REPORT OF THE
NATIONALLY CONSISTENT ENVIRONMENT JUSTICE SCREENING APPROACHES WORK GROUP
TO THE
NATIONAL ENVIRONMENTAL JUSTICE ADVISORY COUNCIL

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I. INTRODUCTION

The Environmental Justice Strategic Enforcement Screening Tool (EJSEAT) was created by EPA's Office of Enforcement and Compliance Assurance (OECA) to serve as "a consistent methodology that would enable OECA to identify communities or areas experiencing disproportionate environmental and public health burdens for the purposes of enhancing and focusing OECA's enforcement and compliance activities in those areas."[1] OECA's desire to improve consistency in EPA's environmental justice program is commendable. For some regulatory functions, there should be consistent logic in approaching environmental justice (EJ) concerns. For example, it is important to have a way of tracking progress in allocating resources to environmental justice areas in order to demonstrate the effectiveness of a national EJ program. In addition it is helpful to clearly articulate the critical factors to be included when screening for areas of concern so that communities know the standards under which they can seek agency support and assistance. However, it is equally important to recognize that for some purposes, a consistent national methodology strictly applied is not appropriate and screening factors must be supplemented by local information. This report to the National Environmental Justice Advisory Council (NEJAC) from the Work Group discusses screening approaches through the lens of EJSEAT, in particular, and how such approaches might better identify areas of concern. This report also discusses the principles that should guide the use of a screening approach, those instances where a nationally consistent screening approach might be appropriate, and those instances where such an approach might be inappropriate or misused.

II. CHARGE TO THE WORK GROUP

The Work Group initially was charged to gain a basic understanding of EJSEAT and to identify policy-level issues, concerns, potential benefits and uses of EJSEAT. This identification process would take place in the context of briefings on EPA's developing programmatic approaches to environmental justice. On December 14, 2007, the NEJAC forwarded to the Assistant Administrator of OECA a letter describing its approach to evaluating EJSEAT, and providing quick feedback on issues and concerns flagged at the outset. The letter was forwarded as well to EPA's staff who were at the time working on EJSEAT for their consideration as they continued to refine the approach. Then Assistant Administrator of OECA. Granta Nakayama requested advice and recommendations from the NEJAC to improve EJSEAT's comprehensiveness, efficacy and accuracy.[2] On the basis of these initially identified issues and the request of the Assistant Administrator, the NEJAC established a Work Group to assess the nature of EJSEAT and its potential uses, and to develop a list of initial principles that should shape development of such a tool.

The Work Group sought to gain a deeper understanding of how EJSEAT worked and how it appeared to be operating in early field testing by EPA Regions. We received briefings from EPA staff. The OECA in particular answered follow-up questions from Work Group members and provided EJSEAT data elements, definitions and sources. The Work Group also requested reports from several Regions performing this testing. We received an informal briefing from one

[1] EPA, Work Plan for the NEJAC Work Group on Nationally Consistent EJ Screening Approaches
[2] Letter from Granta Y. Nakayama to Richard Moore, Chair of the NEJAC, dated February 4, 2008.

of the regions, but not the final results of any particular field testing. This information, along with original research performed by Work Group members, forms the basis of the recommendations offered in this report.

III. INITIAL PRINCIPLES

At the first Work Group meeting following the initial report to the Assistant Administrator, Work Group members came to consensus on a number of criteria against which a screening approach would be measured. As general principles, we believe that EJSEAT and other tools that may be developed to identify priority areas with potential environmental justice concerns should:

(1) Accurately identify potential areas of concern, with assurance that communities of color and low income communities potentially adversely impacted will be identified;
(2) Be able to assess temporal changes within those areas;
(3) Be able to make national comparisons with similar geographical or political units (e.g., among states) based upon uniform criteria;
(4) Be transparent and readily understandable by the public and policy makers;
(5) Be scientifically sound and defensible for the purpose for which it is being used;
(6) Be practical, based on available data, and include the amount of data necessary for its intended application;
(7) Be useful to the public and policy makers (and correspondingly, avoid misuse); and
(8) Articulate strengths and weaknesses of its use for particular purposes.

As our work proceeded, these principles were tested against our evolving assessment of EJSEAT and form the central premises of the conclusions in this report.

IV. PROCESS

The Work Group received extensive briefings from staff working on the EJSEAT at EPA Headquarters and the Regions in the course of two in-person meetings and numerous conference calls, including a briefing on early phases of EJSEAT testing in Region III. [3] Four Work Group members are academic experts of national prominence on these kinds of evaluative approaches, and the results of their testing of the tool informed and greatly enriched our work. As a group, we felt strongly that we would need to understand the workings of EJSEAT in considerable detail in order to provide useful advice on both the elements of EJSEAT and more broadly, the principles that should inform the use of EJSEAT or any other methodology for uses ranging from national programmatic to site specific applications.

Three of the Work Group's experts, Professors Paul Mohai, Juliana Maantay and Jim Sadd, used their extensive experience with EJ communities and the kind of methodology EJSEAT represents

[3] We received a briefing from the EPA staff in Region III about the Sparrows Point analysis. However, of the tracts discussed, none were flagged by EJSEAT, and it was not explained to us how EJSEAT was therefore relevant. We were also given a presentation on aspects of the overall regional review. While some Work Group members understood that some of the Regions had commented upon EJSEAT, and we requested those comments, we did not receive them from the agency.

to develop a presentation for the Work Group. Thus, at our second in-person meeting, they demonstrated to us circumstances in which EJSEAT would and would not work, and the reasons for the difference in the usefulness of EJSEAT for certain applications.[4] For example, Professor Sadd, based upon his preliminary EJ screening work with Professors Manuel Pastor and Rachel Morello-Frosch, indicated that in the context of southern California, EJSEAT's results are fairly similar.[5] According to two of the researchers in the Work Group (Paul Mohai and Juliana Maantay), however, the results were at a variance with conditions they have found in the geographic areas that they have extensively studied (Michigan and New York). This suggests that although the results with southern California were similar, this does not necessarily mean that there is sufficient reliability to the EJSEAT method overall.

Along with our discussions of result consistency with alternative methodologies, the Work Group began looking at the various indicators used by EJSEAT and their relative weight in arriving at an overall score. This discussion was rich and textured, informed by our empirical researchers, state environmental regulators, and community members who provided valuable insight as to how the EJSEAT approach may capture—or in some instances fail to capture—the environmental conditions that their communities are experiencing. The discussion of the EJSEAT approach below details some of these deliberations.

