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STAFF REPORT: REGULAR CALENDAR

APPLICATION FILE NO.: **2-02-001**

APPLICANTS: **Eugene Metz, Carol Cebe, David Sherbon, Stephen Bowman, and Richard Carcione.**

PROJECT DESCRIPTION: Removal and replacement of a 410-foot section of a bulkhead on Seadrift Lagoon.

PROJECT LOCATION: Three, 5, 9, 11, and 17 Dipsea Road, Stinson Beach, Marin County
APNs 195-090-32, -30, -06, -33, and -34

SUBSTANTIVE FILE DOCUMENTS: See Appendix A

1.0 EXECUTIVE SUMMARY

The applicants propose to remove 410 feet of wooden bulkhead on the eastern end of Seadrift Lagoon and replace it with a sheet bulkhead consisting of interlocking, PVC sheet pile armor. The new bulkhead would be located landward of the existing bulkhead. The PVC piles would be 14 to 18 feet long and driven 9 to 13 feet into the sand bottom of the lagoon. Staff recommends that the Commission **deny** permit application 2-02-001 because the proposed project is in conflict with resources protection polices 30230 and 30231of the Coastal Act.

2.0 STAFF RECOMMENDATION

The staff recommends denial of Coastal Development Permit Application No. 2-02-001.

Motion: *I move that the Commission approve Coastal Development Permit No. 2-02-001 for the development proposed by the applicant.*

Staff Recommendation of Approval

Staff recommends a **NO** vote. Failure of this motion will result in denial of the permit and adoption of the following resolution and findings. The motion passes only by affirmative vote of a majority of the Commissioners present.

Resolution

The Commission hereby denies a coastal development permit for the proposed development on the ground that the development will not conform with the policies of Chapter 3 of the Coastal Act. Approval of the permit would not comply with the California Environmental Quality Act because there are feasible mitigation measures or alternatives that would substantially lessen the significant adverse impacts of the development on the environment.

3.0 FINDINGS AND DECLARATIONS

The Commission hereby finds and declares as follows:

3.1 Project Location

The project site, located on the filled portion of the sand spit between Dipsea Road and Seadrift Lagoon in Stinson Beach, Marin County, spans across five separate but contiguous parcels that are on the easternmost end of the lagoon (three, 5, 9, 11, and 17 Dipsea Road) and is within the privately maintained, gated community of Seadrift (Exhibit 1, Location Map & Exhibit 2, Vicinity Map). The applicants' parcels are each developed with single-family residences, are approximately 130 feet long and 60 to 130 feet wide, and extend 12 feet into the interior of the lagoon (Exhibit 3, Assessor Parcel Map). The properties are bordered on the north and south by existing residences, the east by Dipsea Road, and the west by Seadrift Lagoon. Seadrift Lagoon is an artificially created interior lagoon located between Dipsea and Seadrift Roads and which encompasses part of Bolinas Lagoon. The waters of Seadrift Lagoon are part of the Gulf of the Farallones National Marine Sanctuary. As with all of the properties located adjacent to Seadrift Lagoon, an existing wooden bulkhead separates the lagoon from the landward portion of the properties. The bulkhead, installed around 1967, is approximately three feet high and consists of creosote treated wooden posts and lagging (Exhibit 4, Site Photograph). Extensive damage and deterioration has occurred within this section of the Seadrift bulkhead. In some areas the wood has deteriorated to such an extent or been washed away that sediment from the parcels is eroding into the lagoon.

3.2 Project Description

The applicants propose to remove the section of the existing bulkhead in front of their properties, which totals approximately 410 linear feet and replace it with a PVC sheet pile bulkhead. The replacement bulkhead would consist of interlocking, PVC sheet pile armor (specifically, a product called ShoreGuard™) and would be placed landward of the existing wooden bulkhead (Exhibit 5, Site Plan and Typical Bulkhead Cross Section). The PVC piles would be 14-18 feet long and driven 9 to 13 feet into the sand bottom of Seadrift Lagoon using a vibrating hammer on a crane which would be located on a barge in the lagoon. Before the proposed bulkhead is installed, the existing bulkhead would be removed using chains attached to the crane that would grasp the wooden pilings and whaler boards and pull the materials out of the sand bottom. The removed pieces of bulkhead to be disposed of off site and the PVC sheet piles would either be contained on the same barge as the crane or on two smaller barges (Exhibit 6, Bulkhead Installation Plan). The barges would be transported by land and launched from a vacant parcel at the west end of Seadrift Lagoon. This vacant parcel is used as a recreational area and for boat trailer storage (Exhibit 7, Barge and Crane Launching Site).

