CONF-960741--3 SAND96-1477C

A Computer Based System for Prioritizing Pollution Prevention Opportunity Assessments at SNL/NM

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Abstract

Prioritizing waste generators is necessary to determine which are the best candidates for Pollution Prevention Opportunity Assessments (PPOAs). This paper describes the Sandia National Laboratories/New Mexico (SNL/NM) PPOA Ranking System. The system uses a multimedia approach that considers hazardous and radioactive waste disposal data, and hazardous chemical usage data (from which air emissions are extrapolated). Pollution prevention information is included, from the SNL Pollution Prevention Opportunities database that identifies waste streams that have readily apparent pollution prevention opportunities. The system also considers the relative costs of waste management and the chargeback fees paid for waste generation. From these data, organizations are ranked with an algorithm developed in Microsoft Access™ on a personal computer. The concept could readily be transferred to other facilities needing to decide where to perform PPOAs.*

The work described in this report was performed for Sandia National Laboratories under contract number DE-AC04-94AL85000.

1. Background

This paper describes the Sandia National Laboratories/New Mexico (SNL/NM) Pollution Prevention Opportunity Assessment (PPOA) Ranking System (System). The System uses a multimedia approach that considers hazardous and radioactive waste disposal data, and hazardous chemical usage data (from which air emissions are extrapolated). Pollution prevention information is included, from the SNL Pollution Prevention Opportunities database that identifies waste streams that have readily apparent pollution prevention opportunities. The system also considers the relative costs of waste management and the chargeback fees paid for waste generation. From these data, organizations are ranked with an algorithm developed in Microsoft Access™ on a personal computer.

2. Discussion

Prioritizing waste generators is necessary to determine which are the best candidates for PPOAs. This System is a mathematical prioritization based on currently available data. Input data to the PPOA Ranking System includes the waste type, quantity, estimated waste management cost, chargeback dollars paid, and number of implementable pollution prevention options for waste streams. These data are processed through an algorithm, and the result is a relative ranking assigned to each waste-generating organization.

The prioritization algorithm, which is repeated for every waste generating organization, is illustrated in Figure 1, PPOA Ranking System Schematic Diagram.

Insert Figure 1

- Data Fields. Data from different SNL databases are brought in to different "fields." These field names are CB (chargeback dollars paid on generated waste); RAD-WM (radioactive waste volumes generated); HAZ-WM (hazardous waste volumes); P2O ("low hanging fruit," or readily apparent pollution prevention opportunities); and HCUI (Hazardous Chemical Usage Inventory data which provides a rough estimate of air emissions potential). The RAD-WM and HAZ-WM fields are subdivided according to waste types, each of which has a different waste management cost multiplier. The data in each field are multiplied by waste management cost factors so that the more expensive wastes have a greater importance in the algorithm. These products are then summed, to achieve a total cost value for each field.

- Waste Management Cost Factors. An estimate of "avoidable waste management costs" was obtained from the Idaho National Engineering Laboratory (INEL) DOE guidance document (Reference 1). The relative cost comparison between radioactive and hazardous waste at SNL/NM, combined with the INEL comparison of relative costs between the types of radioactive waste to

