b>
<b>Arizona</b>		√
<b>Connecticut</b>		√
<b>Florida</b>		√
<b>Hawaii</b>		√
<b>Idaho</b>		√
<b>Kansas</b>		√
<b>Louisiana</b>	√	
<b>Maine</b>		√
<b>Maryland</b>		√
<b>Michigan</b>		√
<b>Missouri</b>	√	
<b>Nebraska</b>		√
<b>Nevada</b>		√
<b>New Jersey</b>		√
<b>New York</b>	√	
<b>North Carolina</b>		√
<b>Ohio</b>	√	
<b>South Carolina</b>		√
<b>South Dakota</b>		√
<b>Tennessee</b>	√	
<b>Texas</b>	√	
<b>Utah</b>	√	
<b>Wisconsin</b>		√
<b>Wyoming</b>		√

## **WHY?**

<b>Arizona</b>	There are no State/Federal laws requiring screening at landfills for regulated radioactive waste.
<b>Colorado</b>	People should know machine limits; basic radiation issues.
<b>Florida</b>	Responsibility of the Department of Health.
<b>Louisiana</b>	Operators should recognize RAM hazards and handle them properly.
<b>Maine</b>	We are not aware of any reason to train operators in radiation safety or use of monitoring equipment.
<b>Maryland</b>	Lack of appropriate operator training is no more hazardous or detrimental than lack of monitoring devices at 75% of the solid waste facilities.
<b>Michigan</b>	Device manufacturers give onsite training.
<b>Missouri</b>	Could result in excess worker exposure, and materials being inappropriately disposed of in a landfill.
<b>Nebraska</b>	Lack of training on waste screening would be significant but lack of training in radiation training specifically does not appear to be an issue at this time.
<b>New Hampshire</b>	N/A - We have appropriate operator training in our State.
<b>North Carolina</b>	Operating the sensors is apparently very simple and vendor and/or company guidance documents and manuals are thought to be adequate by operating personnel.
<b>New York</b>	When monitors are use, operators generally do not provide sufficient “dwell” time. This significantly decreases radiation detection efficiency.
<b>Ohio</b>	Ohio has authority to adopt rule requirements for training, but cost of training to local health districts (mandatory training) is an issue.
<b>South Dakota</b>	State does not generate much radioactive waste.

<b>Tennessee</b>	With regard to radiation detection instrumentation, they must be familiar with operating procedures in order to make accurate detection assessments.
<b>Texas</b>	Worker safety - unnecessary exposure to ionizing radiation; long term contamination from improper disposal.
<b>Utah</b>	Poor or no training may result in inaccurate monitoring.
<b>Wisconsin</b>	No landfills in Wisconsin, that I am aware of, have radiation detection systems.

**9. Is your State planning any action (e.g. regulation, guidance, outreach) regarding the detection of radioactive contamination at solid waste facilities?**

