September 3, 2013

City of Tracy City Council
333 Civic Center Plaza
Tracy, CA 95376

Dear Councilmembers,

Please find attached the formal policy complaint I submitted to the Tracy Police Department (TPD), which I referred to in the remarks I made at the July 16, 2013 City Council meeting. This document was hand-delivered to Police Chief Hampton during a meeting on or about Oct. 6, 2011.

During our meeting, Mr. Hampton stated that TPD policies were currently being revised, and that he would respond to this complaint when the policy changes were finalized. Contrary to Mr. Hampton's assertions during the City Council meeting, I have received no further communication from Mr. Hampton or any other City representative regarding this complaint.

A copy of this complaint was sent to Mr. Hampton by electronic mail on July 17, 2013, but no response was received.

It is difficult to imagine how City officials can exhibit such a gross disregard of the privacy rights that are guaranteed by the California constitution and that are clearly protected by §§ 630-638 of the California Penal Code.

Please contact me if I can provide any clarification or further information.

Sincerely,

Paul Miles

1397 Mansfield St.

25 September, 2011

Chief Gary Hampton
City of Tracy Chief of Police
1000 Civic Center Drive
Tracy, CA 95376

Dear Chief Hampton,

In the course of the Tracy Police Department (TPD) internal investigation of my recent complaints the internal investigator recorded several Witness/Party interviews without the knowledge of the person being interviewed. These individuals were within their own homes, with every expectation of privacy. Similar events have been related to me by Mr. Robert Rodrigues, an ex-Alameda County Sheriff's Deputy.

Although this behavior may be permissible under CA case law [*People v. Carbonie, 1975, 48 Cal. App. 3rd 679*], it is contrary to the spirit of the law as embodied in Penal Code §630–638. The law properly makes exceptions for obtaining evidence pertaining to specific crimes such as extortion or kidnapping (§633.5), but these exceptions clearly do not extend to the surreptitious recording of the testimony of individuals who are not suspected of any crime.

TPD General Order J-16 currently specifies that in the course of an Internal Investigation, all witness interviews are to be recorded. However, there is no requirement that the individual be notified of this recording.

I am requesting that TPD Policy be reviewed and revised to reflect the constitutional right to privacy of the people of California, and the intent of the legislature to protect this right of privacy.

Sincerely,

Paul Miles
1397 Mansfield St.
Tracy, CA 95376

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September 3, 2013

Via Personal Delivery

City of Tracy City Council
Council Chambers
333 Civic Center Plaza
Tracy, CA 95376

Attn: Hon. Brent H. Ives, Mayor
Attn: Hon. Michael Maciel, Mayor Pro Tem
Attn: Hon. Robert Rickman, Council Member
Attn: Hon. Nancy Young, Council Member
Attn: Hon. Charles Manne, Council Member

Re: City of Tracy - Cordes Ranch Project
City Council Public Hearing September 3, 2013, 7:00 p.m.

Dear Mayor Ives and Council Members:

This letter is submitted on behalf of Horizon Planet, an environmental advocacy group dedicated to protecting, preserving, and conserving agricultural and open space lands throughout the State of California for future generations (hereinafter "Horizon"). Consistent with its mission, as expressed previously by comments opposing sprawl in various projects in the City of Tracy (the "City"), Horizon has reviewed the Specific Plan and Environmental Impact Report ("EIR") for the Cordes Ranch Specific Plan ("Cordes Ranch"), and associated planning documents (collectively "the Cordes Ranch Project" or "the Project"), before the City Council today.

In addition, Horizon issued a Public Records Act request ("PRA") to the City requesting any additional Project documents on August 8, 2013. As late as August 30, City advised that it is continuing to research documents responsive to Horizon's request. City has refused to produce these documents in advance of the final City Council hearing. Thus Horizon has been deprived of the opportunity to review the entire project files in advance of the final City Council hearing, and Horizon respectfully asks that this hearing be continued until the City produces the requested documents and Horizon is afforded a reasonable opportunity to review the relevance of the documents to the proposal's potential environmental effects. Otherwise, Horizon is deprived of a meaningful opportunity to comment on the anticipated environmental affects flowing from the Project.

Horizon wishes City staff had timely complied with its request for documents, thus allowing Horizon to submit its comments earlier than the date of hearing. However, City repeatedly refused to make internal documents available, and directed Horizon to its hearing staff report, which was not made available until August 29.

Horizon has several concerns regarding the documents it has been permitted to review, as located on City's website, especially those deficiencies and omissions in the EIR directly related to Horizon's mission, which includes efforts to reduce sprawl and concomitant environmental effects produced by urban sprawl. Horizon raised preliminary concerns in writing to the Planning Department, and at the special Planning Commission meeting held on July 30, 2013, and buttressed this record with a presentation to the Commission during the public hearing. This letter expands Horizon's concerns previously offered to but ignored by the Planning Commission.

In fact, City staff asserts that the multitude of significant environmental impacts it recommends Council override (Ex. C) can be made when balanced against "the economic, social, technological, and/or other benefits of the Project." Horizon has been unable to find any social/environmental analysis provided by City staff or Prologis which even investigates the impact of the annexation and development of this outlier Project on the City core and other previously approved developments.

URBAN DECAY

Horizon examined the issue of urban decay during the Planning Commission hearing. Previously, Tracy dismissed the potential of economic and social damage resulting from development of Cordes Ranch – starting a chain of events leading to the environmental affect of urban decay by wrongly dismissing the issue as being economic and not environmental in nature.[1] Not only is this position contrary to CEQA requirements, which require an analysis of direct and indirect impacts (Public Resources Code §21065; CEQA Guidelines §15131) and controlling decisional law (see *Bakersfield Citizens for Local Control v. City of Bakersfield* (2004) 124 Cal. App. 4th 1184), it also directly contradicts the City's own documents, including the Cordes Ranch EIR. The Cordes Ranch EIR provides that, "Public agencies are charged with the duty to consider and minimize environmental impacts of the development where feasible, and have an obligation to balance a variety of public objectives. In doing so, the City may consider **economic, social, environmental, and other factors**." (Cordes Ranch Draft EIR, Introduction, Page 1-5, bolding added.)

Urban decay is recognized as an environmental impact that must be examined in the context of a legally sufficient EIR. (See *Bakersfield Citizens for Local Control v. City of Bakersfield* (2004) *supra*; *Anderson First Coalition v. City of Anderson* (2005) 130 Cal. App. 4th 1173; *American Canyon Community United for Reasonable Growth v. City of American Canyon* (2006) 145 Cal. App. 4th 1062, 1081.) In *Bakersfield*, the court expressly held that an EIR must analyze a project's potential to cause urban decay if there

1 See Letter from Andrew Malik, Development Services Director, to Morgan K. Grover, MHCSD Development Director, dated July 30, 2013, setting forth the City's position that "It is foundational principle of CEQA that economic and social effects are not in and of themselves considered as effects on the environment."

is substantial evidence showing that the project may lead to such impacts through a chain of events. The court pointed out that CEQA requires the project proponent to discuss the project's economic and social impacts where "[a]n EIR may trace a chain of cause and effect from a proposed decision on a project through anticipated economic or social changes resulting from the project to physical changes caused in turn by the economic and social changes." (CEQA Guidelines §§ 15131(a) and 15064(f).) In short, the chain of events recognized by *Bakersfield* starts with a direct economic consequence that produces a secondary or indirect environmental effect, urban decay.

Horizon finds no discussion of (1) the effects of the Cordes Ranch Project, located outside the City limits, on existing commercial, retail, and industrial projects located in the City or surrounding communities; (2) whether approval of this Project adversely affects such projects, their vacancies, and remainder absorption; (3) how Cordes Ranch's commercial relocation may affect surrounding residential land use; (4) the effect on employment for the region, including the provision of skilled labor; (5) the effect of low wage earners commuting to the site during construction; (6) the effect the Project has on infrastructure improvement plans on approved plan areas that may stagnate as a result of the Project (especially Mountain House); (7) the effect of the Project robbing economic vitality from the Downtown Area; and (8) resulting negative traffic patterns, living conditions, and social breakdown.

The record reflects the potential for urban decay as a result of the Project. The Project documents fail to identify any potential, immediate users for this site, or even a time-line for such users. The Project proponents have only indicated for the media and at the Planning Commission hearing that they hope to "attract" potential users. In the absence of an identified user, the Cordes Ranch Project has the potential to simply "absorb" commercial uses that would otherwise go to other areas in the City already planned for the commercial use, including the Downtown Area, or worse, to attract existing businesses from the core, thereby leaving a shell in the center of the City. This pattern of commercial flight from existing areas can lead to urban decay and deterioration, and requires a full analysis under CEQA. The EIR omits any discussion of the potential of this additional commercial and industrial acreage contributing to urban decay conditions in nearby County projects or in the cities of Lathrop or Manteca.

The record already reflects the potential for urban decay in a letter from Carpenters Local 152E, which is incorporated herein by reference.[2] (The letter from Carpenters Local 152E is included in the Final EIR, Comments and Responses, at 5-49 through 5-57.) In its letter, Carpenters Local 152E put the City on notice that the City failed to evaluate the "chain of cause and effect" of the Cordes Ranch that could lead to urban blight. Unless there is an identified need (through a market analysis) for the addition of 30,847,014 square feet of commercial use within the City, this extra capacity has the potential to

2 Horizon Planet has no affiliation with Carpenters Local 152E, and only references this letter as it is part of the record on the issue of urban decay.

create a chain of events leading to urban decay by deflecting businesses away from already developed areas (including, but not limited to, Mountain House Master Plan, Ellis Specific Plan, Tracy Gateway Planned Unit Development, and the Tracy Hills Specific Plan), and leaving those areas (as well as the proposed Cordes Ranch Project) empty, undeveloped or partially developed, and subject to blight.

The community of Mountain House also raised the issue of urban decay in its comment letter to the City, which is incorporated herein by reference. (Final EIR, Comments and Responses, pages 5-34 through 5-48.) In its letter, Mountain House raised concerns relative to the Cordes Ranch Project impact on the future build-out of Mountain House, especially on commercial development, writing that, "the freeway commercial development in the first phase of the subject project could have a major impact in the timing of the MH MP Freeway Commercial development. Office zoning will also impact the timing of similar zoning in the MCSD." Thus, the City was on notice in advance of the Planning Commission hearing of the Project's potential to cause urban decay to the City of Tracy and the unincorporated areas of the County.

Another component of urban decay is the availability of employment opportunities that the Project provides. (Pub. Res. Code §21081(a)(3), (b); CEQA Guidelines §15065.) The EIR claims that the Project will bring employment to the region.[3] However, the EIR does not disclose data, studies, market analysis, or the other relevant information to support this comment. To the contrary, at the Planning Commission hearing, a citizen and worker of Tracy made a comment for the record that when Prologis (the primary Cordes Ranch developer) brought Amazon to Tracy, Amazon utilized its own employees and did not hire from within Tracy. No one from Prologis or the City made any comment or submitted documents thereon to contradict this statement. Notably, the same citizen who made the comment that Amazon used its own employees from out of the area requested that the Development Agreement ("DA") include language encouraging local hire. The Planning Commission did not include this comment as part of their recommendation of approval to the City Council.[4] As the DA does not contain any provision for local hire, and there is no data to show that the Project will provide employment to the City (in fact, the only data on the record is to the contrary), the effect of employment on the City must be included in the urban decay analysis.[5] Given the Project's location to the highway, it is logical to conclude that non-Tracy workers will

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3 The DEIR at Page 4.12-18 states that the Cordes Ranch will result in the addition of 36,708 employees to the area and that "it is anticipated that many Project employees would already be Tracy residents." However, there is no analysis or data provided in the EIR to support these conclusions.

4 In fact, the Planning Commission recommended Project approval without one single recommendation or suggestion for change or improvement.

5 To further compound the record on this issue, Carpenters Local 152E wrote in their comment letter that, "...absent a local-hiring preference, there is little basis for assuming that the project will provide employment opportunities for the region's highly trained workers." (At Page 5-51.)

travel daily to work at Cordes Ranch, thereby further clogging overburdened state and national highways.

The Commission Chair voiced concern about the lack of timing for construction improvements in the DA. Staff acknowledged that there was no timing mechanism whatsoever in the DA because they "had a good track record with Prologis" and "trusted them". This lack of timing is echoed in the EIR, which states that, "The Project is expected to be developed in phases, over time, depending on market factors." (DEIR page 4.12-8.) Without any market analysis providing a reference for project need or timing, "over time" could essentially mean "never", leaving the Cordes Ranch empty, subject to blight, and an attractive nuisance for an indefinite period of time.

Despite these concerns, neither Project proponent nor City staff provides a market analysis or an urban decay analysis. Apparently this defect is based either on the City's trust of the developer,[6] or due to a shocking misunderstanding that urban decay issues are economic but not environmental in nature and therefore outside of CEQA's scope. This theme of "trust" runs completely contrary to the purpose of CEQA, which is to inform the public and responsible officials through analysis of available evidence. (See *Citizens of Goleta Valley v. Board of Supervisors* (1990) 52 Cal. 3d, 553.) Ronald Reagan is known for his saying "trust, but verify". Here, it appears that the City of Tracy merely trusts the Project will be good for the City, bring jobs, and not lead to decay in any of the commercial centers already subject to City jurisdiction, but has completely omitted the "verify" component of this aphorism. The failure to consider the effect of the Project's land use patterns to the City core, and to Mountain House, Lathrop and/or Manteca, standing alone, operates to render the EIR legally deficient.

WINCO AND WAL-MART MARKET AND URBAN DECAY ANALYSIS

The City's refusal to acknowledge urban decay as an environmental impact in the case of Cordes Ranch is staggering in light of the City's previous treatment of the urban decay impact in earlier but smaller commercial projects. Contrary to the City's cavalier attitude regarding potential Cordes Ranch impacts, the City of Tracy has acknowledged the requirement to conduct an urban decay analysis as part of both the Wal-Mart expansion project and the Winco project. Collectively, these two projects are magnitudes of scale smaller than the Cordes Ranch Project, yet there is no urban decay analysis as part of the Cordes Ranch Project.

In July 2007, the City revised and expanded the original Wal-Mart expansion project environmental document to include an urban decay analysis, finding that:

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6 As stated in public comments by Staff at the Planning Commission hearing.

> A land use impact is considered significant if the implementation of the project would result in any of the following:
>
> [1-4 omitted]
>
> 5.) Result in urban decay. In this context, urban decay would result if all of the following occurred: 1) the project results in an economic impact so severe that stores might close as a result; 2) buildings and/or properties, rather than being reused within a reasonable time, would remain vacant; and 3) such vacancies would cause buildings and/or properties to deteriorate and lead to the decline of the associated or nearby real estate. (July 2007 Revised Draft EIR at page 4.1-14 through 4.1-22; underline in the original, incorporated herein by reference.)

Due to the potential for urban decay as required by CEQA, the City of Tracy required both Winco and Wal-Mart to conduct a "Market Impact Analysis" – the potential for urban decay was included as part of the market analyses for both of these projects.[7] Both reports analyzed the potential of the project to cause a chain of events leading to urban decay. The reports also analyzed the need for the project, including a population and employment overview, retail sales analysis, impact of proposed project on existing retail outlets, and an analysis of labor force trends. The failure of the Cordes Ranch EIR to include a market analysis, inclusive of an urban decay analysis similar to Winco and Wal-Mart, is a complete failure by the Project and the City to comply with CEQA and the City's own precedent in this area.

The City attempts to justify the absence of a market and urban decay analysis because the Cordes Ranch EIR does not evaluate a specific project such as Winco or Wal-Mart.[8] This argument is specious. The Cordes Ranch EIR covers all future development agreements within the Project area and is therefore not a programmatic EIR, and thus the City does not intend to require a future analysis of any site-specific project. (Draft EIR, Project Description, Page 3-1, Footnote 1.) In fact, any future development in the Project only has to undergo design review. (Draft EIR, Project Description, Page 3-52.) Therefore, the Cordes Ranch EIR anticipates incorporation of specific projects, which could be considerably larger than Winco or Wal-Mart, without any further review beyond design review.

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7 Both these studies are incorporated herein by reference and can be found as part of the appendices for the Amended EIRs for both Winco and Wal-Mart on the City's website at:
http://www.ci.tracy.ca.us/documents/WinCo_Draft_EIR_Amendment.pdf =and=
http://www.ci.tracy.ca.us/documents/WalMart_Expansion_Revised_Draft_EIR.pdf

8 See City's response to comments in the Final EIR at Page 5-55.

As the final environmental document encompassing numerous specific future projects, the Cordes Ranch EIR must follow the law already determining a requirement for urban decay analysis, as well as the precedent established by the City with Winco and Wal-Mart, and conduct a full market and urban decay analysis. An urban decay analysis does not depend upon a developer identifying the actual user; instead it depends on the range of uses permitted by the proposed change in the land use regulation. Here the proposed change in land use regulation permits a massive and unstudied intrusion of industrial and commercial uses.

MARKET AND URBAN DECAY ANALYSIS PREPARED BY PHILIP KING, Ph.D.

In the absence of a market and urban decay analysis prepared by the City or Project applicant, and the City's cavalier response to Horizon's comments made before the Planning Commission, Horizon retained Philip G. King, Ph.D. in Economics from Cornell University and a Professor at San Francisco State University, to prepare a market demand and urban decay analysis for the Cordes Ranch Project. King's work has been cited with favorable authority by appellate courts dealing with urban decay issues. (See *Bakersfield Citizens* and *American Canyon.*) Dr. King found that:

- The Cordes Ranch Project would interfere with the successful build-out of several already planned or approved projects in the area. The result would create a significant probability or risk of urban decay that was not considered in the EIR.

- The current market area, as defined by the City's own consultant Gruen and Gruen, has enough capacity for over 100 years of office space growth without the addition of the Cordes Ranch Project.

- Following the City's report by Gruen and Gruen, the Cordes Ranch Project would create enough supply for industrial space for over 30 years' demand, and will very likely take away from existing industrial space capacity.

- The Cordes Ranch Project could seriously impede the successful completion of the River Islands project in Lathrop, Mountain House, and Tracy Hills.

- There is insufficient present market demand for all the existing market areas to be vibrant and successful, and when coupled with Cordes Ranch, each project will have significant vacant land and unoccupied industrial and office space, the very attributes that start the chain of events towards significant urban decay.

In his report, Dr. King concluded that, "....**it is my professional opinion that the Cordes Ranch project would interfere with the successful build-out of several already planned or approved projects in the area. The result would create a significant probability or risk of urban decay that was omitted in the EIR.**" A full copy of Dr. King's market and urban decay analysis is attached to this letter as **Exhibit A.**

The City and the Project applicant have been put on notice, on the record, that this Project has the potential to interfere with the successful build-out of Tracy and neighboring communities and lead to urban decay. Despite this notice, the City has not requested that the applicant submit any data to support the market demand for the Project or rebut the established record that the Project has the potential to lead to urban decay. In fact, even after substantial commentary by Horizon Planet at the Planning Commission hearing, the City has not supplemented the record on this matter, and has summarily dismissed the concerns of Horizon and other parties previously mentioned.[9] The market and urban decay analysis provided by Dr. King supports the comments on the record that there is no market demand for the Project, that the Project will interfere with the build-out of other planned communities in the area, and cause a chain of events leading to urban decay.

THE 2011 GENERAL PLAN DOES NOT EVALUATE THE POTENTIAL FOR THE CORDES RANCH PROJECT TO START A CHAIN OF EVENTS THAT MAY LEAD TO URBAN DECAY

The City[10] asserted at the Planning Commission Hearing that an urban decay analysis was not required as part of the Project EIR because Cordes Ranch is included as part of the City of Tracy 2011 General Plan (the "GP"). This assertion is incorrect. Cordes Ranch still needs to be annexed. Cordes Ranch was included as part of the General Plan as an urban reserve area only, with no specific land use designations. The GP provides that urban reserve areas are included in the GP as guidelines only, and detailed land uses will be analyzed and considered at the time of approval of a Zoning District, Specific Plan, or PUD. (See GP pages 2-27, 2-28, 2-59 and 2-60.) Thus, the detailed land use specifications of the Cordes Ranch Project were not included as part of the GP analyses, and were specifically deferred to the Specific Plan stage. In fact, the Cordes Ranch Project includes a General Plan Amendment that alters and increases the land use designations that were evaluated as part of the GP. (See Cordes Ranch GPA 13-0002, included as part of the project approval documents before the City Council.) As a result of a vague Cordes Ranch Project description, the General Plan EIR could not evaluate

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9 The City responded to Horizon Planet's written comments at the Planning Commission in a letter dated August 20, 2013, but the City apparently does not take Horizon's comments seriously and, by its letter, does not add any substantive data or analysis to the record. With respect to all concerns raised by Horizon, the City states by its letter that the EIR as drafted is adequate and no further analysis relative to Horizon's concerns is required.

10 Through its agent, EIR consultant The Planning Center/DC&E.

urban decay effects. This approach – omitting urban decay in the General Plan EIR because the Cordes Ranch Project description was too vague – coheres to the CEQA Guidelines: "The degree of specificity in an EIR will correspond to the degree of specificity involved in the underlying activity which is described in the EIR." (CEQA Guidelines §15146(a).) Mentioning Cordes Ranch Project as an urban reserve area in the General Plan does not satisfy the CEQA requirement for an urban decay analysis in the face of evidence of the potential for a chain of events that can lead to urban decay. The degree of specificity in this Project EIR compels an analysis of urban decay.

In short, according to the City, the Cordes Ranch EIR omitted an analysis of urban decay for two reasons: (1) by law EIRs don't address social or economic issues; and (2) Cordes Ranch was included in the Tracy General Plan Update EIR. Since as shown these "defenses" are not based on fact, on case law, or on the Guidelines, the City's failure to consider the Project's potential to cause urban decay renders the Cordes Ranch EIR fatally defective as an information document.

URBAN HEAT ISLANDS

According to the EIR, approximately 1,461 acres will develop for general commercial, general office, and business/industrial park. The EIR assumes each user will build out at a Floor Area Ratio ("FAR") ranging from 30 percent to 50 percent. The EIR omits disclosing the amount of land devoted to paved parking. However, by applying the applicable FAR, at least 745 acres of land will be devoted to paved parking lots. This raises a serious environmental issue, generally referred to as a "hot spot" or an "urban heat island effect". Indeed, by omitting any data or information about the paved parking areas, the EIR, the public, and the decision makers cannot adequately consider environmental effects produced by urban heat islands.

Heat islands result from replacing natural land cover with buildings, pavement, and other infrastructure. The Environmental Project Agency ("EPA") reports that many cities have temperatures that are up to ten degrees higher than the surrounding natural land cover. It affects public health by amplifying the effect of hot weather. It also increases energy use for air conditioning (increasing GHG emissions) and accelerates formation of smog. Because urban heat islands have an effect on the environment, they are required to be evaluated as part of the EIR. (Pub. Res. Code §21100(b)(1); 14 Cal. Code Regs. §15126(a).)

At the Planning Commission Hearing, the City's EIR consultant acknowledged for the record that the EIR did not evaluate the effect of urban heat islands and stated it was not required to do so under CEQA. If the EIR consultant is wrong, then Tracy processed the EIR in a wrongful manner that resulted in the omission of relevant information and data. Additionally, this statement contradicts available science showing that converting open space to pavement and buildings is a potentially adverse environmental impact and therefore must be evaluated under CEQA. (See Cooling Summertime Temperatures,

Strategies to Reduce Urban Heat Islands, 2003, published by the EPA, and Reducing Urban Heat Islands: Compendium of Strategies Urban Heat Island Basics, EPA, attached hereto as **Exhibits B and C**, respectively.) The failure to evaluate the urban heat island effect, coupled with the failure to provide meaningful data and information about the amount of land paved for parking areas, constitute critical omissions in the Project EIR, rendering the EIR legally deficient as an informative document for this environmental topic.

