Proposed Approach to Improve Open Dumps Data and Solid Waste Projects and Programs in Indian Country

Working Paper

May 2016

Open Dump Data Quality Challenges

Data on open dump sites in the Indian Health Service (IHS) Operation and Maintenance Data System (OMDS) indicates there are nearly 3,300 sites where action is pending to close, clean-up, or upgrade the sites. However, the ability of IHS and Environmental Protection Agency (EPA) to confidently stand behind this data and develop projects to address the health impacts of these sites is limited, based on the findings described below:

- Thirty-four percent (34%) of the open dumps pending action have no reported surface area, or the reported surface area is zero (0), which makes calculating the site's Health Threat Score impossible.
- Over 250 (8%) of the 3,300 open dump sites pending action have no location coordinates. Without location coordinates it is impossible to establish eligibility for Sanitation Deficiency System (SDS) project funding or develop an SDS project to address the issue.
- 1,240 open dump sites pending action are located outside of an Indian reservation or legal off-reservation trust land boundary (per U.S. Census boundary information). Of these, 601 (48%) are identified as having a land status in the OMDS as "Unspecified", "Fee", or "Private". The eligibility of these sites for IHS funds is also questionable.
- The majority (54%) of the open dumps pending action do not have condition assessment dates, so the age of the data cannot be assessed.
- 29% of the open dumps with pending action have assessment dates indicating they were completed in 2011 or earlier.

Proposed Actions

In order to protect the public health and meet the requirements of Public Law (P.L.) 103-399, the Indian Lands Open Dump Cleanup Act (25 U.S.C. 3901 et seq.), it is in the interest of the EPA and IHS to work together to improve the quality of the open dump data, coordinate with tribes on projects that address open dumps, and support the development of tribal solid waste management programs. The proposed actions for EPA and IHS to take are as follows:

- Commit to a schedule and approach to review open dump data included in the OMDS and ensure it is accurate and sufficient to develop solid waste projects in (SDS).
- Develop a training program for field staff (IHS and tribal employees identified by the IHS Office of Environmental Health and Engineering (OEHE) Area Directors) to develop skills in assessing open dumps and accurately entering data into OMDS.
- Develop evaluation criteria to assess the effectiveness of tribal solid waste management programs and carry out program assessments on a regular basis to aid in evaluating whether solid waste projects in SDS are ready to fund.
- Continue to encourage and assist tribes to develop solid waste codes and ordinances that discourage open dumping by making the practice illegal and punishable under tribal law.
- Continue to encourage tribes to take action on cleaning up and closing open dumps through tribally-directed initiatives. IHS and EPA can provide technical assistance to the tribe in these efforts.

Proposed Approach to Improve Open Dumps Data and Solid Waste Projects and Programs in Indian Country (May 2016)

I. Purpose

The purpose of this document is to provide an overview of the requirements to collect open dump data, review the quality of the current data, and propose an approach to be used by the Indian Health Service (IHS) and the Environmental Protection Agency (EPA) to improve open dump data quality and projects to address open dumps while supporting the development of tribal solid waste management programs.

II. Background

Section 4 (a) of the Indian Lands Open Dump Cleanup Act (P.L. 103-399, 25 U.S.C. 3901 et seq.) required the IHS to complete an inventory of open dumps on American Indian/Alaska Native (AI/AN) lands. These requirements included:

- A list of the geographic location of all open dumps,
- An evaluation of the contents of each dump, and
- An assessment of the relative severity of the threat to public health and the environment posed by each dump.

IHS met the requirements of Section 4(a) by publishing the *1998 Report to Congress on the Status of Open Dumps on Indian Lands* on October 13, 1999. Since the issuance of the 1998 report, IHS and EPA have worked collaboratively to develop a process to gather open dump information. Open dump data is gathered and stored in the IHS Operation and Maintenance Data System (OMDS), and it should be used to identify projects to address solid waste deficiencies on tribal lands. These projects are included as part of the annual report that IHS provides to Congress on sanitation deficiencies in Indian country, in accordance with the Indian Health Care Improvement Act (P.L. 94-437, 25 U.S.C. 1632 et seq.).

