

Protecting Health Using an Environmental Impact Assessment: A Case Study of San Francisco Land Use Decisionmaking

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Laws and regulations for an environmental impact assessment enable a health impact assessment whenever physical changes in the environment may significantly affect health. In this case study, I describe 2 instances in which a local public health agency used the procedural requirements for an environmental impact assessment to account for societal-level health determinants that are not traditionally evaluated in land-use decisions.

These examples show that a public health critique can contribute both to the scope of analysis in an environmental impact assessment and to substantive changes in land-use decisions. I have evaluated this health appraisal approach as a form of a health impact assessment and will make recommendations for law, research, and practice that support its technical, cultural, and political feasibility. (*Am J Public Health*. 2007;97:406–413. doi:10.2105/AJPH.2005.073817)

THE 1969 NATIONAL

Environmental Policy Act requires federal agencies to identify and analyze potentially adverse environmental effects of public agency–approved policies, programs, plans, and projects. Furthermore, when indicated, federal agencies are required to prepare a “detailed statement” of effects and related mitigations, i.e., an environmental impact statement.^{1,2} So far, US public health professionals have not used the environmental impact assessment (EIA) to provide the public and policymakers with a systematic analysis of health consequences from effects on such factors as housing quality; land use density, design, and diversity; public infrastructure; and residential segregation.^{3–5}

The health impact assessment (HIA) is an emerging practice that is closely related to the EIA and aims to inform policymakers about potential direct and indirect health effects in institutional contexts as diverse as urban planning, agriculture, energy, and economics.⁶ Some countries, including Australia and Canada, integrate the HIA within an EIA; in other countries, such as the United Kingdom and Sweden, practitioners conduct the HIA as an independent appraisal.^{7–10}

With a growing understanding of the associations between social determinants, the built environment, and health in the United States, public health professionals have new opportunities for participating in land-use and transportation policymaking and

planning,^{11–16} and the EIA is a vehicle for this engagement.^{17,18} The National Environmental Policy Act and its related federal guidelines have explicit language that requires the evaluation of both direct and indirect effects on health as well as health effects on low-income and minority populations.^{19,20} At the state level, the California Environmental Quality Act mandates environmental impact reports whenever “the environmental effects of a project will cause substantial adverse effects on human beings, either directly or indirectly,”²¹ and Hawaii requires an EIA to consider changes in economics and social welfare, impacts on public health, and effects on cultural beliefs, practices, and resources.²²

In this case study, I describe the use of EIA procedural requirements by the San Francisco Department of Public Health (SFDPH) to account for potential indirect health effects of land use development. This case study shows how the identification of potential health effects within the EIA process can influence policy decisions and legitimize needs raised by marginal stakeholders. I have evaluated this health appraisal approach as a form of an HIA and make recommendations for law, research, and practice that could enable its further development.

CONTEXT AND APPROACH

In San Francisco during the 1990s, high housing costs,

low-wage jobs, gentrification, contaminated landfills, air pollution, and substandard housing emerged as public health and environmental justice concerns.^{23,24} San Francisco residents, business owners, and community organizations mobilized to demand that the city’s Department of City Planning act to (1) prevent gentrification and displacement, (2) promote affordable housing, (3) preserve light industry, and (4) ensure greater community oversight with respect to real estate development.²⁵ Through several community health partnerships, community objectives (e.g., displacement prevention) became health objectives²⁶; subsequently, community groups encouraged me, as a representative of SFDPH, to conduct health effects analyses on land-use plans and projects.

In San Francisco, the Department of City Planning implements land-use planning and zoning and provides oversight for all local public agency environmental impact reports. The SFDPH routinely reviews these environmental impact reports to ensure there has been adequate study of the impacts on air quality, noise, and chemical hazards. In 2003, the SFDPH began to appraise selected land-use and transportation planning and policy proposals with a more comprehensive set of criteria. Community stakeholders, such as the South of Market Community Action Network, legislators, or public agencies

Rapid Healthy Appraisal Approach for Land Use Projects, Plans, and Policies

Screening

- What is the problem or the need that the project addresses?
- Has the evaluation of the project considered significant potential pathways between the decision's outcomes and health outcomes?
- Does public health evidence exist to support these pathways?
- Do community/lay positions or concerns about the project relate to these pathways?
- Are the health impacts potentially of significant magnitude?
- Can the project result in disparate effects to different social or economic groups?
- Is the decisionmaking process open or closed?
- Are decisionmakers considering all feasible alternatives to address the problem or need?

