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Stockpiles of Obsolete Pesticides and Cleanup Priorities

A Methodology and Application for Tunisia

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Abstract

Obsolete pesticides have accumulated in almost every developing country or economy in transition over the past several decades. Public health and environmental authorities are eager to reduce health threats by removing and decontaminating stockpile sites, but there are many sites, cleanup can be costly, and public resources are scarce. Under these conditions, it seems sensible to develop a methodology for prioritizing sites and treating them sequentially, as budgetary resources permit. This paper presents a methodology that develops cleanup priority indices for Tunisia. The approach integrates information on populations at risk, their proximity to stockpiles, and the relative toxic hazards of the stockpiles. The robustness of this approach is tested by varying model parameters widely and testing for stability in the rank-ordering of results.

This paper—a product of the Environment and Energy Team, Development Research Group—is part of a larger effort in the department to understand implications of Toxic Pollution from Agriculture. Policy Research Working Papers are also posted on the Web at http://econ.worldbank.org. The author may be contacted at sdasgupta@worldbank.org.

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1. Introduction

Mounting evidence of health and environmental damage has focused the attention of the international community on stockpiles of obsolete pesticides[1]. In the absence of a clear obsolete pesticides management strategy, over the years, significant amounts of obsolete pesticides have been stockpiled in developing countries. The FAO Obsolete Pesticides Program has defined six key factors that lead to the accumulation of obsolete pesticides in developing countries (FAO, 1995a): (i) product bans, (ii) inadequate storage and poor stock management, (iii) unsuitable products or packaging, (iv) donation or purchase in excess of requirements, (v) lack of coordination between donor agencies, and (vi) commercial interests of private sector and hidden factors.

In developing countries, often the warehouses are not secured, are dilapidated and packages have deteriorated with the passage of time. As pesticides have decompose they form by-products, and some by-products of decomposition are more toxic than the original poison. Toxic products often leak from corroded or otherwise damaged containers into the surrounding environment – the main pathway for contamination.[2] Frequently people, especially the poor and their livestock, are found to be living near the stock pile, edible crops are grown on contaminated land, and contaminated water is used for drinking and irrigation (World Bank 2002). The absence of secure storage also leads to vandalism, theft of products and access by children.

Leaving the current pesticide problem in developing countries in its current state is not an option.[3] Given the high cost involved in cleanup and safe disposal of obsolete pesticides,

[1] Obsolete pesticides are pesticides that are unfit for further use or for re-conditioning (OECD, FAO, UNEP, 2000). The FAO defines obsolete pesticides as all pesticide products not in current use because they have banned, have deteriorated or are damaged, have passed their expiration date, cannot be used for any other reason, or are not wanted by the current owner (FAO, 1996).

[2] Current environmental hazards from obsolete pesticide stocks include (but not limited to) leakage to soil and dispersal in soil through capillary action and soil microfauna; leaching to groundwater through contaminated soil; surface water contamination by surface runoff and wind dispersal; dispersal by air through volatilization or wind dispersal of pesticide dusts or pesticide contaminated soil particles; and widespread dispersal through natural disasters, such as hurricanes and floods.

[3] It is often difficult to ascertain the ownership of old stockpiles as a result of changes in ownership and in the status of organizations or the disappearance of owners. For example, state enterprises that have since been privatized, or organizations that no longer exist, do not retain responsibility for previously accumulated stockpiles of obsolete pesticides.

interventions should be prioritized on basis of a detailed inventory of pesticide stockpiles and contaminated sites, determining the identity of the contaminant, its quantity and proximity to people and biodiversity. However, most developing countries lack adequate technical, institutional and financial capacity for reliable analysis to manage clean up of contaminated wastes/ sites and the safe destruction of obsolete pesticide stocks, and are therefore dependent on external assistance. In this paper, we develop and apply a methodology prioritizing 197 stockpile sites in Tunisia for clean up- treating them sequentially, as budgetary resources permit. Like many low- and middle-income countries, Tunisia has numerous sites of obsolete pesticide stockpiles, and we take Tunisia as an illustrative example since they are currently finalizing a detailed inventory of all the publicly-held pesticide stockpiles in the country under the Africa Stockpiles Program[4].

Our model is based on the principle of welfare maximization subject to a budget constraint. We develop a composite measure of potential exposure risk for each site as a function of the volume of pesticides, their relative hazard, and the conditions of the containers in which they are stored. We convert this to per-capita exposure risk by introducing a risk-decay factor that is a function of inhabitants' average distance from the site in each Tunisian delegation (our most spatially-disaggregated unit). Then we compute total exposure risks for proximate populations, taking into account the relative vulnerability of children and women of childbearing age. We introduce alternative vulnerability weights for population groups and hazard weights for pesticides, as well as alternative risk-decay parameters that govern the effect of distance on exposure. The result is a set of alternative priority indices for each site, whose variation across weightings provide a test of the robustness of our methodology. After an assessment of the results, we provide what we believe to be a defensible priority ranking for removal and cleanup at Tunisia's 197 sites.

[4] In order to eliminate obsolete pesticides from Africa, Africa Stockpiles Program (estimated duration 10-15 years; funding: US $250 million) has been approved by the World Bank, the GEF and the FAO. In 2005, the First Phase of Africa Stockpiles Program, ASP-P1 (duration 4 years) with focus on 7 countries: Ethiopia, Mali, Morocco, Nigeria, Tanzania, Tunisia, South Africa was initiated with US $60 million grant from the GEF, FAO, the African Development Bank, Belgium, Canada, Denmark, EU, Finland, France, Japan, Netherlands, Sweden, Switzerland and the World Bank Development Grant Facility. A description of the ASP program and its progress is available at: www.africastockpiles.net.

The remainder of the paper is organized as follows. In Section 2, we develop the theoretical model that underlies our priority index methodology. Section 3 introduces the Tunisian database, while Section 4 presents our priority index computations and discusses the results. We provide a summary and conclusions in Section 5.

2. Optimal Allocation of Cleanup Investment[5]

We model the welfare impact of pesticide stockpile cleanup activities as a function of their level and distribution across Tunisian sub-regions (delegations). Political considerations make it desirable to strike a balance between area representation and national welfare maximization in resource allocation decisions. We cannot realistically characterize Tunisia's objective function as linear (infinite elasticity of substitution across sub-regions), because sole allocation of cleanup resources to one sub-region is highly unlikely, whatever the relative scale of its problem. At the same time, Tunisia's objective function is not purely fixed-coefficient (zero elasticity of substitution across sub-regions), because nothing forces the government to maintain cross-subregion parity in per-capita resource allocation. This assertion is acceptable in the case of the pesticide cleanup program, since the distribution of obsolete pesticide stockpiles across subregions may not be highly correlated with the distribution of population.

We adopt an intermediate assumption: that the government's objective function is characterized by unit-elastic substitution across subregions. A unit-elastic (Cobb-Douglas) welfare function permits tailoring of cleanup programs to conditions in each subregion, while encouraging some diversification through the operation of diminishing returns. We assign the same opportunity values to human life and health in all subregions.

We specify the objective function for pesticide cleanup as:

[5] The allocation model developed in this section is a significant extension of the model developed by the authors in Bolt *et al*. (2003).

$$W = \omega_0 \prod_{i=1}^{N} A_i^{\omega_i} \qquad (1)$$

where A_i = Activity in subregion i

ω_i = Poverty weight assigned to subregion i.

We assign poverty weights to incorporate the relative inability of the poor to protect themselves from pesticide exposure. For each subregion, we specify the relevant damage abatement function as:

$$A_i = \alpha_0 C_i^{\alpha_1 D_i} \quad (\alpha_1 > 0) \qquad (2)$$

where C_i = Scale of cleanup activity in subregion i

D_i = Scale of potential damage in subregion i

Equation (2) incorporates scale economies: The productivity of pesticide cleanup rises with the scale of potential exposure damage.