While collaboration between EPA and IHS to capture open dump data has been ongoing since 1998, there has not been a focus on implementing consistent practices associated with collecting, entering and reviewing this data. This working paper describes the current quality of the open dump data and a proposed approach to collect, assess and report on open dumps. This document also establishes a definition of an open dump that will be used by IHS when reporting on them and provides recommended approaches to how EPA and IHS can work with tribal governments to help resolve solid waste problems in Indian country.

III. Open Dump Data Quality

The 12 IHS Areas maintain an inventory of open dumps within the OMDS, which is a component of the IHS Sanitation Tracking and Reporting System (STARS). A snapshot of open dump status based on the data included in OMDS as of April 18, 2016, is shown in Table 1 below.

While there are over 4,600 open dumps reported in the OMDS, actions have been reported at

1,300 of these sites to either close, clean-up, or upgrade the site to bring it into compliance with EPA's municipal solid waste disposal standards (40 CFR Part 258). Based on the OMDS data there are nearly 3,300 sites where action is pending to close, clean-up, or upgrade the site. However, the ability of EPA and IHS to confidently stand behind this data is limited for a number of reasons as described below.

Table 1. Open Dump System Status (As of April 18, 2016)

IHS Area	Active	Inactive		Total Action Pending	Total Universe
	Action Pending	Action Taken	Action Pending		
Great Plains	140	56	37	177	233
Albuquerque	147	112	33	180	292
Alaska	133	79	151	284	363
Bemidji	184	54	47	231	285
Billings	108	15	43	151	166
California	341	248	10	351	599
Navajo	522	41	7	529	570
Nashville	25	16	6	31	47
Oklahoma	335	126	88	423	549
Phoenix	503	393	66	569	962
Portland	189	83	123	312	395
Tucson	1	114	40	41	155
TOTAL	**2,628**	1,337	651	**3,279**	**4,616**

Table 1 Definitions

Total Universe = Active (Action Pending) + Inactive (Action Taken) + Inactive (Action Pending)
"Active" = Open dump site that is actively being used to deposit waste
"Inactive" = Open dump site that was formerly used to deposit waste, but the site has received no waste in the past year.
"Action Taken" = Sum of number of open dump sites reported in OMDS that are Cleaned-up + Closed + Upgraded between Jan 1, 1959 and July 15, 2015
"Cleaned-up" = An open dump site where waste has been removed and the site is no longer used as a dump site.
"Closed" = An open dump site where waste is left in place, the site is properly covered, and the site is no longer used as a dump.
"Upgraded" = An open dump site that is fully compliant with 40 CFR Part 258 standards
"Pending Action" = Sum of the number of open dump sites reported in OMDS that are "Open dump – Buried" (waste on site had been covered in a non-complaint manner) + "Open dump – Surface" (waste on the surface of a site that is not being properly managed)

In a 2015 survey of the IHS Areas, 10 of the 12 Areas indicated there was no or only sporadic review of the open dump data in OMDS. Additionally, 3 of the 12 Areas indicated that the IHS was not involved in listing new open dumps in the data system. In 6 of 12 Areas, multiple users such as Tribes, EPA, and technical assistance providers have been given access to OMDS to enter open dump data with little to no oversight by IHS. No formal training has been developed by EPA or IHS to assist field staff in the assessment open dumps for incorporating data into OMDS.

The following sections highlight some of the additional data quality challenges associated with the current open dump data.

A. Surface Area Data

Surface area data is critical, because it is used to characterize the magnitude of the health threat caused by the open dump. Thirty-four percent (34%) of the open dumps pending action in OMDS have no reported surface area, or the reported surface area is zero (0). This prevents the calculation of a Health Threat Score (HTS) in OMDS. The table below summarizes the surface area data of the 3,279 open dump sites pending action.

Table 2. Open Dump Sites Pending Action Surface Area Data Summary (As of April 18, 2016)

Reported Surface Area	Number of Open Dump Sites Pending Action
None	1,119
0 to 0.1 Acres	333
0.1 to 0.5 Acres	741
0.5 to 10 Acres	1,019
Greater than 10 Acres	67
TOTALS	**3,279**

Additionally, Section 9(b) of the Indian Lands Open Dump Cleanup Act says:

"*This Act shall not apply to open dump sites on Indian lands or Alaska Native lands— (1) that comprise an area of one-half acre or less and that are used by individual families on lands to which they hold legal or beneficial title."*

There are 1,074 open dump sites pending action in OMDS that are reported as equal to or less than ½ acre in size.