V. OVERVIEW OF EJSEAT CONSTRUCTION

EJSEAT is composed of 18 individual variables or indicators. Values for each of the 18 indicators for each of the approximately 65,000 census tracts in the U.S. have been derived from a variety of publicly available databases. The 18 indicators have furthermore been grouped into four categories, or components, designated as "demographic," "environmental," "health," and "compliance." There are six indicators in the demographic component, six in the environmental component, two in the health component, and four in the compliance component.

Demographic indicators are derived from the 2000 census and include:

- percent of persons below the poverty line,
- percent of persons over 25 not having high school diplomas,
- percent of persons under five years old,
- percent of persons over 64 years old,
- percent of households linguistically isolated, and
- percent of persons who are minorities (African American, Hispanic,[6] Native American, or Asian/Pacific Islanders).

Environmental indicators are derived from the National Air Toxics Assessment (NATA) and the Risk Screening Environmental Indicators (RSEI) databases and include:

- NATA cancer risk,
- NATA neurological and respiratory hazard index,
- NATA non-cancer diesel particulate matter (PM),

[4]See Appendix for maps illustrating EJSEAT scoring for census tracts in California, Michigan, and New York).
[5] PowerPoint presentations given by these researchers are included in the appendix at ___.]
[6] We use the term "Hispanic" instead of "Latino" in order to be consistent with U.S. Census Bureau terminology.

- particulate matter (PM)-2.5 concentration,
- ozone concentration (8-hour average), and
- averaged RSEI risk-related scores for all federally permitted industrial facilities in the census tract.

Health indicators, obtained at the county-level for all states in the U.S. but imputed to individual tracts within their respective counties, include:

- rate of infant mortality and
- rate of low birth weight.

Compliance indicators have been obtained from a variety of databases and include:

- number of FRS (facility registry system) facilities per square mile,
- a computed measure of inspections,
- a computed measure of violations, and
- a computed measure of formal actions.

All the respective indicators within a category are combined into a component score. Before combining, each indicator in the category is first normalized by setting the lowest value of the indicator to zero, the highest value to 100, and all remaining values proportionally in between these two end points. The normalized scores for each of the variables within each of the components are then averaged to produce a component score. Each of the four component scores are themselves normalized, again by setting the lowest component score to zero and the highest component score to 100. The four normalized component scores are then averaged to produce a raw EJSEAT score. The raw EJSEAT score is again normalized in the same way as described above. The normalized EJSEAT scores form the basis of ranking census tracts for their EJ potential.

An important feature of the EJSEAT normalizing procedure is that it is conducted on a state–by-state basis rather than for the U.S. as a whole. The highest and lowest values for each of the variables may, and in fact are likely to, differ from state to state. Apparently, EPA's reason for this is, the Agency believes that the state is the appropriate geographic unit of analysis since federal programs are often delegated to states for implementation. However, this method precludes direct comparisons of normalized values across states. For example, a normalized minority percentage of 100 in one state may mean that the largest proportion of minorities in a census tract in that state is 35 percent, while in another state a normalized minority percentage of 100 may mean that the largest proportion of minorities in a tract is 70 percent. In addition to difficulties of making cross-state comparison, the normalizing procedure is also likely to cause difficulties in making comparisons across time as it is likely that EPA will renormalize values with the anticipated availability of newer datasets, e.g., when the 2010 Census data become available.

VI. EVALUATION, FINDINGS,AND RECOMMENDATIONS

EPA seeks a procedure that will help identify areas within the U.S. where vulnerable populations live and where environmental burdens are concentrated. That EPA is employing publicly available databases promotes transparency of the EJSEAT ranking system and helps to provide a

systematic rather than ad-hoc approach to identifying potential EJ areas. Because the data are publicly available, it should ideally allow multiple stakeholders to identify strengths and weaknesses of the EJSEAT method. We anticipate with NEJAC's input, and the further input of other stakeholders, that EJSEAT will continue to evolve and improve as a coarse screening tool. Below we discuss in further detail the Work Group's independent evaluation of EJSEAT, findings, and recommendations for its improvement.

(1) A consistent national approach is needed for some applications:

A national screening tool should provide consistency and some technical rigor to EPA's initial screening to identify potentially high impact areas and prioritize areas needing assistance from the agency.

(2) EJSEAT is more appropriate in evaluating the past than charting the way for the future:

EJSEAT would need to be used differently where it is an identification of EJ areas for prospective action as opposed to a *retrospective* screen to determine whether, for example, past enforcement efforts or past grants had, over time, been focused on EJ areas. For these retrospective-oriented reviews, EJSEAT is a good way to see if priority EJ areas received relatively more or fewer inspections, faster or slower cleanup, or more or fewer small grants or Brownfields grants. This assessment can offer insights into whether the existing EPA programs are working to alleviate disparities in EJ areas, or if more effort or different approaches are needed. Prospectively, EJSEAT also can be useful in a limited way, for example within the NEPA context by showing a rough snapshot of current conditions, as part of a broader analysis being undertaken to assess the environmental impact of a future project involving federal agency action.

When it comes to allocating future resources, however, EJSEAT by itself can only be a very coarse screen, identifying areas of concern, rather than a tool to specifically categorize a community as being "an EJ community" or "not an EJ community." This is because, as discussed in section Part VI (3) below, EJSEAT is not able to capture sufficient information to assure comprehensive identification of all EJ communities. In this report, we use the phrase "areas of concern" to help convey the point that in many instances, EJSEAT cannot pinpoint EJ communities that are fairly small geographically, such as neighborhoods or areas within a metropolitan area, or rural communities. Because of this limitation, if the agency undertakes to compile an annual EJSEAT priority list, such a list must be supplemented by additional analysis (such as local land use data where available) and public comment in order to identify sites where communities have significant EJ concerns that the EJSEAT methodology does not sufficiently recognize. The nature of this comment is further described in Part VII (1) below. This comment and response approach responds to the Work Group's belief that, ideally, a more comprehensive environmental justice analysis should be readily understood and should accurately identify communities of concern by adding additional procedures and data, where appropriate, to cure the weaknesses of a coarse screening tool like EJSEAT. This particularly holds true for small rural communities, Native American areas, and areas burdened by many unpermitted facilities and other land use activities not captured by the indicators used in EJSEAT.