The government faces a fixed budget constraint and differential cleanup costs that reflect the mix of pesticide-related problems in each subregion.

$$\sum_{i=1}^{N} c_i C_i = I_T \qquad (3)$$

where c_i = Unit cost of cleanup in subregion i

I_T = Total cleanup budget

Substitution from (2) into (1) yields the following welfare function:

$$W = \omega_0 \prod_{i=1}^{N} \alpha_0 C_i^{\alpha_1 \omega_i D_i} \qquad (4)$$

Maximization of W subject to the budget constraint yields the following ratio of optimal allocations in subregions i and j:

$$\frac{c_i C_i^*}{c_j C_j^*} = \frac{\omega_i D_i}{\omega_j D_j} \qquad (5)$$

Since ω is a poverty weight, we can specify it as a function of income per capita:

$$\omega_i = \eta y_i^\theta \quad (\theta < 0) \qquad (6)$$

Substituting (6) into (5), we obtain:

$$\frac{c_i C_i^*}{c_j C_j^*} = \frac{D_i y_i^\theta}{D_j y_j^\theta} \qquad (7)$$

and

$$\frac{C_i^*}{C_j^*} = \frac{D_i y_i^\theta c_i^{-1}}{D_j y_j^\theta c_j^{-1}} \qquad (8)$$

From this, we can derive a relative priority index for subregion i:

$$C_i^* = \frac{D_i y_i^\theta c_i^{-1}}{\sum_{j=1}^{N} D_j y_j^\theta c_j^{-1}} \qquad (9)$$

In (9), a subregion's priority index is equal to the product of its exposure damage potential, the appropriate exponential of per-capita income and the inverse of its unit cleanup cost, divided by the sum of products for all subregions.

For a particular pesticide, exposure damage potential is determined by three factors: the pesticide's risk, the number of exposed people (by weighted vulnerability class), and the degree of their exposure. An ideal model would incorporate a risk measure for each exposed individual, and specify risk as declining with distance from the pesticide stockpile. Potential damage from a stockpile would be a function of both total pesticide hazard and storage stability. For feasibility, we model at the subregion level. Defining the area around each stockpile as a subregion, we specify the potential damage function as:

$$D_i = \delta P_i R_i d_i^{\gamma} \quad (10)$$

where P_i = Population at risk in subregion i

R_i = Pesticide risk index for subregion i

d_i = Average inhabitant distance from the site in subregion i

$$P_i = \sum_{l=1}^{L} \varphi_l P_{il} \quad (11)$$

where φ_l = Vulnerability weight for population group l

P_{il} = Population in group l, subregion i

$$R_i = S_i \sum_{m=1}^{M} \rho_m Q_{im} \quad (12)$$

where ρ_m = Hazard rating of pesticide m

Q_{im} = Quantity of pesticide m in subregion i

S_i = Share of pesticide stock in subregion i in degraded containers

The pesticide risk index incorporates several factors. Potential pesticide risk for a subregion is indexed by pesticide volume (in kg) in each risk class, multiplied by the appropriate risk weighting. To compute the risk index, potential risk is multiplied by the share of the pesticide stock in containers that are broken or leaking, as well as the stock that has already contaminated the soil. Substituting (10), (11) and (12) into (9), we obtain the fully-dimensioned priority rating for subregion i:

For $Z_i = [\sum_{i=1}^{L} \varphi_l P_{il}][S_i \sum_{m=1}^{M} \rho_m Q_{im}] d_i^{\gamma} y_i^{\theta} c_i^{-1}$

$$C_i^* = \frac{Z_i}{\sum_{j=1}^{N} Z_j} \quad (13)$$

3. The Tunisian Pesticide Stockpile Database

Like many low- and middle-income countries, Tunisia has hundreds of sites of obsolete pesticide stockpiles with potentially-serious health hazards to nearby populations. Product bans, outdated products, donations or purchases in access of requirement, poor stock management and inadequate storage are primary reasons behind this accumulation. Under the ongoing Africa Stockpiles Program, Project1 (ASP-P1), The Ministry of Environment and Sustainable Development's waste management department, (Agence Nationale de Gestion des Déchets – ANGed) of the Government of Tunisia, has currently finalized and verified a detailed inventory of all the publicly-held pesticide stockpiles in the country, determining the geo-location of the storage sites, whether the storage sites are protected or not, identity of the contaminant, its quantity, and general condition of the stockpiles.

Overall, Tunisia has approximately 1,915 metric tons of obsolete pesticide *formulations* in 197 storage sites. A total of 692 metric tons of *active ingredients* were identifiable from the database, while 415 tons were not identifiable (or 22% of the total).[6] Preliminary investigation revealed only 11% of the stockpiles were contained in "undamaged" packages; 47% of the packages were either broken or showed surface damage, 8% indicated leakage, 34% were considered to be contaminating the soil and equipment.

At the storage site (stockpile) level, the database included pesticide volume, corresponding active ingredient and pesticide volume by damage class for containers (leaking, broken, contaminated soil, etc.). The Chemical Abstract Number (CAS) of each active ingredient was used to assign hazard indicators: the World Health Organisation toxicity class. The analysis revealed the presence of 13 metric tons of WHO-Ia (extremely hazardous), 2 metric tons of WHO-Ib (highly hazardous), 196 metric tons of

[6] The chemical in the pesticide formulation that actually kills the pest(s) is termed the *active ingredient*. The added chemical(s), those which make the product easy and safe to formulate or apply, are termed the inert ingredients or carriers. Each formulation has a specific percentage concentration of active ingredient usually measured as a percentage of the total formulation weight, in grams per kilogram or liter. In this study we are primarily interested in the toxicological properties of the active ingredient.

WHO-II (moderately hazardous) and 258 metric tons of WHO-III (slightly hazardous) active ingredients in the storage sites.[7, 8]

The currently-available information in Tunisia is sufficient to compute the index in (13) for the population and per-capita risk factors. A further avenue for future work could incorporate several of the other parameters such as per-capita income for governorates and poverty weights, as well as unit cleanup costs for pesticides with different hazard ratings and protective container conditions.

Population information was downloaded from the 2004 Demographic Census of Tunisia9 and two vulnerable population classes were constructed - children under the age of 5 and women of childbearing age 20-49. Land area was computed at the Delegation level from the GIS databases of the ANGed.

Table 1 provides distribution statistics for all the relevant variables in our model. It is clear that the distributions of all variables are highly skewed. Population and area follow their standard skewed (rank-size) distribution, while the pesticide variables display even more skewness. The two riskiest pesticide classes (WHO-Ia and Ib) are not stockpiled in 75% of the delegations, and large volumes only appear in delegations above the 90th percentile. Similarly-skewed patterns are evident for the other pesticide classes and for the three classes of container security, the latter indicating that containers are intact at most stockpile sites.

[Insert Table 1]

[7] The remaining 26 metric tons were classified under WHO-Table 5 - unlikely to pose a health hazard; 1 metric ton under WHO - other, and 196 metric tons under WHO - not classified, respectively.
[8] Although detailed data for each storage site was used for computation in this paper, the information is sensitive and classified by the government, hence could not be included in this paper.
[9] Institut National de la Statistique.

4. Estimation of Priority Indices

4.1 Model Data

Using the storage site-specific data, we construct variables for alternative forms of model (13) as follows:

(1) Vulnerability-weighted population in the delegation ($\Sigma\Phi_i P_i$): We set φ=1 for less-vulnerable population groups. In the weighted-population version, we use weights of 2 and 1.5 for children younger than 5 and women aged 20-49, respectively. In the un-weighted version, we assign weights of 1 to all three groups.

(2) Average delegation inhabitant's distance from the stockpile site (d_i): We base our distance proxy on simple geometry. Within a circular area around a stockpile, average distance from the stockpile is proportional to the radius. Accordingly, our average distance proxy is the square root of delegation area (this is a constant ($\pi^{.5}$) times the radius.[10] In our tests of model robustness we use three values of γ, the distance risk-decay parameter in equation (10): -1, -2 and 0.5.

