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Sonoma County  
Department of Health Services

Secretary Matt Rodriguez  
California Environmental Protection Agency  
P.O. Box 2815  
Sacramento, CA 95812-2815

June 25, 2015

Dear Director Rodriguez:

Thank you for the continued opportunity to provide recommendations to improve the State's process for identifying disadvantaged communities under Senate Bill 535. As public health professionals, we are concerned that the exclusive use of CalEnviroScreen (CES)—which California Environmental Protection Agency (CalEPA) developed to screen for cumulative environmental pollution burdens—does not adequately identify disadvantaged communities in terms of health and well-being for the purposes of SB 535, as described in our previous letters, attached.

In this letter, we offer recommendations to improve on-going refinements to identify disadvantaged communities under SB 535 to more adequately include a public health perspective. Please find a summary of recommendations in Table 1, followed by a discussion and rationale for each recommendation.

Table 1: Summary of Recommendations

Overarching, Principal Recommendations	
1	<b>Develop and/or adopt a new statewide measure specifically intended to identify cumulative community disadvantage (such as the Health Disadvantage Index-HDI).</b>
2	<b>Provide two methods by which communities can qualify as disadvantaged: <i>either</i> a measure of cumulative community disadvantage (such as HDI) <i>or</i> a modified version of CES (modifications described in #3-6 below).</b>
Specific Recommendations for Modification of CES	
3	<b>Significantly increase weighting of indicators of social and economic disadvantage relative to pollution burden.</b>
4	<b>Expand the indicators included in CES to include valuable measures of community health, including of educational quality, violent crime, and chronic disease health outcomes. Where data is not available, develop a plan to address current limitations.</b>
5	<b>Uncouple the multiplication of the pollution burden and population characteristic components of CES.</b>
6	<b>Indicators of environmental pollution should use either a scaled value of exposure (z-score) or a threshold value of harmful exposure.</b>

## **Overarching Principal Recommendations for Identifying Disadvantaged Communities Under SB 535**

### **Recommendation 1: Develop and/or adopt a new statewide measure specifically intended to identify cumulative community disadvantage (such as the Health Disadvantage Index-HDI).**

Policies directing allocation of revenue set-asides for disadvantaged communities are to be lauded. It is critical however, that these communities are accurately identified to effectively target resources that will achieve the greatest public good.

To date, CalEPA has relied exclusively on CalEnviroScreen (CES) for the identification of disadvantaged communities. Because CES is a measure designed to screen for cumulative environmental pollution burdens, its results necessarily lead to the identification of a specific facet of community disadvantage. The SB 535 statute language provides for an inclusive identification of disadvantage, including areas with “concentrations of people that are of low income, high unemployment, low levels of homeownership, high rent burden, sensitive populations, or low levels of educational attainment.” These factors, which are termed social determinants of health, are in alignment with how public health practice identifies community disadvantage. Under this construct, disadvantage may very well include environmental toxic exposures; however it is not necessarily predicated upon these exposures to be considered disadvantaged. As we described in our letter dated September 15, 2014, many communities with severe community health and socioeconomic disadvantage have not been identified as “disadvantaged” in the initial round of Greenhouse Gas Reduction Fund (GHGRF) expenditures.

In 2014, The Public Health Alliance of Southern California, with participation from the Bay Area Regional Health Inequities Initiative (BARHII), convened a steering committee comprised of statewide public health department data experts to develop a model cumulative index of health disadvantage adapting international best practices and integrating 27 economic, social, and environmental indicators for which data is publically available. (See Appendix I for a list of method and data resources that may be useful in constructing a measure of cumulative community disadvantage, including the indicators used in the aforementioned “Health Disadvantage Index”.) We presented the resulting Health Disadvantage Index or HDI to Assistant Secretary Mataka and others at CalEPA/OEHHA in a meeting in December 2014, and greatly appreciate the discourse that was opened by this meeting.