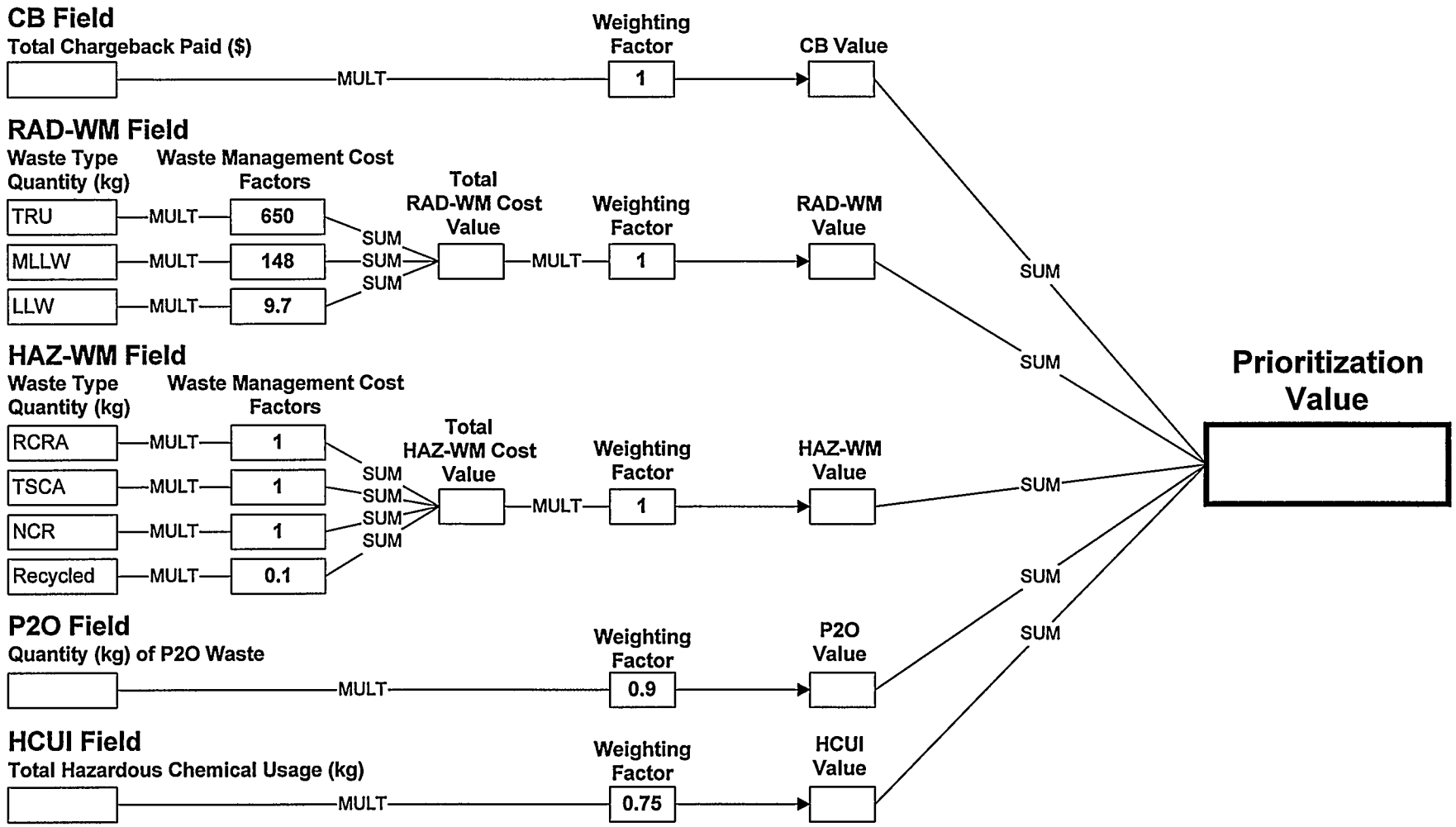

Figure 1. PPOA Ranking System Schematic Diagram

estimate relative waste cost factors for the algorithm.

Table 1. Waste Management Cost Factors

Waste Type	Average Waste Management Cost	Normalized Waste Management Cost Factor (per kg)
TRU	$48,267/m3	650
MLLW	$10,922/m3	148
LLW	$717/m3	9.7
RCRA	$32/kg	1
TSCA	$32/kg	1
NCR	$32/kg	1
Recycled	$3.20/kg	0.1

- Weighting Factors. Each field is multiplied by a weighting factor to make it more or less significant in the overall ranking. As the relative importance of one field over another may change, the weighting factors are adjustable. Variables that may affect the importance of a weighting factor include data accuracy or confidence level (for example, estimated data values would not be considered to be as significant as measured data). In the case where a field is of no interest to the prioritization, the weighting factor could be set to zero. For example, if the chargeback data was not important to a particular prioritization, the CB field could be set to zero. The result is that the chargeback data does not contribute to the prioritization value.

- Prioritization Value. The products of field values and weighting factors are then summed, resulting in a Prioritization Value for the organization. The algorithm is performed on every waste generating organization, and the resulting report is a ranked list of all waste generators.

The System is operated by following on-screen instructions. The waste management cost factors and weighting factors are variables that can be adjusted by the user. The System provides several reports. The main report is the PPOA Ranking System Report. This report includes data on hazardous waste generation history and chargeback dollars paid as well as the prioritization ranking. The summary is based on waste data compiled for a user-specified time period, such as a calendar year, which is also indicated on the summary.

Other reports available from the PPOA Ranking System are waste generation history for user-specified organizations, which include data on hazardous waste, wastewater discharges, and pollution prevention options for some waste streams.

3. Results

The PPOA Ranking System provides consistency and a measure of objectivity to the choice of PPOA candidates. A concerted attempt

has been made to accurately balance weighting factors with statistical analysis testing. Following a careful study of the data, weighting factors were defined, tested, altered, retested, and selected. Through the consistent application of these weighting factors to the waste generating organizations at SNL/NM, a defensible prioritization system has been developed.

References

1. Hsu, K., M. Burns, S. Priebe, and P. Robinson. 1995. Avoidable Waste Management Costs. INEL-94/0205. Idaho National Engineering Laboratory, Idaho Falls, Idaho.

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