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Air Pollution and Environmental Justice: Integrating Indicators of Cumulative Impact and Socio-Economic Vulnerability into Regulatory Decision-Making

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Figure 4.16: Map of the Total Cumulative Impacts score for the Inland Empire

Chapter 5. Utilizing the EJSM to Consider Power Plant Siting

Introduction to the problem and previous work

One potential application of the EJSM might be to inform siting decisions for electrical power plants and/or other facilities. Funding for development of the EJSM was provided by the CEC specifically for evaluation of the method's utility in assessing the EJ implications of siting.

The CEC was established by the state legislature in 1975 to streamline the permitting process for energy facilities in California, and it holds the exclusive authority[45] to certify the locations of new power plants of 50 megawatts or more. State law requires that EJ be taken into consideration in the siting process, and the CEC developed its current "Staff Approach to Environmental Justice."[46] That approach follows U.S. EPA and California Environmental Quality Act (CEQA) guidelines for evaluating and addressing EJ concerns. Current CEC practice related to a power plant permit request is for staff to conduct a CEQA analysis around EJ issues for the proposed site. This EJ analysis consists of three components: demographic screening, public outreach, and impact assessment.[47]

- The demographic screen evaluates census demographics within a six-mile buffer around the proposed site[48] following the 1998 U.S. EPA Guidance in defining an EJ community in terms of threshold values for poverty and percent minority residents. For polygon centroids within the buffer, census blocks with populations that exceed 50% minority, or block groups exceeding 50% low income are considered "environmental justice populations."[49] These two values are highly

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[45] Granted by the Warren-Alquist Act

[46] April 2000, in accordance with Senate Bill 115 and Executive Order 12898. The steps involved in this approach have not always been applied. On December 31, 2001, during the California electricity crisis, the Governor issued emergency orders that allowed for expedited permitting, where projects were exempted from the California Environmental Quality Act, with no environmental justice analysis before permitting, and limited public hearings. Furthermore, Executive Order D-40-01 allowed natural gas-fired plants to operate that did not meet air quality regulations (Latino Issues Forum 2001). Currently, new operating licenses have only been issued through a 12-month review process or the Small Power Plant Exemption process (http://www.energy.ca.gov/sitingcases/index.html).

[47] The information presented here and below is adapted from the CEC's website at: http://www.energy.ca.gov/public_adviser/staff_env_justice_approach.html

[48] The center of proposed site is used for projects less than 20 acres in area, and from the project boundaries for larger facilities.

[49] Council on Environmental Quality and National Environmental Policy Act definitions: minority – sum of self-identified American Indian or Alaskan Native, Asian or Pacific Islander, Black not of Hispanic origin, and Hispanic; low income is defined using the poverty thresholds from the US Census CP-60 calculation, calculated annually at block group level. CEC employs a consultant to monitor and recalculate these race and income measures annually. The guidelines also allow for consideration of areas within the buffer if the percentage of minority or low income population exceeds the percentage of that population in the general population (http://www.energy.ca.gov/envjustice/staff_env_justice_approach.html).

correlated in California. If there is at least one census block within the 6-mile buffer that has a majority minority population, the CEC will actively consider environmental justice in the context of the proposed project.[50]

- The public outreach component, dissemination of information about the proposed project to all local media outlets and public libraries, is conducted in the earliest phases of the project. The CEC's Public Adviser and other CEC staff contact community leaders and organizations to inform them of the project and its details, the process for public participation, and the results of the staff EJ analysis, and they also answer any questions. Local public participation hearings and workshops with language translation are also provided.

- The impact assessment component involves a CEC staff description of the existing setting, analysis of any "unique circumstances" of the affected population, identification of the project's direct, indirect and cumulative impacts, and the assessment and recommendation of appropriate measures of mitigation. This component also determines whether the project creates an unavoidable significant adverse impact on the affected population and, if so, considers whether the impact is disproportionate. It is CEC policy to determine mitigation measures to be applied based on project emissions, and it "mitigates ton for ton" in an effort to ensure that everyone is considered equally.

The question was whether our approach could yield different and/or more sensible results than the current CEC method. To evaluate this, we selected a hypothetical case by mutual agreement: a proposed power plant in South Gate that was never sited. As it turns out, the project was ultimately withdrawn due to community opposition, largely on the grounds of EJ, making it a good case study by which to illustrate whether the EJSM would have highlighted such concerns.

Materials and Methods

Data

In 2000, Sunlaw Energy Corporation proposed the Nueva Azalea power plant project for the city of South Gate, a predominantly minority community about five miles south of the city of Los Angeles. The proposed 550-megawatt, natural gas-fired combined cycle power plant was to be built on a 13.5-acre site at the eastern edge of the city limits. The site is bound by Southern Avenue on the north, East Frontage Road of the 710 Interstate Freeway on the west, and Garfield Avenue and Miller Way on the east; it is largely surrounded by other developed industrial properties on portions of the south, east and west.