B. Locational Data

Establishing the location of the open dump is important for two reasons: to determine their eligibility, and to determine their proximity to populations and drinking water sources, which aids in assessing the health threat posed by the open dump.

Under the Indian Lands Open Dump Cleanup Act the IHS is directed to focus on:

*"…open dumps on Indian lands or Alaska Native lands which are subject to the authority of the Indian tribal government or Alaska Native entity***."**

Locational data helps make these eligibility determinations.

The open dump locational data reported in OMDS on April 19, 2016 was compared to the US Census Boundaries listed below, and it was determined that 1,790 open dump sites pending action were inside of these boundaries and 1,240 sites were outside of these boundaries. Note that only those open dumps with geographic coordinates listed in OMDS could have this determination made. If a dump is located outside of these boundaries it is possible that the dump is located on lands **not** under the control of the tribal government or entity. The boundaries used for this analysis are described in Table 3 below.

Table 3. US Census Bureau Tribal Land Graphic Information System (GIS) Boundary Layers;

Value	Description
D2	Legal federally-recognized American Indian area consisting of reservation only.
D5	The legal off-reservation trust land portion of an American Indian entity with both a reservation and trust land.
D8	The legal reservation portion of an American Indian entity with both a reservation and trust land.

However, there are some situations where the open dump may fall outside of the boundaries described above and still be considered under the control of the tribal government or entity. These cases could include the following Land Status categories: Alaska Native Land, Allotted, New Mexico Pueblos, Trust (Individual) and Trust (Tribal). There are, however, some Land Status categories that seem to indicate that the tribal government is not under control of the tribal government, such as the Fee and Private categories.

As noted above, there are 1,240 open dump sites pending action that are located outside of the boundaries described above. Of these, the land status in OMDS is Unspecified for 534 and 67 are described as Fee or Private. Additionally, of the 1,790 sites located inside of the boundaries the land status in OMDS is Unspecified for 737 and 84 are described as Fee or Private. Table 4 provides a summary of the locational area data attached to open dump sites in OMDS.

An issue with interpreting this data is that there are no written definitions or guidance that describe the Land Status categories included in OMDS. Having clear definitions that staff are trained on determining would guide the evaluation and data gathering efforts and improve the consistency of the open dump site information in OMDS.

Table 4. Open Dump Sites Pending Action Locational Area Data Summary (As of April 18, 2016)

Site Location Description	Number of Sites Pending
No locational data:	**249**
Inside US Census Tribal Boundaries D2, D5 and D8	**1,790**
Unspecified:	*737*
Fee:	*37*
Private:	*47*
Trust (Tribal):	*720*
Trust (Individual):	*32*
Alaska Native Lands:	*1*
New Mexico Pueblos:	*130*
Allotted:	*91*
Outside US Census Tribal Boundaries D2, D5 and D8	**1,240**
Unspecified:	*534*
Fee:	*41*
Private:	*26*
Trust (Tribal):	*356*
Trust (Individual):	*126*
Alaska Native Lands:	*126*
New Mexico Pueblos:	*10*
Allotted:	*21*
Total (Inside + Outside + No Locational Data)	**3,279**

C. Open Dump Survey Data Age

The date that an assessment was made is an important data element, because it helps to establish the currency of (and therefore the quality of) the data. Over time, changes to site characteristics may occur as a result of additional waste disposal activities or clean-up by the tribe or others. The majority of the open dumps pending action (54%) do not have condition assessment dates, so the age of the data cannot be established. Additionally, 30% of the open dump sites with pending action have assessment dates indicating they were completed in 2011 or earlier. Table 5 below provides a summary of the condition assessment dates taken from OMDS on April 18, 2016.