GAS PIPELINE RISKS AND SOIL CONTAMINATION

The EIR does not adequately analyze and address risks associated with gas pipelines, and associated contamination, located within the project, including PG&E natural gas pipelines and petroleum gas lines operated or formerly operated by Chevron and Shell Oil Companies.[11] This is especially true since the Cordes Ranch EIR is a final document that purports to encompass all future users, including, but not limited to, day care facilities, lodging, churches, restaurants, and educational and recreational uses on or adjacent to these active or abandoned gas lines and contaminated sites without further environmental review or risk assessment.[12] While these pipelines were considered a high risk in prior projects within the City requiring mitigation, the Cordes Ranch documents conclude that the presence of these pipelines are safe and not subject to mitigation or even further review, and fail to address the impacts of soil contamination on potential users as a result of the abandoned Shell Oil lines.[13] Indeed, the EIR must explain why this environmental impact was addressed and mitigation measures imposed in a recent and similar nearby project, but the same impact was neither addressed nor mitigated in this EIR. See, for instance, CEQA Appendix G §VIII subsections (a) through (d). This deficiency is exacerbated by the EIR's failure to identify the gas line as part of the environmental setting as required by Guideline §15125. ["An EIR must include a description of the physical environmental conditions in the vicinity of the project." §15125(a).]

PG&E operates two natural gas pipelines, L-401 (36 inches) and L-002 (26 inches), that run through the City of Tracy. Local residents and non-profit organizations, including the Sierra Club and Californians for Renewable Energy, Inc. ("CARE") have consistently argued against new development in the immediate vicinity of these two transmission lines, as any development near these two lines creates an unacceptable safety hazard.

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11 The contamination left behind as a result of the abandoned and partially removed Shell Oil line has not been remediated, and the DEIR does not address the impacts of the presence of petrochemicals in the soil to the future users of the Cordes Ranch. (Cordes Ranch SP, Chapter 2, Section 2-4, citing that contamination was discovered in the soil on site as a result of Shell Oil lines, but has not been remediated.)

12 From Cordes Ranch Specific Plan, Chapter 3, Table 3.1, Permitted and Conditionally Permitted Uses.

13 Ellis Specific Plan; see also Tracy Youth Sports Facility EIR and Tracy Learning Center projects.

In 2007, Dr. Alvin Greenberg of Risk Science Associates prepared a report evaluating the two main PG&E gas lines as well as a Chevron Oil gas line that runs adjacent to one of the PG&E lines. (A true and correct copy of the Greenberg report is attached hereto as **Exhibit D.**) The two PG&E gas lines and the Chevron Oil line also run through the Cordes Ranch Project. The report finds that all three pipelines pose a significant risk of failure, raises concerns about L-002's now obsolete tape-wrapped coating and smart-pigging test results (which show a maximum wall loss of 61%),[14] the triple-risk posed by three pipelines adjacent to one another, and the significant public risk when pipelines are operated in close proximity to areas heavily occupied by the public. The report also notes a risk of fatalities of 120 in a million per mile per year, and of injury of 2,100 in a million per mile per year, and that, "These risks far exceed the risk range found to be acceptable in California by a number of agencies and under CEQA of 1 or 10 in one-million."

In addition, relative to pipeline safety, the Greenberg report found, in part, that:

- On April 17, 2007, an underground fuel pipeline ruptured and leaked near Interstate-580 near Tracey. This resulted in the partial closure of I-580 and significant soil contamination. A similar underground fuel pipeline shares the utility corridor with two natural pipelines. Imagine the catastrophe if one of these pipelines ruptures catches fire, causes a rupture of the other pipelines, and the three pipeline fire burns within feet of hundreds of children and adults[15] [...]

- A recent report prepared by the Transportation Research Board (TRB) for the U.S. DOT makes it clear that a risk-based decision making process regarding public use lands that are near natural gas and hazardous liquids transmission line right-of-way [...] local governments seldom have the capability, data, or resources to use a risk-based decision process when considering land use near transmission pipelines.[16]

- According to the TRB, "*In the last 3 years, hazardous liquids pipeline incidents have resulted in an average of 2 deaths, 11 injuries, and $97 million in property damage each year; natural gas transmission pipeline incidents have resulted in an annual average of 6 deaths , 10 injuries, and $20 million in property damage.*"[17]

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14 A smart pig is a device that travels through the pipeline in order to detect corrosion or weak spots.

15 Greenberg report page 3.

16 Greenberg report page 5.

17 *Id.*

- A report by the California State Fire Marshal (CSFM) concludes that the risk of fatality for transmission pipeline is between 0.02 and 0.04 fatalities per 1000 miles per year which is equivalent to a risk of 20-40 in a million per mile of pipeline [...] these risks would have to be at least tripled to reflect the cumulative risk by all three pipelines [...] These risks far exceed the risk range found to be acceptable in California by a number of agencies and under CEQA of 1 or 10 in one million [...][18]

- The judicious and appropriate land use decision in this matter would be to consider development of other parcels that do not encroach on a pipeline right of way or similar hazards.[19]

The Greenberg report conclusions apply equally to the Cordes Ranch Project, which contemplates significant development for diverse users and age groups that encroach on or are adjacent to the three pipelines and areas of contaminated soils without mitigation or future review.[20] In addition, the Project anticipates attracting users requiring significant work force density. That is, the Project introduces large and dense population.

The presence of the PG&E gas lines was discussed in detail in conjunction with the Tracy Youth Sports Facility. The Sierra Club Motherlode Chapter[21] argued that the Draft Environmental Impact Report ("Sports Facility DEIR") for the Tracy Youth Sports Facility should be rejected, because the Public Health Risk Assessment failed to quantity the dangers of potential pipeline accidents, writing that:

> The Sierra Club urges the City not to certify an EIR that does not contain detailed Public Health Risk Assessment that quantifies the dangers of air emissions from nearby sources and potential pipeline accidents and disruptions. Children and their families who will be using this park site and ball field deserve to know in advance what the potential health risks may be. The EIR cannot defer these detailed studies to a later part of the process, since this would violate a basic

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18 Greenberg report page 7.

19 Greenberg report 11.

20 Similar concerns were raised in conjunction with the Ellis Specific Plan. See Comment Letter No. 18, Final Revised Environmental Impact Report, Modified Ellis Project, submitted by Carole Dominguez, September 2012, incorporated herein by reference with exhibits. See also comment letter from Michael Boyd, President of Californians for Renewable Energy, Comments on the DEIR for the City of Tracy/Surland Companies Development Agreement and Ellis Specific Plan Applications, September 2012, incorporated herein by reference with exhibits.

21 Comments and Responses to Comments on the Draft EIR, Tracy Youth Sports Facility Final EIR, Letter #1 from Eric Parfrey, Chair of the Sierra Club Mother Lode Chapter, June 2006.

> tenet of the California Environmental Quality Act and case law (*Sundstrom v. Mendocino County*, and others).[22]

In a similar comment letter on the Youth Facility DEIR,[23] CARE noted that the planned development exposed residents to a natural gas pipeline explosion – a risk which prompted City officials to reject the Tracy Learning Center in 1989. As noted by CARE, if the site was not deemed safe for a Learning Center, it follows it should not be safe for a Sports Facility:

> Impact 4.2.3 Development of the site in the vicinity of two underground natural gas pipelines may expose people to risk of upset conditions associated with a potential natural release or explosion. The Tracy Learning Center was rejected by the Tracy Planning Commission in 1989 because the project site was considered unsafe because of the natural gas pipelines that run beneath the project site. The decision was not challenged by the city council. It seems inconceivable that an area that was not safe enough for a school campus would be safe enough for our children. The EIR should discuss this policy change by the city government and determine if a free two hundred acres of land is worth putting our children next to a 36-inch and a 26-inch natural gas pipeline.[24]

The same logic applied by the City with respect to the Learning Center should apply here. The uses and users contemplated in Table 3.1 of the Specific Plan raise an unacceptable level of risk which is downplayed and not mitigated by the Cordes Ranch EIR.[25] In this case, the City is permanently omitting and not merely deferring review of the potential impacts of the gas lines and contaminated soils on the future users. It is not evaluating the potential problem between the gas lines and future introduction of significant populations into the immediate areas, for specific future projects such as churches, day cares, lodging, restaurants, and the like. These future projects require only a staff level design review.

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22 Tracy Sports Facility EIR Section 3.0-31.

23 Comments and Responses to Comments on the Draft EIR, Tracy Youth Sports Facility Final EIR, Letter #2 from Michael Boyd, President of Californians for Renewable Energy, June 2006, incorporated herein by reference with exhibits.

24 Tracy Sports Facility EIR Section 3.0-41.

25 The Cordes Ranch EIR acknowledges risks associated with the pipelines as part of the Appendices, Pipelines Safety Assessment Cordes Ranch Specific Plan, March 2013, which identifies a "threat" zone - of up to 774 yards - for the natural gas pipelines within the Project area. There is no identified mitigation for identified threat zones and no apparent restriction on uses within these identified threat zones.

Horizon respectfully submits that the deficiencies outlined in this letter and previously brought to the City's attention as part of the record render the EIR fatally flawed as an environmental disclosure document, and requests that the City defer Project approval until these defects are corrected and the EIR re-circulated, in compliance with CEQA.

Sincerely,

Brigit S. Barnes, Esq.

cc: Client

Horizon.Cordes Ranch\City Council Letter-09.03.13

EXHIBIT "A"

August 17, 2013

Memo

To: Brigit Barnes

From: Philip King, Ph.D.

Re: Potential for Urban Decay in Proposed Cordes Ranch Project

You asked me, on behalf of Horizon Plant, to analyze the proposed Cordes Ranch Project, in particular the possibility that the project could create or exacerbate urban decay in the area. Urban decay is an established environmental impact topic under CEQA that was considered and not analyzed in the Cordes Ranch EIR.

For my analysis below I examined and analyzed data from the following sources: (1) the Cordes Ranch EIR, (2) a report prepared by Gruen and Gruen for the City of Tracy, (3) research on commercial property in the area prepared by Colliers, (4) documents pertaining to similar planned or approved projects in the area.

As a result of my analysis, **it is my professional opinion that the Cordes Ranch project would interfere with the successful build-out of several already planned or approved projects in the area. The result would create a significant probability or risk of urban decay that was omitted in the EIR.** Briefly:

- The EIR does not properly analyze urban decay and the cumulative impacts of this project nor does it provide sufficient information to reach a conclusion that an urban decay environmental impact is less than significant.
    - The section on cumulative impacts (Appendix B) provides thumbnail sketches of a few competing projects, **but offers no analysis of these potential impacts.**
    - Further, **the EIR significantly misstates the potential significance of the impact by truncating and misidentifying the relevant trade area.** A report by Gruen and Gruen, commissioned by the City of Tracy, clearly identifies the trade area as Tracy, Lathrop, Mountain House and Manteca. **The omission of Lathrop is significant** since the River Islands project has several million square feet of planned/approved office space that would compete directly with Cordes Ranch. The EIR does not explain why it dispensed with the market area identified by Gruen and Gruen, a problem exacerbated by the fact that Gruen and Gruen served as market economists for the City of Tracy. The problem is that Cordes Ranch and the other competing projects within the market area will probably experience limited success developing office and industrial land but none will be successful enough to be vibrant and all will suffer from serious vacancy rates and urban decay.

- Although office space vacancies declined, the office space vacancy rate remains unacceptably high for a community proposing to approve more office space and yet avoid urban decay. Moreover, **rents for office space are almost 20% lower today than two years ago**, indicating the market for office space is still soft.
    - Gruen and Gruen estimated demand for new office space at 662,000 sq. ft. over 17 years.
    - The current planned but unbuilt capacity of 5 million sq. ft. is 7 times that amount, **enough capacity for over 100 years of office space growth**.
- Most of this unbuilt office space is in mixed-use projects such as the Mountain House development near Cordes Ranch or the River Islands project in Lathrop. The Cordes Ranch project will likely preempt/forestall the successful development of these projects or result in all three projects failing or suffering economically due to very low office space absorption. In my opinion failing to properly build-out these mixed-use projects creates a serious and realistic potential for conditions creating the chain of events resulting in significant urban decay. The present circumstance should have been examined as significant and evaluated and mitigated in the EIR. Without addressing the significance of the impact and proposing meaningful mitigation measures Tracy, Lathrop and the unincorporated Mountain House project will suffer urban decay due to the excessive approved and/or built office space within the applicable geographic area.
- The EIR for the Cordes Ranch project specifies a build out of 22 million sq. ft. of industrial space. Following Gruen and Gruen's report, **the Cordes Ranch project would create enough supply of industrial office space for over 30 years of demand. Consequently, it is very likely that the Cordes Ranch project will take away existing industrial space capacity.** This is a particular concern for the City of Lathrop, which has a large amount of industrial space, but also south Stockton, which is just adjacent to Lathrop. In addition, Mountain House, which is subject to a strict jobs housing balance County policy, will suffer from partially built industrial parks, and overbuilt and unused water, sewer and storm drain infrastructure capacity.

The remainder of this memo will explore these findings in more detail.

Office Space

Table 1 below presents data on current commercial office space and vacancies taken from Colliers International up through the first quarter 2013 (March 31). My analysis follows Gruen and Gruen's report for the City of Tracy[1], which defined these

[1] See "Forecast of Demand for Retail, Office and Industrial Space in the City of Tracy and Strategic Policy Recommendations: A Report to the City of Tracy," Gruen, Gruen and Associates, Nov. 2007, p.7. Available at: http://issuu.com/city_of_tracy/docs/finaltracyreport111107?e=1005471/4403153.

cities (and surroundings) as the primary trade area for Tracy, though one could also look at all of San Joaquin County (as well as Livermore in Alameda County) as a secondary trade area. (Rather than offer a larger but more accurate trade area for purposes of this report we accept as accurate for this study's analysis the trade area outlined by the Gruen and Gruen report prepared for the City of Tracy.)

Table 1: Current Market for Office Space in the Trade Area (Colliers Intl)[2]

City	Total Inventory (sq. ft.)	Vacancy (sq. ft.)	Vacancy Rate
Tracy	537,081	74,735	13.9%
Manteca	446,468	61,623	13.8%
Lathrop	225,580	25,681	11.4%
Total	1,209,129	162,039	13.4%

The current vacancy rate in the trade area is 13.4%. This figure is higher than optimal, but by itself not necessarily a cause for concern. However, Colliers' report also indicates that rental rates for office space in San Joaquin County have dropped significantly—by almost 20%--over the past two years (Figure 1 below) indicating that much of the reduction in vacancy rates is likely due to renting space at substantially lower rates, not a healthy rebound in the market.

[2] See Stockton/San Joaquin County Research and Forecast Report,: Q1 2013, Colliers International. At: http://www.colliers.com/~/media/d022777b5ad14c3fb4e506a22664ab2c.ashx.

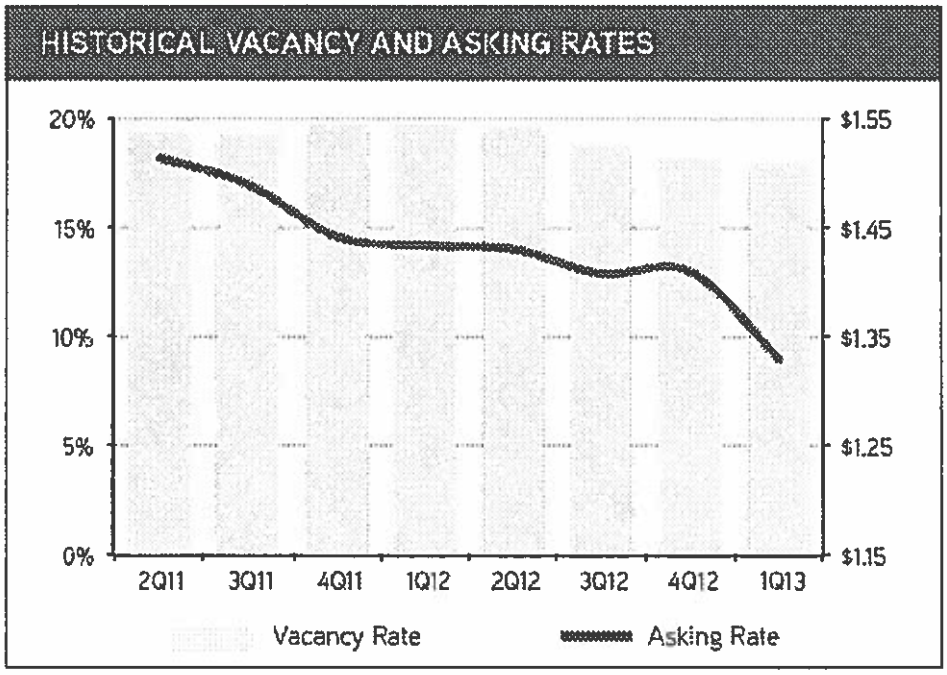

Figure 1: Vacancy and Rental rates in San Joaquin County (Colliers Intl.)

However, the trade area contains a number of planned or approved projects that would compete directly with the office component of the Cordes Ranch Project. Table 2 summarizes these projects and planned office space. Some of these projects are generally mentioned in the Cordes Ranch EIR (Appendix B) but specific impacts are not analyzed.

The most significant project is the River Islands Project, a mixed-use project with residential development in the City of Lathrop. The project has been planned/approved for a number of years, but development slowed during the real estate downturn. Although smaller in terms of commercial space, the Mountain House project is very close to the Cordes Ranch project and thus even more likely to be impacted. The Tracy Hills project was approved in 2003 but also has not been built out yet. The Cordes Ranch EIR mentions another 700,000 sq. ft. of potential office space already zoned in Tracy's General Plan.

The total of these four planned projects represents 5.2 million sq. ft. of planned office space. The Gruen and Gruen report cited above forecasts that the demand for office space in the trade area would be 662,000 sq. ft. total over a 17-year period (about 39,000 sq. ft per year). If all of the current planned office space was built out, this implies it would take 134 years to absorb all of this capacity. Adding Cordes Ranch increases the absorption period to 177 years.

Table 2: Planned or Approved Office Projects in the Trade Area[3]

Project	Office Space (sq. ft.)
River Islands (Lathrop)	3,000,000
Mountain House	488,000
Tracy Hills (Tracy)	1,000,000
Other Tracy	700,000
Total Potential New Capacity	5,188,000
Years for Absorption	134
Cordes Ranch	1,673,000
Total w. Cordes Ranch	6,861,000
Years for Absorption	177

Given current demand conditions it is extremely unlikely that all of this office space will be built, especially in the next ten years. **Since the River Islands, Mountain House and Tracy Hills projects are all mixed-use projects, the failure to develop the commercial property could seriously impede the successful completion of these projects.** Indeed Cordes Ranch and each competing project within the market area will have some limited level of office and industrial development, but none of the projects will achieve an absorption rate to be vibrant and successful. Thus each project will have significant vacant land and unoccupied industrial and office space, the very attributes that starts the chain of events toward significant urban decay.

In particular, Mountain House has struggled. The community was identified by the New York Times in 2008 as the "most underwater community in America,"—the zip code with the highest amount of negative equity in its homes.[4] CALPERS lost over $800 million on its investment in Mountain House during the downturn.[5] Although home sales at Mountain House have picked up significantly this year (with first

[3] Estimates of office square footage are taken from various sources including specific plans and EIRs prepared for these projects. Many plans mention acreage; in these cases we spoke to real estate professionals involved in the projects. The Cordes Ranch EIR identifies 1,7000,000 sq. ft. of office space in Tracy including Tracy Hills. Our estimate of 1 million for Tracy Hills is an approximation.

[4] Streitfeld, David (November 10, 2008). "A Town Drowns in Debt as Home Values Plunge". *The New York Times*.

[5] Kasler, Dale (May 6, 2010). Found Held Underwater: CalPERS to wait for Mountain House Rebound, *Modesto Bee*.

quarter 2013 sales of 88 homes) even at this higher rate of sales it will take over 20 years for the full build-out, much slower than originally planned. The River Islands project, which calls for completion of 11,0000 homes as well as 3 million sq. ft. of office space, has also struggled. The Tracy Hills project is similarly on hold.

The Mountain House and River Islands projects also rely on user fees to help pay for the build out of infrastructure such as sewage and water. If the commercial aspect of these projects suffers, infrastructure buildout will likely be underfinanced. This has already been a problem with the Mountain House project. The Cordes Ranch project would exacerbate the problem.

Industrial Property

The industrial property market in San Joaquin County also has a relatively high vacancy rate of 14% though rents have been stable. The previously cited Gruen and Gruen report forecast future demand for industrial space in the trade area at 11.6 million sq. ft. over 17 years (682,500 sq. ft. a year).[6]

However, the EIR for the Cordes Ranch project specifies a build out of 22 million sq. ft. of industrial space. Following Gruen and Gruen's report, **the Cordes Ranch project would create enough supply of industrial space for over 30 years of demand. Consequently, it is very likely that the Cordes Ranch project, if it moves forward, will take away from existing industrial space capacity and impede plans to develop projects with industrial zoning.** This is a particular concern for the City of Lathrop, which has a large amount of industrial space, but also south Stockton, which is just adjacent to Lathrop.

Urban Decay and Physical deterioration

Urban decay in urban areas can include several possible adverse impacts on the quality of life in the local community. This includes visible symptoms of physical deterioration, capital stock and buildings in impaired condition, and involves aspects of "broken window" theory—that run-down, abandoned buildings signal lack of public policy concern and invite vandalism, loitering, graffiti, high crime rates, and arson for profit. They signal hopelessness for nearby residents who may lose faith in local government. Such sites also pose significant policing problems and fire protection issues. They could become sites for dangerous rodent infestation and avoidable public health issues. The outward manifestations and visual evidence of urban environmental urban decay and physical deterioration, but are not limited to, such markers as:

- Plywood boarded doors and windows;
- Parked trucks and long term unauthorized use of property and parking lot;
- Extensive gang graffiti and offensive words painted n the buildings;

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[6] See "Forecast of Demand for Retail, Office and Industrial Space in the City of Tracy and Strategic Policy Recommendations: A Report to the City of Tracy," Gruen, Gruen and Associates, Nov. 2007, p11.

- Dumping of refuge on site;
- Overturned dumpsters;
- Broken glass, litter of liquor or beer bottles;
- Dead trees and shrubbery together with weeds;
- Unsightly and permanent "For Lease" signs;
- Homeless encampments on the property or doorways; and
- Lack of building maintenance, paint peeling, or property encased in an unsightly chain-link fence.
- Abandoned buildings.

It also leads to a chilling effect on formation of capital that is required to either develop new projects or rehabilitate existing projects that are falling into disrepair and ultimately contributing to urban decay. It is my experience and professional opinion that as urban decay becomes more apparent in an area landowner, for instance, defer or cease making costly maintenance and repairs. This leads to vacancies and new tenants at lower rents levels which in turn exacerbates the chilling effect on spending money on maintain and repairing real property investments.

Existing Urban Decay in the Trade Area and San Joaquin County

A number of my previous memos have established the significance of urban decay in Tracy, as well as other areas in San Joaquin County, in particular, Stockton.[7] Although some time has passed, the situation has changed very little—indeed urban decay increased during the 2007-8 downturn and is similar today to before the downturn. These memos focused on commercial retail real estate; however, the situation in office and industrial real estate is also similarly fragile. As demonstrated above, the Cordes Ranch project will significantly increase existing capacity in both office and industrial real estate into a market still recovering from the 2007-8 downturn. Moreover, several mixed-use projects mentioned above rely on the development of office and industrial space. In particular, the build-out of Cordes Ranch will jeopardize the Mountain House and River Islands projects as well as the Tracy Hills project.

Although Stockton is a bit farther away, the City has struggled with urban decay for decades, especially in south Stockton and downtown Stockton. The City invested millions of dollars in urban renewal funds downtown (a factor in their recent bankruptcy). Though some progress has been made, peripheral areas of the downtown as well as many industrial areas in South Stockton are still experience serious urban decay. In my opinion the trade area for industrial space should include Stockton since it has ample capacity and easy access to Route 5, Route 99, and Highway 4.

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[7] See Dr. Philip King, memos to the City of Tracy dated June 29, 2008, April 3, 2007, October 24, 2007, July 30, 2003 as well as his memos to the City of Stockton May 10, 2007.

Conclusion

The EIR prepared for the Cordes Ranch project is inadequate due to serious omissions. It fails to analyze the potential for urban decay that, as outlined in this memo, is a significant concern. The EIR also misidentifies the proper trade area for this project, even though an earlier study of commercial real estate commissioned by the City of Tracy specifically defines the trade area to include nearby Lathrop, as well as Manteca. In my opinion Stockton should also be included in the analysis, at minimum as a secondary trade area.

Even if the project proceeds there are a number of possibilities for mitigation such as limiting office space or phasing in the project over a longer period or subject to certain criteria (e.g., vacancy rates). However, since none of this was analyzed in the EIR there is no possibility for mitigating what is a significant environmental issue.