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[50] Dale Edwards, CEC Environmental Justice Coordinator, January 23, 2008

Although power plant projects typically face local resistance when sited in densely populated urban areas, Nueva Azalea seemed timely and promising. Environmentalists were excited because this power plant would be unique in California, using "SCONOx" technology to significantly reduce toxic air emissions. This technology had previously been used in power plants no larger than 33-megawatts, with Nueva Azalea planned to be 17 times larger. Labor unions supported the proposed plant because of the promise of new jobs. At the time it was proposed, a Governor's executive order streamlined the CEC power plant approval process to 21 days in response to statewide energy demands, also raising hopes for quick approval. The "energy crisis" dominated newspaper headlines. Power plant construction quickly became a hot topic and the political climate was geared toward building power plants no matter what the monetary or environmental costs.

However, local opposition came from the mayor and local community organizations who argued that the project placed an unfair burden on South Gate, an area already exposed to many other stationary emissions sources, heavy truck traffic from local industry and nearby freeways, and very poor ambient regional air quality due to its geographic location in one of the most heavily polluted parts of the South Coast air basin. They argued that, regardless of how "clean" the technology, Nueva Azalea was an additional source of air pollution that would add to the cumulative local air quality burden and should not be sited in South Gate. Sunlaw campaigned in support of Nueva Azalea, highlighting the local tax dollars the project would provide and promised to fund neighborhood improvements and provide local scholarships.

Sunlaw believed that many residents were generally supportive of the power plant, and agreed to a non-binding advisory referendum to allow residents to vote on whether they wanted the power plant. Sunlaw agreed to end the project if the referendum voted down. The residents' vote rejected the project by a 2-1 margin, and Sunlaw kept its word and abandoned Nueva Azalea in South Gate, indicating that it would look for other communities interested in hosting the project. In March of 2001, Sunlaw requested a six-month suspension of their application to CEC; after further suspensions in September and November, the company withdrew its application.

In retrospect, considerable resources were expended by Sunlaw and, to a lesser extent, by the CEC on a project proposed for a site that might have been identified early by the CEC as having serious EJ concerns had a useful EJ screening method been available at the time. Using this information, the CEC could have anticipated local resistance to the project and directed the applicant to consider alternate locations early in the process, promoting a more positive outcome for all.

To conduct an analysis of this question, the data required were basic census information on race and poverty as well as a geocoded list of the existing >50MW power plants sites in this region, as we assumed that they represent a good proxy for locations attractive for power plants. The latter data were taken from a 2007 CEC database of all operational power plants in 2007,[51] including all natural gas and coal-fired power plants producing at least 50 online megawatts. Once the set of facilities was determined, the next step was to

[51] This database can be found at: http://energyalmanac.ca.gov/electricity/index.html

accurately geocode them. We did this by cross-referencing address location from several sources, including an EPA geospatial shapefile that purportedly contains all the facilities that are listed in the EPA's Facility Registry System (FRS)[52] and an ARB Emissions inventory. A final quality assurance check was carried out by generating a Google Earth (.kmz) file of the facilities and spot checking each one in Google Earth to be sure that it landed on what appeared to be the appropriate location. If it did not, then we first scanned the immediate surrounding area to find an appropriate facility and collect its geographic coordinates. When none was found, we resorted to detailed web searches to locate the facility through a variety of sources including the parent company's website, articles from web media sources, or permit application and review documents.

Analysis

We first evaluated the Nueva Azalea site for EJ concerns using the EJ analysis method currently used by the CEC in power plant siting decisions. We then employed the EJSM to analyze cumulative impacts and community vulnerability in the area surrounding the proposed site. This comparison was further extended to the locations of all power plants >50MW to examine the different conclusions and information offered by the two methods. We did this by first performing a modified form of the standard CEC EJ analysis to the Southern California region, using the preferred 1- and 6- mile buffers. We then compared these results to those derived at the same buffer distances using results from the EJSM. Finally, we applied both methods (our method and a modified form of the CEC method) to the actual locations of the existing >50MW power plants sites in this region, assuming, as noted above, that they represent a good proxy for locations attractive for power plants.

Results

To understand our results, it is important to first consider the CEC method of designating a site as having EJ concerns if it is either fifty percent minority or fifty percent low-income (defined as the percent poor). As it turns out, this is not much of an effective screen. First, we would argue that the underlying information – poverty and minority population – are by themselves insufficient to characterize an EJ community given what we now know about the determinants of environmental injustice (see Chapter 2), and they are of no utility in assessing cumulative impacts. Moreover, at least in Southern California, only one of these two criteria even plays a role in the results of the CEC demographic screen: in the region, while about 58 percent of block groups have a majority minority population, less than 2 percent have more than half the population below the poverty line – and among the 185 block groups that do, all but 6 are majority minority.

Thus, the minority criterion effectively "overscreens" while the poverty criterion "underscreens," and the result in Southern California is that it identifies virtually every

[52] The shapefile was downloaded from: http://www.epa.gov/enviro/geo_data.html

single existing power plant of the size that places it under CEC authority (> 50 MW) as having EJ concerns (see discussion below), with income playing virtually no role. Thus, the "demographic screen" is not really very useful for screening at all; in a moderate or densely populated area, it designates practically everywhere as having EJ concerns.