Table 5. Open Dump Sites Pending Action Condition Assessment Dates (As of April 18, 2016)

Condition Assessment Date Range	Number of Open Dumps Pending
No Assessment Dates	1,789
Jan 2016 to April 2016	7
Jan 2012 to Dec 2015	526
Jan 2008 to Dec 2011	501
Jan 2004 to Dec 2007	351
Jan 2000 to Dec 2003	34
Later than Jan 2000	71
Total	**3,279**

IV. Data Quality Impacts on Health Threat Scores

The Health Threat Score (HTS) is calculated by using the location, size, and content characterizations of open dumps to determine the relative severity of the threat posed by each site to the environment and public health. The basic premise driving the health threat determination is that larger sites, sites closer to homes and water sources, and sites with more hazardous content present a higher threat. The paper titled *Evaluating Health Threat Scores in the IHS Operations and Maintain Data System (OMDS),* August 30, 2013, described how health threat scores are calculated.

It is a general practice to query the database for high health threat open dump sites to focus priority on them for actions by the tribe and federal government; however, the health threat score of an open dump will be underestimated if there are any unspecified data fields in the record.

The health threat score is calculated in the following way:

Health Threat Score (HTS) = Size Factor x Σ(Hazard Factors) x Σ(Proximity Factors)

In order for the dump site to be numerically scored and assigned a health threat category (High, Moderate, or Low), all three factors in the above equation are needed. If insufficient data is entered, OMDS will report the health threat as "No Score".

The Size Factor is solely determined by the surface area of the open dump site. The Size Factor is 1, 2, or 3, depending on the surface area entered into the open dump profile.

The Hazard Factors include the following seven data fields: Contents, Rainfall, Site Drainage and Leachate Potential, Flooding Potential, Frequency of Burning, Controlled Access and Public Concern. Each field is assigned a score that varies from 1 to 3 up to 1 to 8, depending on the relative weight of its impact on the environment. The score for the Hazard Factors is the sum of the scores for these seven fields.

The Proximity Factors include the following three data fields: Vertical Distance to Drinking Water Aquifer, Horizontal Distance to Surface Water Bodies, and Distance to Homes. Each field is assigned a threat factor that varies from 1 to 4 up to 1 to 6, depending on the relative weight of its impact on the environment. The score for the Proximity Factors is the sum of the scores for these three fields.

If there is no surface area data or locational data associated with an open dump site, then a HTS cannot be calculated even if there are high hazard and proximity factors. As noted in Section III- A above, there is currently no surface area data available for 1,119 (34%) of the open dump sites pending action. Additionally, Section III-B noted that 249 open dump sites pending action are missing location coordinates. As a result, 1,561 (48%) of the open dump sites pending action have no Health Threat Score or a Health Threat Score equal to zero (0). Table 6 below summarizes these sites.

Table 6. Open Dump Sites Pending Action Health Threat Scores (As of April 18, 2016)

Health Threat Score	Number of Open Dumps
No Score	1,068
Score = 0	493
Score > 0	1,718
Subtotal	**3,279**

V. Open Dump Data Review Process

There have been limited quality control reviews completed by IHS on the open dump data included in OMDS since its initial entry. Additionally, access to input information has been provided to several outside users over the years with little or no oversight. Due to the limited personnel resources available to IHS, it is important for IHS to maintain partnerships with EPA and the tribes to assist in the collection of open dump data. However, it is still critical that the IHS be responsible for the oversight and review of OMDS data to ensure its accuracy and sufficiency to develop solid waste projects within SDS.

To address these issues, a proposed data review and validation approach is included in Appendix A. This review will only focus on open dump sites that meet the following criteria, derived from Public Law 103-399 and from 40 CFR 241.101:

The Open Dump location is a place where solid waste:

1. *Has been disposed of in an intentional, repetitive manner by multiple families that does not protect public health or the environment, is susceptible to open burning, and is exposed to the elements, disease vectors and scavengers;*
2. *Covers a surface area 0.5 acres or greater and;*
3. *Is on lands subject to the authority of an American Indian tribal government or Alaska Native entity.*

Prior to Areas' review and validation of open dump data in OMDS, IHS and EPA shall develop an open dump training program for field staff to develop skills in assessing open dumps and accurately entering data into OMDS. This training should include topics such as size estimation, content evaluation, land status assessment, GIS Mapping, among others. This training should be delivered to staff that will be engaged with updating open dump data as identified by the OEHE Area Directors.