(3) EJSEAT data has specific limits:

Federally-collected data available at the national level—and therefore EJSEAT as a tool—does not adequately capture a number of activities within and conditions endemic to EJ areas:

- It omits significant sources of EJ concern, primarily impacts from facilities and land use activity that occurs without air permits required under the federal programs or activities exempt from TRI reporting. Primarily EJSEAT includes air toxics data submitted pursuant to the Toxic Release Inventory (TRI) reporters and under the National Air Toxics Assessment (NATA). (The limits of TRI data is explained in connection with the expanded discussion of RSEITOT in Part VI (3) below**)** For the compliance indicator only (not included in the characterization of "environment"), EJSEAT also includes the existence of RCRA hazardous waste treatment, storage and disposal facilities, major facilities with federal reporting obligations under the Clean Air Act, major facilities reporting under the Clean Water Act, and facilities appearing in the federal Permit Compliance System over the past 5 years. However, activities that EJSEAT does not consider include, for example: Clean Air and Clean Water Act minor facilities, Clean Water Act "nonpoint" sources, Clean Air Act mobile sources, small quantity generators of hazardous waste, underground tanks, closed or abandoned facilities and remedial sites, significant releases of toxic air contaminates that are not reported under TRI (because the facility is exempt, or because the chemicals are not listed or are released in amounts that do not trigger reporting requirements), and facilities exempt from permits because of small size, grandfathering, exempted status (e.g., materials that are exempt because they are recycled or are one of the so-called "Bevill wastes" under RCRA). EJSEAT also omits land use activities that can significantly affect environmental conditions but are not captured within a national data base, such as traffic patterns (e.g., heavy truck traffic near landfills) and agricultural activities (e.g. pesticide drift). EPA should make clear in its communications which potential sources of pollution are included in EJSEAT and which are not. It is important to remember that EJSEAT contains a wide range of environmental information, but it is not exhaustive. Therefore, its ability to convey the full range of environmental effects in a community has limits and EJSEAT should be used with caution. In particular, it should be considered that there is always a possibility of EJSEAT not finding environmental problems in an area where they actually exist.

- Important populations are omitted or undercounted in its demographic indicators – For example, it is often observed that Native Americans and Hispanics are not accurately captured by census procedures. In particular, migrant workers and immigrants tend to be significantly under-counted.

    - The underlying data sources do not reflect actual monitoring, but rely on standardized dispersion modeling that may not be adjusted for local conditions, and may not reflect long-range transport of contaminants.

    - It does not adequately capture populations that might be experiencing certain vulnerabilities (see discussion of health data Part VI (3) below).

- Not all data sets are at the same spatial resolution. For example, the health indicators are at the county level, whereas all other indicators are either at the census tract level or are point locations. EJSEAT is largely air focused and does not adequately capture concerns about surface and ground water; soil and land contamination; nuisances (like noise, traffic and odor); and non-point source pollution like pesticide runoff and drift.

- Much of the data that EJSEAT uses are data that have been generated under EPA's regulatory authorities; however there may be other impacts regulated by other federal agencies that do not find expression in EPA data gathering and thus may not be captured within EJSEAT.

- EJSEAT has a number of other important limitations. For example, it does not include qualitative data. These data are essential for understanding how environmental threats, or the lack of environmental amenities, affect the quality of life of residents in communities. They may provide important additional information for evaluating the nature and severity of risks. For example, groundwater contamination or discharges to waterways may have a greater impact in areas where residents rely on wells or local water sources for drinking and residential uses. They may have less impact in areas that draw on water provided by large scale and remote water sources. EJSEAT may also not capture environmental issues that do not fall under EPA's statutory authority such as problems with the built environment, e.g. a lack of grocery stores, sidewalks, or recreational open space, or a problem with a lack of street connectivity. Evidence suggests that these are important factors for health, but they are outside the scope of EJSEAT.

(4) Some of the indicators currently used in EJSEAT might not adequately help identify highly impacted areas:

The inclusion of some of the indicators within certain categories of EJSEAT should be reconsidered. Moreover, EPA's test evaluation of EJSEAT revealed that some indicators currently have relatively more influence on the overall EJSEAT score. Some of these problematic indicators pertain to compliance, health, age, and RSEITOT.[7]

Compliance factors: The compliance category currently contains four indicators: inspections, violations, formal actions and facility density. However, in the violations indicator, for example, there is no distinction between a serious violation (one significantly impairing air or groundwater) and one with no material environmental impact (administrative errors with no physical impact and no suggestion of a pattern of non-compliance). Similarly, in the formal action indicator, there is no distinction between repeat serious violators and those with a single violation in one year.

This is indicative of a larger problem. EJSEAT cannot reflect the complexities and nuances of an enforcement regime that is shared by EPA, the states, regional enforcers, tribes and private enforcement actions taken by citizens. For example, as noted above, EJSEAT methodology uses

[7] EPA, August 5, 2008 Staff Draft EJSEATEAT Questions and Answers for the NEJAC Working Group

number of inspections and number of violations as indicators of an area of concern. Yet, some facilities may be more likely to be cited for violations because they fall into one of EPA's enforcement target sectors; yet other facilities—not in that sector but presenting greater environmental risk—may not have been inspected and therefore not cited for non-compliance. Some facilities are subject to literally thousands of requirements and opportunities for non-compliance, yet pose far less risk than other facilities with fewer (or no) regulatory requirements.[8] With respect to inspections, the constantly inspected facility with a few violations is likely to pose far less of a risk of noncompliance (and thus less of an adverse impact) than a facility rarely inspected.

State enforcement adds another layer of complexity. What would be cited as a violation in one state may be ignored in another state. The presence or absence of citizen suit enforcement in an area might also affect the rate of inspection or public enforcement. Tribal resources (or lack thereof) might also affect enforcement efforts as well. There is also a difference in philosophy held by the various enforcement agencies, with some using a deterrence model and some using a cooperation model. The extent to which these models predominate in any enforcement program affects the rate of violations and other formal actions.