This can be seen by looking at our modification of the CEC method. While it is not currently used in this way, we can use the CEC demographic screen to produce a "screening map" (Figure 5.1; all figures are at the end of the chapter) of the Southern California area. In this map, all the red polygons are areas where the EJ criteria are exceeded.

According to this map, Nueva Azalea would have been literally surrounded by areas of EJ concern; on the other hand, there is little that would distinguish the Nueva Azalea site as being worse or better off than many other potential sites in Southern California. There is nothing represented in that map or criterion, for example, that accounts for the current pattern of disparity in exposure, risk, and vulnerability. The current method would imply a need for public outreach and impact assessment to address any concerns but this would be true of virtually every location in Southern California.

To illustrate how the EJSM could be used as an alternative, Figure 5.2 shows the Nueva Azalea project location against a background of color-classified values of the EJSM-generated CI scores at the 2000 census tract level. As noted in the previous chapter, higher CI scores indicate greater cumulative impacts and community vulnerability.

Note that the area surrounding the proposed Nueva Azalea site has relatively high CI scores. Also shown on the map are all other operating Southern California power plants, nearly all of which are either located in or directly adjacent to areas of high cumulative impact and, therefore, EJ concern.[53] From the map, it is clear that the CI scores in the vicinity of the proposed Nueva Azalea site are much higher than those for the other power plants in the region – the map, in short, is showing more variation than the implied CEC method and therefore gives more nuance to the initial screen.

To give each location and buffer an overall CI score based on the CI scores of the affected tracts, we apply the tract-level scores to all census blocks within each tract and take the population- weighted average CI score across blocks that are within each buffer circle, with blocks designated as being within the buffer circle if their centroid – or geometric center – falls inside of it. This method allows for portions of tracts to be included in the average CI score in cases where the buffer circle intersects a census tract, and it represents the CI score for the average person within the buffer circle rather than the simple average of the tracts that are affected (which seems to be a reasonable approach in that it makes use of the actual population within the buffer).

Figures 5.3 and 5.4 offer the average CI score within the one mile and six- mile buffer distances for all power plants shown in the analysis; while a superior comparison would be to all alternative locations, we did not have that information and thought that the

[53] 2007 CEC list of operational power plants in California with generating capacity >/= 50 megawatts

existing power plants would represent a reasonable range of such alternative locations. At both buffer distances, the area has a very high average CI score - 13 out of a possible 15 points - which is much worse than most all other power plants in the region. Indeed, the proposed Nueva Azalea site has the fourth highest CI score at the one- mile distance and second highest at the six- mile distance. From this comparison, one might conclude, on EJ grounds, that the proposed Nueva Azalea site was among the least desirable locations for a new power plant in Southern California (of course, there are many other reasons why a power plant location may or may not be attractive; we are not suggesting that EJ is the only concern but rather are simply offering a different way to measure that concern).

Interestingly, the Nueva Azalea site is outranked in both buffer comparisons by only one power plant- the Malburg plant in Vernon, which is located about five miles northwest of Nueva Azalea. That plant has been the subject of concern by the surrounding community and there was significant opposition when there was a recent proposal to site a new power plant near the facility.[54] Indeed, that project was halted by the community – as was Nueva Azalea – with the City withdrawing its application with the CEC on September 28th, 2009.[55] This pattern suggests that the screen we have developed could be useful in predicting where potential siting plans might adversely affect already overburdened communities and, in doing do, suggest that either special attention in siting or special outreach to affected groups is appropriate.

Discussion

To compare our results to the current CEC requires utilizing a modified version of the CEC approach. We modify it because, as noted above, using the CEC's binary approach – in which EJ concern is triggered by meeting the 50 % minority or 50 % low-income threshold – means that every existing plant or potential location has some concern. We instead wanted to see if we could at least rank concern along these two dimensions and so we derived a method where we drew the buffer and calculate a "score" similar to our CI score. Essentially, this is the percent minority or percent poor within each buffer, derived by counting up the numbers in each of these categories (and the overall population) associated with block group centroids that fall within the respective buffers.

Those results are depicted in Figures 5.5 through 5.8, inclusive. Using the six- mile buffer distance (Figures 5.6 and 5.8), the Nueva Azalea site ranks relatively high both in terms of minority populations and percent living in poverty, but at the one- mile distance (Figures 5.5 and 5.7), it ranks lower in the distribution, making it appear to have fewer EJ concerns, at least when compared to other facilities in the region.[56] In contrast, the EJSM

[54] CI scores cannot be shown for High Desert and Long Beach (CA) P&G at the 1 mile distance, because of missing data for indicators of social and health vulnerability in some census tracts falling within this buffer distance.

[55] See *Community Stops Dirty Power Plant in Southeast Los Angeles:* http://www.cbecal.org/campaigns/soeastla.html.