(3) The proportion of pesticides that have container problems at the site (S_i): We compute the share of total active-ingredient pesticides that are in broken or leaking containers, or have already leached into the soil.

(4) Hazard-weighted pesticide volume at the site ($\Sigma\rho_j Q_{ij}$): We use two radically-different hazard ratings to test the robustness of our methodology. For the first set, we use exponential differences in hazard ratings: ρ_j = 100, 10, 1, 0.1 for WHO classes 1a, 1b, 2 and 3, respectively. For the second set, we set weights equal to 1 for all four hazard classes.

[10] The square root of the area is the best approximation we can provide for average distance in non-circular cases as well.

4.2 Results

Tables 2, 3 and 4 summarize our results for computation of six priority indices with equation (13). For the first three indices, we use weighted populations and pesticide volumes and vary the distance risk-decay parameter across -2, -1 and -0.5. For the second set of three indices, we use un-weighted population and pesticide volume and vary the distance risk-decay parameter across -2, -1 and -0.5. Taken together, these variations test the robustness of our methodology by assigning very different values to key model parameters.

As Table 2 shows, our approach is quite robust. For the three weighted indices, large changes in the distance risk-decay parameter have almost no effect on the results. In all cases, the rank correlation coefficients (in bold for Rank 1, 2, 3) are 0.96 or higher. The same is true for the three distance risk-decay parameter values in the case of the un-weighted set (in bold for Rank 4, 5, 6). Cross-correlations between sets (Ranks 1, 2, 3 vs. Ranks 4, 5, 6) are also quite high, varying between 0.84 and 0.89.

[Insert Table 2]

Tables 3 and 4 provide detailed results for all 197 stockpile sites and all six variations in model parameter sets.[11] The first column of Table 3 provides the priority ranking. All index values are normalized to a total value of 1000 for all delegations. This allows for easy interpretation of the relative magnitudes in each index. In Table 3, the next three columns display the highest, average and lowest index values for each site across the six variations, while the next three columns provide the equivalent information in the form of ranks. The following columns present index values for weighted and un-weighted population, weighted and un-weighted pesticide volume, and the proportion of pesticides in seriously-damaged containers or contaminated soil. Table 4 provides complete information on index values for the six model variations.

[11] As stated earlier, the stockpile database is still considered confidential – thus we have preserved this confidentiality by replacing the specific location names with generic names.

These results have several striking features. First, variation in population weighting makes little difference. Visual inspection of the weighted and un-weighted population indices in Table 3 confirms that the numbers are practically identical in all cases.

Second, variations in pesticide hazard ratings do make a substantial difference for index values within delegations. Clear examples are provided by sites A and B, respectively. These two sites have the highest overall index values in the sixth column, which displays the highest of the six index values for each stockpile site. Site A's un-weighted pesticide index is far higher than its weighted index, while the converse is true for the site B. Inspection of raw data shows that this site B is a very large repository of WHO - Ia pesticides, which have a hazard weight of 100 in the weighted versions of the model (vs. a weight of 1 for class 3 pesticides). Conversely, site A is a huge repository of WHO-III pesticides, which assume much more significance in the un-weighted versions of the model.

Third, in all variations of the model, priority index values are heavily concentrated at the top of the list. The results for Index 1 in Table 4 provide a good illustration. Here it is useful to recall that index values are normalized to a total of 1000 in each column. For Index 1, site B accounts for about 56% of the total for all 197 sites. The top four sites account for 83% of total value for Index 1. Similar concentration is observable for the other five indices.

Fourth, variations of results within the un-weighted and weighted versions show that the treatment of risk-decay with distance does make a substantial difference. A good example is provided by site D, the second row in Table 4. The surrounding delegation has a fairly large area, so our proxy for average inhabitant distance from the site is also relatively large (40.64). For a risk-decay parameter of -1, the index value is 187.5. Doubling the parameter to -2 reduces the index value to 63.6, while halving it increases the value to 272.4. Similar patterns are apparent elsewhere in the results.

In the face of such variation, it might seem plausible to posit substantial variation in the rank-ordering of sites across the six model versions. If this were the case, developing a stable priority list for cleanup would require the arbitrary imposition of one parameter set on the model. Fortunately, this is not the case. As Table 2 shows, the rank correlations are quite high across all versions of the model. This fortuitous result owes something to self-canceling random variation across model variables. However, the largest part seems due to the correlation of weighted and un-weighted pesticide indices across sites. Those which have big volumes of hazardous pesticides also have big total volumes, so they rank high whether or not highly-varied hazard ratings are applied.

The ultimate implications of this study are most clearly visible in the sixth column of Table 3 (Top Rank), which displays the highest index value across all six models for each site. It is immediately clear that the results are heavily dominated by the top-5 sites, and the index values tail off very quickly. All things considered, we believe that column 6 of Table 3 provides the best guide for cleanup action, because it highlights sites that achieve a very high priority index value for some combination of the hazard, population vulnerability and risk-decay parameters that drive the model.

5. Summary and Conclusions

Virtually every developing country or economy in transition has stockpiles of obsolete pesticides that have accumulated over the past several decades.[12] Public health and environmental authorities strongly recommend removal of stockpiles and site decontamination, but there are many sites, cleanup can be costly, and public resources are scarce. Under these conditions, it seems sensible to develop a methodology for prioritizing sites and treating them sequentially, as budgetary resources permit.

[12] The FAO has completed data gathering for Africa and the Near East. A total of 51,794 tons of obsolete pesticides have been identified in 53 countries in this region (FAO, 1995b). The FAO program on data gathering was expanded to Latin America in 1998 and to Asia in 2001. In total, it is estimated that global obsolete pesticides stockpiles in developing countries and economies in transition amount to approximately 440,800 – 551,000 tons.

In this paper, we have constructed and tested a methodology that computes cleanup priority indices for stockpiles of obsolete pesticides in Tunisia. Our approach integrates information on populations at risk, their proximity to stockpiles, and the relative toxic hazards of the stockpiles themselves. We have tested the robustness of our approach by varying model parameters widely and testing for stability in the rank-ordering of results. Our results indicate that the results are quite stable and robust, and we conclude that it is feasible to divide Tunisian stockpile sets into relatively unambiguous priority groups for cleanup operations. Our results also reveal a spectacular degree of clustering among the top-10 sites in Tunisia. We conclude that a sequenced strategy that follows our summary priority ordering in column 3, Table 3 can rapidly and cost-effectively decrease potential health damage from obsolete pesticide stockpiles in Tunisia.

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Table 1: Distribution of Model Variables

Stats	Pop<5	Women 20-49	Other Pop.	WHO-Ia (kg)	WHO-Ib (kg)	WHO-II (kg)	WHO-III (kg)	Leakage (kg)	Broken (kg)	Soil Contam. (kg)	Area (sq km)
Min	474	1,636	5,243	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.84
p10	1,680	4,845	14,199	0.00	0.00	0.00	0.00	0.00	0.00	0.00	49.49
p25	2,276	6,377	19,698	0.00	0.00	0.00	0.00	0.00	0.00	0.00	195.54
p50	3,124	9,346	26,797	0.00	0.00	4.50	0.35	0.00	0.00	0.00	406.13
p75	4,666	13,851	39,246	0.00	0.00	187.35	28.13	59.74	0.00	0.00	740.95
p90	5,678	16,769	51,102	6.75	7.30	1,800.00	300.00	1,620.00	250.00	2,112.86	1,114.78
Max	7,989	25,132	73,197	10,614.68	1,320.00	22,500.00	108,075.00	84,214.28	7,977.27	117,465.50	2,779.05

Note: p – stands for percentile

Table 2: Rank Correlations: Six Models

			Rank 1	Rank 2	Rank 3	Rank 4	Rank 5	Rank 6
Model	Distance Exponent							
Weighted	-1	Rank 1	1					
	-2	Rank 2	**0.9818**	1				
	-.5	Rank 3	**0.9946**	**0.9600**	1			
Unweighted	-1	Rank 4	0.8797	0.8709	0.8742	1		
	-2	Rank 5	0.8612	0.8853	0.8398	**0.9823**	1	
	-.5	Rank 6	0.8781	0.8537	0.8810	**0.9951**	**0.9620**	1