Table 2, contains a cross-tabulation of California’s census tracts as scored by CES versus their Health Disadvantage Index (HDI) ranking. Among the approximately 8000 tracts scored by both instruments, 1340 census tracts are jointly categorized as being in the top quartiles of both the CES and HDI. The cross-tabulation identify 608 tracts that are in the top quartile of disadvantaged tracts based on the HDI and not identified in the top quartile of CES. Additionally, 608 of the CES 2.0 defined “disadvantaged communities” were not in the highest quartile of the Health Disadvantage index, suggesting deficiencies in how the tool is being used to identify socioeconomic vulnerability and, hence, public health disadvantage.

Table 2: Cross-tabulation of Census Tracts by Quartiles as Identified by CES and HDI

CES Score	Health Disadvantage Index Score				
	Lowest 25%	25% - 50%	50% - 75%	Top 25%	Totals
Lowest 25%	1208	561	155	25	1924
25% - 50%	586	775	484	103	1948
50% - 75%	149	514	805	480	1948
Top 25%	6	98	504	1340	1948
Totals	1949	1948	1948	1923	

Given our confidence in the methodology employed by the Health Disadvantage Index, we are concerned about the exclusion of these 608 tracts from the statewide definition of disadvantage.

Conversely, approximately 104 of the tracts identified in the top quartile of CES do not meet even a top 50% threshold of cumulative social and economic disadvantage under the Health Disadvantage Index (HDI). Though these communities may have poor air quality or other elevated environmental pollution impacts, they may not inherently experience environmental injustice, or appropriately be identified as disadvantaged, because the impact is mediated by wealth, community design, or other factors.

To better target future Greenhouse Gas Reduction Fund (GHGRF) allocations under SB 535, we urge CalEPA to develop and/or adopt a new statewide measure of community disadvantage developed specifically for this purpose rather than exclusively relying on a previously existing tool developed for an entirely different function. This new statewide measure of cumulative community disadvantage should recognize established practices in the field and include indicators for economic security, educational and employment opportunity, community violence, neighborhood quality, and population health with weighting of indicators based on their comparative impact on human health, development and well-being. Furthermore, CalEPA should engage stakeholders with expertise in economic, educational, health, and neighborhood disadvantage in accessing data and crafting the measure.

We believe that the Health Disadvantage Index described above may serve as a model and/or a potential candidate for a new statewide measure. We welcome the opportunity to discuss this further at your convenience.

**Recommendation 2: Provide two methods by which communities can qualify as disadvantaged: *either* a measure of cumulative community disadvantage (such as HDI) *or* a modified version of CES (modifications described in #3-6 below).**

We recommend CalEPA employ an ‘either/or’ approach to identify disadvantaged communities for the purpose of SB 535, whereby communities qualify by *either* an index of cumulative social and economic disadvantage (part 2b of SB 535) using an index such as HDI *or* by an index of disproportionate impacts of environmental pollution, such as a further modified version of CES (part 2a of SB 535) to be eligible

for set-aside funds.

This two-option approach provides a continuing opportunity to utilize CES. Importantly, this approach rectifies the current omission in SB 535 implementation by allowing a qualifying methodology for disadvantaged communities based on health, economic and social measures, not predicated necessarily on pollution burden, as is provided in statute language.

Incorporation of a two-option approach may provide an opportunity to consider stricter cut-off points to ensure that disadvantaged communities are in fact receiving a larger percentage of set-aside allocations than they would already statistically receive based on census tract percentages.

### **Specific Recommendations for Modification of CES**

We believe our concerns regarding the implementation of SB 535 would be best addressed by CalEPA's implementation of principal recommendations 1 and 2 described above. If, however, our principal recommendations cannot be implemented at this time, or will require more time to implement than available before the next round of guidelines are released, we would ask that CalEPA immediately implement the specific recommendations for the modification of the CES tool given below.

#### **Recommendation 3: Significantly increase weighting of indicators of social and economic disadvantage relative to pollution burden.**

We recommend that CalEPA significantly increase weighting of indicators of social and economic disadvantage relative to pollution burden. Currently CES is designed to equally weight pollution burden and population characteristics. As described in the Recommendation #1 discussion, CES is currently not identifying communities that are severely disadvantaged in terms of social and economic indicators, while it is identifying census tracts as disadvantaged that in fact are not highly disadvantaged in terms of economic and social indicators. For this reason, it is critical to revise the weighting of these indicators to provide an improved measure identifying disadvantage that is in better alignment with the scientific literature and international best practices in terms of overall contributions to health, wellbeing and disadvantage.