[56] The percentage minority population and poverty rate is not shown for High Desert at the 1 mile distance because there are no people residing in the census tracts falling within the buffer distance.

clearly identifies the area surrounding the proposed Nueva Azalea site as a problematic location in terms of EJ concerns, mostly because it is using several other social factors as well as cumulative exposure indicators, including proximity to other point source hazards and measures of air-related health risk.

The above analysis suggests that the EJSM may offer more nuance and might be usefully incorporated into the CEC siting analysis and permitting process to allow for a comparison of the relative merits of various siting options on an EJ basis. If used in this way – calculating the average of CI scores for a buffer distance around a set of potential site locations – the EJSM could be implemented as a means to inform the CEC process of existing EJ concerns as determined by cumulative impacts and social vulnerability, as well as to suggest the level of potential local objections to power plant siting. The geographic specificity of the EJSM, yielding CI scores at either the CI polygon (census block or smaller) or tract level of geography, also eliminates the need to focus only on an arbitrary buffer distance. The EJSM could further inform the siting process by evaluating the distribution of CI scores at the finer levels of geography (CI polygons or census tracts) to examine the relative contributions of the different indicator classes - hazard proximity, health risk, and social/health vulnerability – to the overall score, in this way obtaining a more comprehensive and nuanced understanding of the relative level of EJ concern that is highly geographically specific.

To help CEC staff become familiar with the EJSM and experiment with its use, we can provide a tool and spatial data layers that allow the user to quickly specify a buffer for any geographic location and select all features located within the buffer for an exploration of CI metrics and an analysis of average population-weighted CI scores. Information on the tool is provided in the Appendices.

Conclusion

The CEC EJ demographic analysis as currently applied is a broad test used to identify areas of "EJ concern" and, in part, define the degree to which the CEC is compelled to carry out measures to address EJ concerns. It does not make comprehensive use of pertinent data available at the state level, nor can it go beyond a site-specific yes/no decision and compare the suitability of alternative locations that might host a new plant in terms of EJ and cumulative impacts. The underlying information – poverty and minority population – are by themselves insufficient to characterize an EJ community given what we now know about the determinants of environmental injustice, and they are of no utility in assessing cumulative impacts. Moreover, at least in Southern California, only one of these two criteria even plays a role in the results of the CEC demographic screen: in the region, while about 58 percent of block groups have a majority minority population, less than 2 percent have more than half the population below the poverty line – and among the 185 block groups that do, all but 6 are majority minority.

In contrast, the EJSM offers a practical and useful alternative to the current CEC staff approach. In addition to consideration of race and poverty, the EJSM incorporates wide

variety of environmental, health, and socio-demographic information identified in the research literature as significant determinants of disparate impact and environmental injustice. It is of considerable utility for screening purposes and decision making around siting, particularly given that it is implemented at a geographic resolution that is small enough to be useful in, for example, incorporating EJ and cumulative impact information into a comparison of the relative merits of alternative site locations (including a "no project" alternative), as is already required under CEQA and CEC regulations.[57] Using the EJSM, neighborhoods within a region can be compared in terms of existing cumulative impacts.

Focusing only on race and income, as per the CEC demographic screen, has the potential of highlighting areas that are not overburdened by air pollution exposure or health risk. For example, the demographics surrounding the Nueva Azalea site should have alerted both Sunlaw and CEC to expect significant local objection to the proposed power plant. Applying the six- mile buffer zone CEC demographic screen to the five power plants with the highest overall percent minority (this includes Nueva Azalea) shows a range in the percentage minority population from 89 to 97 percent, much higher than the remaining power plants in this region which have minority populations below 80 percent. Using this single measure would have suggested potential EJ concerns to the CEC at all five locations. However, the ranking of these five power plants in terms of average CI scores (Figure 5.4) shows that two of the five – Colmac Energy Inc. and Coachella – are at the lower end of the regional distribution of average CI scores. Similar comparisons can be made using poverty rates and with both buffer distance thresholds.

Because the EJSM relies on a wide variety of indicator metrics that are combined into the final CI score, these results are both reliable and robust in terms of the actual determinants of EJ spatial patterns, and less sensitive to small variations in a single measure, such as the percentage minority population or poverty rate. The EJSM also uses a quantile ranking procedures to calculate CI scores, unlike the CEC demographic screen that uses specific threshold which identify EJ concerns in a binary fashion. In our view, there may be some utility to continuing to test the EJSM against hypothetical and actual cases to see what additional information it can provide policy makers, regulators, and community members.

[57] California Code or Regulations, title 14, § 15126 and title 20, § 1765.

Figure 5.1: CEC "Demographic Screen" map of census block groups overlain by the location of the proposed Nueva Azalea site and one and six mile buffer radii (areas marked red meet the criteria of hosting "environmental justice populations" – exceeding either 50% minority or 50% low income and buffer radii of one; also shown are locations of all existing power plants (>/=50MW) in the southern California region. Areas in dark gray are industrial while areas in light gray are open space/vacant land uses).