In addition, there are concerns about the way in which the variables, "Number of Facilities Not Inspected," "Number of Violations", and "Number of Formal Actions," are constructed. In the case of these variables, the *number* of cases/incidents is multiplied by the *percentage* of cases/incidents. To us, this appears somewhat tautological. More importantly, it does not correlate well with any known patterns of environmental exposure disparity and other indicators of environmental injustice. This allows no meaningful interpretation of the resulting values. Indeed, when mapped in Michigan, and New York, census tracts appeared randomly distributed based on inspections, rather than being concentrated in areas where industrial activity is occurring. When mapped to census tracts in southern California and compared to another environmental justice screening method in development for that State, tracts with high values for the "Number of Violations" shows reasonable correlation with that method's cumulative impacts score, but the other two compliance variables do not.

At the same time, no variation was apparent among the census tracts based on violations and formal actions, i.e., all census tracts in Michigan and New York had the exact same values based on these latter two indicators. A subsequent analysis by one of the technical experts in our Work Group found no variation existed among the census tracts based on Violations in 37 of the states, while no variation existed among the census tracts based on Formal Actions in all 50 states (see Appendix). This suggests significant errors in the scoring.

In summary, compliance statistics are so uncertain in meaning that their use as an indicator is highly questionable. We strongly recommend that they be omitted from EJSEAT, in particular in applications involving targeting enforcement resources.

Health: A focus on health is critically important and is central to the issues raised by environmental justice areas. EJSEAT has a health category that has two indicators, percent

[8] For example, hazardous waste reclaimers are not regulated as hazardous waste treatment, storage and disposal facilities, but their processes may be similar and pose similar environmental risks.

infant mortality and percent low birth weight. This category comprises one-fourth of the total EJSEAT score. However, low birth weight is too problematic to serve as a useful surrogate for community health. One external commentator on EJSEAT noted that the low birth weight indicator might actually distort the accurate identification of Hispanic populations.[9] Moreover, the Office of Compliance's testing of EJSEAT indicated that low birth weight is only a moderate predictor of census tract-level health, and infant mortality is in fact a weak predictor.[10]

The weakness of these measures in indicating community health is compounded by the way that this information is reported—by county rather than by census tract. [11] The county-wide data render the health factor highly inexact. To illustrate, county-wide data cannot meaningfully reveal specific communities within the county that may be experiencing the largest percentage of low birth weights or infant mortalities within that county, masking areas of concern within larger counties. As a result of the distortion that might occur from using these data, we recommend the health category be omitted from the analysis. If EPA should elect to reject the Work Group's recommendation, at the very least we recommend that health indicators be added as one factor in the "social vulnerability" category. In this manner, these health indicators can be taken into account, but they will not have such a substantial impact on the final EJSEAT score.

While we understand that impacts to public health are an important reason for taking aggressive action generally, the technical researchers in the Work Group believe it unacceptable to use county level with tract level data in the way that is currently used in EJSEAT – it is referred to in empirical research as an "ecological fallacy" that should be avoided. If it is used within EJSEAT, it should be accompanied by an explanation that the use of such information is essentially a compromise to accommodate the limited data that exist at this time. To use health data in a screening approach is desirable, but the data should be much better developed before doing so. Some States report data for birth outcomes at a much higher level of geographic resolution (census tract or zip code), and EJSEAT could be made much stronger if more consistent reporting can be achieved. However, the current limitations of the health data in EJSEAT underscore the need for continued efforts to improve and incorporate better health data into screening tools such as EJSEAT.

Age: Currently, EJSEAT has two age indicator categories, one for under 5 years and another for over 64 years of age. The Work Group endorses the use of the under 5 year of age category but some in the Work Group have concerns with the over 64 years of age category.

Although age can be an appropriate surrogate for vulnerability generally, with greater vulnerability occurring at early as well as late stages of life, there currently is no published evidence to suggest that environmental burdens are distributed disproportionately by age. Indeed to the contrary, a recently published article (see November 2009 issue of the *American Journal of Public Health*) finds that people over the age of 64 are less likely, not more likely, than the general population to live near sources of industrial pollution. Furthermore, two of the technical experts in our Work Group found that census tracts with higher than average percentages of those over 64 were located in the wealthier suburban areas of Detroit and New York City. Thus,

[9] Patricia Butterfield, External Comment Summary
[10] October 20, 2008 slide presentation "Analysis of Census Tract-Level Health Data in Maryland." See Appendix _
[11] only Maryland and California have census tract level data available

we are concerned that using age indicators will not lead to areas that are vulnerable due to location near high impact areas. Moreover, it may confound the analysis in several ways. For example, while the elderly may be more vulnerable, they may be concentrated in areas with no recognizable EJ component, such as in relatively affluent suburbs with little pollution. To report elder vulnerability separately may give relatively well-off populations more weight than might be appropriate, especially considering that additional indicators of social vulnerability (such as percent unemployed and percent female-headed households) are not currently considered in the social demographic category. One of the problems, for example, with using percent over 64 is that areas with high concentrations of the poor, poverty, and pollution are also areas that tend to have shorter life expectancy. For these reasons, some in the Work Group feel that the over 64 age category should be removed from EJSEAT. In its place, additional factors indicating social vulnerability might include per capita income, percentage of home ownership, percentage unemployed, percentage of female-headed households, and presence of schools. Most of these have been examined in the environmental justice literature and are better indicators of social vulnerability and of where disproportionate environmental burdens exist than age.

Others in the Work Group feel that the over age 64 variable should be retained. It is well documented that the elderly, in addition to children and those with pre-existing serious health problems, are especially vulnerable to the non-cancer effects of air pollution, as compared to the general population.[12] While it is true that some census tracts that do not otherwise fit the general description of an overburdened community (exposure to environmental hazards, other SES variables, etc.) do contain concentrations of elderly resident, these areas would not likely be misclassified or otherwise highlighted by EJSEAT because this age variable is only one of many indicators used to calculate the final EJSEAT score –wealthy suburbs with high concentrations of elderly would not be expected to be at the upper end of the range of EJSEAT scores. However, if there are two census tracts that are equal in all variables except the over 64 age category, the tract with a higher percentage of elderly residents does have a greater burden and should receive an incrementally higher EJSEAT score. Because EJSEAT uses many other indicator variables in addition to the over 64 age category, its impact is likely marginal.