Table 3: Cleanup Priority Ranking

Priority	Site ID	Highest Index	Average Index	Lowest Index	Top Rank	Average Rank	Lowest Rank	Weighted Population	Unweighted Population	Risk-Weighted Pesticides	Unweighted Pesticides	Containers Proportion Damaged	Exposure Distance Index
1	A	618.36	263.24	17.03	1	2.5	5	2.7	2.7	7.09	217.39	1.00	3.59
2	B	561.09	287.89	19.55	1	2.5	5	11.42	11.46	136.17	43.23	0.82	16.74
3	C	342.44	106.14	10.06	1	4.2	8	10.27	10.2	5.81	178.08	0.98	24.41
4	D	272.38	93.58	1.38	2	5.3	11	3.86	3.84	711.85	117.07	0.38	40.64
5	E	226.26	69.79	2.30	2	8.3	25	4.37	4.47	4.28	131.29	0.10	1.88
6	F	113.95	53.53	23.70	3	3.5	5	8.78	8.76	3.73	11.42	1.00	5.41
7	G	31.61	20.30	12.84	5	6.2	7	5.3	5.29	4.23	12.96	1.00	8.5
8	H	16.94	4.99	0.61	7	24.3	43	4.04	4.07	1.17	3.55	0.10	1.69
9	I	14.99	6.31	0.25	6	19.3	38	5.42	5.44	8.67	2.66	1.00	27.9
10	J	11.99	4.89	0.03	8	36.7	73	4.03	4.05	9.38	0.39	0.92	24.1
11	K	9.54	4.48	1.98	8	16.2	27	8.78	8.76	0.31	0.96	1.00	5.41
12	L	9.41	4.43	0.75	8	15	27	3.13	3.15	5.82	17.83	1.00	31.9
13	M	9.33	4.21	1.11	8	15.2	24	10.27	10.2	1.63	7.09	0.67	24.41
14	N	8.60	3.54	0.05	9	33.7	64	10.27	10.2	2.71	0.24	0.91	24.41
15	O	8.47	3.99	0.67	10	17.5	29	3.13	3.15	5.24	16.05	1.00	31.9
16	P	8.45	4.22	0.86	10	14	21	3.9	3.88	3.91	11.98	1.00	27.12
17	Q	6.74	1.74	0.06	12	45.3	86	6.1	6.11	0.28	8.47	1.00	52.72
18	R	6.28	3.75	1.24	11	14.7	19	5.39	5.41	1.67	5.13	1.00	17.43
19	S	6.20	3.19	0.72	14	19.7	28	4.92	4.92	2.17	6.64	1.00	24.88
20	T	6.05	3.53	0.46	10	17.7	26	10.27	10.2	2.14	2.47	0.81	24.41
21	AA	5.29	2.94	0.82	15	18.7	22	7.42	7.39	1.12	3.42	1.00	20.5
22	AB	5.26	2.93	0.81	16	19.7	23	7.42	7.39	1.11	3.40	1.00	20.5
23	AC	5.19	2.14	0.19	17	29.7	46	6.1	6.11	2.13	6.52	1.00	52.72
24	AD	5.03	3.22	0.55	12	19	25	5.24	5.2	2.71	2.95	0.87	18.21
25	AE	4.84	2.71	0.79	18	21.5	25	3.12	3.14	2.37	7.30	0.99	19.79
26	AF	4.81	3.49	1.94	9	16.2	24	3.14	3.12	14.77	45.26	0.10	9.92
27	AG	3.77	1.25	0.05	15	49	79	9.19	9.14	2.53	0.23	0.10	7.93
28	AH	3.72	1.77	0.02	16	45.8	77	3.38	3.37	7.44	0.40	0.29	14.75
29	AI	3.67	1.84	0.38	21	28	37	5.42	5.41	1.21	3.71	1.00	26.79
30	AJ	3.49	1.06	0.12	22	44.5	76	6.1	6.11	0.60	5.04	0.87	52.72
31	AK	3.46	1.35	0.03	18	43.5	74	7.55	7.57	1.66	0.33	0.90	30.09
32	AL	3.14	0.93	0.11	12	46.8	79	4.04	4.07	0.22	0.66	0.10	1.69
33	AM	3.13	1.60	0.35	24	29.8	38	1.06	1.06	5.20	15.93	0.99	25.59
34	AN	2.94	1.14	0.33	13	35.3	56	2.7	2.7	0.14	0.47	0.95	3.59
35	AO	2.59	1.07	0.10	26	41	63	6.1	6.11	1.06	3.26	1.00	52.72
36	AP	2.47	0.83	0.11	27	51.2	77	3.24	3.21	0.12	3.54	1.00	18.96
37	AQ	2.41	1.19	0.23	29	35.7	44	4.52	4.48	0.98	3.02	1.00	28.14
38	AR	2.14	1.11	0.19	10	39.3	68	3.13	3.08	0.93	17.03	0.10	6.87
39	AS	1.99	1.19	0.39	28	31.8	35	5.39	5.41	0.53	1.64	0.99	17.43
40	AT	1.97	1.17	0.39	29	32.8	36	5.39	5.41	0.52	1.60	1.00	17.43
41	AU	1.88	0.71	0.21	21	44.5	66	2.7	2.7	0.09	0.29	0.94	3.59
42	AV	1.86	0.87	0.01	28	56.2	84	6.68	6.68	0.70	0.04	0.93	17.39
43	AW	1.66	1.17	0.24	30	35	39	4.89	4.88	1.25	1.83	0.68	18.4
44	AX	1.64	0.93	0.27	33	36.2	40	3.87	3.86	0.65	2.00	1.00	19.73
45	AY	1.64	0.72	0.09	34	46	67	2.33	2.31	1.58	4.83	1.00	41.32
46	AZ	1.52	0.76	0.15	35	41.2	50	4.15	4.17	0.66	2.01	1.00	27.24
47	BA	1.42	0.76	0.15	31	41.3	52	3.13	3.13	0.63	0.49	1.00	11.92
48	BB	1.40	0.64	0.32	32	45.3	59	9.49	9.42	0.10	0.75	0.83	15.82
49	BC	1.39	0.71	0.14	19	47.3	76	5.3	5.29	0.07	1.19	0.67	8.5

Table 3: Cleanup Priority Ranking (cont.)