3.3 Coastal Act Issues

3.3.1 Water Quality

Coastal Act Section 30230 states:

> *Marine resources shall be maintained, enhanced, and where feasible, restored. Special protection shall be given to areas and species of special biological or economic significance. Uses of the marine environment shall be carried out in a manner that will sustain the biological productivity of coastal waters and that will maintain healthy populations of all species of marine organisms adequate for long-term commercial, recreational, scientific, and educational purposes.*

Coastal Act Section 30231 states:

> *The biological productivity and the quality of coastal waters, streams, wetlands, estuaries, and lakes appropriate to maintain optimum populations of marine organisms and for the protection of human health shall be maintained and, where feasible, restored through, among other means, minimizing adverse effects of waste water discharges and entrainment, controlling runoff, preventing depletion of ground water supplies and substantial interference with surface water flow, encouraging waste water reclamation, maintaining natural vegetation buffer areas that protect riparian habitats, and minimizing alteration of natural streams.*

Seadrift Lagoon is hydrologically connected with Bolinas Lagoon via two tidal gates located at the west and east ends of Seadrift Lagoon. The tidal gates are used by the Seadrift Association to maintain a certain water level in Seadrift Lagoon. When the gates are open, water from Bolinas Lagoon flows into Seadrift Lagoon via the western tide gate and water from Seadrift Lagoon flows into Bolinas Lagoon through the eastern tide gate. This eastern gate is located approximately one parcel over from the project site.

Bolinas Lagoon is within the Gulf of the Farallones National Marine Sanctuary, one of four national marine sanctuaries in California and one of thirteen in the nation. The Sanctuary was designated in 1981 to protect and manage the 1,255 square miles encompassing the Gulf of the Farallones, Bodega Bay, Tomales Bay, Drakes Bay, Bolinas Bay, Estero San Antonio, Estero de Americano, Duxbury Reef, and Bolinas Lagoon. The approximately 2.2-square-mile (1,400-acre) Bolinas Lagoon contains environmentally sensitive habitat, including wetland and mudflats. Bolinas Lagoon provides an important haul-out and birthing site for harbor seals. In addition, benthic invertebrates and fish in the lagoon support a great diversity and abundance of wintering and migratory shorebirds, waterfowl, gulls, and other water-associated birds (Marin County LCP 1981). Bolinas lagoon is the only designated "Wetland of International Significance" on the Pacific Flyway as determined by the Convention on Wetlands of International Importance in 1998, and was recognized particularly for its waterfowl habitat. Approximately 245 species of birds have been identified at the Lagoon and its surrounding watershed. Twenty-three of these species are considered rare, threatened, or endangered. Shorebirds and waterbirds such as the brown pelican, snowy plover, dunlin, great blue heron, black crowned night heron, willet, sandpiper, and greater sand plover have been observed on the lagoon. Heron and egret are known to nest in the lagoon. Of the fifty or so estuaries that have formed along the Pacific Coast, Bolinas Lagoon is one of only 13 that sustains large numbers of migratory shorebirds. Furthermore, the Bolinas Lagoon Management Plan prepared by Marin County in 1996 also identified three species each of amphibians and mammals that frequent

Bolinas Lagoon as rare, threatened or endangered (Bolinas Lagoon Ecosystem Restoration 2001). Marin County designates Bolinas Lagoon as a County Nature Preserve. The U.S. Army Corps of Engineers found that Bolinas Lagoon is part of a larger natural habitat complex that is part of or adjoins the Sanctuary, encompassing the Pt. Reyes National Seashore, Golden Gate National Recreation Area, Central California Coast Biosphere Preserve, Mt. Tamalpais State Park, and the Audubon Canyon Ranch Bird Sanctuary (USACOE 1997).