PHILIP G. KING

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Education:

July, 87	**Ph.D. in ECONOMICS** **Fields: Applied Microeconomics,** Economic Development, International Economics **Dissertation:** Bargaining between Multinational Corporations and Less Developed Countries over Mineral Concessions Contracts.	**CORNELL UNIVERSITY**
May, 78	**B. A. in PHILOSOPHY & ECONOMICS** Nominated to Omicron Delta Epsilon (Economics Honor Society.)	**WASHINGTON UNIVERSITY**

Work Experience:

1/06-present	**ASSOCIATE PROFESSOR**	**SAN FRANCISCO STATE UNIVERSITY**
9/02-12/05	**CHAIR, ECONOMICS DEPARTMENT**	**SAN FRANCISCO STATE UNIVERSITY**
9/93-present	**ASSOCIATE PROFESSOR**	**SAN FRANCISCO STATE UNIVERSITY**
9/87-9/93	**ASSISTANT PROFESSOR**	**SAN FRANCISCO STATE UNIVERSITY**
9/83-5/85	**ASSISTANT PROFESSOR, ECONOMICS**	**S.U.N.Y. at CORTLAND**

Current Research

- Economics of Sea Level Rise at Ocean Beach, San Francisco (w. SPUR), and in Southern Monterey Bay (w. PWA).
- The Ecological Economics of Beaches (Funded by California Dept. of Boating and Waterways and BEACON), w. J. Dugan (UCSB).

Recent Refereed Papers:

"ESTIMATING THE POTENTIAL ECONOMIC IMPACTS OF CLIMATE CHANGE ON SOUTHERN CALIFORNIA BEACHES," with L. Pendleton, C. Mohn, D. G. Webster, R. Vaughn, and P. Adams, in press, *Climatic Change*.

"The Economic Costs of Sea Level Rise to California Beach Communities," w. A. McGregor and J. Whittet, California Resources Agency & Dept. of Boating and Waterways (Refereed through California Ocean Science Trust).

"Who's Counting: An Analysis of Beach Attendance Estimates in Southern California," w. A. McGregor, *Ocean and Coastal Management*, March 2012, Pages 17–25.

"Size Matters: The Economic Value of Beach Erosion and Nourishment in Southern California', with L. Pendleton, C. Mohn, R. Vaughn, and J. Zoulas., *Contemporary Economic Policy*, April 2012.

"Economic Analysis of Reconfiguring the Long Beach Breakwater," w. A. McGregor, *Shore and Beach*, April/May 2011.

"Potential Loss in GNP and GSP from a Failure to Maintain California's Beaches", Fall 2004, with Douglas Symes, *Shore and Beach*.

Books: *International Economics and International Economic Policy*, 5th Edition, McGraw-Hill, 2009.

International Economics and International Economic Policy, 4th Edition, McGraw-Hill, 2004.

International Economics and International Economic Policy, 3rd Edition, McGraw-Hill, 2000.

International Economics and International Economic Policy, 2nd Edition, McGraw-Hill, 1995.

International Economics and International Economic Policy, 1st Edition, McGraw-Hill, 1990.

Policy Papers prepared for Government and Non-Profit Organizations:

Contributed Economics portion of Regional Sediment Master Plan for BEACON (Beach Erosion Authority for Clean Oceans and Nourishment—Santa Barbara and Ventura Counties), February 2009, with Noble Consultants.

ESTIMATING THE POTENTIAL ECONOMIC IMPACTS OF CLIMATE CHANGE ON SOUTHERN CALIFORNIA BEACHES, prepared for the California Energy Commission (Energy Commission) and the California Environmental Protection Agency (Cal/EPA), with Linwood Pendleton, Craig Mohn, D. G. Webster, Ryan K. Vaughn, and Peter Adams.

Prepared for the City of Stockton: Economic Analysis of A Proposed Ordinance to Limit Grocery Sales at Superstores in Stockton, California, May 10, 2007

Contributed Economics Portion of: "The ARC GIS Coastal Sediment Analysis Tool: A GIS Support Tool for Regional Sediment Management Program: White Paper, Draft Technical Report for U.S. Army Corps of Engineers, by Ying Poon (Everest Consultants), Los Angeles District, April 2006.

Contributed Economics Portion of: "Coastal Sediment Analysis Tool (CSBAT) Beta Version--Sediment Management Decision Support Tool for Santa Barbara and Ventura Counties," Draft Technical Report for U.S. Army Corps of Engineers, by Ying Poon (Everest Consultants), Los Angeles District, June 2006.

"The ArcGIS Coastal Sediment Analyst: A Prototype Decision Support Tool for Regional Sediment Management, John Wilson et. al., USC Geography Department, 2004 (contributed economic analysis for paper).

"The Economic of Regional Sediment Management in Ventura and Santa Barbara Counties," prepared for the California State Resources Agency, Final draft (refereed) , Fall 2006, prepared for the Coastal Sediment Management Work group (CSMW).

"The Potential Loss in GNP and GSP from a failure to Maintain California's Beaches," with Douglas Symes, prepared for the California State Resources Agency, 2002, http://userwww.sfsu.edu/~pgking/pubpol.htm.

"The (Economic) Benefits of California's Beaches," prepared for the California State Resources Agency, 2002, http://dbw.ca.gov/beachreport.htm.

"The Economic and Fiscal Impact of Beach Recreation in San Clemente," presented as part of Hearings on Congressional Appropriations for California Coastal Projects, US House of Representatives, April 2002. Also completed similar projects for Cities of Carlsbad, Carpinteria, Encinitas, and Solana Beach.

"Do Beaches Benefit Local Communities?: A Case Study of Two California Beach Towns," Fall 2002, *Proceedings of the Conference on California and the World Oceans.*

San Francisco's Economic Growth 1995-2000: The Fiscal Health of the City and Implications for the Future," prepared for the San Francisco Committee on Jobs Summer 2001. This report was widely cited in the San Francisco press including front page articles by the *Chronicle* and *Examiner*.

"The Demand for Beaches in California," prepared for the California Dept. of Boating and Waterways, Spring 2001.

"Cost Benefit Analysis of Shoreline Protection Projects in California," prepared for the California Dept. of Boating and Waterways, Spring 2000.

"The Fiscal Impact of Beaches in California," prepared for the *Public Research Institute*, San Francisco State University, Fall 1999, available at http://online.sfsu.edu/~pgking/beaches.htm.

"An Economic Analysis of Coastal Resources on the Majuro Atoll," prepared for the *United Nations Development Program* Project MAS 95/001/D01/99 and the *Majuro Atoll Local Government*, September, 1997.

"The Economic Impact of California's Beaches," prepared for the *Public Research Institute*, San Francisco State University, Summer, 1997 (with Michael Potepan.)

"The Revenue Impact of the Proposed Marine Link Pipeline System in Richmond, California," prepared for the *Public Research Institute*, San Francisco State University, Spring, 1997 (with Ted Rust.)

"The Economic Impact of California's Ports and Harbors," prepared for the *Public Research Institute*, San Francisco State University, Spring, 1997 (with Ted Rust).

Public Testimony:

Testified and prepared report to the California Coastal Commission in San Diego on the economic loss due to a proposed seawall at Las Brisas, Solana Beach, California, 2005.

Submitted testimony for over forty urban decay cases in California.

Current SFSU Committees:

Chair, SFSU Foundation Investment Committee and member of SFSU Foundation.

Chair, SFSU University Corporation Finance Committee and member of University Corporation Board.

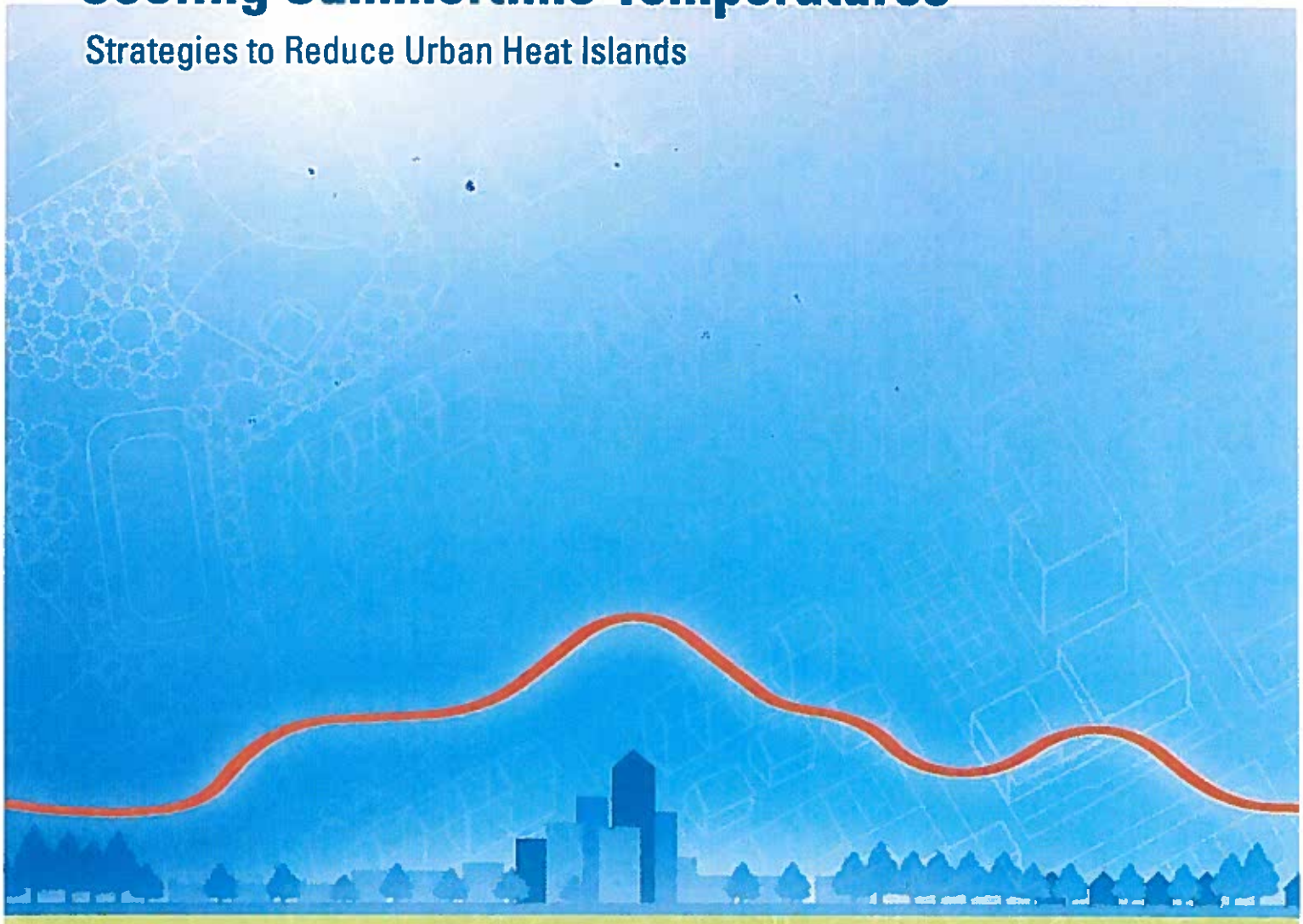
Chair, Economics RT Committee.

Chair, Hiring Committee for University Advancement Chief of Operations.

EXHIBIT "B"

Cooling Summertime Temperatures

Strategies to Reduce Urban Heat Islands



September 2003

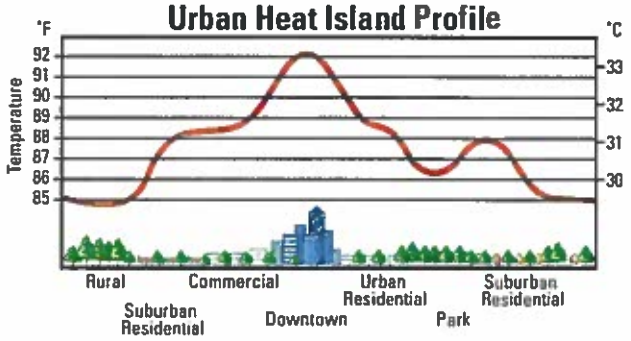
For millions of Americans living in and around cities, elevated summertime temperatures are of growing concern. Commonly referred to as urban heat islands, this phenomenon can impact communities by increasing peak energy demand, air conditioning costs, air pollution levels, and heat-related illness and mortality.

Fortunately, there are common-sense measures that communities can take to reduce the negative effects of heat islands.

What Is a Heat Island?

Heat islands are characterized by urban air and surface temperatures that are higher than nearby rural areas. Many U.S. cities and suburbs have air temperatures up to 10° F (5.6° C) warmer than surrounding natural land cover.

The heat island sketch below shows a city's heat island profile. It demonstrates how temperatures typically rise from the urban-rural border, and that the warmest temperatures are in dense downtown areas.



Heat islands are often largest over dense development but may be broken up by vegetated sections within an urban area.

What Causes Heat Islands?

Heat islands form as cities replace natural land cover with pavement, buildings, and other infrastructure. These changes contribute to higher urban temperatures in the following ways:

- Displacing trees and vegetation minimizes the natural cooling effects of shading and evaporation of water from soil and leaves (evapotranspiration).
- Tall buildings and narrow streets can heat air that is trapped between them and reduce wind flow.
- Waste heat from vehicles, factories, and air conditioners may add warmth to the air, further increasing temperatures.

Heat islands are also influenced by a city's geography and prevailing weather conditions. For example, strong winds and rain can flush out hot, stagnant air from city centers, while sunny, windless conditions can exacerbate heat islands.

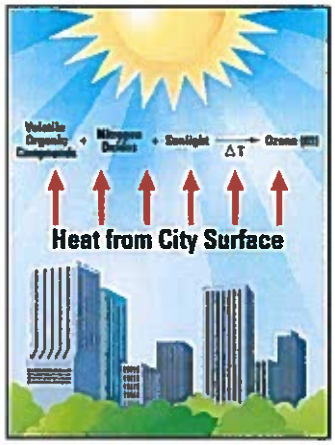
When Do Heat Islands Form?

Heat islands can occur year-round during the day or night. Urban-rural temperature differences are often largest during calm, clear evenings. This is because rural areas cool off faster at night than cities, which retain much of the heat stored in roads, buildings, and other structures.

How Do Heat Islands Affect Us?

Increased urban temperatures can affect public health, the environment, and the amount of energy that consumers use for summertime cooling.

Public Health: Heat islands can amplify extreme hot weather events, which can cause heat stroke and may lead to physiological disruption, organ damage, and even death – especially in vulnerable populations such as the elderly.



Ozone forms when precursor compounds react in the presence of sunlight and high temperatures.

The Environment: Summertime heat islands increase energy demand for air conditioning, raising power plant emissions of harmful pollutants. Higher temperatures also accelerate the chemical reaction that produces ground-level ozone, or smog. This threatens public health, the environment, and, for some communities, may have implications for federal air quality goals.

Energy Use: Because homes and buildings absorb the sun's energy, heat islands can increase the demand for summertime cooling, raising energy expenditures. For every 1° F (0.6° C) increase in summertime temperature, peak utility loads in medium and large cities increase by an estimated 1.5 – 2.0 percent.

Cities in cold climates may actually benefit from the wintertime warming effect of heat islands. Warmer temperatures can reduce heating energy needs and may help melt ice and snow on roads.

In the summertime, however, the same city may experience the negative effects of heat islands.

Cool Roofs in Action

The Energy Coordinating Agency (ECA) in Philadelphia initiated the Cool Homes Program to help elderly residents escape extreme summertime heat. ECA installs cool roofs and uses other measures to reduce indoor temperatures to promote comfort and minimize health risks. As of April 2003, the Cool Homes Program had installed over 450 roofs.

Both types of green roofs can be used on residences, industrial facilities, offices, and other commercial property. Green roofs are widespread in Europe and Asia, and are becoming more common in the United States.

Cool Pavement

High-albedo pervious pavement supports light traffic while mitigating the heat island effect and allowing stormwater to pass through.

Pavements with low solar reflectance absorb large amounts of heat and can be up to 70° F (40° C) hotter in the sun than cooler alternatives.

Portland cement concrete and asphalt concrete – commonly called "concrete" and "asphalt," respectively – are the most common paving materials for sidewalks and streets. Most new concrete has a solar reflectance, or albedo, of 35-40 percent; the solar reflectance of fresh asphalt is typically 5-10 percent.

Over time, the albedo of these pavements change. Concrete darkens from the build-up of tire residue, dirt, and oil, and asphalt lightens as the asphalt binder wears away to expose the underlying rock aggregate.

To maximize the albedo of both types of pavement, lighter-colored aggregate can be used in the pavement mix. Alternatively, asphalt pavements can be covered with high-albedo sealcoats, small rocks set in binder, or a thin layer of concrete. For concrete applications, using lighter-colored sand and cement can increase reflectivity.

Permeable, or porous, pavements allow water to percolate and evaporate, cooling the pavement surface and surrounding air. Permeable pavements can be constructed from a number of materials including concrete, asphalt, and plastic lattice structures filled with soil, gravel, and grass.

Although there is no official standard or labeling program to designate cool paving materials, communities interested in reducing the heat island effect may consider surface reflectivity and permeability – along with other costs and benefits – when selecting a paving product.

The Difference between Heat Islands and Global Warming

Heat islands describe local-scale temperature differences between urban and rural areas. In contrast, global warming refers to the gradual rise of worldwide average surface temperatures.

What is EPA Doing to Reduce Heat Islands?

Through its Heat Island Reduction Initiative (HIRI), EPA works with community groups, public officials, industry representatives, researchers, and other stakeholders to identify opportunities to implement heat island reduction strategies and evaluate their impacts on energy demand, local meteorology, air quality, health, and other factors.

For More Information

EPA's Heat Island Reduction Initiative
www.epa.gov/heatisland

EPA Global Warming Information
www.epa.gov/globalwarming

ENERGY STAR Qualified Cool Roof Products
www.energystar.gov/products

The Lawrence Berkeley National Laboratory's Heat Island Group
http://heatisland.lbl.gov

International Council for Local Environmental Initiatives' Hot Cities Information
www.hotcities.org

NASA's Global Hydrology and Climate Center (GHCC)
www.ghcc.msfc.nasa.gov

Cool Roof Rating Council
www.coolroofs.org

USDA Urban and Community Forestry Program
www.fs.fed.us/ucf

Green Roofs for Healthy Cities
www.greenroofs.ca/grhcc

U.S. Green Building Council
www.usgbc.org

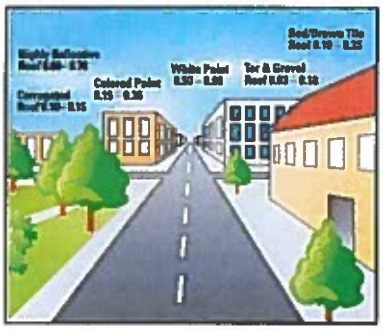
Center for Green Roof Research
http://hortweb.cas.psu.edu/research/greenroofcenter

Cool Pavement in Action

The village of Fair Oaks in Sacramento, California installed a permeable portland cement concrete parking lot at a local park. It avoids the cost of a stormwater drainage system and helps reduce the heat island effect.

What Can Communities Do to Reduce the Heat Island Effect?

Communities interested in reducing heat islands have several options. Strategies to lower urban temperatures and achieve related benefits include installing reflective **cool roofs** on residential and commercial buildings; planting **trees and vegetation**, including **green roofs**; and using **cool paving materials** for roads, sidewalks, and parking lots. Additional heat mitigation options include modifying urban design and layout, and choosing efficient heating and cooling systems.



Various urban environmental albedos.

Widespread implementation across a community can reduce urban temperatures, energy use, air pollution, and heat-related health impacts. Heat island reduction strategies also benefit individual home and building owners directly. Cool roofs and shade trees, for example, can save money on summertime cooling bills.

Cool Roofs

The term "cool roof" describes roofing materials that have a high solar reflectance. This characteristic reduces heat transfer to the indoors and can enhance roof durability. Cool roofs may also have high emittance, releasing a large percentage of the solar energy they absorb.

On a hot, sunny, summer day, traditional roofing materials can reach peak temperatures of 190° F (88° C). By comparison, cool roofs reach maximum temperatures of 120° F (49° C).

In buildings with air conditioning (AC), cool roofs can save money on energy bills, lower peak energy demand, and reduce air pollution and greenhouse gas emissions. In buildings without AC, cool roofs can increase indoor occupant comfort by lowering top-floor temperatures. In both cases, cool roofs can help reduce urban heat islands.

The Utah Olympic Oval used cool roof technology.

Types of Cool Roofs

- **Commercial (low slope):** Most cool roof applications for low-slope, primarily commercial, buildings have a smooth, bright white surface to reflect solar radiation and achieve related benefits.
- **Residential (steep slope):** Most cool roof applications for sloped, primarily residential, buildings come in various colors and may use special pigments to reflect the sun's energy.

Albedo, Solar Reflectance, and Emittance

The **albedo**, or **solar reflectance**, of a surface is the percentage of incoming solar radiation that is reflected by that surface. Albedo is measured on a scale of 0 to 1, where a value of 0 indicates that a surface absorbs all solar radiation and a value of 1 represents total reflectivity.

Light-colored surfaces typically have higher albedos than darker surfaces. While a traditional black shingle has an average albedo of 0.05, or 5 percent, the average albedo for a white roof coating is 0.75, or 75 percent.

The emittance of a material refers to its ability to release absorbed heat. Scientists use a number between 0 and 1 to express emittance. With the exception of metals, most construction materials have emittances above 0.85, or 85 percent.

EPA's ENERGY STAR® program has voluntary product specifications for both commercial and residential roofs. Low-slope roofs must have an initial solar reflectance of at least 65 percent, and steep-slope roofs must have an initial solar reflectance of 25 percent or more. Emittance is not a qualifying criterion for the ENERGY STAR label, but a high rating can further reduce energy costs.

Community-Level Benefits from Cool Roofs

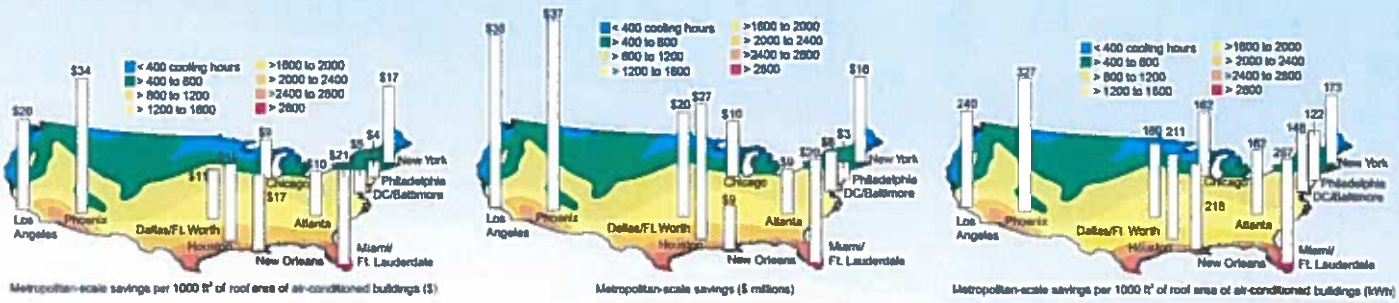
Installing cool roofs across a city can provide substantial energy savings. The figure on the next page illustrates this potential for 11 U.S. cities according to research conducted at the Department of Energy's Lawrence Berkeley National Laboratory (LBNL).

Factors Affecting Building-Level Energy Savings from a Cool Roof

- **Air conditioning:** Cool roofs can reduce summertime energy use in air-conditioned buildings. In buildings without air conditioning, cool roofs can improve comfort by reducing top-floor temperatures.
- **Local climate:** Cooling energy savings are typically greatest in areas with long, sunny, and hot summers.
- **Building height:** Cool roofs are generally most effective on one-or two-story buildings with large roof areas. They provide less energy savings for multi-story buildings with small roofs.

Trees and Vegetation in Action

The City of Austin, Texas's NeighborWoods program uses aerial photos to identify neighborhoods with insufficient tree coverage. Austin Energy, the city-owned utility, then provides residents with free saplings that will ultimately provide shade, beauty, and energy savings.