Analysis

- Document existing data on health outcomes logically related to the decision (e.g., baseline incidence of pedestrian injuries, asthma rates).
- Document empirical peer-reviewed and “gray” literature relevant to the health impacts you have identified for analysis.
- Document existing environmental conditions in the project setting related to these health impacts (e.g., traffic volumes, noise measurements, unmet housing needs).
- Apply existing environmental data to effect measures, where appropriate, to forecast health impacts.

Informing the decision

- Summarize the background information, logic model, literature review, secondary data review, and forecasting in a report or letter to decisionmakers or a comment letter on the EIR.
- Informally present findings to decisionmakers, agency staff, and community stakeholders.
- Testify on the findings at a public hearing.

Evaluation

- Review response to comments on EIR, comments and questions by legislators.
- Document changes in the content of the EIR.
- Document changes in the final or proposed plan or action.

Note. EIR=environmental impact report.

TRINITY PLAZA AND RESIDENTIAL DISPLACEMENT

The first review concerned the demolition of Trinity Plaza Apartments, which comprised 360 rent-controlled units, and the reconstruction of 1400 new condominiums. Officials from the Department of City Planning initially concluded that redevelopment of the site would not have adverse housing impacts, because the proposal increased the total number of dwelling units.

Residents and tenant advocates challenged the city's determination in public testimony by arguing that displacement of people would physically impact the residents, leading to mental stress and the destruction of a cohesive community. The SFDPH review subsequently identified several health consequences of the redevelopment proposal: psychological stress, fear, and insecurity caused by eviction; crowding or substandard living conditions because of limited affordable replacement housing; food insecurity or hunger caused by increased rent burdens; and loss of supportive social networks owing to displacement.^{28–32} Furthermore, the SFDPH qualitatively assessed the health impacts of eviction through focus groups with affected tenants.

Providing evidence that associated the demolition with adverse health impacts met the California Environmental Quality Act threshold requirement to study any environmental change that may be adverse to humans. Officials from the Department of City Planning acknowledged this requirement but challenged the SFDPH to show how adverse consequences could be analyzed.

requested or solicited these reviews; however, the requests occurred in the context of the agency—the aforementioned community partnerships. This health appraisal approach, which became part of my routine practice as one of the deputy public health officers, resembles a rapid or desktop approach to an HIA, generally done in a short period of time (weeks) without community oversight and typically without original data collection or quantitative research.

The box on this page shows the general sequence of steps that guided the SFDPH's reviews. When proposals for review were screened, the following criteria were considered:

the objectives of the project, the potential pathways between decision outcome and health outcomes, the incidence of related health outcomes among the population, the potential magnitude and distribution of effects, the consideration of health issues during the decisionmaking process, the existence of health evidence, and the associations between evidence and stakeholder positions. Literature on the social determinants of health, health disparities, place and health, and the concept of social change processes guided the identification of pathways between the proposed action and health effects²⁷ (Table 1). The appraisal involved mapping pathways, assessing relevant

empirical research, conducting secondary data analysis, and in some cases, conducting focus groups, monitoring exposure, or quantifying impacts with empirical models. Testimony at public hearings, informal presentations, and formal agency comment on environmental impact reports informed decisions. Evaluation of the practice included monitoring changes in decision outcomes and using health-based arguments by stakeholders.

I examined 2 residential development projects that were the first 2 local applications of this approach. Table 2 shows the subsequent experience that the SFDPH and I had when we used this approach.