Priority	Site ID	Highest Index	Average Index	Lowest Index	Top Rank	Average Rank	Lowest Rank	Weighted Population	Unweighted Population	Risk-Weighted Pesticides	Unweighted Pesticides	Containers Proportion Damaged	Exposure Distance Index
50	BD	1.37	0.39	0.03	37	66	97	7.85	7.82	0.04	1.20	0.90	33.39
51	BE	1.19	0.46	0.17	34	49.3	64	6.63	6.58	0.87	0.92	0.10	7.03
52	BF	1.11	0.53	0.10	40	48.8	64	7.55	7.57	0.28	0.85	1.00	30.09
53	BG	1.08	0.33	0.04	41	64.5	88	4.52	4.48	0.33	6.66	0.20	28.14
54	BH	1.02	0.52	0.11	43	48.3	59	1.06	1.06	1.68	5.15	1.00	25.59
55	BI	0.89	0.57	0.18	42	43.3	45	6.26	6.24	0.29	0.77	0.81	17.24
56	BJ	0.78	0.29	0.00	40	81.3	121	8.24	8.27	0.31	0.01	1.00	29.75
57	BK	0.72	0.53	0.30	34	43.5	53	3.14	3.12	2.20	6.91	0.10	9.92
58	BL	0.64	0.50	0.26	36	45.3	52	6.14	6.16	1.18	3.62	0.10	10.79
59	BM	0.59	0.27	0.01	43	69.3	96	8.1	8.06	0.13	0.01	0.94	12.93
60	BN	0.58	0.27	0.00	45	73.2	102	2.28	2.27	0.76	0.06	0.76	16.89
61	BO	0.55	0.23	0.00	46	78.3	107	5.32	5.35	1.60	0.11	0.19	23.7
62	BP	0.54	0.31	0.09	48	57.2	65	4.28	4.32	1.87	5.76	0.10	19.15
63	BQ	0.49	0.17	0.03	49	72	93	5.39	5.41	0.17	3.97	0.10	17.43
64	BR	0.48	0.23	0.04	50	65.2	81	7.85	7.82	0.12	0.38	1.00	33.39
65	BS	0.47	0.23	0.03	48	65.3	76	3.83	3.81	0.35	0.17	0.46	11.59
66	BT	0.45	0.31	0.11	49	54.2	59	6.3	6.21	1.02	1.83	0.10	11.97
67	BU	0.44	0.21	0.00	49	75.3	100	4.28	4.32	1.59	0.17	0.17	19.15
68	BV	0.42	0.26	0.05	50	58.2	65	2.28	2.27	0.46	0.47	0.92	16.89
69	BW	0.38	0.23	0.05	33	63	89	2.9	2.89	0.26	2.89	0.10	6.11
70	BX	0.34	0.12	0.05	53	72.8	85	11.86	11.91	0.01	0.01	1.00	4.75
71	BY	0.33	0.21	0.04	58	63.2	68	2.28	2.27	0.36	0.39	0.92	16.89
72	BZ	0.32	0.24	0.05	55	60	66	6.1	6.04	0.23	0.40	0.62	19.95
73	CA	0.30	0.13	0.02	58	72.7	87	3.86	3.84	0.17	0.53	1.00	40.64
74	CB	0.30	0.14	0.00	56	92.8	128	2.13	2.14	2.66	0.08	0.10	13.98
75	CC	0.29	0.14	0.00	62	88.7	114	4.28	4.32	1.75	0.14	0.10	19.15
76	CD	0.27	0.14	0.04	60	70.3	82	7.63	7.64	0.58	1.78	0.10	22.68
77	CE	0.26	0.14	0.01	65	76.5	87	6.26	6.24	0.13	0.05	0.75	17.24
78	CF	0.25	0.14	0.04	61	70.5	80	1.64	1.65	0.24	0.74	1.00	21.06
79	CG	0.25	0.19	0.10	52	63	75	6.14	6.16	0.46	1.41	0.10	10.79
80	CH	0.24	0.11	0.04	47	71.2	90	11.86	11.91	0.01	0.04	0.41	4.75
81	CI	0.20	0.08	0.00	71	96	124	4.73	4.7	0.07	0.01	0.78	11.24
82	CJ	0.20	0.09	0.01	65	79.5	95	2.33	2.31	0.19	0.58	1.00	41.32
83	CK	0.19	0.09	0.01	67	79	91	8.24	8.27	0.09	0.06	0.89	29.75
84	CL	0.19	0.08	0.03	58	77.8	94	11.86	11.91	0.04	0.11	0.10	4.75
85	CM	0.18	0.06	0.01	68	88.2	109	2.33	2.31	0.50	5.34	0.10	41.32
86	CN	0.17	0.07	0.00	70	87.8	103	8.24	8.27	0.16	0.06	0.42	29.75
87	CO	0.16	0.08	0.00	71	87.5	104	4.28	4.32	0.99	0.22	0.10	19.15
88	CP	0.16	0.10	0.06	61	73.2	84	5.3	5.29	0.21	0.64	0.10	8.5
89	CQ	0.15	0.10	0.04	67	73.7	81	8.61	8.53	0.22	0.68	0.10	13.61
90	CR	0.14	0.04	0.00	70	96.7	121	3.13	3.15	0.11	2.59	0.10	31.9
91	CS	0.12	0.04	0.01	63	90.2	112	3.17	3.19	0.03	0.10	0.10	2.99
92	CT	0.09	0.07	0.04	69	77.5	87	6.14	6.16	0.17	0.53	0.10	10.79
93	CU	0.09	0.03	0.00	74	100.7	124	7.63	7.64	0.02	0.60	0.10	22.68
94	CV	0.08	0.02	0.00	75	103.7	128	3.86	3.84	0.01	0.21	0.71	40.64
95	CW	0.08	0.05	0.01	80	87.3	94	8.24	8.27	0.20	0.34	0.15	29.75
96	CX	0.07	0.03	0.00	60	97.8	129	2.7	2.7	0.00	0.03	0.97	3.59
97	CY	0.06	0.05	0.03	76	84.2	92	3.14	3.12	0.20	0.61	0.10	9.92
98	CZ	0.06	0.03	0.00	86	103.2	118	2.66	2.66	0.60	0.22	0.10	23.58

Table 3: Cleanup Priority Ranking (cont.)