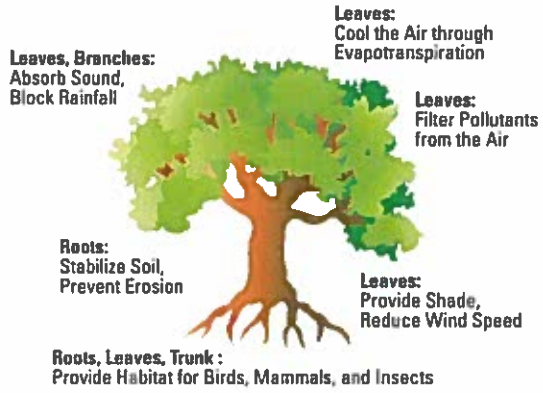


Metropolitan-scale potential savings from cool roofs in 11 U.S. cities. Results are stated in net energy savings and factor in any increased heating costs from the cool roof "wintertime penalty."

Trees and Vegetation

Increasing a city's vegetative cover by planting trees, shrubs, and vines is a simple and effective way to reduce the heat island effect. Scientists at LBNL estimate that planting trees and vegetation for shade can reduce a building's cooling energy consumption by up to 25 percent annually.

In addition to direct shading, trees and vegetation cool the air through evapotranspiration. Urban vegetation also provides economic, environmental, and social benefits such as enhanced storm water management and reduced air pollution.



Trees provide a variety of benefits, from cooling the air to stabilizing the soil.

Where to Plant

Strategically placed shade trees and vegetation block the sun's rays, minimizing heat transfer to building interiors, and reducing the need for air conditioning. In most U.S. cities, trees should shade the east, and especially west, walls to maximize cooling savings. Planting trees directly to the south may provide little shade in the summertime and block desired sun in the wintertime.

What to Plant

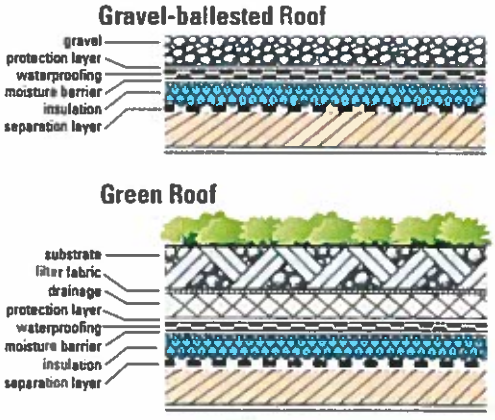
Deciduous trees work well as they balance energy requirements over the course of a year. In summer, foliage cools buildings by blocking solar radiation. In winter, after the leaves have fallen, the sun's energy passes through the trees and helps to warm buildings.

Green Roofs

Another alternative to traditional roofing materials is a rooftop garden or "green roof." Installed widely in a city, green roofs contribute to heat island reduction by replacing heat-absorbing surfaces with plants, shrubs, and small trees that cool the air through evapotranspiration. Planted rooftops remain significantly cooler than a rooftop constructed from traditional heat-absorbing materials. In addition, green roofs reduce summertime air conditioning demand by lowering heat gain to the building.

Green roofs consist of soil and vegetation planted over a waterproofing layer. They can be **intensive** or **extensive** depending on the amount of soil and plant cover, and whether the roof is accessible.

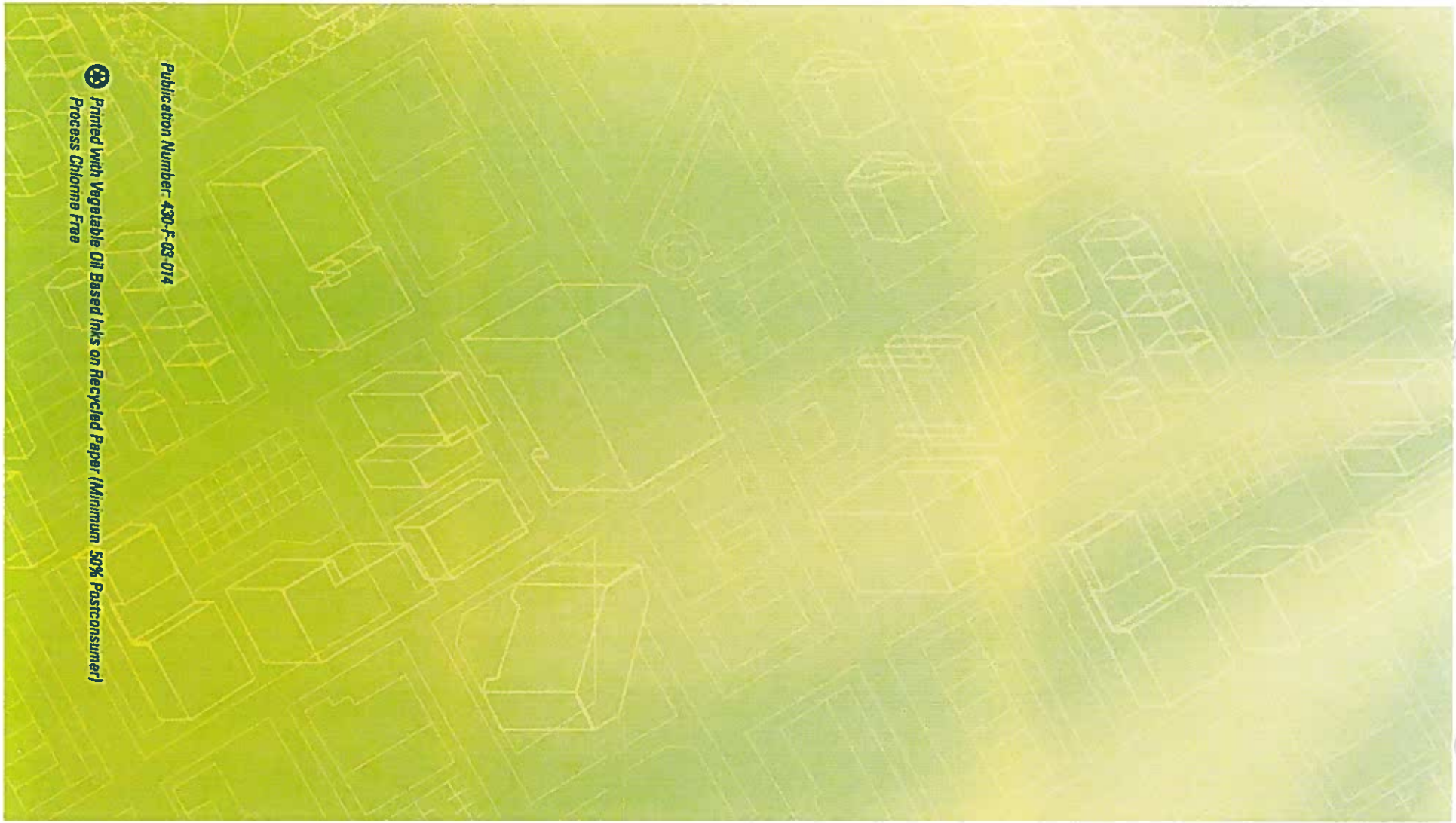
- **Intensive green roofs** require a minimum of one foot of soil. Trees and shrubs are usually planted, adding 80-150 pounds per square foot of load to the building. These roofs need complex irrigation and drainage systems, and significant maintenance. Intensive roofs are often accessible to the public.
- **Extensive green roofs** require only 1-5 inches of soil. Low lying plants and grasses are usually planted, and 12-50 pounds per square foot of load may be added. These roofs use simple irrigation and drainage systems, and require little maintenance. Extensive green roofs usually are not accessible to the public.



Green roofs remain significantly cooler than rooftops made of traditional heat-absorbing material.

Green Roofs in Action

The City of Chicago installed a 20,300 square foot green roof on its City Hall. The city expects the roof to reduce annual air conditioning costs by $4,000. Businesses such as the Gap and Ford Motor Company have also installed green roofs on their corporate headquarters buildings.



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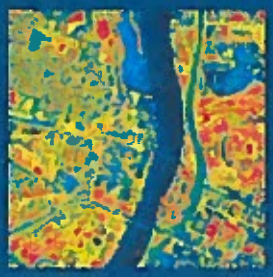

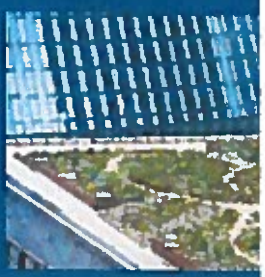

Reducing Urban Heat Islands: Compendium of Strategies

Urban Heat Island Basics

Acknowledgements

Reducing Urban Heat Islands: Compendium of Strategies describes the causes and impacts of summertime urban heat islands and promotes strategies for lowering temperatures in U.S. communities. This compendium was developed by the Climate Protection Partnership Division in the U.S. Environmental Protection Agency's Office of Atmospheric Programs. Eva Wong managed its overall development. Kathleen Hogan, Julie Rosenberg, and Andrea Denny provided editorial support. Numerous EPA staff in offices throughout the Agency contributed content and provided reviews. Subject area experts from other organizations around the United States and Canada also committed their time to provide technical feedback.

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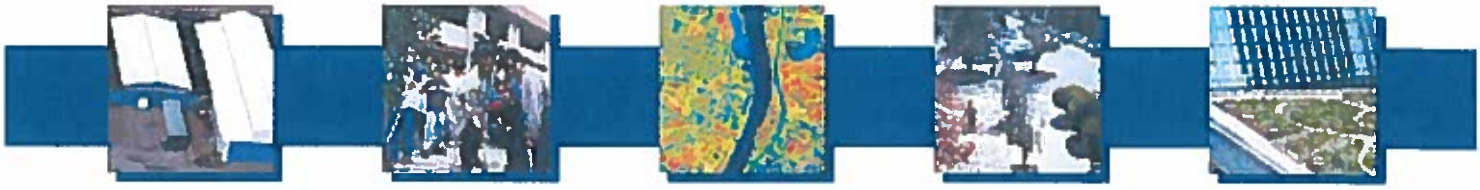


Urban Heat Island Basics

As urban areas develop, changes occur in the landscape. Buildings, roads, and other infrastructure replace open land and vegetation. Surfaces that were once permeable and moist generally become impermeable and dry.* This development leads to the formation of urban heat islands—the phenomenon whereby urban regions experience warmer temperatures than their rural surroundings.

This chapter provides an overview of different types of urban heat islands, methods for identifying them, and factors that contribute to their development. It introduces key concepts that are important to understanding and mitigating this phenomenon, as well as additional sources of information. It discusses:

- General features of urban heat islands
- Surface versus atmospheric heat islands
- Causes of urban heat island formation
- Urban heat island impacts on energy consumption, environmental quality, and human health
- Resources for further information.

1. What Are Urban Heat Islands?

Many urban and suburban areas experience elevated temperatures compared to their outlying rural surroundings; this difference in temperature is what constitutes an urban heat island. The annual mean air temperature of a city with one million or more people can be 1.8 to 5.4°F (1 to 3°C) warmer than its surroundings,[1] and on a clear, calm night, this temperature difference can be as much as 22°F (12°C).[2] Even smaller cities and towns will produce heat islands, though the effect often decreases as city size decreases.[3]

This chapter focuses on *surface* and *atmospheric* urban heat islands. These two heat island types differ in the ways they are formed, the techniques used to identify and measure them, their impacts, and to some degree, the methods available to mitigate them. Table 1 summarizes the basic characteristics of each type of heat island. These features are described in more detail in the following sections of this chapter.

*This change in landscape may differ in regions such as deserts, where moisture may increase in urban areas if development introduces grass lawns and other irrigated vegetation.

Table 1: Basic Characteristics of Surface and Atmospheric Urban Heat Islands (UHIs)[4]

Feature	Surface UHI	Atmospheric UHI
Temporal Development	• Present at all times of the day and night • Most intense during the day and in the summer	• May be small or non-existent during the day • Most intense at night or predawn and in the winter
Peak Intensity (Most intense UHI conditions)	• More spatial and temporal variation: ▪ Day: 18 to 27°F (10 to 15°C) ▪ Night: 9 to 18°F (5 to 10°C)	• Less variation: ▪ Day: -1.8 to 5.4°F (-1 to 3°C) ▪ Night: 12.6 to 21.6°F (7 to 12°C)
Typical Identification Method	• Indirect measurement: ▪ Remote sensing	• Direct measurement: ▪ Fixed weather stations ▪ Mobile traverses
Typical Depiction	• Thermal image	• Isotherm map • Temperature graph

1.1 Surface Urban Heat Islands

On a hot, sunny summer day, the sun can heat dry, exposed urban surfaces, like roofs and pavement, to temperatures 50 to 90°F (27 to 50°C) hotter than the air,[5] while shaded or moist surfaces—often in more rural surroundings—remain close to air temperatures. Surface urban heat islands are typically present day and night, but tend to be strongest during the day when the sun is shining.

On average, the difference in daytime surface temperatures between developed and rural areas is 18 to 27°F (10 to 15°C); the difference in nighttime surface temperatures is typically smaller, at 9 to 18°F (5 to 10°C).[6]

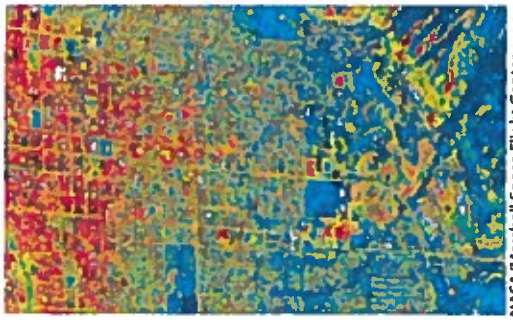
The magnitude of surface urban heat islands varies with seasons, due to changes in the sun's intensity as well as ground cover and weather. As a result of such variation, surface urban heat islands are typically largest in the summer.[7]

How Weather Influences Urban Heat Islands

Summertime urban heat islands are most intense when the sky is clear and winds are calm. Heavy cloud cover blocks solar radiation, reducing daytime warming in cities. Strong winds increase atmospheric mixing, lowering the urban-rural temperature difference. This document, *Reducing Urban Heat Islands: Compendium of Strategies,* focuses on mitigating summertime heat islands through strategies that have maximum impact under clear, calm conditions.

To identify urban heat islands, scientists use direct and indirect methods, numerical modeling, and estimates based on empirical models. Researchers often use remote sensing, an indirect measurement technique, to estimate surface temperatures. They use the data collected to produce thermal images, such as that shown in Figure 1.

Figure 1: Thermal Image Depicting a Surface Urban Heat Island



NASA/Marshall Space Flight Center

This image, taken from an aircraft, depicts a midday surface urban heat island in Salt Lake City, Utah, on July 13, 1998. White areas are around 160°F (70°C), while dark blue areas are near 85°F (30°C). Note the warmer urban surface temperatures (left side of image) and cooler surfaces in the neighboring foothills (on the right).

1.2 Atmospheric Urban Heat Islands

Warmer air in urban areas compared to cooler air in nearby rural surroundings defines atmospheric urban heat islands. Experts often divide these heat islands into two different types:

- **Canopy layer urban heat islands** exist in the layer of air where people live, from the ground to below the tops of trees and roofs.
- **Boundary layer urban heat islands** start from the rooftop and treetop level and extend up to the point where urban landscapes no longer influence the atmosphere. This region typically extends no more than one mile (1.5 km) from the surface.[8]

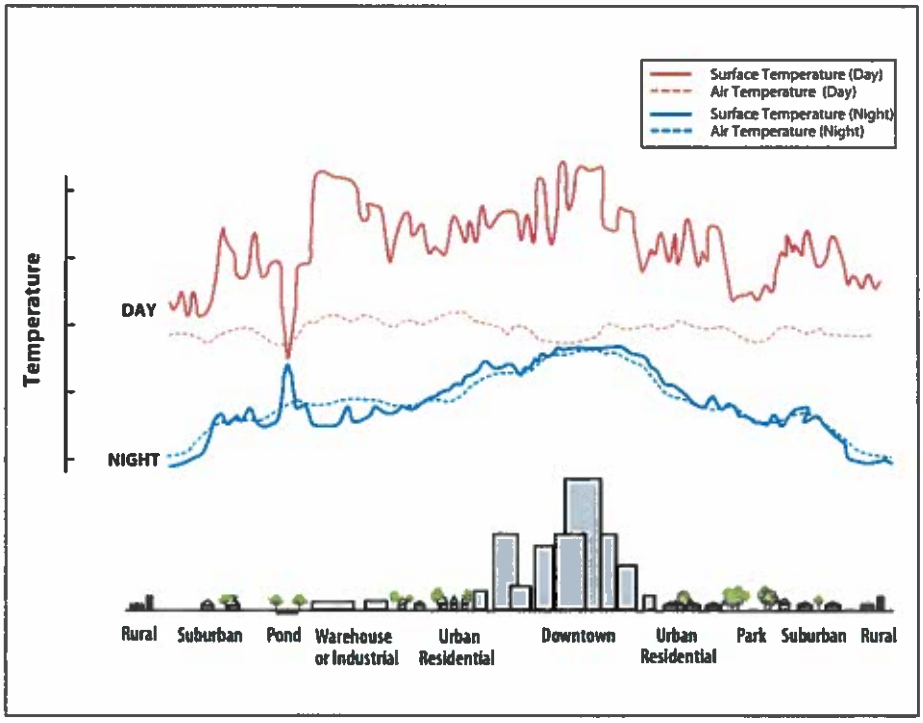
Canopy layer urban heat islands are the most commonly observed of the two types and are often the ones referred to in discussions of urban heat islands. For this reason, this chapter and compendium use the more general term *atmospheric urban heat islands* to refer to canopy layer urban heat islands.

Atmospheric urban heat islands are often weak during the late morning and throughout the day and become more pronounced after sunset due to the slow release of heat from urban infrastructure. The timing of this peak, however, depends on the properties of urban and rural surfaces, the season, and prevailing weather conditions.

Surface and Air Temperatures: How Are They Related?

Surface temperatures have an indirect, but significant, influence on air temperatures, especially in the canopy layer, which is closest to the surface. For example, parks and vegetated areas, which typically have cooler surface temperatures, contribute to cooler air temperatures. Dense, built-up areas, on the other hand, typically lead to warmer air temperatures. Because air mixes within the atmosphere, though, the relationship between surface and air temperatures is not constant, and air temperatures typically vary less than surface temperatures across an area (see Figure 2).

Figure 2: Variations of Surface and Atmospheric Temperatures



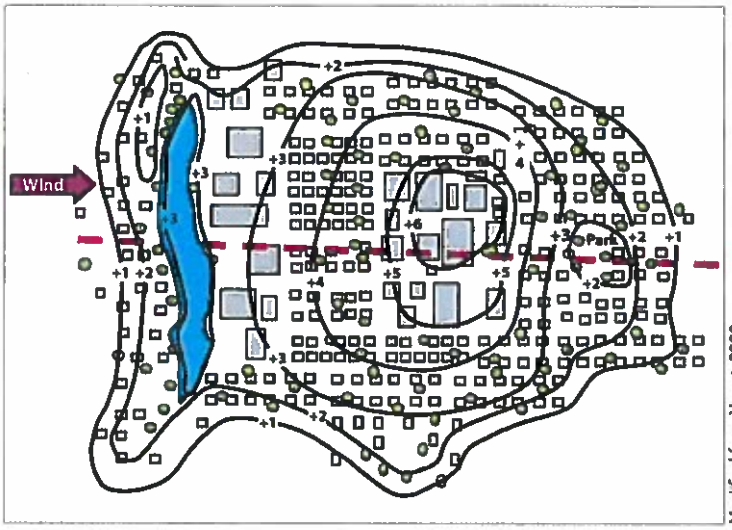
Surface and atmospheric temperatures vary over different land use areas. Surface temperatures vary more than air temperatures during the day, but they both are fairly similar at night. The dip and spike in surface temperatures over the pond show how water maintains a fairly constant temperature day and night, due to its high heat capacity.

* Note: The temperatures displayed above do not represent absolute temperature values or any one particular measured heat island. Temperatures will fluctuate based on factors such as seasons, weather conditions, sun intensity, and ground cover.

Atmospheric heat islands vary much less in intensity than surface heat islands. On an annual mean basis, air temperatures in large cities might be 1.8 to 5.4°F (1 to 3°C) warmer than those of their rural surroundings.[9]

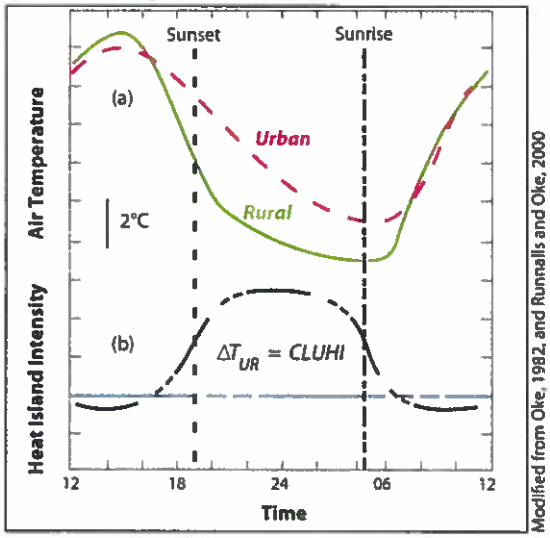
Researchers typically measure air temperatures through a dense network of sampling points from fixed stations or mobile traverses, which are both direct measurement methods. Figure 3 illustrates a conceptual isotherm map that depicts an atmospheric urban heat island. The center of the figure, which is the hottest area, is the urban core. A simple graph of temperature differences, as shown in Figure 4, is another way to show the results.

Figure 3: Isotherm Map Depicting an Atmospheric Nighttime Urban Heat Island



This conceptual map with overlaid isotherms (lines of equal air temperature) exhibits a fully developed nighttime atmospheric urban heat island. The dotted red line indicates a traverse along which measurements are taken.

Figure 4: Conceptual Drawing of the Diurnal Evolution of the Urban Heat Island during Calm and Clear Conditions



Atmospheric urban heat islands primarily result from different cooling rates between urban areas and their surrounding rural or non-urban surroundings (section (a) of Figure 5). The differential cooling rates are most pronounced on clear and calm nights and days when rural areas can cool more quickly than urban areas. The heat island intensity (section (b)) typically grows from mid- to late afternoon to a maximum a few hours after sunset. In some cases, a heat island might not reach peak intensity until after sunrise.

Urban Heat Islands, Climate Change, and Global Warming

Urban heat islands refer to the elevated temperatures in developed areas compared to more rural surroundings. Urban heat islands are caused by development and the changes in radiative and thermal properties of urban infrastructure as well as the impacts buildings can have on the local micro-climate—for example tall buildings can slow the rate at which cities cool off at night. Heat islands are influenced by a city's geographic location and by local weather patterns, and their intensity changes on a daily and seasonal basis.

The warming that results from urban heat islands over small areas such as cities is an example of local climate change. Local climate changes resulting from urban heat islands fundamentally differ from global climate changes in that their effects are limited to the local scale and decrease with distance from their source. Global climate changes, such as those caused by increases in the sun's intensity or greenhouse gas concentrations, are not locally or regionally confined.

Climate change, broadly speaking, refers to any significant change in measures of climate (such as temperature, precipitation, or wind) lasting for an extended period (decades or longer). Climate change may result from:

- Natural factors, such as changes in the sun's intensity or slow changes in the Earth's orbit around the sun
- Natural processes within the climate system (e.g. changes in ocean circulation)
- Human activities that change the atmosphere's composition (e.g. burning fossil fuels) and the land surface (e.g. deforestation, reforestation, or urbanization).

The term climate change is often used interchangeably with the term global warming, but according to the National Academy of Sciences, "the phrase 'climate change' is growing in preferred use to 'global warming' because it helps convey that there are [other] changes in addition to rising temperatures."

Global warming is an average increase in the temperature of the atmosphere near the Earth's surface and in the lowest layer of the atmosphere, which can contribute to changes in global climate patterns. Global warming can occur from a variety of causes, both natural and human induced. In common usage, "global warming" often refers to the warming that can occur as a result of increased emissions of greenhouse gases from human activities. Global warming can be considered part of global climate change along with changes in precipitation, sea level, etc.

The impacts from urban heat islands and global climate change (or global warming) are often similar. For example, some communities may experience longer growing seasons due to either or both phenomena. Urban heat islands and global climate change can both also increase energy demand, particularly summertime air conditioning demand, and associated air pollution and greenhouse gas emissions, depending on the electric system power fuel mix.

Strategies to reduce urban heat islands—the focus of this document, *Reducing Urban Heat Islands: Compendium of Strategies*—produce multiple benefits including lowering surface and air temperatures, energy demand, air pollution and greenhouse gas emissions. Thus, advancing measures to mitigate urban heat islands also helps to address global climate change.

For more information on global warming see EPA's Climate Change website, <www.epa.gov/climatechange>.