TABLE 1—Examples of Health Determinants Potentially Affected by Land-Use Planning in Urban Areas

Category	Examples of Health Determinants Within Category
Housing	Housing adequacy and affordability Stable housing tenure Housing quality and safety
Livelihood	Security of employment Adequacy of wages, income, benefits, and leave Job hazards Job autonomy Economic diversity Locally owned businesses
Nutrition	Food cost Food quality and safety Proximity of retail food resources
Air quality	Contaminants and pollutants in outdoor air Contaminants and pollutants in indoor air Exposure to environmental tobacco smoke
Water quality	Contaminants or infectious agents in drinking water Safety of the recreational waters
Noise	Intensity and frequency of environmental noise
Safety	Rate of violent crime Rate of property crime Rate of structural fires Pedestrian hazards and injuries
Transportation	Access to jobs, goods, services, and educational resources Proportion of trips walking and bicycling Total miles traveled using personal vehicles
Education	Quality, proximity, and capacity of schools
Parks and open space	Quality, proximity, and capacity of parks
Private goods	Quality and proximity of financial institutions Quality and proximity of child care services Quality and proximity of health services
Public services	Quality and proximity of health services Capacity of safety net resources for housing and welfare
Social networks	Number and quality of contacts with friends and families Participation in voluntary organizations Quality of informal interactions
Social inclusion	Population living in relative poverty Attitudes toward or stereotypes of minority racial, social, and ethnic groups Residential segregation by race, ethnicity, religion, or class Degree of inequality in income or wealth
Political participation	Degree and quality of participation in public decisionmaking Responsiveness of government to popular needs

How could one estimate the socioeconomic status of displaced tenants and their future housing choices, level of crowding, commute lengths, and relationships

with family or friends? Officials also worried that requiring a health analysis within an environmental impact report would demand greater agency time and

resources and would invite legal challenges and controversy.

Department of City Planning officials ultimately revised their determination for the Trinity Plaza proposal and required the project’s environmental impact report to analyze residential displacement and any indirect impacts on health. The developer—who was facing tenant organizing, public criticism, the potential for adverse environmental impact report findings, and a possible citywide legislative moratorium on demolition—ultimately agreed to negotiate with tenants. In 2005, a revised proposal called for the replacement of the 360 rent-controlled units, continued leases for existing tenants, a 1000-square-foot meeting space, and a children’s play structure.³³

THE RINCON HILL SPECIAL USE DISTRICT AND SMART GROWTH

Soon after the Trinity Plaza review, community organizations asked the SFDPH to review 2 high-rise condominium projects in the proposed Rincon Hill Special Use District. The Rincon Hill District is south of the downtown area and is adjacent to the South of Market neighborhoods, where community organizations were working to prevent displacement. Department of City Planning staff also encouraged SFDPH to document the associations between real estate development and health, because they believed that documenting the health benefits of neighborhood schools, pedestrian-friendly streets, and community centers would support requirements for developer funding of these improvements.

Developers had already promoted the environmental benefits of building housing near

public transit and jobs.³⁴ However, in its review, the SFDPH raised concerns about the costs of housing (a studio apartment had an estimated cost of approximately \$700 000) and argued that although housing for people who worked nearby was needed, only a small proportion of workers would be able to take advantage of housing that was prohibitively expensive.³⁵ The mismatch between income and housing costs thus missed an important opportunity for reducing commutes, energy consumption, and pollution. The SFDPH recommended that a jobs–housing balance analysis disaggregated by income be conducted as part of a revised environmental impact report.³⁶

Officials from the Department of City Planning responded that housing affordability was a social concern not associated with environmental quality. They further claimed that it was speculative to predict the environmental effects of changes in housing affordability by stating that people choose residence on the basis of not only job location and housing costs but also amenities, location of family and friends, and quality of schools.

The SFDPH review also criticized the project for potentially reinforcing segregation. San Francisco law required the project developer to ensure 12% of the developed units were affordable to households with moderate incomes. However, some developers elected to build these required units in a high-poverty neighborhood outside the Rincon Hill planning area. The SFDPH review suggested that adverse impacts of segregation, including higher rates of mortality and violent injury and lower opportunity for educational and economic

TABLE 2—Project and Plan Health Reviews Conducted Using the Rapid Health Appraisal Approach