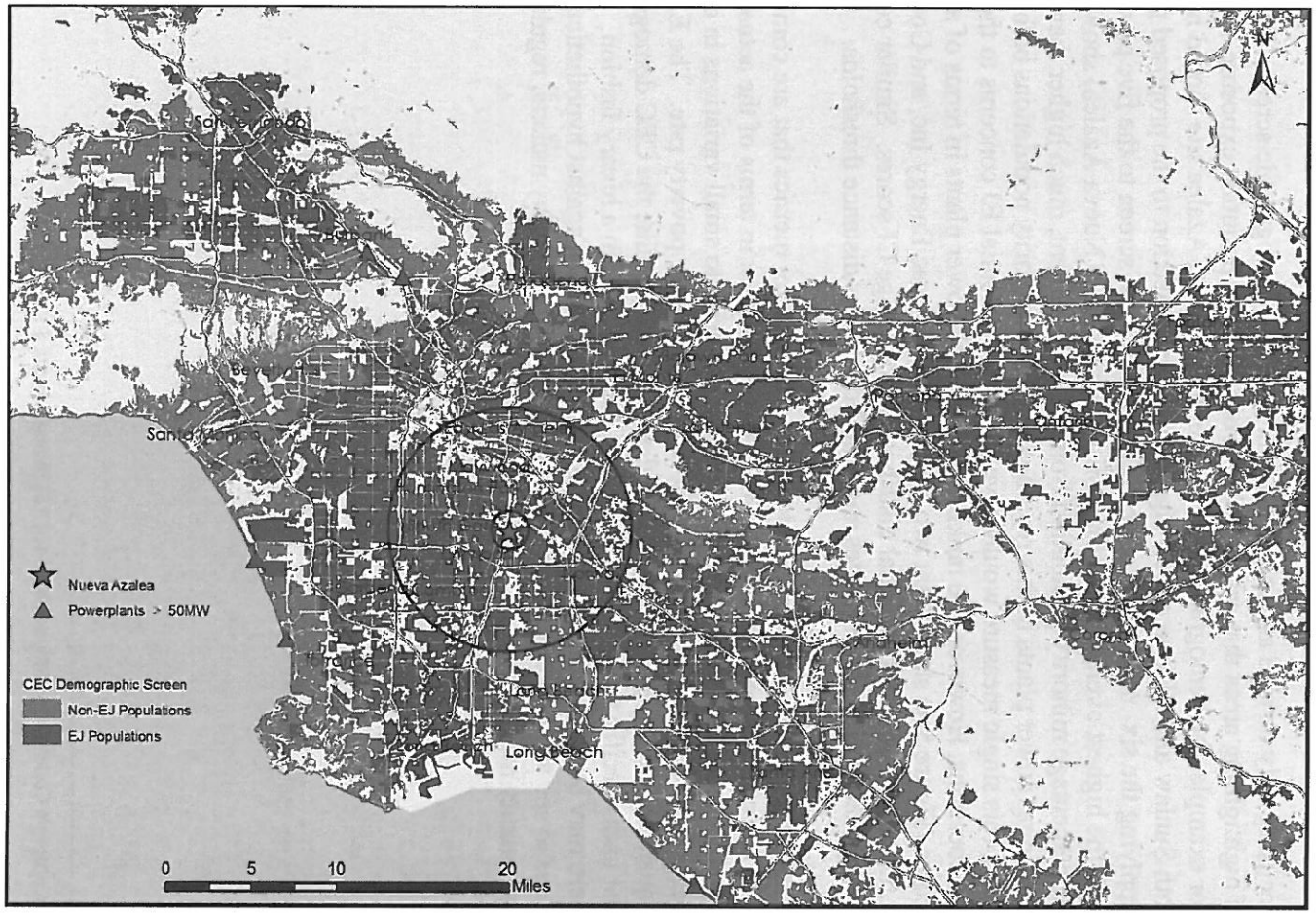

Figure 5.2: EJSM map of cumulative impact score overlain by the location of the proposed Nueva Azalea site, and one and six mile buffer radii (also shown are locations of all existing power plants (>/=50MW) in the southern California region).