All in the Work Group agree that the percentage under 5 years of age is entirely appropriate and should be retained it EJSEAT. This variable was not found to produce distortions in EJSEAT. That is, its inclusion does not result in a pointing away from census tracts reflecting environmental injustice characteristics of over-concentrations of pollution, minorities, and the poor. Indeed, areas where those under 5 years of age are concentrated are likely areas where life expectancies are shorter due to high pollution burdens and low economic resources.

Thus, the under 5 social indicator should not be omitted nor combined with over 64. The concern and caution include an under-valuation or weighting of air quality impacts on under 5 health impacts related to disproportionate and adverse impacts on long-term quality of life (longevity, diminished health in formative and educational years, as well as insurability for quality healthcare). Under 5 concerns also takes into consideration the future capacity for future full/active employment for low-income minority/tribal populations that currently are carrying a disproportionate share of under and unemployment.

[12] There is also substantial evidence that children are more sensitive to cancer-causing chemicals from air pollution

RSEITOT: One of the EJSEAT environmental indicators is a measure of exposure from facilities that report to the Toxic Release Inventory (TRI). This indicator is taken from US EPA's Risk-Screening Environmental Indicators (RSEI) project, which was created by EPA to provide a more complete assessment of the information contained in the TRI. EPA's Office of Pollution Prevention and Toxics processes the TRI data on the quantity of each chemical reported released by each facility to create the RSEI (for details, see http://www.epa.gov/oppt/rsei and OPPT 2004). EPA combines three methods to assess the human health risks posed by each release: (1) fate and transport, or how the chemical spreads from the point of release to the surrounding area; (2) toxicity, or how dangerous the chemical is in terms of chronic human health effects on a per-pound basis; and (3) population exposure, or how many people live in the affected areas. These values are referred to as facility "RSEI scores," an estimate of the total human health hazard due to contributions of individual chemicals to the facility's total score.

EPA calculates the total chronic health risks (cancer and non-cancer) from toxic air pollution using toxicity weights and inhalation factors for the underlying chemicals reported by every facility in the Toxics Release Inventory (TRI). It then uses a fate-and-transport model that estimates exposure levels in each of more than 10,000 one-kilometer-square "grid cells" around the facility. The RSEI process then overlays the grid of toxicity-weighted air concentrations with a conforming grid of population data matched from census block-level data from the U.S. Census to measure total population risk from each release. As EPA's primary objective in creating RSEI was to help federal and state agencies set priorities for environmental protection, the raw data are aggregated (across chemicals and across impacted population) on a facility-by-facility basis. The facility-wise RSEI scores, a source-based measure, are made available to agencies and the public on the RSEI public release data CD-ROM.

It is possible to average these facility scores by census tract, allowing calculation of an averaged tract-level score. EJSEAT appears to be using this tract score as the variable RSEITOT. If the data came from a pre-2006 release of the RSEI information that is distributed by EPA on the RSEI CD-ROM, it might be both wrong and inaccurate. However, a team of university-based researchers (including two members of this Work Group) were provided with all of the geographic microdata for individual grid cells nationwide. These researchers discovered significant errors in the geographic model used in RSEI score calculations that make it impossible to obtain accurate tract-based scores. They have corrected this problem and reported the fix to EPA and the consulting company that is charged with RSEI database maintenance and calculations, but RSEI CDs have not been corrected. It appears likely that the RSEITOT values used in EJSEAT are uncorrected or otherwise in error. When mapped in California, Michigan, and New York, the patterns of RSEITOT values with census tracts appeared randomly distributed based on RSEITOT, rather than being concentrated in areas where industrial activity is occurring. Furthermore, it was found that for 74% of the census tracts in the U.S., the RSEITOT values are missing. This variable needs clarification and possible modification, before we can constructively comment on its use or appropriateness for EJSEAT.

What is needed is a measure of ground-level pollution burdens at the tract level that reflect the contributions of multiple facility sources, both within and proximate to the tract, to the total ambient pollutant concentrations for that tract. One broad overall measure that comes from the

RSEI program is the toxicity-weighted exposure for census tract residents, which can be calculated by summing all reported emissions from all TRI sources that accumulate in any census tract, appropriately weighted by the accepted toxicity value for each chemical. We recommend that EJSEAT adopt this metric as the environmental indicator that represents TRI reported releases.

Moreover, EPA will need to explain clearly the limits of the Toxic Release Inventory (TRI) so there will be no misunderstanding of the scope of information conveyed by TRI and thus incorporated in RSEITOT and EJSEAT. These limits include:

- Only selected industrial sectors or polluting activities (limited to 23,000 facilities in the U.S.) and selected chemicals (approximately 650 at present) are included in TRI.
- Within the selected sectors and activities, facilities with fewer than 10 full-time employees are exempt from reporting.
- Facilities releasing toxics each year at levels under the reporting threshold set for an individual chemical (or in a form different than that designated for reporting - in dust or fibrous form, for example) are exempt from reporting.
- Limitations on regulation and data gathering obligations authorized under federal environmental statutes (e.g., grandfather clauses, toxic materials sent for recycling without intervening processing) will transfer to limits on TRI data.

As a result, many facilities and activities of concern to environmental justice communities will not be captured in the TRI/RSEITOT data. For this reason, we recommend in the subsequent section that EPA "ground truth" its use of EJ SEAT with active outreach to potentially impacted communities in order to assure that conditions actually on the ground are consistent with what is in the data sets and ultimately, what the analysis reveals.

Percent minority population: Within EJSEAT, percent minority is one of six indicators in the Social Demographic category that comprises one-fourth of the overall ESJEAT score. NEJAC has frequently observed over the years that the legacy of racial and ethnic discrimination has real impacts in terms of communities' health and welfare, as well as their vulnerability to environmental stressors. Empirical data reveal a strong correlation between race and environmental stressors, such as proximity to polluting facilities and exposures to certain chemicals. Other studies reveal racial correlations to actual health effects, such as high blood lead levels and asthma. Thus, this is a reliable indicator whose weight should not be diluted by including less important, or indeed in some cases erroneous, variables within the overall EJSEAT score.