	Description of Project, Policy, or Plan	Year of Review	Requested by Public Agency	Requested by Community Stakeholders	Categories of Health Determinants Affected	Appraisal Methods	Communication to Decisionmakers
Trinity Plaza Apartments redevelopment ^a (San Francisco, Calif)	Demolition and reconstruction of multifamily residential development	2003		X	Housing Social networks	Literature review Focus group Local data review	Written report Public testimony EIR comment
Spear/Folsom development ^a (San Francisco, Calif)	Development of new mixed use multifamily residential and commercial development	2003	X	X	Housing Social integration Parks Community schools Air quality	Literature review Local data review	Written report Public testimony EIR comment
Rincon Hill District plan ^a (San Francisco, Calif)	Land-use plan for new residential and commercial mixed use neighborhood	2004	X	X	Housing Social integration Parks Community schools Air quality	Literature review Local data review	Written report Public testimony EIR comment
Housing element of the San Francisco general plan ^a (San Francisco, Calif)	State-required plan for housing, including statements of policy, objectives, and implementation activities	2004	X		Housing Social integration Air quality	Literature review Local data review	Written report Public testimony
Redevelopment of University of California family housing redevelopment ^b (Albany, Calif)	Demolition and reconstruction of university family housing	2004		X	Housing Social integration Social networks	Literature review Local data review	EIR comment
Central Station redevelopment ^c (Oakland, Calif)	New market-rate residential development within redevelopment area at site of historic train station	2005		X	Housing Social integration Social networks Air quality	Literature review Local data review	EIR comment, public testimony
Oak to Ninth Avenue development ^d (Oakland, Calif)	New 3500-unit market-rate residential development on industrial waterfront land	2006		X	Housing Air quality Noise Pedestrian safety	Literature review Local data review Forecasting pedestrian injury	EIR comment, public testimony, written report

Note. EIR = environmental impact report.

^aReview conducted while acting as a representative of the San Francisco Department of Public Health.

^bReview conducted while acting as an individual on behalf of graduate student families residing at the site of the proposed development.

^cReview conducted while acting as an individual on behalf of the 16th and Wood Train Station Coalition.

^dReview conducted as part of a collaborative faculty-student project at the University of California, Berkeley.

success, could indirectly result from building an exclusive high-income neighborhood. Finally, the project did not provide for a neighborhood school, which raised the potential of negative impacts on traffic air pollution, physical activity, and children’s educational success.³⁷

The Department of City Planning approved the environmental impact report for the project

without any further environmental study; however, questions about the project’s affordability, its effects on social integration, and its demands on public infrastructure remained. Community organizations appealed the approval of the environmental impact report to the city’s board of supervisors, and 1 legislator, who used findings from the SFDPH review, negotiated a

higher proportion of affordable units. Zoning rules subsequently approved for the Rincon Hill planning area in 2005 required all below-market-rate units to be constructed within the adjacent South of Market planning district and included developer fees for street improvements, parks, and a community center and “community stabilization” funds for affordable housing

and community economic development.

LESSONS LEARNED

The Trinity Plaza and Rincon Hill case studies illustrate how land-use development projects along with their associated EIAs can be informed and influenced by HIA. Parry and Kemm suggested that the diverse

approaches to an HIA all share 3 interrelated objectives: “To predict impacts in a robust manner and to judge both their magnitude and importance [predicting effects]; to involve people affected in the assessment process [stakeholder participation]; and to inform the decisionmaking process [informing decisions].”^{38(p1123)} I considered the SFDPH practice against these 3 objectives. There was no formal external evaluation of this approach, and these reflections are mine alone.

Predicting Effects

These health appraisals did not quantify health effects; nevertheless, evidence, including empirical research and local data, provided the basis for potential pathways between the project and health outcomes and showed the direction and the relative magnitude of these health effects as well as their local significance. Some decisionmakers and Department of City Planning staff challenged the validity of predictions not substantiated by quantitative methods and estimates; however, the suggestion of specific tools to support estimation (e.g., jobs–housing balance analysis) did not lead to their implementation.

Stakeholder Participation

External participation was limited within the appraisal, but it was evident in both the screening and informing decisions. The reviews supported the interests of both community organizational stakeholders and public health; however, they would not have occurred without the community organizations’ understanding of the potential policy contribution of a local health agency, which highlights the

instrumental role of community partnerships. Community members were involved in the focus group but were not involved in other appraisal activities. The SFDPH shared documents, data, and other findings with community stakeholders and the Department of City Planning in advance of public testimony staff to support the dissemination and influence of the appraisals.

Informing Decisions

Policy decisions on the Trinity and Rincon Hill developments occurred in the context of a vigorous public debate, and it is not possible to attribute changes in the developments exclusively to the health appraisals. However, changes to the scope of environmental analysis required by Department of City Planning for the EIA of the Trinity Plaza project, the negotiated changes in affordability requirements for the Spear and Folsom projects (Table 3), and the final zoning rules for the Rincon Hill planning area all suggest that the SFDPH reviews influenced policy.