#### **Recommendation 4: Expand the indicators included in CES to include valuable measures of community health, including of educational quality, violent crime, and chronic disease health outcomes. Where data is not available, develop a plan to address current limitations.**

There are many valuable population characteristic and pollution burden indicators that are not currently included in CES. Please refer to Appendix 1 for a discussion of the range of indicators included in small-area indicators of cumulative community disadvantage. We would suggest adding many of these measures to the population characteristics section of CES. While some of these measures are available 'off the shelf' from ACS data or other sources, some measures will require CalEPA to partner with other state agencies to develop new data sets.

Some of the 'off the shelf' data we would particularly recommend for inclusion are:

- **Measures of Educational Opportunity**, including “not in pre-school” and “not in high school” data sets.
- **Measures of Economic Resources**: in addition to metrics already included in CES, we recommend adding “high housing cost” and “median income”
- **Health Outcomes**: Including “Years of Life Lost” and “Population Disabled”
- **Measures of Environmental Hazard** that have a demonstrated impact on health, even if they are not related to pollution burden. These include measures such as poor housing quality and traffic safety hazards.<sup>1</sup>

In addition to these areas, there are several important metrics of community disadvantage that are not currently available in a format where they can be easily included in CES. These include:

- **Educational quality**: In addition to the indicator of educational *attainment* already included in CES, we recommend the addition of a measure of educational *quality* as well. While educational attainment is strongly correlated with existing economic conditions, educational quality may be predictive of future conditions, including ‘expected years of education<sup>2</sup>.’ Data related to educational quality is currently available at a school point level, and work would need to correlate this point-level data to a census tract level of geography. For this reason, it is not currently included in the HDI. We recommend that CalEPA partner with the Department of Education to develop this dataset at a census tract level for inclusion.
- **Violent Crime**: Violent crime is a public issue that affects everyone’s health. In addition to contributing to death and disability, violence exacerbates various chronic diseases by inducing stress and fear. Constant stress and fear evoke unhealthy physical responses (e.g., high blood pressure), confine residents to their homes eliminating the health benefits of physical activity, and prohibit commuting via walking or bicycling to jobs, goods, and services<sup>3</sup>. Violent crime data is currently available on a city by city basis, and there are different techniques for coding the data that could make it challenging to create a statewide dataset. Given the impact of crime on community health, however, we feel that developing this indicator for inclusion in CES would greatly enhance the tool.
- **Chronic Disease**: Though we know that chronic disease is highly correlated with the social determinants of health mentioned above, there would be advantages to the inclusion of chronic disease rates in a measure of disadvantage per SB 535. Though CES currently includes two health outcomes (low birthweight and asthma hospitalizations), it is other chronic diseases such as heart disease, diabetes and cancer that have the greatest proportional contribution to morbidity/mortality. Because census tract level data for these diseases is often unstable and subject to privacy concerns, we encourage CalEPA to work with CDPH and the OSHPD to develop a modeled dataset that would allow the inclusion of chronic disease.

In addition to improving the population characteristic component of CES as discussed above, the following recommendations address pollution burden where data is only partially available, is of varying quality, or may have varying relevance across census tracts

<sup>1</sup> (Hänninen O et al. [Environmental Burden of Disease in Europe: Assessing Nine Risk Factors in Six Countries](#). *Environ Health Perspect*; DOI:10.1289/ehp.1206154).