Facility density: Currently, in the compliance category, EJSEAT uses facility density (number of facilities captured in the fields of national data included in EJSEAT) as one of the compliance indicators. Facility density is one of the cornerstones of cumulative risk and impact, and is a vital component of EJSEAT. It is given insufficient weight in EJSEAT, however. For example, an analysis by one of the technical experts in our Work Group found that when the 18 indicators are grouped into their components, the Health component was the most influential, having twice the impact on the EJSEAT score as compared to the Compliance, Demographic and Environmental components. Moreover, within the facility density category itself, all facilities

that have at least one permit are counted equally. Thus, a huge refinery with multiple permits counts the same as a small facility with one permit. The configuration of EJSEAT also should be adjusted to accord this feature sufficient weight.

(5) The Categories of measures currently used in EJSEAT result in over-weighting of some categories:

As indicated above, currently EJSEAT uses 4 main categories of analysis: social demographic measures (with 6 different indicators), environmental measures (with 6 different indicators), compliance measures (with 4 different indicators) and health measures (with 2 indicators). Each of these four categories carries equal weight, despite the fact that they have different numbers of indicators within them. As a result, of 18 indictors overall, some of the indicators have a relatively higher weight in the overall score than indicators in other categories. For example, low birth weight is only one of two indicators in the health measure, while percent in poverty is one of six indicators in the social demographic indicators. Birth weight, an unreliable indicator, is weighted more heavily in the overall score than is percent in poverty, a very reliable indicator. Moreover, we believe that race is an appropriate factor in EJSEAT, and currently its relevance may be unintentionally diluted in the EJSEAT methodology by including the compliance and health variables.

As a result of our review of the various EJSEAT indicators and their relative weight in arriving at an overall score, we recommend, to increase overall reliability, the main measures in EJSEAT could be reduced to two categories equally weighted: social vulnerability and environmental burden. Environmental burden would include the current environmental indicators plus facility density. Social vulnerability would include the current demographic factors as modified in the discussion above. For illustration purposes, EPA may elect to reorganize the categories in the following manner:

- Environmental burden
  - NATA cancer risk,
  - NATA neurological and respiratory hazard index,
  - NATA non-cancer diesel particulate matter (PM),
  - particulate matter (PM)-2.5 concentration,
  - ozone concentration (8-hour average), and
  - averaged RSEI risk-related scores for all federally permitted industrial facilities in the census tract
  - Facility density
- Social Vulnerability
  - percent persons below the poverty line,
  - percent persons over 25 not having high school diplomas,
  - percent persons under 5 years old,
  - percent households linguistically isolated, and
  - percent persons who are minorities (African American, Hispanic, Native American, or Asian/Pacific Islanders).
  - Rate of low birth weight or rate of infant mortality, especially if available at the census tract level.

- An additional factor indicating social vulnerability, such as per capita income, percentage of home ownership, percentage unemployed, percentage of female-headed households, and presence of schools.

Reduction to two categories accurately highlights the two main factors central to environmental justice concerns, will better balance appropriate indicators, and may compensate for the fact that certain indicators in both categories contain data that are not optimal (e.g., too few sources of environmental burden are accessible in the national database, census data may undercount certain minority populations and health data are too limited to be useful at all).

In short, distortion occurs when there are an unequal number of variables in each major category. As EPA ultimately decides what variables to retain within each major category—or, in the future, whether to add variables—the Agency must make sure that inappropriate overweighting or corresponding dilution does not occur, for example, by performing a sensitivity analysis to see the impact of the overall category configuration ultimately chosen.

(6) Alternate methods of normalizing indicator, category, and EJSEAT scores:

The current method of normalizing in EJSEAT assigns zero to the lowest value of an indicator and 100 to the highest value. This method of normalizing is also applied to the four component scores and to the composite EJSEAT score. In lieu of this kind of normalizing we recommend that z-scoring (subtracting from values the mean value and dividing by the standard deviation) be used instead as it appears to better differentiate census tracts. This observation is based on analyses performed in California and Michigan by technical experts in the Work Group (see Appendix). There are several advantages for using z scales. They allow for a better identification of areas with high effects, they control for the differing ranges of the various sub-indicators, and they use a greater detail of the data, allowing for a more refined consideration of the data.

(7) The current EJSEAT methodology limits its usefulness for certain applications:

As indicated above, under the methodology that EJSEAT employs, the data are normalized to a standard scale that somewhat suppresses the range of results. In addition, the data are normalized each time an EJSEAT score is recalculated. Because of this, scores cannot be compared over time. This impedes the ability of the agency to identify historically exposed areas and track progress in that community. Normalizing also makes it difficult to compare state-by-state performance over time. In addition, EJSEAT includes population and facility density factors that will underweight rural populations and communities with few but very large or very polluting facilities. These points are discussed in greater detail below.