When reviewing and validating the data in OMDS, the data fields in Table 7 below shall be completed, at a minimum. Upon completion, the Area OEHE Director or designee shall confirm that the requirements for the data categories listed below have been met. In order to facilitate review of the Areas' data validation efforts, a report shall be created in OMDS to indicate which data requirements have not been met. Sites that do not include the minimum data will not be removed from the data system, but will be reported as an "incomplete assessment" and a health treat score will not be calculated.

Table 7. Open Dump Minimum Data Elements

Data Category	Requirement
Condition	Data that described the current condition of the site.
Land Status	Information on the land status must be included based on clearly defined and understood categories. Documentation that establish this land status should be included.
Location	Geographical coordinates (latitudinal and longitudinal) must be included.
Surface Area	Must be included, reported in acres and verified through GIS imaging software as thoroughly as possible.
Hazard Factors	Hazard factors related to Contents, Rainfall, Frequency of Cover, Frequency of Burning and Controlled Access.
Surveyor Name	The surveyor name must be indicated.
Proximity Factors	Distances to groundwater aquifers, surface water bodies and homes must be included.
Condition Date	Open dumps with no last survey date or older than 4 years.

Area Programs will be encouraged to develop quality control protocols at the Area and District levels. Examples of data validation procedures that could be used by the Areas are checks to the site characteristics (land status, lat/long and surface area), hazard and proximity factors.

Area Programs should have the flexibility to allow the inclusion of other open dump data in OMDS; however, only the data that meets the above criteria shall be reported in the inventory and used by IHS when planning SDS projects to close open dumps. When allowing this flexibility, it is recommended that Areas develop guidelines on their practices and procedures.

VI. SDS Projects to Close or Clean-Up Open Dumps

As specified in Section 4e of the *Sanitation Deficiency System (SDS) Guide for Reporting of Sanitation Deficiencies for Indian Homes and Communities,* May 2003, each open dump site identified in OMDS must have an associated SDS project for its clean-up, closure or upgrade. Multiple open dump sites can be addressed by one SDS project. SDS projects will only be developed for open dump sites that have been determined by the SFC Program to meet the definition and have complete assessment data as described in Section V.

The SFC Program will annually review the cost and scope of these projects through the SDS data review process. The projects to close open dumps in SDS will be linked back to the open dump site in OMDS.

An SDS project to close an open dump site will only be feasible for funding when the tribe has:

i. Completed a solid waste management plan
ii. A functioning solid waste management program that includes codes and ordinances

iii. Identified an alternative for solid waste disposal or a plan for upgrading the existing disposal site to be compliant with EPA requirements.

Following the completion of a solid waste project that addresses an open dump, the open dump's "Condition" in OMDS should be changed to Closed or Cleaned-Up. The Area SFC Program should encourage tribes who close or clean-up their open dumps without IHS funding to notify IHS of these actions so that the data in STARS can be updated. Table 8 below summarizes the definitions of the various conditions associated with the completion of SDS open dump projects.

Table 8. Open Dump Condition Descriptions

Open Dump Condition Field Values	**Description**
Closed	Waste is left in place, the site is properly covered, and the site no longer is used as a dump.
Cleaned-Up	Waste is removed, and the site no longer is used as a dump.
Upgraded	Waste site has been improved by making the site fully compliant with EPA Criteria for Municipal Solid Waste Landfills (40 CFR Part 258 standards).

VII. Tribal Solid Waste Program Evaluation and Technical Support

In order to evaluate the effectiveness of the technical assistance provided and improve the public's understanding of the status of solid waste management programs in Indian country, the EPA should develop evaluation criteria to assess the effectiveness of tribal solid waste management programs and complete program assessments on a regular basis. This requirement should be agency-wide. These evaluations could then be included as part of the tribe's solid waste organizational data in STARS and used as supporting evidence that the tribe has a functioning program and the SDS projects related to the open dump closure are "Ready to Fund" because the risk of continued open dumping practices within the tribe's jurisdiction has been minimized.

In order to support tribes in their efforts to develop effective solid waste management programs EPA and IHS should continue to encourage and assist tribes to develop solid waste codes and ordinances that discourage open dumping by making the practice illegal and punishable under tribal law. IHS in coordination with EPA should examine approaches to augment training activities for tribes requiring assistance in the development of solid waste codes and ordinances.