<sup>2</sup> Rand Corporation, “The Impact of Educational Quality on the Community” [http://www.rand.org/content/dam/rand/pubs/documented\\_briefings/2008/RAND\\_DB562.pdf](http://www.rand.org/content/dam/rand/pubs/documented_briefings/2008/RAND_DB562.pdf)

<sup>3</sup> Bay Area Regional Health Inequities Initiative “Applying Social Determinants of Health Indicators to Advance Health Equity.” <http://barhii.org/resources/sdoh-indicator-guide/>

- **Add or revise indicators to ensure that CES components can be comparably counted in all California census tracts.** For example, structural and home pesticide use can have health significance in urban areas. However, because of limited data reporting requirements, non-agricultural pesticide use is not represented in the pesticide exposure indicator.
- **Augment the density of pollution monitors to better reflect exposures near known pollution sources and vulnerable populations.** CES estimates census tract level indicators for some pollutants based on monitors far away from assessed tracts. Monitor density varies from region to region and monitoring stations used to estimate fine particulate levels could be up to 50 km (30 miles) from affected populations. By design air pollution monitors are typically not located where local pollution sources (e.g. freeways, fossil fuel based electricity generators) exist.
- **Improve how exposure measures adjust for proximity to emissions sources and population density.** Exposure to and harm from pollutants depends on proximity between the source of emissions and the exposed population. Some indicators in CES account for proximity to emissions through modeling (e.g., TRI emissions) while others simply use the quantity of emissions within an area as a proxy for exposure. For example, CalEPA's indicator assumes exposure to pesticides occurs uniformly across a census tract and that the total pesticide quantity can be accurately applied anywhere in the tract. In census tracts with large areas there may be little relationship between emissions and exposures. In regions with higher population density, assigning emissions uniformly across a grid of uniform size is likely to misclassify exposure among census tracts within the grid.

**Recommendation 5: Uncouple the multiplication of the pollution burden and population characteristic components of CES.**

The CES approach of combining indicators by arithmetically multiplying average percentile ranks of the two components is not a well-established methodological practice. While the underlying idea (vulnerability x exposure) has its root in epidemiology, it is complicated by the system of adding multiple averages, leading to several concerns regarding interpretation. First, the product of two average percentile ranks yields a value that has no easy or intuitive interpretation beyond relative rank. Furthermore, multiplying the average of one set of 10 indicators represented in percentile quantities by another set of 10 yields 100 distinct products. Many of the resulting products do not have empirically identified biological relationships or interactions among their component parts. As an example, one of the products of the CES multiplication method is water pollution x asthma hospitalization rates. No established science would suggest asthma morbidity makes one more vulnerable to the health effects of water pollution.

**Recommendation 6: Indicators of environmental pollution should use either a scaled value of exposure (z-score) or a threshold value of harmful exposure.**

CES produces a relative, rather than absolute, measure of impact. Specifically, CES uses an area's percentile rank for a pollutant emission or exposure as a proxy for relative exposure. The significance of a percentile rank depends on the proportion of the distribution of exposure in the population. For example, according to CalEPA, water systems serving only between 1.4 and 2.7 percent of California's

population are in violation of one or more drinking water standards (CalEPA, 2014). If the proportion of the population with a significant exposure to one pollutant is 40% and the exposure to a second pollutant is 5%, comparable percentile ranks for the two pollutants will have very different significance for human health.

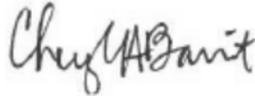
## **Conclusions**

Thank you for your consideration of these recommendations. We would be happy to further discuss our recommendations with you and assist in any way to help incorporate these modifications. In the appendix to this letter, we identify data and methodological resources that could be useful in this process, including more information on the Health Disadvantage Index referenced above. We look forward to continuing to participate in the evolution of CalEPA's approach to defining disadvantaged communities.

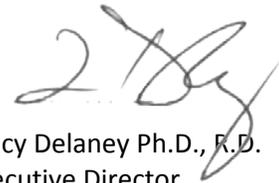
Sincerely,



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**Cc:**

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**Appendix I:  
Data Sources Available For a Cumulative Measure of Community Disadvantage**

Inequality in health status results directly from disadvantage in the conditions of our everyday lives. According to the World Health Organization, the fundamental resources for health are “... peace, shelter, education, food, income, a stable ecosystem, sustainable resources, social justice, and equity.” (WHO 1986) And the U.S. Department of Health and Human Services, states that health is determined by “... access to social and economic opportunities; the resources and supports available in our homes, neighborhoods, and communities; the quality of our schooling; the safety of our workplaces; the cleanliness of our water, food, and air; and the nature of our social interactions and relationships.”