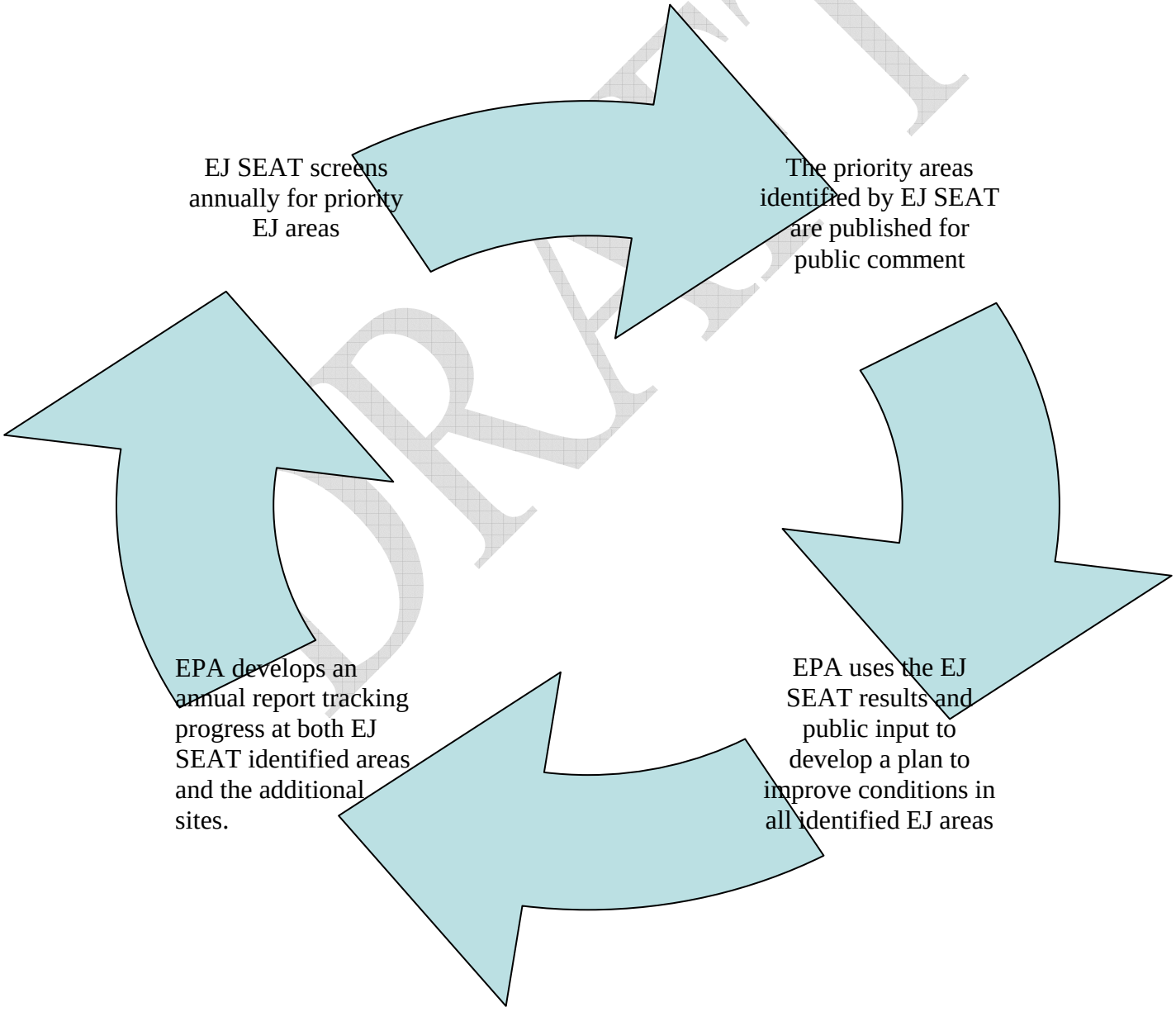
VII. CONCLUSIONS

Our review has led us to equally important conclusions about the applications of EJSEAT:

(1) Use of the tool should be carefully delineated:

- Generally, EJSEAT can be useful as part of retrospective evaluations of whether a particular EPA program has been effective in improving environmental justice. Region V, for example, has used the tool to characterize whether its inspection pattern has sufficiently covered EJ areas, whether its case settlement policies are sufficiently robust in EJ areas, whether pollution prevention efforts have focused on EJ areas, and whether environmental benefits received (small grants, etc.) have sufficiently been focused on EJ areas.

- In contrast, where EJSEAT is used prospectively, it must be part of a community-specific (although consistently employed) process to identify areas not captured by the elements of EJSEAT. The Work Group does not know whether EPA intends to use EJSEAT to create a list of the high priority areas for which environmental justice may be an important issue (for purposes of targeting enforcement efforts, grant opportunities, or otherwise). If that is the case, it will be important that the list be administered in a way that is transparent and that



compensates for the limits on data available in the national data base. For this reason, we recommend the following protocol for use of EJSEAT in circumstances in which it will have an impact on current and future allocation of resources:

In using this public participation model, which should include both public input and review of any available local land use data, it will be particularly important that EPA adequately outreach to potential EJ areas impacted by this prioritization, perhaps using the network of Regional EJ coordinators to arrange public meetings and other means to solicit comment.

(2) EPA communications describing EJSEAT should be clear:

All communications about the tool must be very clear that:

- EJSEAT is a consistent, data-based screening tool, but is only a coarse screen, not a conclusion that any particular community is or is not an EJ community. It should be made clear at all times that EJSEAT is a screening tool, not an assessment tool, and that further analysis may be necessary.
- EJSEAT includes features tracked in a national database, but does not capture many burdens that must be part of an EJ analysis and response, particularly on a regional or local area, as well as in rural areas.
- EJSEAT is largely air focused and will not adequately capture concerns about surface and ground water; soil and land contamination; nuisances like noise, traffic and odor; and non-point sources like pesticide drift and transit corridor emissions.
- EJSEAT is a coarse screening tool only – it can flag areas for attention, but communities must have the opportunity to comment upon an EJSEAT score where they believe an EJ community has not been identified by the scoring process. If the particular application does not require national consistency, the community should have the opportunity to supplement the analysis with reliable data, such as land use patterns, from a regional or local database. Similarly, communities believed falsely identified by EJSEAT (for example, industrial zones with virtually no residents) should have the opportunity to make their views known to EPA. However, in general we expect that agency resources will be devoted to EJ areas, and these resources should be welcomed by community members. EPA should create a training program for those using EJSEAT, whether in EPA or throughout the states, to assure that its contents (and what it does not capture) are understood and its uses are appropriate.

Communications must be equally clear on what EJSEAT is not:

- The Work Group recommends in the strongest possible terms that EJSEAT cannot be used in an exclusionary manner. Failure to be prioritized in EJSEAT does not indicate a community should not be treated as an EJ community, and this fact must be communicated clearly to all potential users of the tool. Possible misuse is particularly troubling because many of the EJ communities not ranked thus by EJSEAT are in fact those who have suffered neglect the longest. For example, communities not in the national database because they are living with the consequences of historic contamination (pre-dating modern regulatory obligations) will simply fall through the EJSEAT screen at the same time that they will not have the benefit of regular attention by regulatory inspectors.

- Nor should designation as an EJSEAT priority community (if scoring is used to rank) be used arbitrarily to impede community development or otherwise overturn, as opposed to inform, local land use authorities or state or EPA permitting officials. EJSEAT is intended to bring needed additional resources and opportunity to communities with legitimate EJ concerns, and should not be used in a way that creates any stigma for a community identified as a result of its use. EJSEAT must not become a new form of "redlining." At the same time, however, the concern about stigma should not be used to provide a rationale for declining to use a coarse screen method to identify potential areas of concern, or for declining to undertake a more nuanced environmental justice analysis within the regulatory context.
- Moreover, EJSEAT is an analytic tool and not itself a source of regulatory authority, and does not override applicable rules and regulations. EJSEAT merely screens to identify potential areas needing environmental improvement, and the response – as opposed to screening process – must take in all appropriate factors and controlling legal requirements. We also believe that EJSEAT should be used in the context of NEJAC's principles of collaborative problem solving and a bias for action.[13]
- EJSEAT should not be used in a way that thwarts the goals NEJAC set forth in its report on Cumulative Risk. The limits of the national databases used in EJSEAT mean that only some of the vulnerabilities and some of the stressors that compromise the health and welfare of residents of EJ areas will be captured. If EPA and the states focus resources only on the sources captured within EJSEAT, some highly impacted and vulnerable areas will be unaddressed. As a result, some sources included for regulatory action may argue that activities to reduce pollution and improve community conditions are not being demanded proportionately of all contributors to the existing environmental burdens. These are not circumstances likely to result in problem-solving and concrete progress toward community improvement.