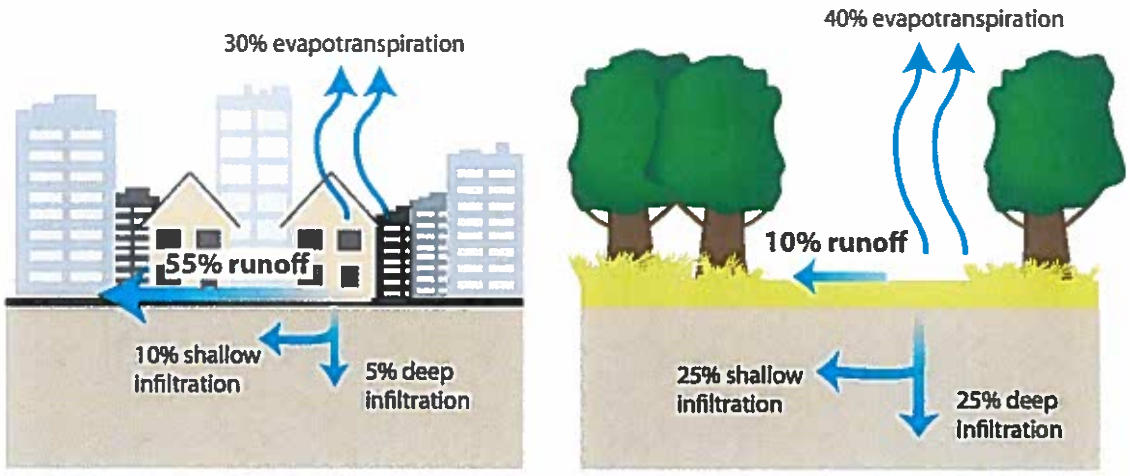
2. How Do Urban Heat Islands Form?

While many factors contribute to urban heat island formation (see Table 2), this chapter focuses on vegetative cover and surface properties because communities can directly address these factors with available technologies. See the "Trees and Vegetation," "Green Roofs," "Cool Roofs," and "Cool Pavement" chapters for detailed information on these strategies.

2.1 Reduced Vegetation in Urban Areas

In rural areas, vegetation and open land typically dominate the landscape. Trees and vegetation provide shade, which helps lower surface temperatures. They also help reduce air temperatures through a process called evapotranspiration, in which plants release water to the surrounding air, dissipating ambient heat. In contrast, urban areas are characterized by dry, impervious surfaces, such as conventional roofs, sidewalks, roads, and parking lots. As cities develop, more vegetation is lost, and more surfaces are paved or covered with buildings. The change in ground cover results in less shade and moisture to keep urban areas cool. Built up areas evaporate less water (see Figure 5), which contributes to elevated surface and air temperatures.

Figure 5: Impervious Surfaces and Reduced Evapotranspiration



Modified from the Federal Interagency Stream Restoration Working Group (FISRWG)

Highly developed urban areas (right), which are characterized by 75%-100% impervious surfaces, have less surface moisture available for evapotranspiration than natural ground cover, which has less than 10% impervious cover (left). This characteristic contributes to higher surface and air temperatures in urban areas.

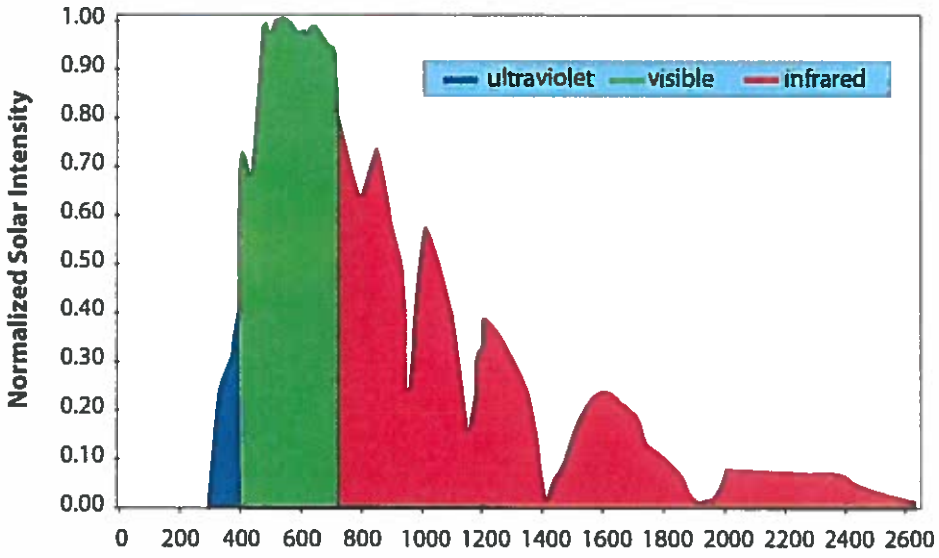
2.2 Properties of Urban Materials

Properties of urban materials, in particular solar reflectance, thermal emissivity, and heat capacity, also influence urban heat island development, as they determine how the sun's energy is reflected, emitted, and absorbed.

Figure 6 shows the typical solar energy that reaches the Earth's surface on a clear summer day. Solar energy is composed of ultraviolet (UV) rays, visible light, and infrared energy, each reaching the Earth in different percentages: five percent of solar energy is in the UV spectrum, including the type of rays responsible for sunburn; 43 percent of solar energy is visible light, in colors ranging from violet to red; and the remaining 52 percent of solar energy is infrared, felt as heat. Energy in all of these wavelengths contributes to urban heat island formation.

Solar reflectance, or albedo, is the percentage of solar energy reflected by a surface. Much of the sun's energy is found in the visible wavelengths (see Figure 6); thus, solar reflectance is correlated with a material's color. Darker surfaces tend to have lower solar reflectance values than lighter surfaces. Researchers are studying and developing cool colored materials, though, that use specially engineered pigments that reflect well in the infrared wavelengths. These products can be dark in color but have a solar reflectance close to that of a white or light-colored material. (See the "Cool Roofs" chapter for further discussion of cool colored roof products.)

Figure 6: Solar Energy versus Wavelength Reaching Earth's Surface



Solar energy intensity varies over wavelengths from about 250 to 2500 nanometers.

Urban areas typically have surface materials, such as roofing and paving, which have a lower albedo than those in rural settings. As a result, built up communities generally reflect less and absorb more of the sun's energy. This absorbed heat increases surface temperatures and contributes to the formation of surface and atmospheric urban heat islands.

Although solar reflectance is the main determinant of a material's surface temperature, thermal emittance, or emissivity, also plays a role. Thermal emittance is a measure of a surface's ability to shed heat, or emit long-wave (infrared) radiation. All things equal, surfaces with high emittance values will stay cooler, because they will release heat more readily. Most construction materials, with the exception of metal, have high thermal emittance values. Thus, this property is mainly of interest to those installing cool roofs, which can be metallic. See the "Cool Roofs" chapter of the compendium for more information.

Another important property that influences heat island development is a material's heat capacity, which refers to its ability to store heat. Many building materials, such as steel and stone, have higher heat capacities than rural materials, such as dry soil and sand. As a result, cities are typically more effective at storing the sun's energy as heat within their infrastructure. Downtown metropolitan areas can absorb and store twice the amount of heat compared to their rural surroundings during the daytime.[10]

Radiative and Thermal Properties—Cool Roofs and Cool Pavements

Albedo and emissivity are considered "radiative properties." Heat capacity, on the other hand, is one of several "thermal properties" a material can possess. For thin materials like roofing, which is typically placed over insulation, reflectance and emittance are the main properties to consider, as the heat capacity of a well insulated roof is low. For pavements, which are thicker than roofing products and are placed on top of the ground, which has its own set of thermal characteristics, designers and researchers need to consider a more complex set of factors that include radiative and thermal properties—such as heat capacity, thermal conductivity, and density.

2.3 Urban Geometry

An additional factor that influences urban heat island development, particularly at night, is urban geometry, which refers to the dimensions and spacing of buildings within a city. Urban geometry influences wind flow, energy absorption, and a given surface's ability to emit long-wave radiation back to space. In developed areas, surfaces and structures are often at least partially obstructed by objects, such as neighboring buildings, and become large thermal masses that cannot release their heat very readily because of these obstructions. Especially at night, the air above urban centers is typically warmer than air over rural areas. Nighttime atmospheric heat islands can have serious health implications for urban residents during heat waves (see textbox in Section 3.3, "Factors in Heat-Related Illnesses and Death.")

Researchers often focus on an aspect of urban geometry called urban canyons, which can be illustrated by a relatively narrow street lined by tall buildings. During the day, urban canyons can have competing effects. On the one hand, tall buildings can create shade, reducing surface and air temperatures. On the other, when sunlight reaches surfaces in the canyon, the sun's energy is reflected and absorbed by building walls, which further lowers the city's overall albedo—the net reflectance from surface albedo plus urban geometry—and can increase temperatures.[11] At night, urban canyons generally impede cooling, as buildings and structures can obstruct the heat that is being released from urban infrastructure.

Table 2: Factors that Create Urban Heat Islands

Factors Communities are Focusing On
• Reduced vegetation in urban regions: Reduces the natural cooling effect from shade and evapotranspiration. • Properties of urban materials: Contribute to absorption of solar energy, causing surfaces, and the air above them, to be warmer in urban areas than those in rural surroundings.
Future Factors to Consider
• Urban geometry: The height and spacing of buildings affects the amount of radiation received and emitted by urban infrastructure. • Anthropogenic heat emissions: Contribute additional warmth to the air.*
Additional Factors
• Weather: Certain conditions, such as clear skies and calm winds, can foster urban heat island formation. • Geographic location: Proximity to large water bodies and mountainous terrain can influence local wind patterns and urban heat island formation.

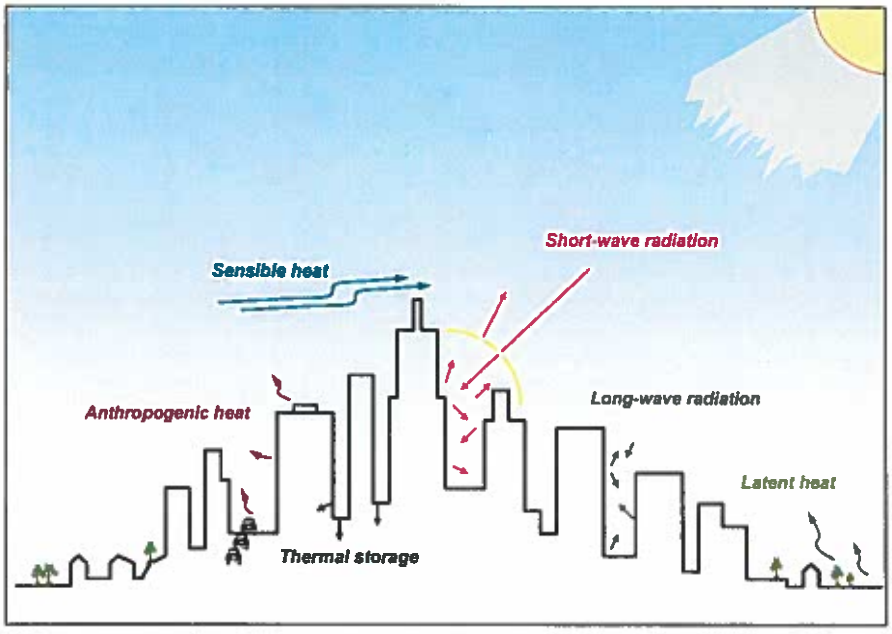
* Although communities currently can lower anthropogenic heat emissions through energy efficiency technologies in the building and vehicle sectors, this compendium focuses on modifying vegetative cover and surface properties of urban materials, as they have long been regarded as urban heat island reduction strategies. An emerging body of literature on the role waste heat plays in urban heat island formation, though, may lead communities to focus on anthropogenic heat in the near future.

The Urban Surface Energy Budget

An energy budget provides an equation that quantifies the balance of incoming and outgoing energy flows, or fluxes (see Figure 7). The surface energy budgets of urban areas and their more rural surroundings will differ because of differences in land cover, surface characteristics, and level of human activity. Such differences can affect the generation and transfer of heat, which can lead to different surface and air temperatures in urban versus rural areas. Various elements of the budget include:

- **Short-wave radiation** is ultraviolet, visible light, and near-infrared radiation from the sun that reaches the Earth (see Figure 6). This energy is a key driver of urban heat islands. Urban surfaces, compared to vegetation and other natural ground cover, reflect less radiation back to the atmosphere. They instead absorb and store more of it, which raises the area's temperature.
- **Thermal storage** increases in cities in part due to the lower solar reflectance of urban surfaces, but it is also influenced by the thermal properties of construction materials and urban geometry. Urban geometry can cause some short-wave radiation—particularly within an urban canyon—to be reflected on nearby surfaces, such as building walls, where it is absorbed rather than escaping into the atmosphere.

Figure 7: Urban Surface Energy Budget



Continued on next page

The Urban Surface Energy Budget (continued)

- Similarly, urban geometry can impede the release of **long-wave, or infrared, radiation** into the atmosphere. When buildings or other objects absorb incoming short-wave radiation, they can re-radiate that energy as long-wave energy, or heat. However, at night, due to the dense infrastructure in some developed areas that have low sky view factors (see section 2.3), urban areas cannot easily release long-wave radiation to the cooler, open sky, and this trapped heat contributes to the urban heat island.
- Evapotranspiration describes the transfer of **latent heat,** what we feel as humidity, from the Earth's surface to the air via evaporating water. Urban areas tend to have less evapotranspiration relative to natural landscapes, because cities retain little moisture. This reduced moisture in built up areas leads to dry, impervious urban infrastructure reaching very high surface temperatures, which contribute to higher air temperatures.*
- Convection describes the transfer of **sensible heat,** what we feel as temperature, between the surface and air when there is a difference in temperature between them. High urban surface temperatures warm the air above, which then circulates upwards via convection.
- **Anthropogenic heat** refers to the heat generated by cars, air conditioners, industrial facilities, and a variety of other manmade sources, which contributes to the urban energy budget, particularly in the winter.

* This change in landscape may differ in regions such as deserts, where moisture may increase in urban areas if development introduces grass lawns and other irrigated vegetation.

The effects of urban geometry on urban heat islands are often described through the "sky view factor" (SVF), which is the visible area of the sky from a given point on a surface. For example, an open parking lot or field that has few obstructions would have a large SVF value (closer to 1). Conversely, an urban canyon in a downtown area that is surrounded by closely spaced, tall buildings, would have a low SVF value (closer to zero), as there would only be a small visible area of the sky.

2.4 Anthropogenic Heat

Anthropogenic heat contributes to atmospheric heat islands and refers to heat produced by human activities. It can come from a variety of sources and is estimated by totaling all the energy used for heating and cooling, running appliances, transportation, and industrial processes. Anthropogenic heat varies by urban activity and infrastructure, with more energy-intensive buildings and transportation producing more heat.[12] Anthropogenic heat typically is not a concern in rural areas and during the summer. In the winter, though, and year round in dense, urban areas, anthropogenic heat can significantly contribute to heat island formation.

2.5 Additional Factors

Weather and location strongly influence urban heat island formation. While communities have little control over these factors,

residents can benefit from understanding the role they play.

- **Weather.** Two primary weather characteristics affect urban heat island development: wind and cloud cover. In general, urban heat islands form during periods of calm winds and clear skies, because these conditions maximize the amount of solar energy reaching urban surfaces and minimize the amount of heat that can be convected away. Conversely, strong winds and cloud cover suppress urban heat islands.
- **Geographic location.** Climate and topography, which are in part determined by a city's geographic location, influence urban heat island formation. For example, large bodies of water moderate temperatures and can generate winds that convect heat away from cities. Nearby mountain ranges can either block wind from reaching a city, or create wind patterns that pass through a city. Local terrain has a greater significance for heat island formation when larger-scale effects, such as prevailing wind patterns, are relatively weak.

3. Why Do We Care about Urban Heat Islands?

Elevated temperatures from urban heat islands, particularly during the summer, can affect a community's environment and quality of life. While some heat island impacts seem positive, such as lengthening the plant-growing season, most impacts are negative and include:

- Increased energy consumption
- Elevated emissions of air pollutants and greenhouse gases
- Compromised human health and comfort
- Impaired water quality.

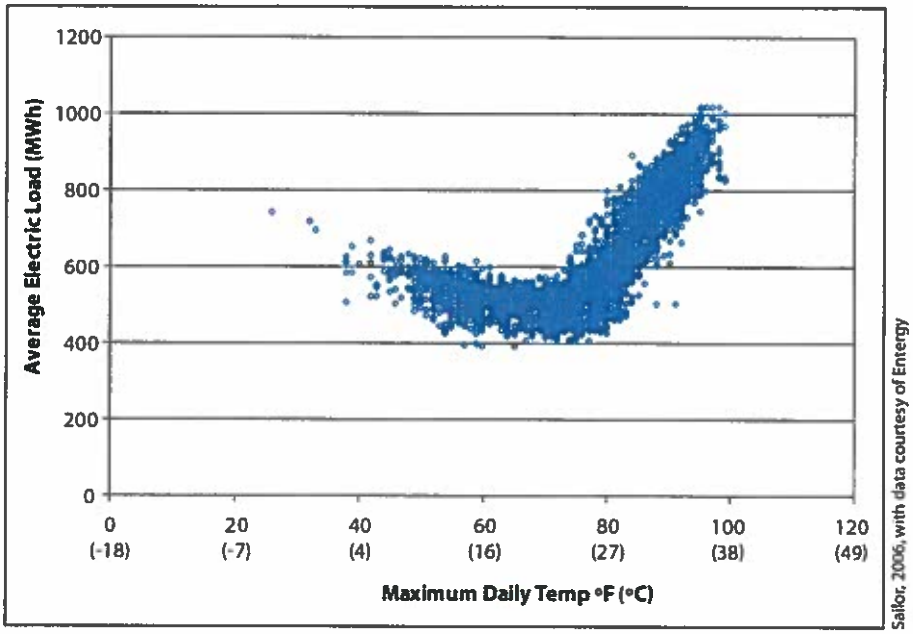
Wintertime Benefits of Urban Heat Islands

Communities may benefit from the wintertime warming effect of urban heat islands. Warmer temperatures can reduce heating energy needs and help to melt snow and ice on roads. Fortunately, urban heat island mitigation strategies—for example, trees and vegetation and green roofs—generally provide year-round benefits, or their winter penalty, such as that from cool roofs, is much smaller than their summertime benefits.

3.1 Energy Consumption

Elevated summertime temperatures in cities increase energy demand for cooling and add pressure to the electricity grid during peak periods of demand, which generally occur on hot, summer weekday afternoons, when offices and homes are running cooling systems, lights, and appliances (see Figure 8). This peak urban electric demand increases 1.5 to 2 percent for every 1°F (0.6°C) increase in summertime temperature. Steadily increasing downtown temperatures over the last several decades mean that 5 to 10 percent of community-wide demand for electricity is used to compensate for the heat island effect.[13] During extreme heat events, which are exacerbated by urban heat islands, the resulting demand for cooling can overload systems and require a utility to institute controlled, rolling brownouts or blackouts to avoid power outages.

Figure 8: Increasing Power Loads with Temperature Increases[14]



As shown in this example from New Orleans, electrical load can increase steadily once temperatures begin to exceed about 68 to 77°F (20 to 25°C). Other areas of the country show similar demand curves as temperature increases.

3.2 Air Quality and Greenhouse Gases

As discussed in Section 3.1, higher temperatures can increases energy demand, which generally causes higher levels of air pollution and greenhouse gas emissions. Currently, most electricity in the United States is produced from combusting fossil fuel. Thus, pollutants from most power plants include sulfur dioxide (SO_2), nitrogen oxides (NO_x), particulate matter (PM), carbon monoxide (CO), and mercury (Hg). These pollutants are harmful to human health and contribute to complex air quality problems such as acid rain. Further, fossil-fuel-powered plants emit greenhouse gases, particularly carbon dioxide (CO_2), which contribute to global climate change.

In addition to increases in air emissions, elevated air temperatures increase the rate of ground-level ozone formation, which is produced when NO_x and volatile organic compounds (VOCs) react in the presence of sunlight. If all other variables are equal—such as the level of precursor emissions or wind speed and direction—ground-level ozone emissions will be higher in sunnier and hotter weather.

3.3 Human Health and Comfort

Increased daytime surface temperatures, reduced nighttime cooling, and higher air pollution levels associated with urban heat islands can affect human health by contributing to general discomfort, respiratory difficulties, heat cramps and exhaustion, non-fatal heat stroke, and heat-related mortality.

Urban heat islands can also exacerbate the impact of heat waves, which are periods of abnormally hot, and often humid, weather. Sensitive populations, such as children, older adults, and those with existing health conditions, are at particular risk from these events. For example, in 1995, a mid-July heat wave in the Midwest caused more than 1,000 deaths.[15] While it is rare for a

Factors in Heat-Related Illnesses and Death

Low income elderly people who live in row homes are at a particular risk for heat-related health incidents. Living on the upper floor of a typical row home, with a dark roof, brick construction, and windows on only two sides, could contribute to the risk of heat-related illness or death during heat waves, as temperatures in these homes can be extreme.[16] These homes often lack air conditioning, especially in areas unaccustomed to high temperatures. Further, even when air conditioning is available, residents may not use it for fear of high utility bills.

Social isolation and physical health also contribute to one's vulnerability. Elderly people, especially, may not have family or friends nearby, may not report to work regularly, and may lack neighbors who can check on them, leaving them stranded during extreme heat events. The elderly may also fail to hear news or other warnings of impending heat waves and recommendations on how to cope. Finally, their bodies may be less able to handle heat stress.

The lack of nighttime relief in air temperatures is strongly correlated with increased mortality during heat waves. Some studies suggest that these oppressive nighttime temperatures may be more significant than high maximum daytime temperatures.[17]

For more information on heat-related health incidents and ways to respond, see the EPA Excessive Heat Events Guidebook <www.epa.gov/hiri/about/pdf/EHEguide_final.pdf>

heat wave to be so destructive, heat-related mortality is not uncommon. The Centers for Disease Control estimates that from 1979 to 1999, excessive heat exposure contributed to more than 8,000 premature deaths in the United States.[18] This figure exceeds the number of mortalities resulting from hurricanes, lightning, tornadoes, floods, and earthquakes combined.

3.4 Water Quality

Surface urban heat islands degrade water quality, mainly by thermal pollution. Pavement and rooftop surfaces that reach temperatures 50 to 90°F (27 to 50°C) higher than air temperatures transfer this excess heat to stormwater. Field measurements from one study showed that runoff from urban areas was about 20-30°F (11-17°C) hotter than runoff from a nearby rural area on summer days when pavement temperatures at midday were 20-35°F (11-19°C) above air temperature. When the rain came before the pavement had a chance to heat up, runoff temperatures from the rural and urban areas differed by less than 4°F (2°C).[19] This heated stormwater generally drains into storm sewers (see Figure 5) and raises water temperatures as it is released into streams, rivers, ponds, and lakes. A study in Arlington, Virginia, recorded temperature increases in surface waters as high as 8°F (4°C) in 40 minutes after heavy summer rains.[20]

Water temperature affects all aspects of aquatic life, especially the metabolism and reproduction of many aquatic species. Rapid temperature changes in aquatic

ecosystems resulting from warm stormwater runoff can be particularly stressful. Brook trout, for example, experience thermal stress and shock when the water temperature changes more than 2 to 4°F (1-2°C) in 24 hours.[21]

4. Strategies to Reduce Urban Heat Islands

Although urban climatologists have been studying urban heat islands for decades, community interest and concern regarding them has been more recent. This increased attention to heat-related environment and health issues has helped to advance the development of heat island reduction strategies, mainly trees and vegetation, green roofs, and cool roofs. Interest in cool pavements has been growing, and an emerging body of research and pilot projects are helping scientists, engineers, and practitioners to better understand the interactions between pavements and the urban climate.

This compendium *Reducing Urban Heat Islands: Compendium of Strategies* provides details about how these strategies work, their benefits and costs, factors to consider when selecting them, and additional resources for communities to further explore. It presents the multiple benefits—beyond temperature reduction—that a community can accrue from advancing heat island reduction strategies. It also gives examples of how communities have implemented these strategies through voluntary and policy efforts in the "Heat Island Reduction Activities" chapter. Communities can use this compendium as a foundation and starting point for understanding the nuts and bolts of existing urban heat island reduction strategies that communities are currently advancing.