The IHS and EPA should continue to encourage tribes to take action on closing or clean-up of open dumps through tribally directed initiatives. IHS and EPA can provide technical assistance to the tribe in these efforts.

VIII. Conclusion

The quality of the data in the IHS data systems that address open dumps in Indian country needs to be improved. In order to protect the public health and meet the requirements of Public Law (P.L.) 103-399, the Indian Lands Open Dump Cleanup Act (25 U.S.C. 3901 et seq.), it is in the interest of the EPA and IHS to work together to improve the quality of the open dump data in OMDS, coordinate with tribes on projects that address open dumps, and support the development of tribal solid waste management programs. The proposed actions for EPA and IHS to take are as follows:

- Commit to a schedule and approach to review open dump data included in the IHS data system and ensure it is accurate and sufficient to develop solid waste projects in the IHS Sanitation Deficiency System.
- Develop a training program for field staff (IHS and tribal employees identified by the IHS Office of Environmental Health and Engineering (OEHE) Area Directors) to develop skills in assessing open dumps and accurately entering data into OMDS.
- Develop evaluation criteria to assess the effectiveness of tribal solid waste management programs and carry out program assessments on a regular basis to aid in evaluating whether solid waste projects in SDS are ready to fund.
- Continue to encourage and assist tribes to develop solid waste codes and ordinances that discourage open dumping by making the practice illegal and punishable under tribal law.
- Continue to encourage tribes to take action on cleaning up and closing open dumps through tribally-directed initiatives. IHS and EPA can provide technical assistance to the tribe in these efforts.

Appendix A: Possible Open Dump Data Validation Process

Prior to expending resources to complete a field visit verification of the open dump data it may be possible to improve the data quality via a desk review using the following approaches:

a. Site Characteristics
    i. Land Status – Verify the location according to US Census Boundary Data via the IHS GIS map viewer and selected land status category in OMDS. May require additional confirmation with tribal GIS or Housing departments.
    ii. Latitude and Longitude – Verify the location using either the provided link or:
        1. Google Maps – Copy and paste the lat/long to Google Maps. Is the open dump visible from the Aerial Image? (assumes no tree cover). Adjust lat/long coordinates until the location is adequately provided. Google Maps settings may be adjusted to eliminate the conversion of DDMMSS to Degree Decimal format.
        2. Use the IHS GIS map viewer to see tribal land boundaries in relation to open dump locations.
    iii. Surface Area (acres) – Verify the size of the open dump. Trees or low resolution may obstruct the view. This acreage should be the size of the trash pile excluding windblown and scattered debris.
        1. The IHS GIS map viewer can be used to calculate the area from drawing a polygon object.
        2. Google Maps may be useful using the line measure function. Size may be estimated from a summation of the parts. Google Earth's timeline may be useful to check prior year's aerial images that may show the site in a different time of the year.
        3. A common mistake of many surveyors is to input the lot size or parcel size. Ensure the trash pile size is represented and not the lot size.

b. Hazard Factors
    i. Contents – Verify the contents to the extent possible. Consult the original survey and site photographs. Desk review maybe of limited use if the original survey is years old and/or if the resolution of the GIS image is poor.
    ii. Rainfall – ensure a quantity is entered for rainfall. Many states produce precipitation maps which may prove useful. Example include:
        1. South Dakota Climate and Weather web page (http://climate.sdstate.edu/normals/monthlyprecip/index.asp)
        2. USGS National Map Small Scale web page (https://nationalmap.gov/small_scale/printable.html) - Scroll down to "Climate" – Printable Maps.

c. Proximity Factors
    i. Vertical Distance to Drinking Water Aquifer – Consult with the field engineer about the likelihood of wells in the local area and typical drill depths and capacity of the raw water source .in relation to the open dump site. This is a drinking water aquifer and not just local ground water.
    ii. Horizontal Distance to Surface Water Bodies – Verify this from the open dump survey form in OMDS.
        1. Google Maps and IHS GIS map viewer may be used to verify.
    iii. Distance to Homes
        1. Google Maps and IHS GIS map viewer may be used to verify.