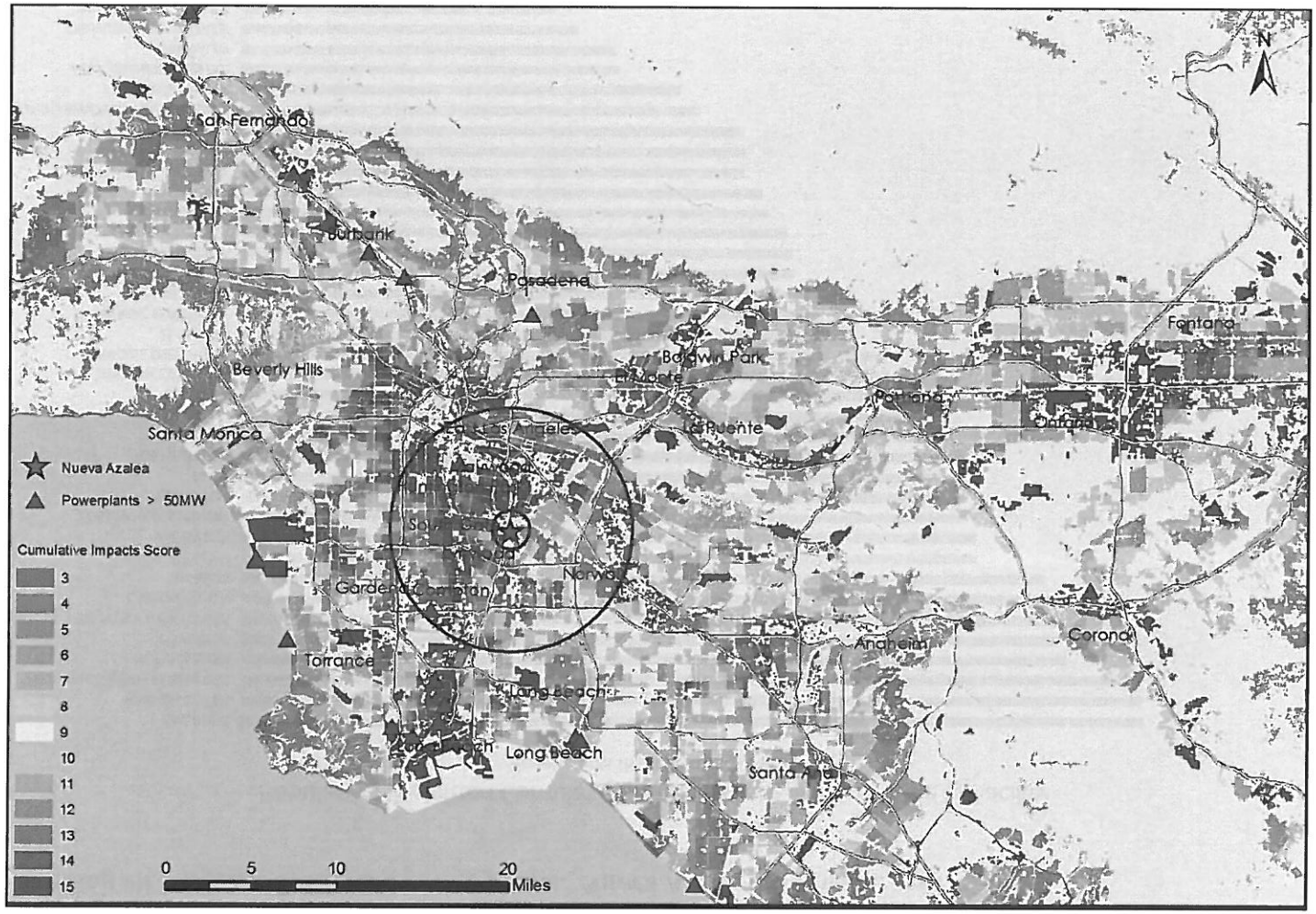

Figure 5.3: Rank of average population-weighted CI scores for census block groups located within a one mile circular buffer surrounding all southern California power plants. Nueva Azalea is shown in red.