Future policy efforts may focus on encouraging strategies to modify urban geometry and anthropogenic heat in communities to reduce urban heat islands. Research in this area is on-going, and there is a growing awareness of the importance of these factors.

5. Additional Resources

The table on the next page provides additional resources on urban heat island formation, measurement, and impacts.

Table 3: Urban Heat Island Resources

Name	Description	Web Link
General Information		
EPA's Heat Island Website	Through this website, EPA provides background information, publications, reports, access to national webcasts, a database of urban heat island activities, and links to other resources to help communities reduce urban heat islands.	<www.epa.gov/heatislands>
International Association for Urban Climate (IAUC)	This international website is the main forum in which urban climatologists communicate. Urban climate resources, including a bimonthly newsletter, and information on upcoming meetings can be found here.	<www.urban-climate.org>
Lawrence Berkeley National Laboratory (LBNL) Heat Island Group	LBNL provides background information on urban heat islands and their impacts through this website. It also presents some of the impacts heat island reduction strategies can have on temperature, energy consumption, and air quality.	<http://eetd.lbl.gov/HeatIsland>
National Center of Excellence - SMART Innovations for Urban Climate and Energy	Arizona State University's National Center of Excellence collaborates with industry and government to research and develop technologies to reduce urban heat islands, especially in desert climates. Its website provides background information on urban heat islands.	<www.asusmart.com/urbanclimate.php>
Urban Heat Islands: Hotter Cities	This article explains urban heat islands and presents solutions to mitigate them.	<www.actionbioscience.org/environment/voogt.html>
Measuring Heat Islands and Their Impacts		
National Aeronautics and Space Administration (NASA) and the U.S. Geological Survey Landsat Program	The Landsat program is a series of Earth-observing satellites used to acquire images of the Earth's land surface and surrounding coastal regions. These images provide information from which researchers can derive surface temperatures and evaluate urban heat islands.	<http://landsat.gsfc.nasa.gov/>
National Weather Service	The National Weather Service is a source for air temperature measurements, climate and weather models, and past and future climate predictions. The site also has links to excessive heat outlooks, fatality statistics, historic data on major heat waves, drought information, and advice on how to minimize the health risks of heat waves.	<www.nws.noaa.gov/>
EPA's Excessive Heat Events Guidebook	This document is designed to help community officials, emergency managers, meteorologists, and others plan for and respond to excessive heat events by highlighting best practices that have been employed to save lives during excessive heat events in different urban areas. It provides a menu of options that officials can use to respond to these events in their communities.	<www.epa.gov/hiri/about/heatguidebook.html>

Endnotes

1 Oke, T.R. 1997. Urban Climates and Global Environmental Change. In: Thompson, R.D. and A. Perry (eds.) Applied Climatology: Principles & Practices. New York, NY: Routledge. pp. 273-287.

2 Oke. T.R. 1987. Boundary Layer Climates. New York, Routledge.

3 Oke, T.R. 1982. The Energetic Basis of the Urban Heat Island. Quarterly Journal of the Royal Meteorological Society. 108:1-24. The threshold city population for heat islands of the size 2-5°F may be closer to 100,000 inhabitants in some cases. See also Aniello, C., K. Morgan, A. Busbey, and L. Newland. 1995. Mapping Micro-Urban Heat Islands Using Landsat TM and a GIS. Computers and Geosciences 21(8):965-69.

4 From: 1) Oke, T.R. 1997. Urban Climates and Global Environmental Change. In: Thompson, R.D. and A. Perry (eds.) Applied Climatology: Principles & Practices. New York, NY: Routledge. pp. 273-287. 2) Oke. T.R. 1987. Boundary Layer Climates. New York, Routledge. 3) Voogt, J.A. and T.R. Oke. 2003. Thermal Remote Sensing of Urban Areas. Remote Sensing of Environment. 86. (Special issue on Urban Areas): 370-384. 4) Roth, M., T. R. Oke, and W. J. Emery. 1989. Satellite-derived Urban Heat Islands from Three Coastal Cities and the Utilization of Such Data in Urban Climatology. Int. J. Remote Sensing. 10:1699-1720.

5 Berdahl P. and S. Bretz. 1997. Preliminary Survey of the Solar Reflectance of Cool Roofing Materials. Energy and Buildings 25:149-158.

6 Numbers from Voogt, J.A. and T.R. Oke. 2003. Thermal Remote Sensing of Urban Areas. Remote Sensing of Environment. 86. (Special issue on Urban Areas): 370-384. Roth, M., T. R. Oke, and W. J. Emery. 1989. Satellite-derived Urban Heat Islands from Three Coastal Cities and the Utilization of Such Data in Urban Climatology. Int. J. Remote Sensing. 10:1699-1720.

7 Oke, T.R. 1982. The Energetic Basis of the Urban Heat Island. Quarterly Journal of the Royal Meteorological Society. 108:1-24.

8 Oke, T.R. 1982. The Energetic Basis of the Urban Heat Island. Quarterly Journal of the Royal Meteorological Society. 108:1-24.

9 Oke, T.R. 1997. Urban Climates and Global Environmental Change. In: Thompson, R.D. and A. Perry (eds.) Applied Climatology: Principles & Practices. New York, NY: Routledge. pp. 273-287.

10 Christen, A. and R. Vogt. 2004. Energy and Radiation Balance of a Central European City. International Journal of Climatology. 24(11):1395-1421.

11 Sailor, D.J., and H. Fan. 2002. Modeling the Diurnal Variability of Effective Albedo for Cities. Atmospheric Environment. 36(4): 713-725.

12 Voogt, J. 2002. Urban Heat Island. In Munn, T. (ed.) Encyclopedia of Global Environmental Change, Vol. 3. Chichester: John Wiley and Sons.

13 Akbari, H. 2005. Energy Saving Potentials and Air Quality Benefits of Urban Heat Island Mitigation. Retrieved 2 Jul. 2008 from <http://www.osti.gov/bridge/servlets/purl/860475-UlH-WIq/860475.PDF>.

14 Sailor, D. J. 2002. Urban Heat Islands, Opportunities and Challenges for Mitigation and Adaptation. Sample Electric Load Data for New Orleans, LA (NOPSI, 1995). North American Urban Heat Island Summit. Toronto, Canada. 1-4 May 2002. Data courtesy Entergy Corporation.

15 Taha, H. and L.S. Kalkstein, S.C. Sheridan, and E. Wong. 2004. The Potential of Urban Environmental Controls in Alleviating Heat-wave Health Effects in Five US Regions. Presented at the American Meteorological Society Fifth Conference on Urban Environment. 25 August. See also NOAA. 1995. Natural Disaster Survey Report: July 1995 Heat Wave. Retrieved 20 June 2008 from <http://www.nws.noaa.gov/om/assessments/pdfs/heat95.pdf>.

16 Kalkstein, L.S. and S.C. Sheridan. 2003. The Impact of Heat Island Reduction Strategies on Health-Debilitating Oppressive Air Masses in Urban Areas. Prepared for U.S. EPA Heat Island Reduction Initiative.

17 Kalkstein, L.S. 1991. A New Approach to Evaluate the Impact of Climate upon Human Mortality. Environmental Health Perspectives 96: 145-50.

18 CDC. 2004. Extreme Heat: A Prevention Guide to Promote Your Personal Health and Safety. Retrieved 27 July 2007 from <http://www.bt.cdc.gov/disasters/extremeheat/heat_guide.asp>.

19 Roa-Espinosa, A., T.B. Wilson, J.M. Norman, and Kenneth Johnson. 2003. Predicting the Impact of Urban Development on Stream Temperature Using a Thermal Urban Runoff Model (TURM). National Conference on Urban Stormwater: Enhancing Programs at the Local Level. February 17-20. Chicago, IL. Retrieved 17 Jul. 2008 from <http://www.epa.gov/nps/natlstormwater03/31Roa.pdf>.

20 EPA. 2003. Beating the Heat: Mitigating Thermal Impacts. Nonpoint Source News-Notes. 72:23-26.

21 EPA. 2003. Beating the Heat: Mitigating Thermal Impacts. Nonpoint Source News-Notes. 72:23-26.

EXHIBIT "D"

Risk Science Associates
Risk Assessment
Toxicology
Occupational Health
Hazardous Materials Management
Vulnerability Assessments
Infrastructure Security

Tracy Sports Field
Appeal before the CPUC

Technical Analysis by
Alvin Greenberg, Ph.D., QEP, REA

September 1, 2007
(revised October 10, 2007)

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Summary

The granting of a waiver to PG&E regarding natural gas pipeline L-401 was ill-advised and contrary to sound public safety. The placement of a youth sports complex over the three buried pipelines represents a safety hazard and significant risk to the children and adults who visit the field. All three pipelines (two natural gas and one liquid petroleum fuel) pose a significant risk of failure. Smart Pigging demonstrated that the section of Line 401 located within the waiver area (sports field) contained two of the largest anomalies found in a total of 110 miles of pipeline assessed. The potential for failure of the second natural gas pipeline (L-002) was never addressed in the waiver and yet, it poses an even greater risk of failure and subsequent catastrophic impacts to children and adults playing at the sports field. Line L-002, constructed in 1972, would not even meet current code requirements for pipe coating and the pipe thickness and is certainly not adequate to meet Class 3 standards. Regarding the third pipeline, liquid petroleum pipelines have leaked many times in the Tracy area with the latest being the Shell Oil pipeline (one that is similar to the Chevron pipeline located at the sports field site) that ruptured and closed down I-580 on April 16 of this year. Given these significant risks, the waiver should not have been granted and the sports field should not be built on this parcel. The significant risk posed to users of the park cannot be mitigated and thus safer alternative locations should be assessed and selected.

Analysis

On August 19, 2000, in an area along the Pecos River near Carlsbad, NM, 12 people were killed in the early morning hours when a natural gas pipeline ruptured and the gas caught fire. The victims were camping approximately 675 feet from the point of the

pipeline rupture. The causes of death were thermal burns, carbon monoxide poisoning, and smoke inhalation, all due to the natural gas pipeline fire located a considerable distance away. The area had been posted with warning signs that gas pipelines were buried in the area. The area where the people were camping was privately owned. After the incident, El Paso Natural Gas (EPNG) purchased the property and installed fencing to restrict access to the area. A hard yet very important lesson was learned by EPNG but apparently not learned by PG&E, the CPUC, or the City of Tracy. It is clear that in order to provide safety to the public, the area around three pipelines at the Tracy Field parcel should be kept free from human presence.

The request by PG&E should not have been a test case of this type of waiver. The set-backs were established for a reason. In a search of the U.S. DOT Office of Pipeline Safety database, no evidence could be found that a waiver has ever been granted for a pipeline changing to a Class 3 location involving a recreation field where hundreds of children will be present. PG&E, in response to Robert Sarvey's data request number 4, has confirmed that they have never had a class location waiver at any location, let alone for a sports or recreation field destined to attracts hundreds of visitors. The Tracy Sports Field is a Class 3 location and thus would have been the first. The CPUC should note that U.S. Department of Transportation (DOT) Office of Pipeline Safety (OPS) regulations do not allow a waiver when changing to a Class 4 location. Furthermore, although the CPUC was aware that a second natural gas pipeline and a liquid fuel pipeline share the same utility corridor, it appears that the added risks were not considered in the CPUC's decision. On April 17, 2007, an underground fuel pipeline ruptured and leaked near Interstate-580 near Tracy. This resulted in the partial closure of I-580 and significant soil contamination. A similar underground fuel pipeline shares the utility corridor with the two natural gas pipelines. Imagine the catastrophe if one of these three pipelines ruptures, catches fire, causes a rupture of the other pipelines, and a three-pipeline fire burns within feet of hundreds of children and adults at the Tracy Sports Field. A natural gas fire has a thermal radiation significant impact zone of hundreds of feet based upon a human exposure criteria of 1.4 kW/m^2 (450 $BTU/ft^2/hr$). Thus, a gas pipeline leak and subsequent fire

would impact every person at the sports field and cause significant morbidity and mortality.

Although not within the CPUC's jurisdiction, the CPUC should be aware that another state agency (the California Energy Commission) has designated Schulte Road as the only approved hazardous materials transportation route to the GWF Energy power plant (Commission Decision on the Tracy Peaker Project, July 18, 2002. Condition of Certification HAZ-6). That agency would not have approved that route if there were a recreational field along Schulte Road because increased traffic on the road and the presence of children at a sports field would create a significant risk of accident and subsequent hazardous material spill that could be avoided. The CPUC should have taken this into consideration when granting a variance. The City of Tracy should have assessed this in the EIR and now must consider this issue.

While the HRA was adequate to describe the impacts -- or lack of impacts -- due to routine emissions from the industries located immediately adjacent to and nearby the site of the Tracy Sports Field, no analysis has been conducted to assess the risk of a catastrophic accidental release of hazardous materials from these facilities. There are four industrial facilities in the immediate area (less than 1500 feet from the sports field) that use and store large volumes of hazardous materials. These include Wiltel, Thermal Energy, Owens Brockway, and GWF Energy. A review of the history of these industrial facilities shows several fires and hazardous materials releases that would or could pose an unacceptable risk of harm to children and adults frequenting a sports field at the proposed location.

Detailed Analysis of Pipelines L-401 and L-002

The City of Tracy's proposal to develop a youth sports facility at a location where it would be directly over a major transmission pipeline right-of-way has not been adequately studied. This right-of-way passes through the proposed facility and contains two natural gas transmission lines and a hazardous liquids pipeline. The proposal to develop a public sports facility at this location has not been appropriately

analyzed on the basis of potential public risk. A recent report prepared by the Transportation Research Board (TRB) for the U.S. DOT makes it clear that a risk-based decision making process should be used in making decisions regarding public use of lands that are near natural gas and hazardous liquids transmission line right-of-ways (TRB 2004). The report makes the point that authority for land use decisions and development of set back requirements are usually controlled by local governments. It goes on to state that local governments seldom have the capability, data, or resources to use a risk-based decision process when considering land use near transmission pipelines.

In general, the level of public safety associated with transmission pipelines is largely governed by design requirement, testing and maintenance requirements, and control of excavation in pipeline rights-of-way. Because the proposed facility will significantly increase the population near a section of a pipeline right-of-way its classification will change from Class 1 to Class 3. As a result, 49 CFR 192.611 requires that the margin of safety between the design pressure and maximum operating pressure for the natural gas pipelines in the right-of-way be upgraded to comply with the requirements for a Class 3 designation by either replacing the section of pipeline with pipe that will handle a higher operating pressure or reduction of the operating pressure to achieve a equivalent safety margin between the design pressure and the operating pressure. Replacement can be avoided by pressure testing the existing pipeline to show that its actual test pressure is high enough to provide the required margin of safety between the actual tested pressure and the existing operating pressure. Title 49 also allows the pipeline operator to request a wavier based on achieving a similar level of risk reduction (public safety) through use of other methods. It was this provision that led to the decision to pursue a waiver instead of replacing the pipeline.

PG&E operates two natural gas pipelines in this right of way; a 36 inch diameter transmission line designated as L-401 and a 26 inch diameter transmission line designated as L-002. This right –of-way also includes an 18 inch petroleum pipeline operated by Chevron. PG&E requested a waiver for L-401 but did not do so for L-002

because of a claim that a hydrostatic test conducted in 1972 exempted L-002 from replacement even though the pipeline's thickness does not qualify for a Class 3 location. The coating on L-002 is a tape wrapped coating which is no longer allowed because it is prone to corrosion. Recent pipe-to-soil data have indicated corrosion on both pipelines within the Tracy Field waiver area. A 2001 smart pig inspection of L-002 confirmed that maximum wall loss was 61% on line L-002. And yet, the waiver request for L-401 was predicated on a qualitative assertion that better testing and oversight of the right-of-way at the sports field location would produce a greater risk reduction (improvement in public safety) than replacement.

While it is generally accepted that damage caused by excavation in pipeline right-of-ways is the leading cause of accidental releases from pipelines, it is inappropriate to assume that replacement is without benefit in this regard. In the absence of the waiver, the L-401 pipeline segment would be replaced with pipe of greater wall thickness and/or greater yield strength. Replacing the existing pipe with new pipe having increased wall thickness and/or yield strength would improve the intrinsic resistance of the pipe to puncture by excavating equipment. Replacement would also reduce the risk associated with degradation of the existing pipeline that could result in failure. It is not clear, based on the information provided by PG&E and the CPUC, that the proposed waiver measures were superior to replacement in reducing public risk. Communication between PG&E's pipeline experts reveals that PG&E's safety plan leaves much to be desired in the area of additional mitigation for third party damage (PG&E 2007).

Operations of transmission pipelines pose significant public risks when they are operated in close proximity to areas that are heavily occupied by the public. Significant failures of transmission pipelines can and have result in loss of life, personal injury, property damage, and environmental damage. According to the TRB, *"In the last 3 years, hazardous liquids pipeline incidents have resulted in an average of 2 deaths, 11 injuries, and $97 million in property damage each year; natural gas transmission pipeline incidents have resulted in an annual average of 6 deaths, 10*

injuries, and $20 million in property damage." A report by the California State Fire Marshal (CSFM) concludes that the risk of fatality for transmission pipeline is between 0.02 and 0.04 fatalities per 1000 miles per year which is equivalent to a risk of 20-40 in a million per mile of pipeline each year for fatalities (CSFM 1993). This same report also concludes that the risk of injury is 0.70 injuries per 1000 miles per years or a risk of 700 in one million per mile per year of being injured. These risks would be at least tripled to reflect the cumulative risk imposed by all three pipelines, thus resulting in a cumulative risk of fatality of 120 in a million per mile per year and of injury of 2100 in a million per mile per year. These risks far exceed the risk range found to be acceptable in California by a number of agencies and under CEQA of 1 or 10 in one million.

Recent incidents involving natural gas and hazardous liquids pipelines demonstrate the magnitude of the potential impact that can result from a major pipeline incident. On July 30, 2004, the rupture and subsequent explosion of a major high pressure natural gas pipeline in Belgium resulted in 24 deaths and over 120 injuries. On October 17, 1998, the rupture and subsequent explosion of a petroleum pipeline killed 1200 in Jesse, Nigeria. On May 12, 2006, the rupture of a petroleum pipeline in Lagos, Nigeria killed more than 150 people. On December 26, 2006, an intentional release in Lagos, Nigeria killed about 500 people. On June 10, 1999, a gas line in Bellingham Washington leaked and the ensuing fire killed three children. These incidents clearly demonstrate the potential magnitude for loss of life and injury that can be associated with releases from pipelines such as those that exist at the Tracy sports field site. These events demonstrate the potential to cause between 100 and 1000 fatalities in a heavily occupied public area such as would exist if the proposed sports field is permitted and constructed. This potential magnitude of these impacts would appear to strongly suggest that the risk (or probability) of such an incident occurring at the Tracy site would have to be estimated at being below one in ten million - or more likely, below one in one million - to be considered an insignificant risk.

It should be noted that current regulations or industry standards fail to address the mechanisms of failure that caused these events. In the case of the Belgium event, the

pipe appears to have failed as a result of brittle fracture resulting from cooling of the pipe during depressurization post puncture (Mahgereftech and Atti 2006) while the Nigerian incidents were caused by perpetrated events (intentional puncture for purposes of theft or sabotage). Failure by low temperature-induced brittle fracture is catastrophic in nature and it appears to be a fairly common and credible mode of failure based on review of pipeline incidents worldwide (Mahgereftech and Atti 2006). Use of steels with higher resistance to brittle fracture at cold temperatures could reduce the risk of such catastrophic failure and resulting loss of life, but to what extent is not known. However, this mitigating effect can only occur if the risk of such a failure scenario is understood and if the pipeline segment is replaced with a brittle fracture resistant material. This information on low temperature induced brittle failure as a credible failure scenario for natural gas pipeline failure calls into serious question the CPUC waiver for L-401 and the pressure testing provision of Section 192.611 that exempted replacement of L-002. The existing codes also fail to address control of perpetrated events such as those that occurred in Nigeria. Further, it is not apparent that there is any requirement to upgrade the existing Chevron petroleum pipeline.

A preliminary consideration of this information suggests that the risks associated with the proposed Tracy Field project are not insignificant and that further mitigation must be considered. The only mitigation measure that would reduce the risk below the level of significance would be consideration of alternative locations. Even if the natural gas pipelines could be replaced with pipe that is resistant to brittle fracture and greater setbacks from the pipeline right-of-way are required, the remaining area for sports would be severely limited and the pipelines would continue to be susceptible to corrosion, physical attack, and cold fracture. Furthermore, there are several aspects of the Belgium event that are not reflected in current code that question the efficacy of reliance on compliance with design codes to protect public safety. The Belgium event also challenges the generally held belief that unconfined natural gas clouds do not detonate. In addition, data from this incident provides some information about the setback distances that may be necessary to preclude public injury and fatalities in the event of an accident. In the Belgium event, the property damage and burning of

vegetation extended as far as 500 to 600 meters (1968 feet) from the point of gas release. It is clear from this data that the setbacks associated with any buried natural gas pipeline should be reconsidered. The use of a 1900-foot setback would eliminate this site as a sports field site. It is thus clear that alternative sites must be considered.

The typical practice used to control the risk poses to the public associated with proximity to major transmission pipelines is to rely on "actions taken by pipeline operators to create, inspect, and enforce their own pipeline rights-of-way". That is the approach being used in development of the proposed Tracy Youth Sports Facility. According to the TRB *"Land use measures can further reduce the risk of disturbing the pipelines by keeping human activity away from the immediate vicinity of the pipelines and minimizing the exposure of those living and working near a transmission pipeline in the event of an incident. At present, local governments employ building standards, site design requirements, land use controls, and public awareness measures to reduce losses due to natural hazards (such as earthquakes and floods.). However, state and local officials lack guidance for pipelines, other than rules of thumb and existing practice concerning appropriate setbacks."* The findings of the TRB regarding land use and risk are as follows:

1. Pipeline incidents have the potential for significant impact on life, property, and the environment.
2. Just as transmission pipelines pose a risk to their surroundings, so does human activity in the vicinity of pipelines pose a risk to pipelines. These risks increase with growth in population, urban areas, and pipeline capacity and network.
3. Land use decisions can affect the risk associated with increased human activity in the vicinity of transmission pipelines.
4. Pipeline safety and environmental regulation have generally focused on (a) the design, operation, and maintenance of pipelines and (b) incident response. They have not directed significant attention to the manner in which land use decisions can affect public safety and the environment.

5. For the most part, state and local governments have not systematically considered risk to the public from transmission pipeline incidents in regulating land use.
6. Risk informed approaches are being used effectively in other domains (e.g. natural hazards mitigation, industrial hazard mitigation, nuclear reactor and waste disposal programs, tanker safety). These techniques are also being used to address other aspects of pipeline safety (e.g. pipeline integrity), but they have not been used to make informed land use decisions.
7. Currently, decision makers lack adequate tools and information to make effective land use decisions concerning transmission pipelines.
8. Many different forms of pipeline easements are in effect, and the terms and conditions vary widely. To the extent that an easement lacks clarity, enforcement of right-of-way is more difficult.
9. Encroachments and inappropriate human activity within the right-of-way can adversely affect pipeline safety. There appears to be variability in the quality and extent of inspection, maintenance, and enforcement of right-of-way.

The TRB report goes on to conclude that:

- Judicious land use decisions can reduce the risk associated with transmission pipelines by reducing the probabilities and the consequences of incidents.
- It is feasible to use risk-informed approaches to establish land use guidelines for application by local governments.

The questions regarding the waiver for line L-401 and the fact that no upgrade of line L-002 will be required emphatically demonstrates the limitation of existing regulations to adequately consider public risk. And, it is not apparent that any significant analysis of risk or mitigation was undertaken regarding the hazardous liquids pipeline operated by Chevron. The decision to use land containing this transmission pipeline right of way would be questionable if only **one** of these pipelines were present. The presence of three pipelines that pose a significant risk clearly indicates that the change in land use to allow a sport field was not only inappropriate but ill-advised and lacked an

adequate risk assessment. In my opinion, as a professional with 27 years in the field of risk assessment, it is clear that the proposed land use change will impose significant risks on those use the facilities and that thee risks should be carefully evaluated using both quantitative and qualitative risk assessment methods.

The judicious and appropriate land use decision in this matter would be to consider development of other parcels that do not encroach on a pipeline right-of-way or similar hazards. The set back distances that would be required to ensure safety of the public at this location would make development of the proposed youth sports center infeasible. However, if this parcel is used, the pipelines should be upgraded in a manner that addresses cold brittle fracture and perpetrated releases. This could be accomplished by use of alloy pipe that maintains its toughness a low temperatures. The risk of perpetrated release can be better controlled by using a reinforced concrete cover over the pipeline in this area.