SB 535 authorized CalEPA/ARB to identify disadvantaged communities for the purpose of targeting a share of investment of the Greenhouse Gas Reduction Funds to disadvantaged communities. According to SB 535 (De Leon, 2012):

*These communities **shall** be identified based on geographic, socioeconomic, public health, and environmental hazard criteria, and may include, but are not limited to, either of the following: (a) Areas disproportionately affected by environmental pollution and other hazards that can lead to negative public health effects exposure, or environmental degradation. (b) Areas with concentrations of people that are of low income, high unemployment, low levels of homeownership, high rent burden, sensitive populations, or low levels of educational attainment. (SB 535, 2012)*

SB 535 requires that a broad range of factors be included in identifying disadvantaged communities. However, CalEPA/OEHHA designed CES before the adoption of SB 535 and for a different purpose, namely, as a screening methodology to identify California communities that are “disproportionately burdened by multiple sources of pollution.” (OEHHA, CES 2.0. October 2014) CES is not an optimal measure of cumulative community disadvantage both because it excludes several established indicators for socioeconomic, public health, and environmental disadvantage but also because it values non-pollution forms of disadvantage only in relationship with environmental pollution.

Several countries, academic institutions, and private organizations have developed measures of cumulative disadvantage for small-areas for the purpose of research, education, and public investment. Cumulative measures of disadvantage, such as the UK Indexes of Multiple Disadvantage, additively combine various dimensions of disadvantage, including indicators of economic security, educational and employment opportunity, community violence, neighborhood quality, and population health. A measure of cumulative community disadvantage for California should utilize the indicators in these multiple domains, including:

- Economic Insecurity, including lower median income, unemployment, high housing cost burdens, and food insecurity.
- Educational Opportunity, including measures of academic performance and school infrastructure and quality.
- Community Violence, including crime and child abuse and neglect.
- Employment Opportunity, including, for example, the area’s job density and the number of jobs within a 30 minute commute time, as well as unemployment rate.
- Neighborhood Infrastructure, including access to parks and recreational resources.
- Population health, including longevity, disability, and unscheduled hospitalizations.

- Environmental Quality, including air pollution, traffic hazards, unsafe housing, tree canopy and ambient noise.

In the appendix to this letter, we provide a list of methodological and data resources that may be useful in constructing a measure of cumulative community disadvantage. A measure of cumulative community disadvantage should weight such indicators based on demonstrated impacts on human health and wellbeing. Most international measures of cumulative disadvantage have given the largest weights to indicators of material well-being and economic security, including measures of income, employment, crowding, housing tenure, auto-ownership and hunger. Such weights are justified because poverty impacts not only longevity and health outcomes, but also health risk behaviors, educational success in children, social cohesion, and economic opportunity.

Several data sources current maintained by California and National public agencies are relevant for the identification of disadvantaged communities but not currently available as census tract indicators. We identify some of these resources below:

#### California Department of Public Health (CDPH)

The California Department of Public Health (CDPH) maintains records of deaths for California; these death records could be aggregated to death rates by cause of death for small areas. The [Healthy Communities Data and Indicators Project](#) provides data, a standardized set of statistical measures, and tools that a broad array of sectors can use for planning healthy communities and evaluating the impact of plans, projects, policy, and environmental changes on community health and that may be useful in identification of community cumulative disadvantage. The [California Environmental Health Tracking Program](#) is statewide source of environmental health exposure and effects data.

#### US Department of Housing and Urban Development Healthy Communities Index

In 2012, the US Department of Housing and Urban Development commissioned the development of a small-area index to monitor the effects of community development on health and well-being. [HUD's Healthy Communities Index](#), provides uniform methods for computing 37 neighborhood-level indicators of community health being that can be applied in every US city. In California, the San Diego region has implemented the Healthy Communities Index.

#### Health Disadvantage Index

The Public Health Alliance of Southern California has developed a cumulative index of health disadvantage adapting international best practices for small-area measures of disadvantage and integrating 27 economic, social, and environmental indicators available publically in. The list below identifies the variables and the data sources used to develop the Health Disadvantage Index.