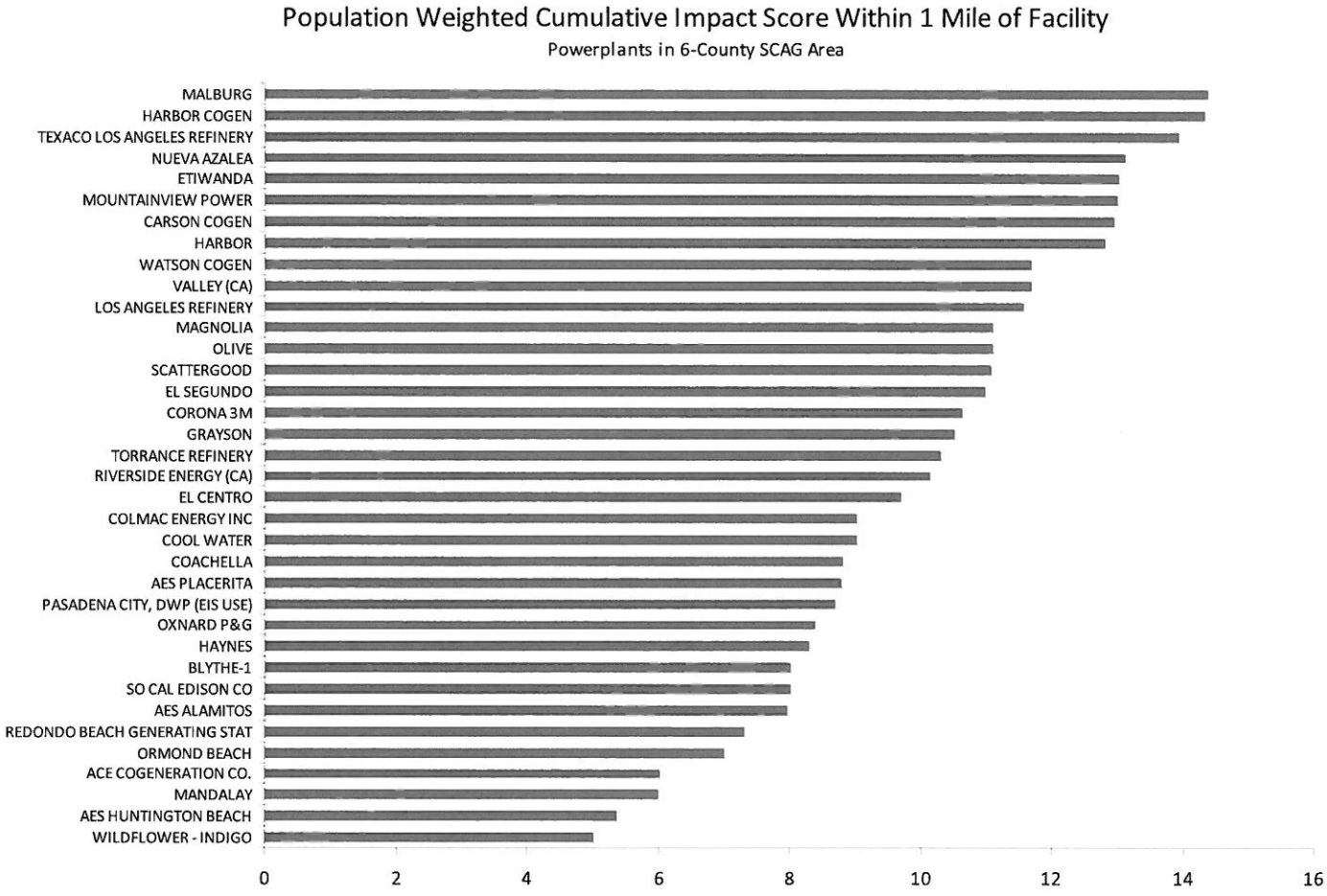

Figure 5.4: Rank of average population-weighted CI scores for census block groups located within a six mile circular buffer surrounding all southern California power plants. Nueva Azalea is shown in red.