Conclusion

The EIR for the Tracy Sports Field is defective and the safety plan should be altered to address the significant risks all three pipelines present to the sports field users. The significant risk posed to users of the park cannot be adequately mitigated and thus safer alternative locations should be assessed and chosen.

References

CSFM (California State Fire Marshal), 1993. Hazardous liquid Pipeline Risk Assessment, March 1993.

H. Mahgerefteh and O. Atti, 2006 Modeling Low-temperature-Induced Brittle Fracture of Pressurized Pipelines, American Institute of Chemical Engineers, AIChE J, 52: 000-000, 2006.

PG&E 2007. Email from Chris Warner to Dave Germann dated March 7.

TRB (Transportation Research Board), 2004 Transmission Pipeline and Land Use, A Risk Informed Approach, Transportation Research Board, Washington, D.C. 2004.

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Name & Title: **Alvin J. Greenberg, Ph.D., FAIC, REA, QEP**
Principal Toxicologist

Dr. Greenberg has had over two decades of complete technical and administrative responsibility as a team leader in the preparation of human and ecological risk assessments, air quality assessments, hazardous materials handling and risk management/prevention, infrastructure vulnerability assessments, occupational safety and health, hazardous waste site characterization, interaction with regulatory agencies in obtaining permits, and conducting lead surveys and studies. He has particular expertise in the assessment of dioxins, lead, diesel exhaust, petroleum hydrocarbons, mercury, the intrusion of subsurface contaminants into indoor air, and the preparation and review of public health/public safety sections of EIRs/EISs. Dr. Greenberg's expertise in risk assessment has led to his appointment as a member of several state and federal advisory committees, including the California EPA Advisory Committee on Stochastic Risk Assessment Methods, the US EPA Workgroup on Cumulative Risk Assessment, the Cal/EPA Peer Review Committee of the Health Risks of Using Ethanol in Reformulated Gasoline, the California Air Resources Board Advisory Committee on Diesel Emissions, the Cal/EPA Department of Toxic Substances Control Program Review Committee, and the DTSC Integrated Site Mitigation Committee. Dr. Greenberg is the former Chair of the Bay Area Air Quality Management District Hearing Board, a former member of the State of California Occupational Health and Safety Standards Board (appointed by the Governor), and former Assistant Deputy Chief for Health, California OSHA. And, since the events of 9/11, Dr. Greenberg has been the lead person for developing vulnerability assessments, power plant security programs, and conducting safety and security audits of power plants for the California Energy Commission and has assisted the CEC in the assessment of safety and security issues for proposed LNG terminals. In addition to providing security expertise to the State of California, Dr. Greenberg was the Team Leader and main consultant to the State of Hawaii on the updating of their Energy Emergency Preparedness Plan.

Years Experience: 26

Education:

B.S. 1969 Chemistry, University of Illinois Urbana

Ph.D. 1976 Pharmaceutical/Medicinal Chemistry, University of California, San Francisco

Postdoctoral Fellowship 1976-1979 Pharmacology/Toxicology, University of California, San Francisco

Postgraduate Training 1980 Inhalation Toxicology, Lovelace Inhalation Toxicology Research Institute, Albuquerque, NM

Professional Registrations:

Board Certified as a Qualified Environmental Professional (QEP)
California Registered Environmental Assessor - I (REA)
Fellow of the American Institute of Chemists (FAIC)

Professional Affiliations:

Society for Risk Analysis
Air and Waste Management Association
American Chemical Society
American Association for the Advancement of Science
National Fire Protection Association

Technical Boards and Committee Memberships - Present:

Squaw Valley Technical Review Committee
(appointed 1986)

Technical Boards and Committee Memberships - Past:

July 1996 – March 2002
Member, Bay Area Air Quality Management District Hearing Board
(Chairman 1999-2002)

September 2000 – February 2001
Member, State Water Resources Control Board Noncompliant Underground Tanks Advisory Group

January 1999 – June 2001
Member, California Air Resources Board Advisory Committee on Diesel Emissions

January 1994 - September 1999
Vice-Chairman, State Water Resources Control Board Bay Protection and Toxic Cleanup Program Advisory Committee

September 1998
Member, US EPA Workgroup on Cumulative Risk Assessment

April 1997 - September 1997
Member, Cal/EPA Private Site Manager Advisory Committee

January 1986 - July 1996
Member, Bay Area Air Quality Management District Advisory Council
(Chairman 1995-96)

January 1988 - June 1995
Member: California Department of Toxic Substance Control Site Mitigation Program Advisory Group

January 1989 - February 1995
Member: Department of Toxics Substances Control Review Committee, Cal-EPA

October 1991 - February 1992
Chair: Pollution Prevention and Waste Management Planning Task Force of the Department of Toxics Substances Control Review Committee, Cal-EPA

September 1990 - February 1991
Member: California Integrated Waste Management Board Sludge Advisory Committee

September 1987 - September 1988
ABAG Advisory Committee on Regional Hazardous Waste Management Plan

March 1987 - September 1987
California Department of Health Services Advisory Committee on County and Regional Hazardous Waste Management Plans

January 1984 - October 1987
Member, San Francisco Hazardous Materials Advisory Committee

March 1984 - March 1987
Member, Lawrence Hall of Science Toxic Substances and Hazardous Materials Education Project Advisory Board

Jan. 1, 1986 - June 1, 1986
Member, Solid Waste Advisory Committee, Governor's Task Force on Hazardous Waste

Jan. 1, 1983 - June 30, 1985
Member, Contra Costa County Hazardous Waste Task Force

Sept. 1, 1982 - Feb. 1, 1983
Member, Scientific Panel to Address Public Health Concerns of Delta Water Supplies, California Department of Water Resources

Present Position

January 1983- present
Owner and principal with Risk Sciences Associates, a Marin County, California, environmental consulting company specializing in multi-media human health and ecological risk assessment, air pathway analyses, hazardous materials management-infrastructure security, environmental site assessments, review and evaluation of EIRs/EISs, preparation of public health and safety sections of EIRs/EISs, and litigation support for toxic substance exposure cases.

Previous Positions

Jan. 2, 1983 - June 12, 1984
Member, State of California Occupational Safety and Health Standards Board (Cal/OSHA), appointed by the Governor

Aug. 1, 1979 - Jan. 2, 1983
Assistant Deputy Chief for Health, California Occupational Safety and Health Administration

Feb. 1, 1979 - Aug. 1, 1979

Administrative Assistant to Chairperson of Finance Committee, Board of Supervisors, San Francisco

Jan. 1, 1976 - Feb. 1, 1979
Research Pharmacologist and Postdoctoral Fellow, Department of Pharmacology and Toxicology, School of Medicine, University of California, San Francisco

Jan. 1, 1975 - Dec. 31, 1975
Acting Assistant Professor, Department of Pharmaceutical Chemistry, University of California, San Francisco

Experience

General

Dr. Greenberg has been a consultant in Hazardous Materials Management and Security, Human and Ecological Risk Assessment, Occupational Health, Toxicology, Hazardous Waste Site Characterization, and Toxic Substances Control Policy for over 26 years. He has broad experience in the identification, evaluation and control of health and environmental hazards due to exposure to toxic substances. His experience includes Community Relations Support and Risk Communication through experience at high-profile sites and presentations at professional society meetings.

He has considerable experience in the review and evaluation of exposure via the air pathway - particularly to emissions from power plants, refineries, and diesel exhaust - and a thorough knowledge of the regulatory requirements through his experience at Cal/OSHA, the BAAQMD Hearing Board, as a consultant to the California Energy Commission, and in preparing such assessments for local government and industry. He has assessed exposures to diesel exhaust during construction and operations of stationary and mobile sources and has testified at evidentiary hearings numerous times on this subject.

He is presently assisting the California Energy Commission in assessing the risks to workers and the public of proposed power plants and LNG terminals in the state. His experience in hazard identification, exposure assessment, risk assessment, occupational safety and health, emergency response, and Critical Infrastructure Protection has made him a valuable part of the CEC team addressing this issue. He has reviewed and commented on the DEIS/DEIR for the proposed SES LNG Port of Long Beach terminal, focusing on security issues for the CEC and on safety matters for the City of Long Beach. He has presented technical information and analysis to the State of California Interagency LNG Working Group on thermal radiation public exposure criteria and safety/security at an east coast urban LNG terminal. (Both presentations are confidential owing to the nature of the material.) He has conducted numerous evaluations of the safety and hazards of natural gas pipelines for the CEC and has presented his findings and recommendations at public meetings and evidentiary hearings.

He served for over five years as the Vice-chair of the California State Water Resources Control Board Advisory Committee convened to address toxic substances in sediments in bays, rivers, and estuaries. He has been a member of the Squaw Valley Technical Review Committee since 1986 establishing chemical application management plans at golf courses to protect surface and

groundwater quality. He has also conducted numerous ecological risk assessments and characterizations, including those for marine and terrestrial habitats.

Dr. Greenberg has extensive experience in data collection and preparation of human and ecological risk assessments on numerous military bases and industrial sites with Cal/EPA DTSC and RWQCB oversight. He has also been retained to provide technical services to the Cal/EPA Department of Toxic Substances Control (preparation of human health risk assessments) and the Office of Environmental Health Hazard Assessment (review and evaluation of air toxics health risk assessments and preparation of profiles describing the acute and chronic toxicity of toxic air contaminants). He has also conducted several surveys of sites containing significant lead contamination from various sources including lead-based paint, evaluated potential occupational exposure to lead dust and fumes in industrial settings, prepared numerous human health risk assessments of lead exposure, and prepared safety and health plans for remedial investigation of lead contaminated soils. Dr. Greenberg is also a recognized expert on the requirements of California's Proposition 65 and has served as an expert on Prop. 65 litigation.

Liquefied Natural Gas (LNG)

Dr. Greenberg assisted the CEC in the preparation of the "background" report on the risks and hazards of siting LNG terminals in California ("LNG in California: History, Risks, and Siting" July 2003) and consulted for the City of Vallejo on a proposed LNG terminal and storage facility at the former Mare Island Naval Shipyard. He has also conducted an evaluation and prepared comments on the risks, hazards, and safety analysis of the DEIS/DEIR for the City of Long Beach on a proposed LNG terminal at the Port of Long Beach (POLB) and conducted an analysis on vulnerability and critical infrastructure security for the CEC on this same proposed LNG terminal. He currently advises the CEC on the POLB LNG proposal on risks, hazards, human thresholds of thermal exposure, vulnerability, security, and represented the CEC at a U.S. Coast Guard briefing on the Waterway Suitability Assessment that included the sharing of SSI (Sensitive Security Information). He has presented technical information and analysis to the State of California LNG Interagency Working Group on thermal radiation public exposure criteria and safety/security at an east coast urban LNG terminal. (Both presentations are confidential owing to the nature of the material.) He has conducted numerous evaluations of the safety and hazards of natural gas pipelines for the CEC and has presented his findings and recommendations at public meetings and evidentiary hearings.

Infrastructure Security

Since 2002, Dr. Greenberg has been trained by and is working with the Israeli company SB Security, LTD, the most experienced and tested security planning and service company in the world. Since the events of 9/11, Dr. Greenberg has been the lead person for developing vulnerability assessments and power plant security programs for the California Energy Commission (CEC). In taking the lead for this state agency, Dr. Greenberg has interfaced with the California Terrorism Information Center (CATIC) and provided analysis, recommendations, and testimony at CEC evidentiary hearings regarding the security of power plants within the state. These analyses include the assessment of Critical Infrastructure Protection, threat assessments, criticality assessments, and the preparation of vulnerability assessments and off-site consequence analyses addressing the use, storage, and transportation of hazardous materials, recommendations for security to reduce the threat from foreign and domestic terrorist activities, perimeter security, site access by personnel and vendors, personnel background checks,

management responsibilities for facility security, and employee training in security methods. Dr. Greenberg is the lead person in developing a model power plant security plan, vulnerability assessment matrix, and a security training manual for the CEC. The model security plan is used by power plants in California as guidance in developing and implementing security measures to reduce the vulnerability of California's energy infrastructure to terrorist attack. He has testified at several evidentiary hearings for the CEC on power plant security issues. He also leads an audit team conducting safety and security audits at power plants throughout California that are under the jurisdiction of the CEC. In addition to providing security expertise to the State of California, in August 2004, a team of experts led by Dr. Greenberg was awarded an 18-month contract by the State of Hawaii to update and improve the state's Energy Emergency Preparedness Plan and make recommendations for increased security of critical energy infrastructure on this isolated group of islands.

Air Pathway Analysis

Dr. Greenberg has prepared numerous Air Pathway Analyses and human health risk assessments, evaluating exposure at numerous locations in California, Hawai'i, Oregon, Minnesota, Michigan, and New York. He is experienced in working with Region IX EPA, the State of California DTSC, and the Hawai'i Department of Health Clean Air Branch in the application of both site-specific and non site-specific health risk assessment criteria.

Examples

Human Health Risk Assessment for the Open Burn/Open Detonation Operation at McCormick Selph, Inc., Hollister, Ca. (June 2003)

Air Quality and Human Health Risk Assessment for the Royal Oaks Industrial Complex, Monrovia, Ca. (January 2003)

Human Health Risk Assessment and Indoor Vapor Intrusion Assessment for the former Pt. St. George Fisheries Site, Santa Rosa, Ca. (October 2002)

Human Health Risk Assessment for the former Sargent Industries Site, Huntington Park, Ca. (July 2001)

Ballard Canyon Air Pathway Analysis and Human Health Risk Assessment, Santa Barbara County, Ca. (September 2000)

Health Risk Assessment Due to Diesel Train Engine Emissions, Oakland, Ca. (June 1999)

The Avila Beach Health Study Phase 1: Reconnaissance Sampling Findings, Conclusions, and Recommendations. (July 1997) Volume 1: Baseline Human Health Risk Assessment. (May 1998)

The Avila Beach Health Study Phase 1, Volume 2: Environmental Monitoring. (May 1998)

Health Risk Assessment and Air Pathway Analysis for the Ballard Canyon Landfill, Santa Barbara County, Ca. (March 1999)

Human Health Risk Assessment, Teledyne Ryan Aeronautical, McCormick Selph Ordnance. Hollister, California. (December 1996)

Initial Phase Human Health Risk Assessment, Teledyne Inc., San Diego, Ca. (October 1996)

Human Health Risk Assessment for Current and Proposed Expanded Class II and Class III Operations at the Altamont Sanitary Landfill, Alameda County, Ca. (March, 1993)

Focused Ecological Risk Characterization, Hawaiian Electric Company, Keahole Generating Station Expansion, Hawai'i (June 1993)

Human Health Risk Assessment for the Proposed Palima Point Space Launch Complex, prepared for the Hawai'i Office of Space Industry (April 1993)

Ecological Risk Assessment for the Proposed Palima Point Space Launch Complex, prepared for the Hawai'i Office of Space Industry (March 1993)

Human Health Risk Assessment Due to Emissions from a Medical Waste Incinerator, prepared for Kauai Veterans Memorial Hospital, Kauai, Hawai'i (1994)

Cancer Risk Assessment for the H-Power Generating Station, Campbell Industrial Park, Oahu, Hawai'i (1988)

Hazardous Materials Assessments, Waste Management Assessments, Worker Safety and Fire Protection Assessments, and Public Health Impacts Assessments

Dr. Greenberg also has significant experience as a consultant and expert witness for the California Energy Commission providing analysis, recommendations, and testimony in the areas of hazardous materials management, process safety management, waste management, worker safety and fire protection, and public health impacts for proposed power plant/cogeneration facilities. These analyses include the evaluation and/or preparation of the following:

- Off-site consequence analyses of the handling, use, storage, and transportation of hazardous materials,
- Risk Management Plans (required by the Cal-ARP) and Business Plans (required by H&S Code section 25503.5),
- Safety Management Plans (required by 8 CCR section 5189),
- Natural gas pipeline safety,
- Solid and hazardous waste management plans,
- Phase I and II Environmental Site Assessments,
- Construction and Operations Worker Safety and Health Programs,
- Fire Prevention Programs,
- Human health risk assessment from stack emissions and from diesel engines, and
- Mitigation measures to address PM exposure, including diesel particulates

Examples

- San Francisco Energy Reliability Project, San Francisco, Ca. 2004-present. Hazardous materials management, worker safety/fire protection, waste management, public health
- Inland Empire Energy Center, Romoland, Ca. 2002-3. hazardous materials, worker safety/fire protection, waste management, public health
- Malburg Generating Station Project, City of Vernon, Ca. 2002-3. hazardous materials, worker safety/fire protection, waste management, public health
- Blythe II, Blythe, Ca. 2002-3. hazardous materials, worker safety/fire protection,
- Palomar Energy Center, Escondido, Ca. 2002-3. hazardous materials, worker safety/fire protection, waste management, public health
- Cosumnes Power Project, Rancho Seco, Ca. 2002-3. hazardous materials, worker safety/fire protection, waste management, public health
- Tesla Power Project, Tesla, Ca. 2002-3. hazardous materials, worker safety/fire protection, waste management, public health
- San Joaquin Valley Energy Center, San Joaquin, Ca. 2002-3. hazardous materials, worker safety/fire protection, waste management
- Morro Bay Power Plant, Morro Bay, Ca., 2001-2: hazardous materials, worker safety/fire protection, waste management
- Potrero Power Plant Unit 7, San Francisco, Ca., 2001-2: hazardous materials, worker safety/fire protection
- El Segundo Power Redevelopment Project, El Segundo, Ca., 2001-2: hazardous materials, worker safety/fire protection, waste management
- Rio Linda Power Project, Rio Linda, Ca., 2001-2: hazardous materials, worker safety/fire protection, waste management, public health
- Pastoria II Energy Facility Expansion, Grapevine, Ca., 2001: hazardous materials, worker safety/fire protection
- East Altamont Energy Center, Byron, Ca., 2001-2: hazardous materials, worker safety/fire protection
- Magnolia Power Project, Burbank, Ca., 2001-2: hazardous materials, worker safety/fire protection, waste management, public health
- Russell City Energy Center, Hayward, Ca., 2001-2: hazardous materials, worker safety/fire protection, waste management
- Woodbridge Power Plant, Modesto, Ca., 2001: hazardous materials, worker safety/fire protection, waste management
- Colusa Power Plant Project, Colusa County, Ca., 2001-2: hazardous materials, worker safety/fire protection, waste management, public health
- Valero Refinery Cogeneration Project, Benicia, Ca., 2001: hazardous materials, worker safety/fire protection
- Ocotillo Energy Project, Palm Springs, Ca., 2001: hazardous materials, worker safety/fire protection
- Gilroy Energy Center Phase II Project, Gilroy, Ca., 2001-2: hazardous materials, worker safety/fire protection
- Los Esteros Critical Energy Facility, San Jose, Ca., 2001-2: hazardous materials, worker safety/fire protection, waste management, public health
- Roseville Energy Facility, Roseville, Ca., 2001-2: hazardous materials, worker safety/fire protection, waste management, public health

- Spartan Power, San Jose, Ca., 2001-2: hazardous materials, worker safety/fire protection, waste management, public health
- Inland Empire Energy Center, Romoland, Ca., 2001-2: hazardous materials, worker safety/fire protection, waste management, public health
- South Star Cogeneration Project, Taft, Ca., 2001-2: hazardous materials, worker safety/fire protection, waste management, public health
- Tesla Power Plant, Eastern Alameda County, Ca., 2001-2: hazardous materials, worker safety/fire protection, waste management, public health
- Tracy Peaker Project, Tracy, Ca., 2001-2: hazardous materials, worker safety/fire protection, waste management, public health
- Henrietta Peaker Project, Kings County, Ca., 2001: hazardous materials, worker safety/fire protection, waste management, public health
- Central Valley Energy Center, San Joaquin, Ca., 2001-2: hazardous materials, worker safety/fire protection, waste management, public health
- Cosumnes Power Plant, Rancho Seco, Ca., 2001-2: hazardous materials, worker safety/fire protection, waste management, public health
- Los Banos Voltage Support Facility, Western Merced County, Ca., 2001-2: waste management, public health
- Palomar Energy Project, Escondido, Ca., 2001-2: hazardous materials, worker safety/fire protection, waste management, public health
- Metcalf Energy Center, San Jose, Ca., 2000-1: hazardous materials
- Blythe Power Plant, Blythe, Ca., 2000-1: hazardous materials
- San Francisco Energy Co. Cogeneration Project, San Francisco, Ca., 1994-5: hazardous materials
- Campbell Soup Cogeneration Project, Sacramento, Ca., 1994: hazardous materials
- Proctor and Gamble Cogeneration Project, Sacramento, Ca., 1993-4: hazardous materials
- San Diego Gas and Electric South Bay Project, Chula Vista, Ca., 1993: hazardous materials
- SEPCO Project, Rio Linda, Ca., 1993: hazardous materials
- Shell Martinez Manufacturing Complex Cogeneration Project, Martinez, Ca., 1993: hazardous materials and review and evaluation of EIR
- SFERP Project, San Francisco, Ca. 2004 – 2006. hazardous materials, worker safety/fire protection, waste management, public health

Occupational Safety and Health/Health and Safety Plans/Indoor Air Quality

Dr. Greenberg has significant experience in occupational safety and health, having directed the development, adoption, and implementation of over 50 different Cal/OSHA regulations, including airborne contaminants (>450 substances), lead, asbestos, confined spaces, and worker-right-to-know (MSDSs). He has conducted numerous occupational health surveys and has extensive experience in the sampling and analysis of indoor air quality at residences, workplaces, and school classrooms. He is currently the team leader conducting safety and security audits at power plants throughout California for the California Energy Commission. Safety issues audited include compliance with regulations addressing several safety matters, including but not limited to, confined spaces, lockout/tagout, hazardous materials, and fire prevention/suppression equipment.

Examples

Review and Evaluation of Public and Worker Safety Issues at the proposed SES LNG Facility, Port of Long Beach. prepared for the City of Long Beach. (November 2005)

Confidential safety and security audit reports for 18 power plants in California. prepared for the California Energy Commission. (January 2005 through March 2006)

Report on the Accidental release and Worker Exposure to Anhydrous Ammonia at the BEP I Power Plant, Blythe, Ca. prepared for the California Energy Commission. (October 2004)

Investigation of a Worker Death in a Confined Space, La Paloma Power plant. prepared for the California Energy Commission. (July 2004)

Preliminary Report on Indoor Air Quality in Elementary School Portable Classrooms, Marin County, Ca. (December 1999)

Health Risk Assessment Due to Diesel Train Engine Emissions, Oakland, Ca. (June 1999)

Air Pathway Analysis for the Ballard Canyon Landfill. Submitted to the County of Santa Barbara, (March 1999)

Review and Evaluation of the Health Risk Assessment for Outdoor and Indoor Exposures at the Former Golden Eagle Refinery Site, Carson, Ca. (May 1998)

The Avila Beach Health Study Phase 1: Reconnaissance Sampling Findings, Conclusions, and Recommendations. (July 1997) Volume 1: Baseline Human Health Risk Assessment. (May 1998)

The Avila Beach Health Study Phase 1, Volume 2: Environmental Monitoring. (May 1998)

Phase 2 Human Health Risk Assessment, Teledyne Inc., San Diego, Ca. (February 1997)

Determination of Occupational Lead Exposure at a Tire Shop in Placerville, Ca. (April 1993)

Development of an Environmental Code of Regulations for Hazardous Waste Treatment Facilities on La Posta Indian Tribal lands, San Diego County, Ca. (August 1992)

Sampling and Analysis Plan, Health and Safety Plan, Site Characterization of Lead Oxide Contaminated Areas, Mare Island Naval Shipyard, Vallejo, California. Prepared in conjunction with Kaman Sciences Corp. (September 2, 1988)

Sites with RWQCB and/or DTSC Oversight

Dr. Greenberg has specific experience in assessing human health and ecological risks at contaminated sites at the land/water interface, including petroleum contaminants, metals, mercury, and VOCs at several locations in California including Oxnard, Richmond, Avila Beach, Mare Island Naval Shipyard, San Diego, Hollister, San Francisco, Hayward, Richmond, the Port of San Francisco, and numerous other locations. He has used Cal/EPA methods, US EPA

methods, and ASTM Risk Based Corrective Action (RBCA) and Cal/Tox methodologies. He is extremely knowledgeable about SWRCB and SF Bay RWQCB regulations on underground storage tank sites and with ecological issues presented by contaminated sediments including sediment analysis, toxicity testing, tissue analysis, and sediment quality objectives. Dr. Greenberg served on the State Water Resources Control Board Bay Protection and Toxic Cleanup Program Advisory Committee from 1994 until the end of the program in 1999.