Priority	Site ID	Highest Index	Average Index	Lowest Index	Top Rank	Average Rank	Lowest Rank	Weighted Population	Unweighted Population	Risk-Weighted Pesticides	Unweighted Pesticides	Containers Proportion Damaged	Exposure Distance Index
99	DA	0.05	0.03	0.00	88	103	118	3.87	3.86	0.37	0.12	0.10	19.73
100	DB	0.05	0.02	0.01	85	94.3	104	4.28	4.32	0.02	0.12	0.46	19.15
101	DC	0.05	0.02	0.00	86	105.7	123	3.42	3.46	0.05	0.75	0.10	22.97
102	DD	0.05	0.02	0.00	88	100.8	115	3.86	3.84	0.03	0.10	0.85	40.64
103	DE	0.05	0.03	0.01	89	93.5	98	5.93	5.92	0.12	0.37	0.10	20.13
104	DF	0.05	0.01	0.00	90	113.5	131	6.1	6.11	0.04	0.57	0.10	52.72
105	DG	0.04	0.02	0.00	91	97.7	105	8.24	8.27	0.09	0.29	0.10	29.75
106	DH	0.04	0.02	0.00	90	115.5	141	5.54	5.49	0.13	0.01	0.10	14.97
107	DI	0.03	0.02	0.01	92	100.5	108	7.42	7.39	0.04	0.22	0.10	20.5
108	DJ	0.03	0.02	0.00	93	109	124	2.34	2.33	0.36	0.11	0.10	18.14
109	DK	0.03	0.02	0.01	81	101.2	116	6.63	6.58	0.02	0.07	0.10	7.03
110	DL	0.02	0.01	0.00	97	109.8	119	3.86	3.84	0.15	0.42	0.10	40.64
111	DM	0.02	0.02	0.01	93	99.3	106	7.33	7.3	0.04	0.13	0.10	13.79
112	DN	0.02	0.01	0.00	87	111.5	131	6.14	6.16	0.00	0.06	0.24	10.79
113	DO	0.02	0.01	0.00	99	131.5	161	2.97	3.01	0.33	0.02	0.10	51.99
114	DP	0.02	0.01	0.00	99	115.3	132	2.28	2.31	0.03	0.01	1.00	27.02
115	DQ	0.02	0.01	0.00	101	107	112	1.06	1.06	0.04	0.11	1.00	25.59
116	DR	0.02	0.01	0.00	78	110.5	133	4.12	4.14	0.00	0.07	0.10	4.36
117	DS	0.02	0.01	0.00	96	105	114	5.69	5.67	0.04	0.14	0.10	14.94
118	DT	0.02	0.01	0.00	102	116.2	129	2.4	2.42	0.02	0.39	0.10	20.5
119	DU	0.02	0.01	0.00	102	119.7	138	3.3	3.31	0.19	0.06	0.10	28.92
120	DV	0.02	0.01	0.00	106	112.8	120	7.85	7.82	0.05	0.15	0.10	33.39
121	DW	0.02	0.01	0.00	102	114.5	127	4.37	4.38	0.12	0.05	0.10	21.76
122	DX	0.02	0.01	0.00	107	122	136	3.87	3.86	0.00	0.02	1.00	19.73
123	DY	0.01	0.01	0.00	110	114.2	119	7.42	7.39	0.00	0.01	0.88	20.5
124	DZ	0.01	0.01	0.00	104	110.2	115	6.26	6.24	0.04	0.10	0.10	17.24
125	EA	0.01	0.00	0.00	112	126	140	7.55	7.58	0.00	0.09	0.10	20.84
126	EB	0.01	0.01	0.00	109	126	142	4.03	4.05	0.08	0.03	0.10	24.1
127	EC	0.01	0.01	0.00	110	117	125	7.55	7.58	0.04	0.04	0.10	20.84
128	ED	0.01	0.00	0.00	117	129.5	143	1.83	1.85	0.00	0.12	0.25	22.47
129	EE	0.01	0.00	0.00	117	132.5	148	3.28	3.29	0.07	0.02	0.10	22.28
130	EF	0.01	0.00	0.00	120	134	150	5.42	5.41	0.05	0.01	0.10	26.79
131	EG	0.01	0.00	0.00	119	122.7	125	4.37	4.38	0.01	0.02	0.36	21.76
132	EH	0.01	0.00	0.00	114	121.8	126	6.68	6.68	0.01	0.01	0.34	17.39
133	EI	0.01	0.00	0.00	120	133.7	146	7.55	7.58	0.00	0.04	0.10	20.84
134	EJ	0.01	0.00	0.00	113	130.7	145	2.13	2.14	0.00	0.12	0.10	13.98
135	EK	0.00	0.00	0.00	127	135.8	145	6.86	6.9	0.00	0.00	0.94	30.72
136	EL	0.00	0.00	0.00	126	131.8	144	3.86	3.84	0.04	0.07	0.10	40.64
137	EM	0.00	0.00	0.00	128	139.7	150	2.94	2.93	0.00	0.06	0.10	19.17
138	EN	0.00	0.00	0.00	128	131.3	134	4.03	4.05	0.02	0.04	0.10	24.1
139	EO	0.00	0.00	0.00	134	142.5	151	5.42	5.44	0.00	0.03	0.10	27.9
140	EP	0.00	0.00	0.00	131	134	137	7.55	7.58	0.00	0.02	0.10	20.84
141	EQ	0.00	0.00	0.00	135	138.2	142	3.66	3.68	0.01	0.04	0.10	25.41
142	ER	0.00	0.00	0.00	129	136.5	142	2.52	2.53	0.01	0.04	0.10	15.76
143	ES	0.00	0.00	0.00	127	137.3	150	1.17	1.18	0.02	0.02	0.10	10.57
144	ET	0.00	0.00	0.00	130	135.3	139	2.9	2.91	0.01	0.04	0.10	20.98
145	EU	0.00	0.00	0.00	130	143.2	153	0.81	0.83	0.00	0.09	0.10	14.1
146	EV	0.00	0.00	0.00	142	145.7	148	4.05	4.03	0.00	0.02	0.10	26.47
147	EW	0.00	0.00	0.00	138	141	146	1.64	1.65	0.01	0.04	0.10	21.06

Table 3: Cleanup Priority Ranking (cont.)

Priority	Site ID	Highest Index	Average Index	Lowest Index	Top Rank	Average Rank	Lowest Rank	Weighted Population	Unweighted Population	Risk-Weighted Pesticides	Unweighted Pesticides	Containers Proportion Damaged	Exposure Distance Index
148	EX	0.00	0.00	0.00	144	154	161	3.86	3.84	0.00	0.03	0.10	40.64
149	EY	0.00	0.00	0.00	145	152.5	159	3.9	3.88	0.00	0.00	0.85	27.12
150	EZ	0.00	0.00	0.00	147	149.3	152	8.24	8.27	0.00	0.01	0.10	29.75
151	FA	0.00	0.00	0.00	132	139.7	149	7.67	7.71	0.00	0.01	0.10	13.74
152	FB	0.00	0.00	0.00	143	153.8	161	2.2	2.18	0.00	0.01	0.10	11.53
153	FC	0.00	0.00	0.00	153	157.5	162	4.03	4.05	0.00	0.01	0.10	24.1
154	FD	0.00	0.00	0.00	138	147.2	154	2.72	2.72	0.00	0.01	0.10	10.16
155	FE	0.00	0.00	0.00	143	153.2	163	3.87	3.86	0.00	0.00	0.20	19.73
156	FF	0.00	0.00	0.00	154	158.8	163	2.91	2.91	0.00	0.01	0.10	18.08
157	FG	0.00	0.00	0.00	154	155.5	157	2.33	2.35	0.00	0.01	0.10	27.22
158	FH	0.00	0.00	0.00	149	153.2	157	3.24	3.21	0.00	0.01	0.10	18.96
159	FI	0.00	0.00	0.00	155	157.3	159	2.33	2.35	0.00	0.01	0.10	27.22
160	FJ	0.00	0.00	0.00	152	155.2	159	5.32	5.35	0.00	0.00	0.32	23.7
161	FK	0.00	0.00	0.00	160	160.2	161	3.42	3.46	0.00	0.00	0.10	22.97
162	FL	0.00	0.00	0.00	154	157.5	161	5.39	5.41	0.00	0.00	0.10	17.43
163	FM	0.00	0.00	0.00	157	159.7	162	2.4	2.38	0.00	0.00	0.10	29.91
164	FN	0.00	0.00	0.00	164	165	166	5.1	5.11	0.00	0.00	0.10	19.18
165	FO	0.00	0.00	0.00	164	164.5	165	3.66	3.68	0.00	0.00	0.10	25.41
166	FP	0.00	0.00	0.00	165	165.5	166	1.83	1.84	0.00	0.00	0.12	20.15
167	FQ	0.00	0.00	0.00	167	167	167	4.12	4.14	0.00	0.00	0.10	4.36
167	FR	0.00	0.00	0.00	167	167	167	2.54	2.54	0.00	0.00	0.10	24.46
167	FS	0.00	0.00	0.00	167	167	167	3.3	3.31	0.00	0.00	0.10	28.92
167	FT	0.00	0.00	0.00	167	167	167	3.87	3.86	0.00	0.00	0.10	19.73
167	FU	0.00	0.00	0.00	167	167	167	11.86	11.91	0.00	0.00	0.10	4.75
167	FV	0.00	0.00	0.00	167	167	167	6.63	6.58	0.00	0.00	1.00	7.03
167	FW	0.00	0.00	0.00	167	167	167	7.67	7.71	0.00	0.00	0.10	13.74
167	FX	0.00	0.00	0.00	167	167	167	4.52	4.48	0.00	0.00	0.10	28.14
167	FY	0.00	0.00	0.00	167	167	167	8.24	8.27	0.00	0.00	1.00	29.75
167	FZ	0.00	0.00	0.00	167	167	167	4.28	4.32	0.00	0.00	1.00	19.15
167	GA	0.00	0.00	0.00	167	167	167	5.32	5.35	0.00	0.00	1.00	23.7
167	GB	0.00	0.00	0.00	167	167	167	6.1	6.11	0.00	0.00	1.00	52.72
167	GC	0.00	0.00	0.00	167	167	167	6.84	6.81	0.00	0.00	0.98	14.62
167	GD	0.00	0.00	0.00	167	167	167	6.63	6.58	0.00	0.00	1.00	7.03
167	GE	0.00	0.00	0.00	167	167	167	9.19	9.14	0.00	0.00	0.10	7.93
167	GF	0.00	0.00	0.00	167	167	167	6.63	6.58	0.00	0.00	0.89	7.03
167	GG	0.00	0.00	0.00	167	167	167	6.1	6.11	0.00	0.00	1.00	52.72
167	GH	0.00	0.00	0.00	167	167	167	6.68	6.68	0.00	0.00	1.00	17.39
167	GI	0.00	0.00	0.00	167	167	167	3.3	3.31	0.00	0.00	0.10	28.92
167	GJ	0.00	0.00	0.00	167	167	167	3.86	3.84	0.00	0.00	0.10	40.64
167	GK	0.00	0.00	0.00	167	167	167	8.24	8.27	0.00	0.00	1.00	29.75
167	GL	0.00	0.00	0.00	167	167	167	5.42	5.44	0.00	0.00	0.10	27.9
167	GM	0.00	0.00	0.00	167	167	167	6.86	6.9	0.00	0.00	1.00	30.72
167	GN	0.00	0.00	0.00	167	167	167	4.37	4.38	0.00	0.00	0.10	21.76
167	GO	0.00	0.00	0.00	167	167	167	3.3	3.31	0.00	0.00	1.00	28.92
167	GP	0.00	0.00	0.00	167	167	167	4.28	4.32	0.00	0.00	0.10	19.15
167	GQ	0.00	0.00	0.00	167	167	167	2.91	2.91	0.00	0.00	0.10	18.08
167	GR	0.00	0.00	0.00	167	167	167	2.34	2.33	0.00	0.00	0.10	18.14
167	GS	0.00	0.00	0.00	167	167	167	5.3	5.29	0.00	0.00	0.10	8.5
167	GT	0.00	0.00	0.00	167	167	167	4.03	4.05	0.00	0.00	0.10	24.1
167	GU	0.00	0.00	0.00	167	167	167	3.13	3.13	0.00	0.00	0.10	11.92