**YES**

AZ, MI (information notice), MO (guidance is being drafted), NJ

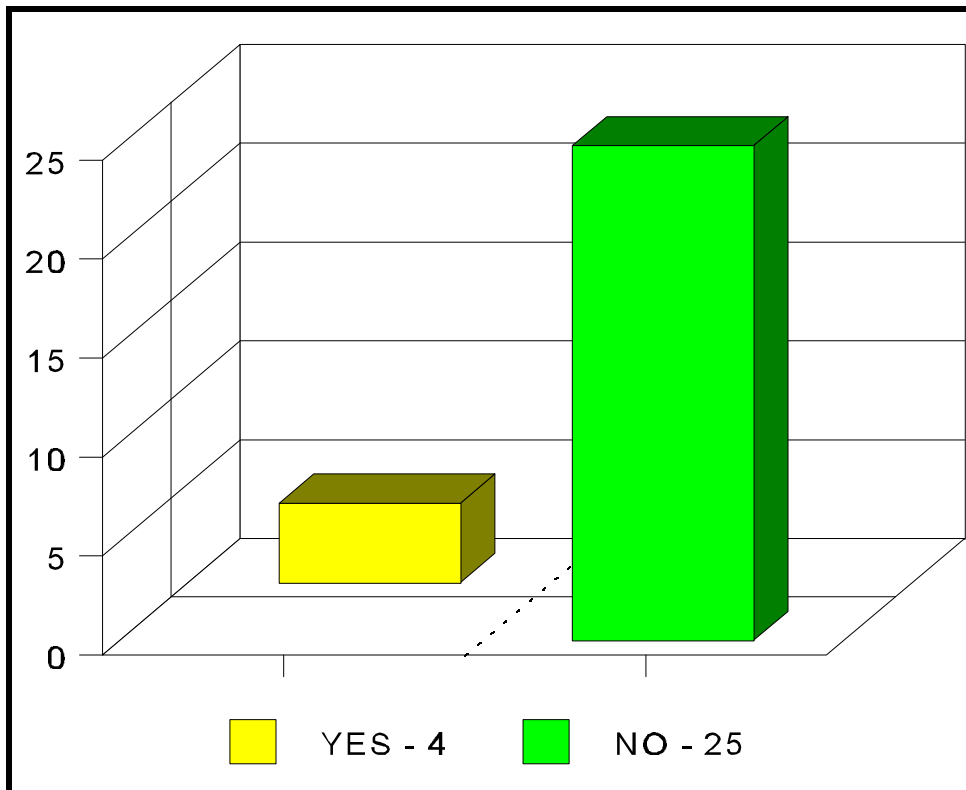
**NO**

CO - No, but our solid waste and radiation groups should work together to clarify any problems

CT, FL, HI, ID, KS, LA, ME, MD, MA, NE, NV, NH (already in rule), NC, NY, ND, OH, SC, SD, TN, TX, UT, VA, WI, WY

**Other**

CA - Rad regulators have distributed guidance documents to site operators and regulators



**10. If ASTSWMO worked on further guidance regarding radioactive waste at solid waste facilities, your State would be interested in the following areas:**

STATE	Develop Disposal Procedure	Develop Procedure to Dispose LLW in SW Landfills	Health & Safety Procedures	Develop Standard Alarm Levels	Develop Disposal for NORM
AZ				1	2
CO	1	3	4	5	2
CT	2	5	5	1	1
HI		3	4	2	1
ID				1	2
KS	1	5	4	2	3
LA	3	5	1	2	4
MA		3	1	2	
MD			1	2	
MI	1		4	3	2
MO	5	1		2	3
NE	4	5	2	3	1
NH			1		
NJ	1	5	2	1	4
NY	2		3	1	
NC		2	4	5	3
ND		1			1
SD	4	1	3	5	2
TN	1	1	1	1	1
TX			1	2	
UT			1	1	1
VA			1	2	
WI		2			1
WY	2		1	3	

<b>TOTAL</b>	<b>2.30</b>	<b>3.0</b>	<b>2.5</b>	<b>2.23</b>	<b>2.11</b>
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*None*

CA - None of these should be done outside the rad regulatory authority in the State. NV, SC

*Other*

OH - assessment of risk and incident of rad material going to SW landfill.

VA - 3 - procedure for best management after source is identified, source specific.

**Other Comments**

- Arizona** When landfill operators detect radioactivity, they call the AZ Radiation Regulatory Agency (ARRA) for instructions to reject the load. ARRA tell them that under certain conditions, the load may be accepted. The ARRA sent the attached letter to all solid waste landfills in AZ to provide guidance.
- Colorado** Requests are dealt with on a case by case basis in conjunction with local government authorities.
- Idaho** Interested in all topics regarding radioactive waste guidance/regulation development as pertaining to solid waste facilities.
- Nebraska** If guidance is developed, we would be very interested in getting a copy or access to it.
- New Hampshire** Guidance should be directed toward operator training.
- Ohio** Once the rad material is in landfill, it seems that the response has been to leave it there. This situation has rarely been brought to our attention and the few instances we know about have been very low level.
- South Carolina** Please be aware that SC has both a low-level rad waste landfill and high-level rad waste disposal facility. SC monitors, very closely, rad waste disposal. Please contact the State of South Carolina for a copy of their State regulations - (803) 896-4218.
- Texas** Other option above in #10, require statutory and or rule changes before they could be implemented.

**Wisconsin**

Wisconsin, as well as other States with high levels of NORM, have unique problems concerning radiation detectors at MSW facilities. Materials with elevated levels of NORM are fairly common (any water treatment devices, materials with scale, etc.) And it would be difficult to separate NORM detects from alarms associated with accidental disposal of radioactive sources.