Dr. Greenberg experience on many of these contaminated sites has been as a consultant to local governments, state agencies, and citizen groups. He assisted the City and County of San Francisco in developing local ordinance requiring soil testing (Article 20, Maher ordinance) and hazardous materials use reporting (Article 21, Walker ordinance). He served as the City of San Rafael's consultant to provide independent review and evaluation of the site characterization and remedial action plan prepared for a former coal gasification site. He was a consultant to a citizen group in northern California regarding exposure and risks due to accidental releases from a petroleum refinery and assisted in the assessment of risks due to crude petroleum contamination of a southern California beach. He has prepared a number of risk assessments addressing crude petroleum, diesel and gasoline contamination, including coordinating site investigations, environmental monitoring, and health risk assessment for the County of San Luis Obispo regarding Avila Beach subsurface petroleum contamination. That high-profile project lasted for over one year and Dr. Greenberg managed a team of experts with a budget of $750,000. Another high-profile project included the preparation of an extensive comprehensive human and ecological risk assessment for the Hawaii Office of Space Industry on rocket launch impacts and transportation/storage of rocket fuels at the southern end of the Big Island of Hawaii. Dr. Greenberg's risk assessments were part of the EIS for the project. Dr. Greenberg also worked on another high-profile project conducting Air Pathway Analysis of off-site and on-site impacts from landfill gas constituents, including indoor and outdoor air measurements, air dispersion modeling, flux chamber investigations, and health risk assessment for the County of Santa Barbara. Dr. Greenberg has conducted RI/FS work, prepared health risk assessments, evaluated hazardous waste sites and hazardous materials use at numerous locations in California, Hawaii, Oregon, Minnesota, Michigan, and New York. He has considerable experience in the development of clean-up standards and the development of quantitative risk assessments for site RI/FS work at CERCLA sites, as well as site closures, involving toxic substances and petroleum hydrocarbon wastes. He is experienced in working with both Region IX EPA and the State of California DTSC in negotiating clean-up standards based on the application of both site-specific and non site-specific health and ecological based clean-up criteria. He has significant experience in the development of site chemicals of concern list, quantitative data quality levels, site remedial design, the site closure process, the design and execution of data quality programs and verification of data quality prior to its use in the decision making process on large NPL sites.

Examples

The Avila Beach Health Study Phase 1: Reconnaissance Sampling Findings, Conclusions, and Recommendations. (July 1997) Volume 1: Baseline Human Health Risk Assessment. (May 1998)
The Avila Beach Health Study Phase 1, Volume 2: Environmental Monitoring. (May 1998)

Health Risk Assessment and Air Pathway Analysis for the Ballard Canyon Landfill, Santa Barbara County, Ca. (March 1999)

Screening Human Health Risk Assessment, Calculation of Soil Clean-up Levels, and Aquatic Ecological Screening Evaluation, Galilee Harbor, Sausalito, Ca. (May 1998)

Health Risk Assessment Due to Diesel Train Engine Emissions, Oakland, Ca. (June 1999)

Health Risk Assessment for Residual Mercury at the Deer Creek Facility, 3475 Deer Creek Road, Palo Alto, California. (July 1997)

Phase 2 Human Health Risk Assessment, Teledyne Inc., San Diego, Ca. (February 1997)

Human Health Risk Assessment, Teledyne Ryan Aeronautical, McCormick Selph Ordnance. Hollister, California. (December 1996)

Initial Phase Human Health Risk Assessment, Teledyne Inc., San Diego, Ca. (October 1996)

Human Health Risk Assessment, Ecological Screening Evaluation, and Development of Proposed Remediation Goals for the Flair Custom Cleaners Site, Chico, California (January 1996)

Human Health Risk Assessment for the X-3 Extrudate Project at Criterion Catalyst, Pittsburg, Ca. (November 1994)

Screening Health Risk Assessment and Development of Proposed Soil Remediation Levels at Hercules Plant #3, Culver City, Ca. (July 1993)

Ecological Screening Evaluation for the Altamont Landfill, Alameda County, Ca. (June, 1993)

Focused Ecological Risk Characterization, Hawaiian Electric Company, Keahole Generating Station Expansion, Hawaii (June 1993)

Human Health Risk Assessment for the Proposed Palima Point Space Launch Complex, prepared for the Hawaii Office of Space Industry (April 1993)

Ecological Risk Assessment for the Proposed Palima Point Space Launch Complex, prepared for the Hawaii Office of Space Industry (March 1993)

Human Health Risk Assessment for Current and Proposed Expanded Class II and Class III Operations at the Altamont Sanitary Landfill, Alameda County, Ca.
(March, 1993)

Screening Health Risk Assessment for the Proposed Expansion of the West Marin Sanitary Landfill, Point Reyes Station, Ca.
(March, 1993)

Health Risk Assessment for the Proposed Expansion of the Forward, Inc. Landfill, Stockton, Ca. (September 14, 1992)

Health Risk Assessment for the Rincon Point Park Project, San Francisco, Ca. Prepared for Baseline Environmental Consulting and the San Francisco Redevelopment Agency. (August 10, 1992)

Health Risk Assessment for the South Beach Park Project, San Francisco, Ca. Prepared for Baseline Environmental Consulting and the San Francisco Redevelopment Agency. (August 10, 1992)

Screening Health Risk Assessment and Development of Proposed Soil and Groundwater Remediation Levels, Kaiser Sand and Gravel, Mountain View, Ca. Prepared for Baseline Environmental Consulting (January 30, 1992)

Development of Proposed Soil Remediation Levels for the Marine Corps Air-Ground Combat Center, 29 Palms, California (May 30, 1991)

Preliminary Health Risk Assessment for the City of Pittsburg Redevelopment Agency, Pittsburg, California (May 29, 1991)

Military Bases

Dr. Greenberg has experience in conducting assessments at DOD facilities, including RI/FS work, preparation of health risk assessments, evaluation of hazardous waste sites and hazardous materials use at the following Navy sites in California: San Diego Naval Base; Marine Corps Air-Ground Combat Center, 29 Palms; Mare Island Naval Shipyard, Vallejo; Treasure Island Naval Station, San Francisco, Hunters Point Naval Shipyard, San Francisco, and the Marine Corps Logistics Base, Barstow. He worked with the U.S. Navy and the U.S. EPA in the implementation of Data Quality Objectives (DQO's) at MCLB, Barstow.

Examples

Review and Evaluation of the Remedial Investigation Report and Human Health Risk Assessment for the U. S. Naval Station at Treasure Island, Ca. (June 1999)

Screening Health Risk Assessment for the Proposed San Francisco Police Department's Helicopter Landing Pad at Hunters Point Shipyard, San Francisco, Ca. (September 1997)

Development of Proposed Soil Remediation Levels for the Marine Corps Air-Ground Combat Center, 29 Palms, California (May 30, 1991)

Health Risk Assessment for the Chrome Plating Facility, Mare Island Naval Shipyard, Vallejo, California (October 24, 1988)

Background Levels and Health Risk Assessment of Trace Metals present at the Naval Petroleum Reserve No.1, 27R Waste Disposal Trench Area, Lost Hills, California (August 12, 1988)

RCRA Facility Investigation (RFI) Work Plan of Lead Oxide Contaminated Areas, Mare Island Naval Shipyard, Vallejo, California. Prepared in conjunction with Kaman Sciences Corp. (August 14, 1989)

Hazardous Waste and Solid Waste Audit and Management Plan, Mare Island Naval Shipyard, Vallejo, California. Prepared in conjunction with Kaman Sciences Corp. (July 3, 1989)

Water Quality Solid Waste Assessment Test (SWAT) Proposal RCRA Landfill, Mare Island Naval Shipyard, Vallejo, California. Prepared in conjunction with Kaman Sciences Corp. (October 31, 1988)

Waste Disposal Facilities, Waste Haulers, Waste Recycling Facilities Report, Mare Island Naval Shipyard, Vallejo, California. Prepared in conjunction with Kaman Sciences Corp. (September 22, 1988)

Sampling and Analysis Plan, Health and Safety Plan, Site Characterization of Lead Oxide Contaminated Areas, Mare Island Naval Shipyard, Vallejo, California. Prepared in conjunction with Kaman Sciences Corp. (September 2, 1988)

Air Quality Solid Waste Assessment Test (SWAT) Proposal, Mare Island Naval Shipyard, Vallejo, California. Prepared in conjunction with Kaman Sciences Corp. (August 25, 1988)

Mercury Contamination

Dr. Greenberg has prepared and/or reviewed several human health and ecological risk assessments regarding mercury contamination in soils, sediments, and indoor surfaces. Dr. Greenberg served on the State Water Resources Control Board Bay Protection and Toxic Cleanup Program Advisory Committee from 1994 until the end of the program in 1999.

Examples

Review and evaluation of a human health risk assessment of ingestion of sport fish caught from San Diego Bay and which contain tissue levels of mercury and PCBs (November 2004 – present)

Screening Human Health Risk Assessment, Calculation of Soil Clean-up Levels, and Aquatic Ecological Screening Evaluation, Galilee Harbor, Sausalito, Ca. (May 1998)

Health Risk Assessment for Residual Mercury at the Deer Creek Facility, 3475 Deer Creek Road, Palo Alto, California. (July 1997)

Human Health Risk Assessment Due to Emissions from a Medical Waste Incinerator, prepared for Kauai Veterans Memorial Hospital, Kauai, Hawai'i (1994)

To: Sutter Gould & City of Tracy

Re: Proposed new Medical Building at Eaton and Bessie in Tracy
Plan submitted to City of Tracy August 22, 2013.

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- ☐ 3. The trash enclosure, ambulance services, etc. shall be placed to minimize the impact to the adjacent residential neighborhoods.

Mary Sonya Mitracos 9/3/13

Signed Date

Mary M. Tracos 407 W. EATON
363 W. EATON

Print name Address

To: Sutter Gould & City of Tracy

Re: Proposed new Medical Building at Eaton and Bessie in Tracy
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[signature]	9/3/13
Signed	Date
Pete Mitvalos	407 W. EATON 363 W. EATON
Print name	Address

To: Sutter Gould & City of Tracy

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Signed	Date 9-1-2013
Print name Jose L Gonzales	Address 1366 Wall St

To: Sutter Gould & City of Tracy

Re: Proposed new Medical Building at Eaton and Bessie in Tracy
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Tony Funk 9-1-13

Signed Date

Tony Funk 1357 Mall St Tracy CA 95376

Print name Address

To: Sutter Gould & City of Tracy

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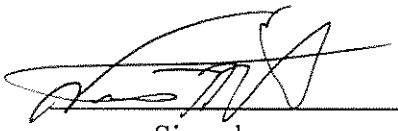

Signed

9/1/13

Date

Victor Mills

Print name

1434 Wall st

Address

To: Sutter Gould & City of Tracy

Re: Proposed new Medical Building at Eaton and Bessie in Tracy
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Oscar Ulloa & Maria D. Dlascencia — 9/01/2013

Signed — Date

Oscar Ulloa — 362 W Eaton Ave

Print name — Address

To: Sutter Gould & City of Tracy

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Jesus Gutierrez Jr. 9/1/13

Signed Date

Jesus Gutierrez Jr. 412 W Eaton Ave.

Print name Address

To: Sutter Gould & City of Tracy

Re: Proposed new Medical Building at Eaton and Bessie in Tracy
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Crystal Gutierrez — 9/1/13

Signed — Date

Crystal Gutierrez — ~~9/1/13~~ 412 W Eaton

Print name — Address

To: Sutter Gould & City of Tracy

Re: Proposed new Medical Building at Eaton and Bessie in Tracy
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Christa Bisbee 9/1/13

Signed Date

CHRISTA BISBEE 1361 Wall Street

Print name Address

To: Sutter Gould & City of Tracy

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Donald R. Bisbee Charlotte W. Bisbee 8/28/2013
Signed Date

Donald R. Bisbee 1361 Wall St, Tracy, CA 95376
Print name Address

To: Sutter Gould & City of Tracy

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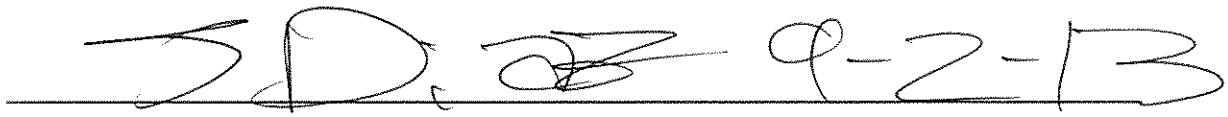
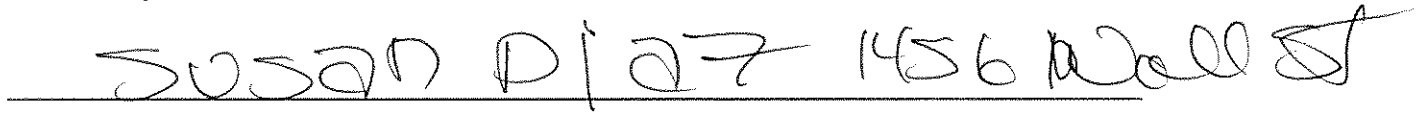


Signed Date



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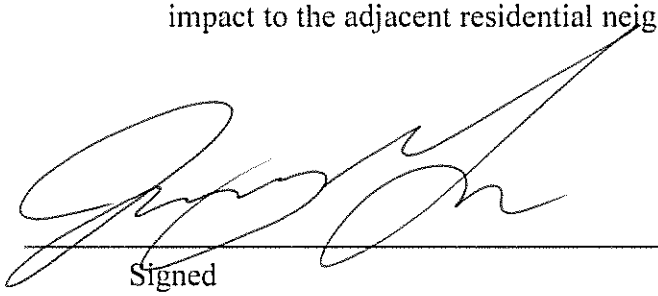

Signed	Date
	9/2/13
Jeremy Gordon	1445 Well St.
Print name	Address

To: Sutter Gould & City of Tracy

Re: Proposed new Medical Building at Eaton and Bessie in Tracy
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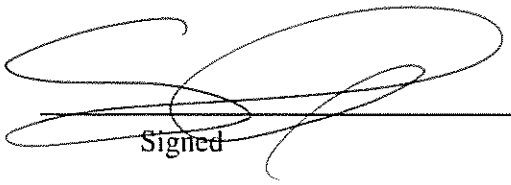

Signed

SEPT 2, 2013

Date

SARAH GORDON

1445 WALL ST

Print name

Address

To: Sutter Gould & City of Tracy

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Alina Cardoza 09/02/13

Signed Date

Alina Cardoza 1405 Wall St.

Print name Address

To: Sutter Gould & City of Tracy

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[signature]	9/2/2013
Signed	Date
Joe Alvidrez	400 W Bessie PL
Print name	Address

To: Sutter Gould & City of Tracy

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David Velasco — 8/2/2013

Signed — Date

David Velasco — 424 W. Beverly Pl.

Print name — Address

To: Sutter Gould & City of Tracy

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Dejuan Brooks 9-2-2013

Signed Date

Dejuan Brooks 1544 Lincoln blvd Apt A Tracy CA

Print name Address

To: Sutter Gould & City of Tracy

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Kari Morales — 9/2/13

Signed — Date

Kari Morales — 422 W. Beverly Pl

Print name — Address

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Amanda Jackson — 8/2/13
Signed — Date

Amanda Jackson — 422 W. Beverly Rd.
Print name — Address

To: Sutter Gould & City of Tracy

Re: Proposed new Medical Building at Eaton and Bessie in Tracy
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William miller 9-2-13

Signed Date

William miller 422 W Beverly Pl.

Print name Address

To: Sutter Gould & City of Tracy

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Joseph M Stansbury 9-2-13

Signed Date

Joseph M Stansbury 4477 Tropaz Ln

Print name Address

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Cristina Garcia 9-3-13

Signed Date

Cristina Garcia 349 W. Eaton Ave

Print name Address Tracy CA. 95376

To: Sutter Gould & City of Tracy

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M. Farakos	9-30-13
Signed	Date
MENA FARAKOS	400 W. 10th St.
Print name	Address
	owner 1339 Wall St.

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09/05/13

Signed Date

Esmeralda Madueca 2209 Gibraltar Lane Tracy Ca. 95377

Print name Address

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Helen Noah 9/3/13

Signed Date

Helen Noah 1338 Wall St

Print name Address

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J R Noah — 9-3-13

Signed — Date

Jimmie R Noah — 1338 West 5th.

Print name — Address

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Cheri Brunow 9-3-13

Signed Date

Cheri Brunow 338 W. Eaton Ave

Print name Address

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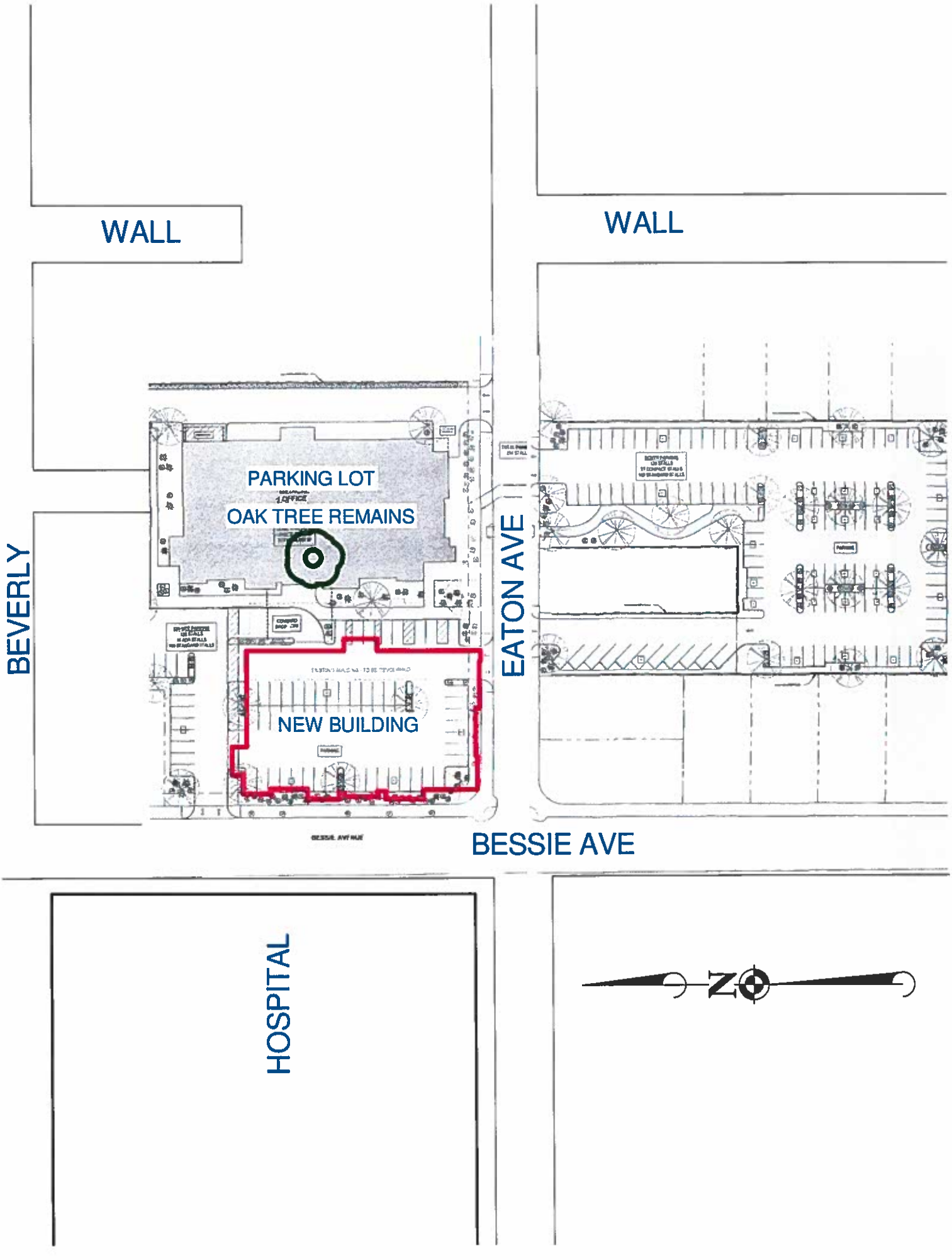
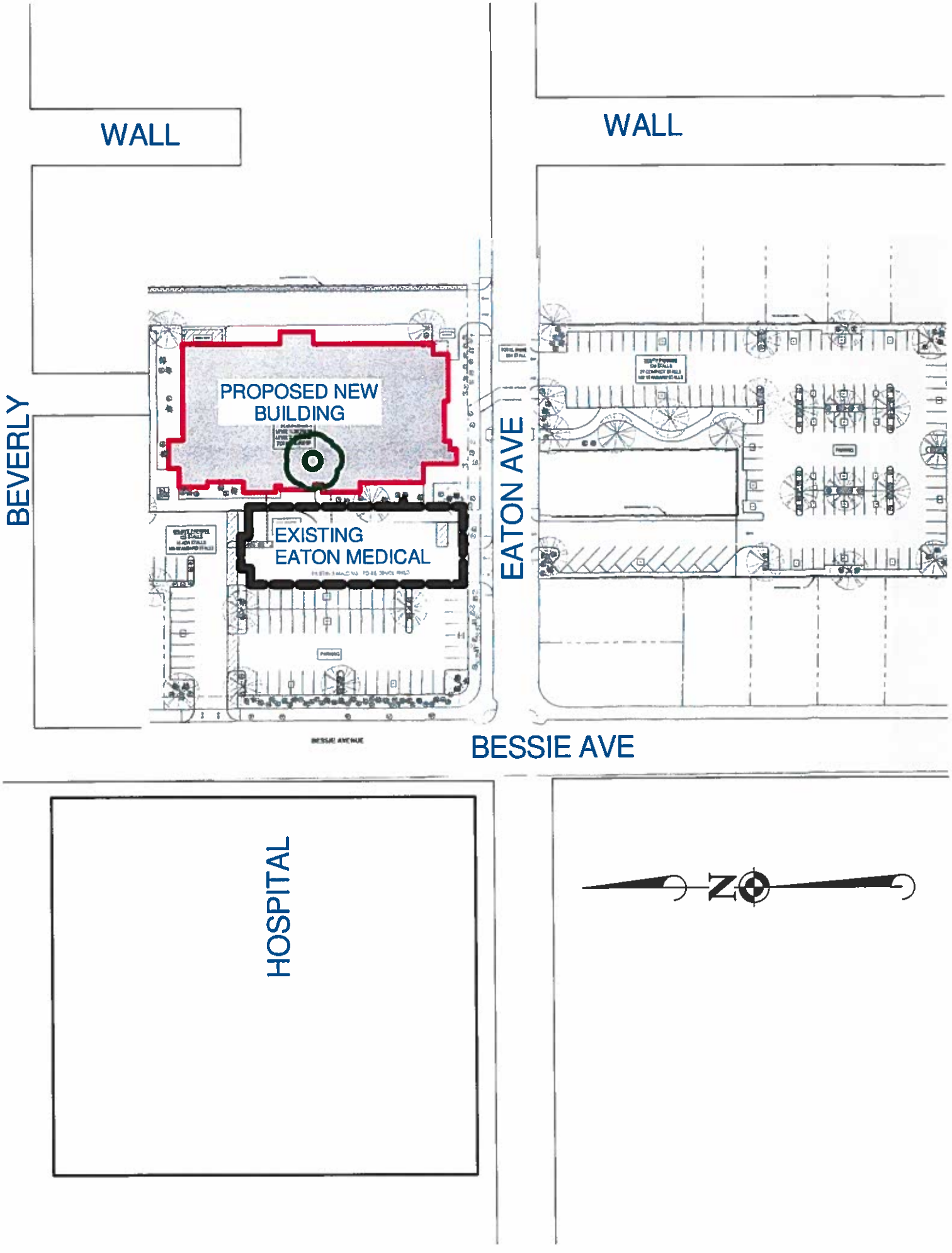
Maria J Ulloa — Sept 3, 2013
Signed — Date

Maria J Ulloa — 411 W. Eaton
Print name — Address


WALL
WALL
PARKING LOT
OFFICE
OAK TREE REMAINS
NEW BUILDING
BEVERLY
EATON AVE
BESSIE AVE
HOSPITAL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