Table 4: Index Values

	Weighted Results			Unweighted Results		
	γ=-1	γ=-2	γ=-0.5	γ=-1	γ=-2	γ=-0.5
Site Id	Index 1	Index 2	Index 3	Index 4	Index 5	Index 6
B	561.09	462.16	523.21	67.85	19.55	93.49
D	187.48	63.62	272.38	11.64	1.38	24.99
F	44.71	113.95	23.70	51.91	46.28	40.66
A	39.46	151.73	17.03	459.71	618.36	293.17
G	19.50	31.61	12.96	22.64	12.84	22.24
C	17.81	10.06	20.06	205.79	40.66	342.44
I	12.45	6.15	14.99	1.45	0.25	2.59
J	10.72	6.13	11.99	0.17	0.03	0.28
N	7.63	4.31	8.60	0.25	0.05	0.42
E	7.38	54.24	2.30	87.99	226.26	40.58
T	5.37	3.03	6.05	2.34	0.46	3.90
AD	5.03	3.81	4.89	2.06	0.55	2.97
L	4.22	1.82	5.43	4.95	0.75	9.41
P	4.16	2.11	4.93	4.82	0.86	8.45
R	3.83	3.03	3.64	4.46	1.24	6.28
O	3.80	1.64	4.89	4.45	0.67	8.47
K	3.74	9.54	1.98	4.34	3.87	3.40
AH	3.72	3.47	3.25	0.08	0.02	0.10
AF	3.46	4.81	2.49	3.99	1.94	4.24
M	3.43	1.94	3.86	5.61	1.11	9.33
S	3.17	1.76	3.60	3.69	0.72	6.20
AA	2.99	2.01	3.09	3.47	0.82	5.29
AB	2.97	2.00	3.07	3.45	0.81	5.26
AK	2.76	1.27	3.46	0.21	0.03	0.39
AE	2.74	1.91	2.77	3.23	0.79	4.84
AG	2.17	3.77	1.39	0.07	0.05	0.07
H	2.07	16.94	0.61	2.40	6.87	1.05
AV	1.86	1.47	1.77	0.04	0.01	0.05
AC	1.82	0.48	3.01	2.12	0.19	5.19
AI	1.81	0.93	2.14	2.11	0.38	3.67
AW	1.66	1.25	1.63	0.92	0.24	1.33
AM	1.58	0.85	1.83	1.84	0.35	3.13
BA	1.23	1.42	0.97	0.36	0.15	0.42
AS	1.22	0.96	1.16	1.42	0.39	1.99
AT	1.20	0.95	1.14	1.40	0.39	1.97
AQ	1.17	0.57	1.41	1.35	0.23	2.41
AX	0.94	0.66	0.96	1.10	0.27	1.64
AO	0.91	0.24	1.51	1.06	0.10	2.59
AN	0.77	2.94	0.33	0.95	1.27	0.60
AZ	0.74	0.37	0.88	0.87	0.15	1.52
AY	0.66	0.22	0.96	0.76	0.09	1.64
BJ	0.63	0.29	0.78	0.01	0.00	0.01
BI	0.63	0.50	0.60	0.63	0.18	0.89
BE	0.60	1.19	0.37	0.24	0.17	0.22
BN	0.58	0.47	0.54	0.02	0.00	0.02
BM	0.55	0.59	0.45	0.02	0.01	0.03
BK	0.52	0.72	0.37	0.61	0.30	0.65

Table 4: Index Values (cont.)

	Weighted Results			Unweighted Results		
	γ=-1	γ=-2	γ=-0.5	γ=-1	γ=-2	γ=-0.5
Site Id	Index 1	Index 2	Index 3	Index 4	Index 5	Index 6
BF	0.52	0.24	0.64	0.60	0.10	1.11
BH	0.52	0.28	0.59	0.60	0.11	1.02
BL	0.50	0.64	0.37	0.58	0.26	0.64
BO	0.49	0.29	0.55	0.01	0.00	0.02
AU	0.49	1.88	0.21	0.57	0.76	0.36
AJ	0.45	0.12	0.74	1.43	0.13	3.49
BU	0.44	0.32	0.44	0.02	0.00	0.03
BV	0.42	0.34	0.39	0.16	0.05	0.22
BS	0.40	0.47	0.31	0.07	0.03	0.08
BT	0.40	0.45	0.31	0.27	0.11	0.31
AL	0.38	3.14	0.11	0.45	1.29	0.20
BB	0.38	0.33	0.34	1.04	0.32	1.40
BY	0.33	0.27	0.31	0.14	0.04	0.19
BZ	0.32	0.22	0.32	0.21	0.05	0.32
AR	0.31	0.63	0.19	2.14	1.51	1.89
BP	0.31	0.22	0.31	0.36	0.09	0.54
CB	0.30	0.29	0.25	0.00	0.00	0.00
CC	0.29	0.21	0.29	0.01	0.00	0.01
CE	0.26	0.21	0.25	0.04	0.01	0.05
Q	0.24	0.06	0.39	2.76	0.25	6.74
BC	0.22	0.35	0.14	1.39	0.79	1.36
BR	0.21	0.09	0.28	0.25	0.04	0.48
CG	0.19	0.25	0.14	0.23	0.10	0.25
CO	0.16	0.12	0.16	0.01	0.00	0.02
CI	0.16	0.20	0.12	0.00	0.00	0.01
CK	0.16	0.07	0.19	0.04	0.01	0.08
AP	0.15	0.11	0.14	1.68	0.43	2.47
CD	0.14	0.09	0.16	0.17	0.04	0.27
CF	0.14	0.09	0.15	0.16	0.04	0.25
CN	0.14	0.06	0.17	0.02	0.00	0.03
CA	0.12	0.04	0.18	0.14	0.02	0.30
BX	0.12	0.34	0.06	0.07	0.07	0.05
CQ	0.10	0.11	0.09	0.12	0.04	0.15
CP	0.10	0.16	0.06	0.11	0.06	0.11
BW	0.09	0.21	0.05	0.38	0.30	0.32
CH	0.08	0.24	0.04	0.11	0.12	0.08
BG	0.08	0.04	0.10	0.60	0.10	1.08
CJ	0.08	0.03	0.12	0.09	0.01	0.20
CT	0.07	0.09	0.05	0.08	0.04	0.09
CL	0.06	0.19	0.03	0.08	0.08	0.06
BD	0.06	0.03	0.08	0.71	0.10	1.37
CW	0.06	0.03	0.08	0.04	0.01	0.07
DA	0.05	0.04	0.05	0.01	0.00	0.01
CZ	0.05	0.03	0.06	0.01	0.00	0.01

Table 4: Index Values (cont.)