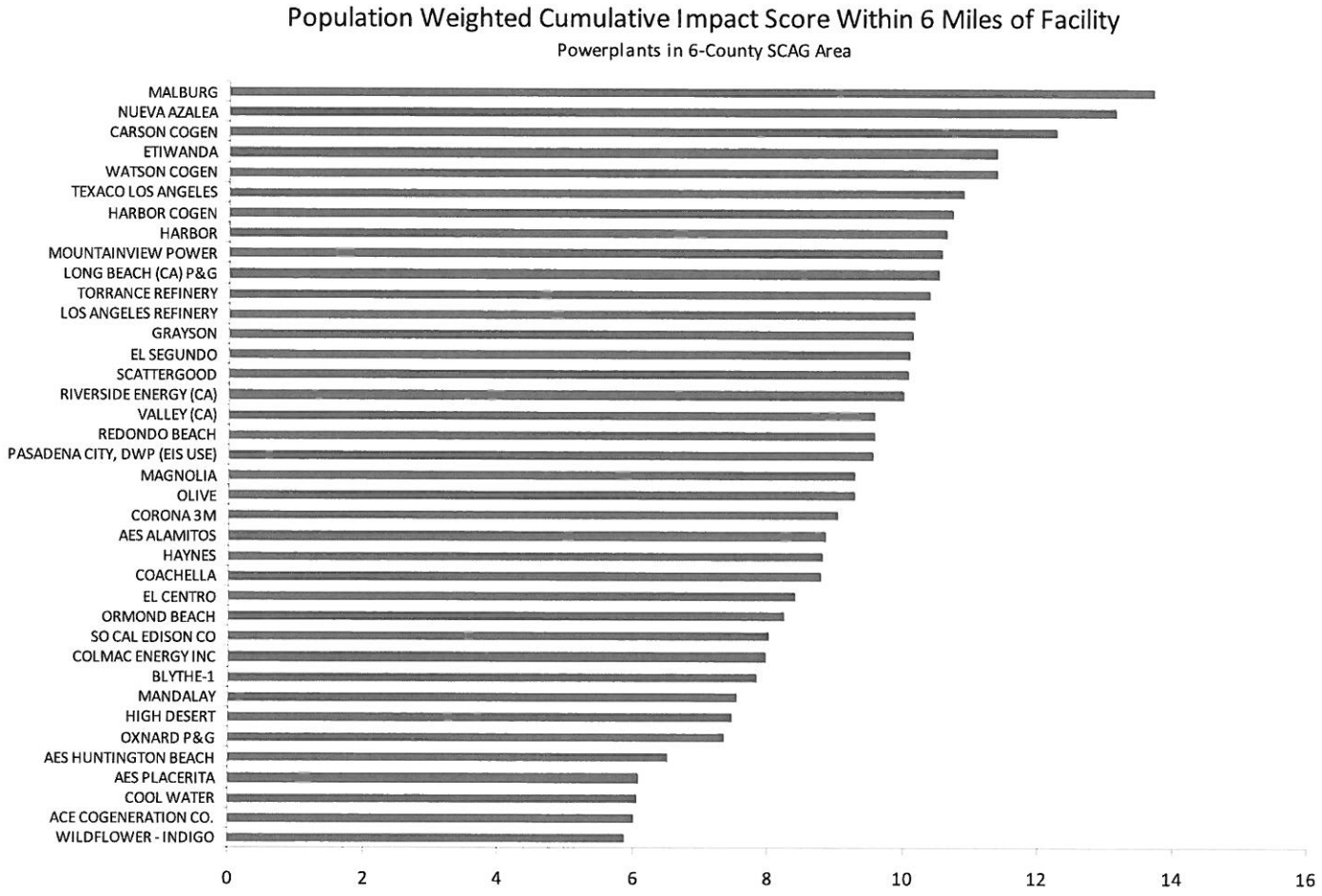

Figure 5.5: Rank of percent minority residents for census block groups located within a one mile circular buffer surrounding all southern California power plants. Nueva Azalea is shown in red.

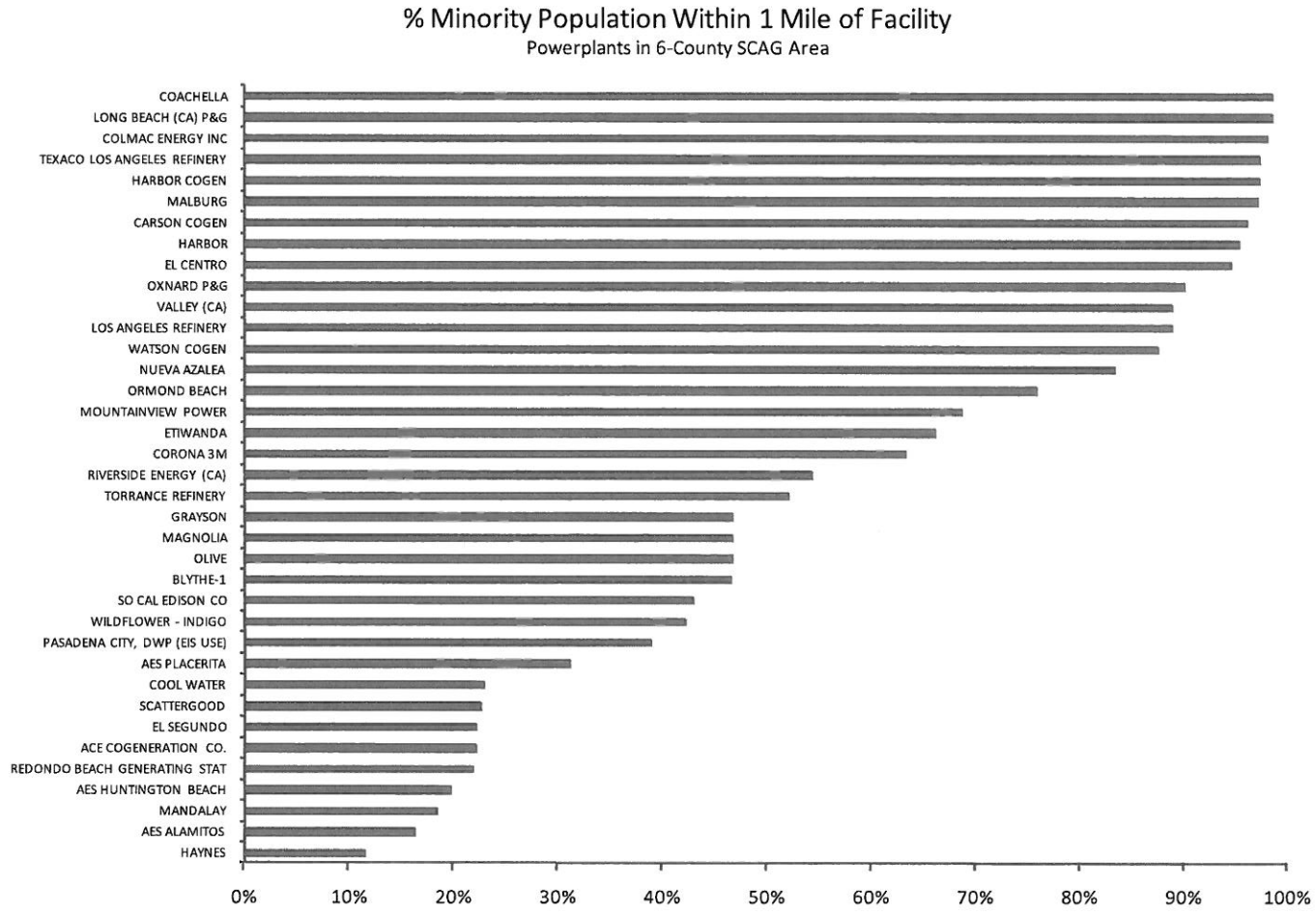

Figure 5.6: Rank of percent minority residents for census block groups located within a six mile circular buffer surrounding all southern California power plants. Nueva Azalea is shown in red.

Figure 5.7: Rank of percent residents below the federal poverty level for census block groups located within a one mile circular buffer surrounding all southern California power plants. Nueva Azalea is shown in red.