(3) Next steps: In our discussions with EPA Headquarters and the Regions, all concurred that EJSEAT will remain a work in progress as new data bases are developed, features of the tool are evaluated in the field, and new opportunities emerge to improve its accuracy and usefulness. EPA is to be commended for seeking the views of the diverse group of stakeholders represented in NEJAC to assist the agency as it formulates and rolls out this tool. This kind of outreach should continue under the auspices of NEJAC or other forums reflecting similarly diverse and knowledgeable stakeholders.

[13] See NEJAC, Cumulative Risk.

VIII. SUMMARY OF KEY RECOMMENDATIONS

(1) Technical Recommendations:

For Immediate Implementation

a. Because of the significant problems found for some of the indicators by the Work Group's technical experts, it is recommended that some indicators be significantly modified or deleted entirely. Recommended for deletion are: a) Facilities Not Inspected, b) Violations, and c) Number of Formal Actions. It is further recommended that a) Rate of Low Birth Weight and b) Rate of Infant Mortality be either combined with the Demographic variables or be deleted. RSEITOT should be significantly modified or deleted. We recommend that the geographically specific air pollution risk estimates from the TRI be used rather than the current RSEITOT variable.

b. Organizing the 18 indicators into four components, with varying numbers of indicators in each component, results in giving some indicators more weight than others. The four components (Compliance, Environment, Demographic, and Health) could be logically and more usefully collapsed into two: Environmental Impacts and Social Vulnerability. Facility Density should be included in the "Environment" category, thus eliminating "Compliance" as a separate component (after also deleting Facilities Not Inspected, Violations, and Formal Actions, as recommended above). Infant mortality and low birth weight should either be added to the social vulnerability component, or deleted altogether, eliminating "Health" as a separate component.

c. EPA should reexamine the age variables. There is overall agreement that the under age five variable should be retained. In terms of the over age 64 variable, EPA may omit the variable altogether, may combine it with the under age five variable so as not to overweight age generally, or may retain both age variables separately.

d. EPA should perform a sensitivity analysis on each variable to determine the degree to which that variable may influence EJSEAT scores and the pattern of those scores.

e. The current method of normalizing in EJSEAT should be replaced by z-scoring (subtracting the mean and dividing by the standard deviation of the indicator's values). This method better differentiates census tracts.

f. EPA should make geographic maps of EJSEAT for each state and post these on its website in order to make EJSEAT accessible to everyone. Individuals and groups can then identify tracts/geographic areas that were either overlooked by EJSEAT or require additional information, and bring this to EPA's attention.

Longer-Range Goals

a. EJSEAT currently uses environmental indicators that are focused mostly on air pollution. Data pertaining to soil contamination; surface and ground water contamination; nuisances like noise,

traffic and odor; and non-point sources like pesticide drift and transit corridor emissions and other environmental factors ought to be also considered.

b. Additional indicators of Social Vulnerability could be considered, e.g., per capita or median household incomes, percentage of home ownership, percentage unemployed, percentage of female-headed households, and presence of schools, among others. However, thought must be given to the proper weighting of these indicators within the Social Vulnerability Category in order to avoid diluting variables with greater reliability.

c. It should be noted that the spatial distribution of Native American people within the U.S. may be problematic within the methodology of EJSEAT; first, there are relatively few numbers of Native Americans generally and there is a question whether environmental risks to these groups may be eclipsed within larger areas and go undetected. Moreover, EPA does not explain whether (or how) EJSEAT attempts to capture risks to Native Americans who reside on reservations. We recommend that EPA take a closer look at this issue, in close collaboration with Native American groups.

d. EJSEAT ought to allow local groups to add additional data to EJSEAT for applications that may not call for nationally consistent methodologies. Specifically, EPA should consider including a component in EJSEAT designated to community concerns.

e. Because of the normalizing methods used in EJSEAT, scores cannot be compared across states and across time. As a result EJSEAT in its current form cannot be used to assess progress. Additional methods should be developed, or EJSEAT modified, so that comparisons can be made across place and time.

f. EPA ought to obtain better data on other health indicators associated with environmental exposures such as incidence of cancer, lead poisoning, asthma and other respiratory diseases. EPA should attempt to obtain these data at the census tract level so that the data can be incorporated into EJSEAT in a methodologically consistent manner.

(2) Policy Recommendations

a. Questions were raised about how the agency will use this methodology in general and how it will deal with false positives (i.e. EJSEAT giving high scores to census tracts where EJ problems do not exist) and false negatives (i.e., EJSEAT giving low scores to tracts where EJ issues are in fact present) in particular. There is special concern regarding false negatives, i.e., that EJSEAT will be used to justify inaction in communities with EJ issues. EPA needs to be explicit about how such problems will be avoided. Concerns were expressed by the Work Group that people both within and outside of EPA will focus on the quantitative aspects of EJSEAT and take the scoring too literally. A training program on the appropriate use of EJSEAT may help to avoid this. The outreach and training regarding EJSEAT might include:

- Demonstration projects - as part of the implementation of EJSEAT, pilot projects should be established

- Dissemination of info - brochures, webinars, Web site
- Evaluation process - projects that use EJSEAT should be monitored and results evaluated
- Training sessions - both within and outside of EPA

b. There is currently a lack of clarity about how EJSEAT will be used. EPA should consider widely the possible uses that can be made of EJSEAT. Demonstration projects should be developed and disseminated to the public. Public participation and stakeholder input should be solicited to help further develop EJSEAT's potential for helping affected areas.

APPENDIX

(To include maps and other information from the technical experts, Work Group's initial letter on EJ SEAT and its appendix. Also EPA's letter of response to the Work Group.)