	Weighted Results			Unweighted Results		
	γ=-1	γ=-2	γ=-0.5	γ=-1	γ=-2	γ=-0.5
Site Id	Index 1	Index 2	Index 3	Index 4	Index 5	Index 6
CY	0.05	0.06	0.03	0.05	0.03	0.06
BQ	0.04	0.03	0.04	0.35	0.10	0.49
DH	0.04	0.03	0.03	0.00	0.00	0.00
DJ	0.03	0.03	0.03	0.00	0.00	0.01
CS	0.03	0.12	0.01	0.03	0.05	0.02
DE	0.03	0.02	0.03	0.03	0.01	0.05
DG	0.02	0.01	0.02	0.02	0.00	0.04
DB	0.02	0.01	0.02	0.04	0.01	0.05
DW	0.02	0.01	0.02	0.00	0.00	0.00
DM	0.02	0.02	0.01	0.02	0.01	0.02
DU	0.02	0.01	0.02	0.00	0.00	0.00
DD	0.02	0.01	0.02	0.02	0.00	0.05
DO	0.01	0.00	0.02	0.00	0.00	0.00
DK	0.01	0.03	0.01	0.02	0.01	0.02
DI	0.01	0.01	0.01	0.02	0.01	0.03
DQ	0.01	0.01	0.01	0.01	0.00	0.02
DS	0.01	0.01	0.01	0.02	0.00	0.02
DL	0.01	0.00	0.02	0.01	0.00	0.02
EC	0.01	0.01	0.01	0.00	0.00	0.01
EB	0.01	0.01	0.01	0.00	0.00	0.00
DZ	0.01	0.01	0.01	0.01	0.00	0.01
DV	0.01	0.00	0.01	0.01	0.00	0.02
CR	0.01	0.00	0.01	0.07	0.01	0.14
EE	0.01	0.00	0.01	0.00	0.00	0.00
DY	0.01	0.01	0.01	0.01	0.00	0.01
EH	0.01	0.01	0.01	0.00	0.00	0.00
EF	0.01	0.00	0.01	0.00	0.00	0.00
CV	0.01	0.00	0.01	0.04	0.00	0.08
DC	0.01	0.00	0.01	0.03	0.01	0.05
CU	0.00	0.00	0.01	0.06	0.01	0.09
CX	0.00	0.02	0.00	0.05	0.07	0.03
EG	0.00	0.00	0.00	0.00	0.00	0.01
DF	0.00	0.00	0.01	0.02	0.00	0.05
EL	0.00	0.00	0.00	0.00	0.00	0.00
DT	0.00	0.00	0.00	0.01	0.00	0.02
DR	0.00	0.01	0.00	0.02	0.02	0.01
EN	0.00	0.00	0.00	0.00	0.00	0.00
DN	0.00	0.00	0.00	0.02	0.01	0.02
ES	0.00	0.00	0.00	0.00	0.00	0.00
ET	0.00	0.00	0.00	0.00	0.00	0.00
FA	0.00	0.00	0.00	0.00	0.00	0.00
EP	0.00	0.00	0.00	0.00	0.00	0.00
DX	0.00	0.00	0.00	0.01	0.00	0.02
EQ	0.00	0.00	0.00	0.00	0.00	0.00
EW	0.00	0.00	0.00	0.00	0.00	0.00
EA	0.00	0.00	0.00	0.01	0.00	0.01
ER	0.00	0.00	0.00	0.00	0.00	0.00

Table 4: Index Values (cont.)

	Weighted Results			Unweighted Results		
	γ=-1	γ=-2	γ=-0.5	γ=-1	γ=-2	γ=-0.5
Site Id	Index 1	Index 2	Index 3	Index 4	Index 5	Index 6
EK	0.00	0.00	0.00	0.00	0.00	0.00
ED	0.00	0.00	0.00	0.01	0.00	0.01
FE	0.00	0.00	0.00	0.00	0.00	0.00
EJ	0.00	0.00	0.00	0.01	0.00	0.01
FD	0.00	0.00	0.00	0.00	0.00	0.00
EI	0.00	0.00	0.00	0.00	0.00	0.01
EV	0.00	0.00	0.00	0.00	0.00	0.00
EO	0.00	0.00	0.00	0.00	0.00	0.00
EZ	0.00	0.00	0.00	0.00	0.00	0.00
EM	0.00	0.00	0.00	0.00	0.00	0.00
FH	0.00	0.00	0.00	0.00	0.00	0.00
EU	0.00	0.00	0.00	0.00	0.00	0.00
FJ	0.00	0.00	0.00	0.00	0.00	0.00
FG	0.00	0.00	0.00	0.00	0.00	0.00
FL	0.00	0.00	0.00	0.00	0.00	0.00
FI	0.00	0.00	0.00	0.00	0.00	0.00
FM	0.00	0.00	0.00	0.00	0.00	0.00
EY	0.00	0.00	0.00	0.00	0.00	0.00
EX	0.00	0.00	0.00	0.00	0.00	0.00
FB	0.00	0.00	0.00	0.00	0.00	0.00
FK	0.00	0.00	0.00	0.00	0.00	0.00
FC	0.00	0.00	0.00	0.00	0.00	0.00
FF	0.00	0.00	0.00	0.00	0.00	0.00
FO	0.00	0.00	0.00	0.00	0.00	0.00
FP	0.00	0.00	0.00	0.00	0.00	0.00
FN	0.00	0.00	0.00	0.00	0.00	0.00
GR	0.00	0.00	0.00	0.00	0.00	0.00
FT	0.00	0.00	0.00	0.00	0.00	0.00
GE	0.00	0.00	0.00	0.00	0.00	0.00
FX	0.00	0.00	0.00	0.00	0.00	0.00
GT	0.00	0.00	0.00	0.00	0.00	0.00
GF	0.00	0.00	0.00	0.00	0.00	0.00
FV	0.00	0.00	0.00	0.00	0.00	0.00
GD	0.00	0.00	0.00	0.00	0.00	0.00
GN	0.00	0.00	0.00	0.00	0.00	0.00
FQ	0.00	0.00	0.00	0.00	0.00	0.00
FR	0.00	0.00	0.00	0.00	0.00	0.00
GL	0.00	0.00	0.00	0.00	0.00	0.00
FU	0.00	0.00	0.00	0.00	0.00	0.00
GM	0.00	0.00	0.00	0.00	0.00	0.00
FZ	0.00	0.00	0.00	0.00	0.00	0.00
GP	0.00	0.00	0.00	0.00	0.00	0.00
GS	0.00	0.00	0.00	0.00	0.00	0.00
GQ	0.00	0.00	0.00	0.00	0.00	0.00
FW	0.00	0.00	0.00	0.00	0.00	0.00

Table 4: Index Values (cont.)

	Weighted Results			Unweighted Results		
	γ=-1	γ=-2	γ=-0.5	γ=-1	γ=-2	γ=-0.5
Site Id	Index 1	Index 2	Index 3	Index 4	Index 5	Index 6
GO	0.00	0.00	0.00	0.00	0.00	0.00
FS	0.00	0.00	0.00	0.00	0.00	0.00
GI	0.00	0.00	0.00	0.00	0.00	0.00
GB	0.00	0.00	0.00	0.00	0.00	0.00
GG	0.00	0.00	0.00	0.00	0.00	0.00
FY	0.00	0.00	0.00	0.00	0.00	0.00
GK	0.00	0.00	0.00	0.00	0.00	0.00
GJ	0.00	0.00	0.00	0.00	0.00	0.00
GA	0.00	0.00	0.00	0.00	0.00	0.00
GC	0.00	0.00	0.00	0.00	0.00	0.00
GU	0.00	0.00	0.00	0.00	0.00	0.00
GH	0.00	0.00	0.00	0.00	0.00	0.00