Some of the issues raised in the health reviews (e.g., housing affordability) were already high on the public agenda. In these cases, a key contribution of the health appraisal was the enumeration of causal pathways between the project decision, social and environmental conditions, and human health outcomes. Several stakeholders and legislators took public positions, in part, on the basis of health-related arguments. The SFDPH understood how reviews would legitimize particular community interests. Not surprisingly, the actions taken by the SFDPH were met with criticism and even hostility by those who took alternative positions.

Directly communicating our findings to Department of City Planning staff who were responsible for staff reports and recommendations to the planning commission also created awareness and concern. For example, staff at the Department of City Planning changed their position on the need for studying displacement in the context of demolition, and they also expressed interest in learning how design changes could mitigate health impacts. The health impacts of residential segregation appeared to have contributed to the agency changing its position on requiring that below-market-rate units be built near market-rated housing developments.

Finally, the SFDPH contributed new data to the planning process. Community stakeholders used maps that showed locations and sizes of city parks, locations of pedestrian injuries, and locations of overcrowding and segregation to successfully argue for development impact fees for the new neighborhoods.

RECOMMENDATIONS FOR PRACTICE, RESEARCH, AND LAW

Although these development projects show the potential of a health analysis within an EIA, application in more diverse contexts is necessary before the value of health analysis approach can be fully appraised. The following are recommendations for supporting the development and application of an HIA within an EIA.

Use an Environmental Impact Assessment Process

The first recommendation is simple: practitioners should use existing procedures and laws for

an EIA whenever possible to promote public and decision-maker awareness about the potential health effects of public decisions. Although some believe that an HIA should occur as a voluntary process without the procedural and legal limitations of an EIA—as the case studies illustrate—the regulatory standing of an EIA is in part responsible for its influence on policymakers and project proponents.^{39,40}

Public health practitioners also can use an EIA in some cases to promote awareness and analysis of the social and economic determinants of health. An EIA is triggered by decisions that lead to physical environmental changes; nevertheless, the National Environmental Policy Act requires an environmental impact statement to include all effects on the human environment whenever economic or social and natural or physical environmental effects are interrelated.⁴¹ More specifically, California law requires agencies to analyze economic or social effects if these effects are on a causal pathway that leads to environmental effects.⁴²

Despite federal guidelines for a social analysis within an EIA,^{43–45} these analyses occur sporadically.⁴⁶ The practice of community impact assessment with transportation planning suggests some recent shifts in attitudes about a social analysis within an EIA, and planning for recent roadway projects has included mitigations of impacts on health and community cohesion.^{47,48} Public health practitioners should capitalize on both federal guidelines and more recent developments.

Build Tools for Forecasting Health Effects

Although EIA regulations legally enable a health and social

analysis, they provide no guidance on how that analysis should occur. An HIA needs new analytic methods that forecast the effects of changes in social and environmental measures on traditional human health outcomes (e.g., life expectancy, hospitalization rates, disease incidence). Evidence-based causal diagrams should be the starting point for forecasting efforts. Such diagrams also should be recognized as tools in themselves for building community and policymaker understanding.

Existing research within planning and health disciplines often provides a solid basis for forecasting health effects. For example, on the basis of numbers and types of jobs that are the result of a project, a health analysis may be able to estimate effects on income, health insurance benefits, and vacation and sick leave and subsequent effects on effects on health-related outcomes such as life expectancy, injury and illness rates, avoidable hospitalization, and childhood development.⁴⁹ Changes in tax revenue might be similarly associated with the availability of public health, public safety, and other social services. Ecosystem health concepts and models of climate change can provide other templates for mapping diverse and interrelated human environments and health pathways.^{50,51}

Recent research has begun to associate land use, urban design, and transportation system characteristics with outcomes such as physical activity, air pollution, environmental noise, body mass index, and social cohesion.^{52–55} This research could be used with existing EIA metrics. For example, health effects analysis can associate changes in motor vehicle traffic volumes with

health-related outcomes such as injuries, sleep disturbance, noise-related stress, diabetes, respiratory disease, and social cohesion. In a review of the Oak to Ninth project (Table 3), I used an empirically derived road facility safety performance function and the environmental impact report's estimates of changes in roadway volumes to quantitatively forecast changes in pedestrian injuries.