#### California Department of Health Services

The California Department of Health Services requires hospitals to provide the state with records on all patient discharges from hospitals, including emergency room visits. Currently, aggregate discharge data is reported and available for common conditions at the level of the zip code.

The California Department of Education (CDE)

CDE produces several indicators of school performance at the school level. These indicators include reading levels at various grades, truancy, teacher tenure, chronic absence, and student graduation rates. CDE data at the school could be translated to indicators of educational opportunity at the census tract level.

**Indicators and Data Sources Used for the Health Disadvantage Index**

<b>Indicator</b>	<b>Definition</b>	<b>Group</b>	<b>Source</b>	<b>Year</b>
Household Crowding	Proportion of households with more than 1 occupant per room	Economic Resources	ACS	2012
High Housing Costs	Share of renter households paying more than 30% of income on rent	Economic Resources	ACS	2012
No Auto Access	Proportion of households without access to an automobile	Economic Resources	ACS	2012
Unemployment Rate	Proportion of population aged 25-64 who are unemployed	Economic Resources	ACS	2012
Poverty	Proportion of the population under aged 64 with household incomes below twice the Federal Poverty Line	Economic Resources	ACS	2012
Median Income	Median household income	Economic Resources	ACS	2012
Uninsured	Proportion of the population without health insurance	Economic Resources	ACS	2012
No Kitchens	Proportion of the population in homes lacking complete kitchen facilities	Economic Resources	ACS	2012
Not High School Graduates	Proportion of population over age 25 without a high school education	Social Resources	ACS	2012
No English Spoken	Proportion of household where no person at least 14 years old speaks English well	Social Resources	ACS	2012
Renter Occupied	Proportion of occupied housing units not occupied by property owners	Social Resources	ACS	2012
Not Voting 12	Proportion of registered voters not voting in the 2012 general election	Social Resources	UCB	2012
Not Voting 10	Proportion of registered voters not voting in the 2010 general election	Social Resources	UCB	2010
Single Parent	Proportion of family households with children	Social Resources	ACS	2012

<b>Indicator</b>	<b>Definition</b>	<b>Group</b>	<b>Source</b>	<b>Year</b>
Households	under 18 with only one parent			
Not in Pre-school	Proportion of 3 and 4 year olds not enrolled in school	Educational Opportunity	ACS	2012
Not in High School	Proportion of 15-17 year olds not enrolled in school	Educational Opportunity	ACS	2012
Population Disabled	Proportion of the non-institutionalized population with any disability	Health Outcomes	ACS	2012
Low Birth Weight	Proportion of live born infants with low birth weights	Health Outcomes	CalEPA	2013
Years of Life Lost	Years of life lost per capita	Health Outcomes	VCU	2010
Asthma ER Visits	Annual rate of emergency room visits for asthma	Health Outcomes	CalEPA	2012
Pedestrian Injuries	Annual rate of pedestrian injuries	Environmental Hazards	CDPH	2011
PM 2.5 Concentration	Annual average PM 2.5 level	Environmental Hazards	CalEPA	2013
Traffic Density	Traffic density on highways within 150 feet of census tract boundaries	Environmental Hazards	CalEPA	2013
No Nearby Supermarket	Share of the population living more than one mile from a supermarket or large grocery store	Complete Neighborhoods	USDA	2013
No Nearby Park	Share of the population not living within a half-mile of a park, beach, or open space greater than 1 acre	Complete Neighborhoods	CDPH	2012
Retail Density	Combined employment density for retail, entertainment, and educational uses	Complete Neighborhoods	USEPA	2011
Transit Service	Aggregate frequency of transit service within 0.25 miles of block group boundary per hour during evening peak period	Complete Neighborhoods	USEPA	2011

**Appendix II: Letters previously sent by the Public Health Alliance of Southern California and BARHII on Identifying Disadvantaged Communities Per SB 535**

- II.a**     **May 28, 2014 Letter to Dr. John Faust at OEHHA commenting on CES 2.0.**
- II.b**     **September 15, 2014, Letter to ARB and CalEPA commenting on guidance for identifying disadvantaged communities.**