Adopt Supportive Rules and Standards

Broader application of this health appraisal approach might require changes to laws that require an EIA to include more explicit requirements for an HIA. Regulatory changes also should enable the assessment of beneficial environmental effects because current laws for an EIA mandate only the study of adverse impacts. For example, in the case of the Rincon Hill project, the environmental impact report included a detailed analysis of the increase in local traffic but did not consider the benefits conferred by reducing regional traffic. Furthermore, making the case for community health assets, such as neighborhood schools, grocery stores, parks and recreational centers, and pedestrian and bicycle facilities (e.g., sidewalks, benches, enhanced crosswalks, bicycle lanes and parking), requires the inclusion of a benefits analysis.

An EIA involves making a determination about the significance of effects, where significance is often judged against existing regulatory standards. Thus, there exists a need to create, reference, or adopt more health-based standards associated with social and environmental conditions. In California, agencies are permitted to develop locally

specific significance thresholds for an EIA through a legislative or administrative process.⁵⁶ Local standards that are based on empirical associations with health outcomes might include those for proximity to and accessibility of parks or open space, transit service frequency, pedestrian safety, and housing quality.

Several federal and state agencies already publish measures and targets that are potentially adaptable to a health analysis. For example, the US Housing and Urban Development's 2000–2006 Strategic Plan identifies the decline of residential segregation by race/ethnicity or income as a measurable performance objective, and the US Census Bureau collects measures of housing quality, such as overcrowding.⁵⁷ *Healthy People 2010* objectives associated with community design include the reduction of violence, pedestrian injuries, and substandard housing; improved air quality; and increased daily physical activity.⁵⁸

Integrate New Practices for Inclusive Participation

Similar to the National Environmental Policy Act, the California Environmental Quality Act provides rules for information transparency and allows the public to inform the scope and the methods of the analysis. In practice, lay stakeholders, such as residents, who attempt to participate in policy analysis processes are usually forced to discuss technical issues isolated from the broader public agenda, moral and political questions, and issues of institutional legitimacy and public trust.^{59–62} In San Francisco, community groups frequently claimed that the environmental impact report analysis ignored day-to-day social, health,

and economic impacts of environmental planning decisions. As Oscar Grande of the People Organized to Demand Environmental and Economic Rights explained during testimony given to the San Francisco Board of Supervisors Land Use Subcommittee, “[Planning officials] kept saying that we could only talk about issues they could address [in the EIA], but we were simply talking about bread-and-butter issues.”

Without meaningful public participation, a technical analysis of the health effects within an EIA might not effectively serve as a proxy for health needs. Effective public participation in a public agency decisionmaking process is necessary not only because it identifies problems hidden to experts but also because it contributes ideas for more effective solutions, it makes explicit competing values and interests, it creates opportunities for articulating and advancing a common interest, and it generates the buy-in necessary for effective policy implementation.^{63,64} New methods for public involvement, such as consensus conferences and habitat conservation planning, also show how scientific analysis and public deliberation can complement each other in a policy analysis.^{65–67} Methods for participatory action research, including community-based participatory research, call for the democratization of research and technical practice and attempts to link the production of new theory and knowledge with social action.⁶⁸ Community-based participatory research may provide a more inclusive way for developing HIA processes and health analysis tools for impact assessment.⁶⁹ The Eastern Neighborhoods HIA in San Francisco is an early example of joining participatory

and deliberative methods with empirical health research in a land use HIA.⁷⁰

CONCLUSIONS

The National Environmental Policy Act envisioned the environmental impact statement to be prepared “using an inter-disciplinary approach which will insure the integrated use of the natural and social sciences and the environmental design arts.”⁷¹ Although this vision remains unrealized, the SFDPH experience suggests that the public health community has significant opportunities for using the existing procedural framework of an EIA—at least in land use policy settings—to gain knowledge about several social and environmental determinants of health. Practice can begin in an experimental and adaptive mode that is sensitive to context and political limitations and that builds on experiences and lessons learned. Institutionalizing practice will require building interdisciplinary collaborations and supportive constituencies, developing analytic methods, revising regulations, and demonstrating the value of an HIA within the EIA process. ■

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