Coastal Act Section 30230 requires that marine resources be maintained, enhanced, and where feasible, restored and provides special protection to areas and species of special biological or economic significance. Coastal Act Section 30231 further requires that the biological productivity and the quality of coastal waters, streams, wetlands, estuaries, and lakes appropriate to maintain optimum populations of marine organisms and for the protection of human health be maintained and, where feasible, restored through, among other means, minimizing adverse effects of waste water discharges and entrainment, controlling runoff, preventing depletion of groundwater supplies and substantial interference with surface water flow, encouraging waste water reclamation, maintaining natural vegetation buffer areas that protect riparian habitats, and minimizing alteration of natural streams. The Commission considers Bolinas Lagoon to be a unique and important coastal wetland and finds that any development proposed within the connected Seadrift Lagoon must be undertaken to avoid impacts that would significantly degrade the biological productivity and quality of these connected coastal waters and wetlands consistent with Coastal Act Sections 30230 and 30231. Furthermore, Seadrift community members use Seadrift Lagoon for recreational swimming and non-motorized boating. Thus, it is important that the proposed project protect human health of recreational users of these waters consistent with Section 30231.

At the October 2002 hearing, the Commission raised concerns about the proposed use of PVC sheet piles and their potential to add plastic debris to the marine environment. Since plastic is an inorganic material, it does not biodegrade, but rather continually breaks down into ever-smaller pieces. The presence of plastics in the coastal and ocean environment is both widespread and harmful to human and marine life.

An article, written by Jose G.B. Derraik, entitled "The pollution of the marine environment by plastic debris: a review," reviews much of the literature published on the topic of deleterious effects of plastic debris on the marine environment. The article states:

> *The literature on marine debris leaves no doubt that plastics make-up most of the marine litter worldwide.* (Derraik 2002)

In support of this statement, the article includes a table that presents figures on the proportion of plastics among marine debris around the world. In most of the locations listed on the table, plastics represented more than 50 percent of the total marine debris found in areas such as beaches, shorelines, surface waters, harbors, and seafloors (Derraik 2002). In the Pacific Ocean, researchers found in the North Pacific Central Gyre, which serves as a natural eddy system to concentrate neustonic material, including plastic, a mean of 334,271 pieces of plastic per square mile (Moore 2001).

Whether found deposited on beaches, floating on surface waters, suspended in the water column or settled on seafloors, plastic debris creates problems for both marine life and human activities. Plastic marine debris affects at least 267 species worldwide, including 86% of all sea turtle

species, 44% of all sea bird species, and 43% of marine mammal species (Laist 1997). For example, plastics cause significant adverse impacts in seabirds, when birds mistakenly ingest the plastic debris. A study performed in 1988, concluded that seabirds consuming large amounts of plastics reduce their food consumption, which limits their ability to lay down fat deposits and in turn reduces fitness. In addition, ingesting plastics can block gastric enzyme secretion, diminish feeding stimulus, lower steroid hormone levels, delay ovulation, and cause reproductive failures (Derraik 2002). Plastic debris that has settled on the seabed floor also harms the biological productivity of coastal waters. In Derriak's article, he states:

> *The accumulations of such [plastic] debris can inhibit gas exchange between the overlying waters and the pore waters of the sediments, and the resulting hypoxia or anoxia in the benthos can interfere with the normal ecosystem functioning, and alter the make-up of life on the sea floor. Moreover, as for pelagic organisms, benthic biota is likewise subjected to entanglement and ingestion hazards. (Derraik 2002)*

Plastic marine debris may also cause impacts to humans, such as impacting fisherman or recreational boaters by fouling props and jamming cooling intakes.

In a previous action denying CDP File No. E-95-5, the Commission found that a project proposing the use of PVC, among other materials in the marine environment was inconsistent with Coastal Act Section 30230 and 30231 because the materials used for the project, including the PVC plastic, would contribute to marine debris and pose a significant risk of harm to marine resources and to the quality and biological productivity of coastal waters. The findings included information on PVC debris issues related to Tomales Bay and Point Reyes National Seashore (PRNS), coastal areas just north of the proposed project. The report included the following findings:

> *Johnson's Oyster Farm, an aquaculture operation in Tomales Bay, Marin County, utilizes sections of PVC pipe as a substrate for the culture of oysters. Although Johnson's aquaculture facility is located within the semi-sheltered environment of Tomales Bay, tidal currents have broken up and carried many sections of the PVC pipe out to sea. Eventually, some of the PVC pipe washed up on beaches along the Point Reyes National Seashore and beyond. According to a personal conversation with John Del Osso, Ranger, at the Point Reyes National Seashore, PVC pipe is easily moved about by ocean forces. Once in the surf zone, the PVC can be broken up by the forces of the crashing waves. PVC pipe has been the source of on-going clean-up within the Point Reyes National Seashore.*

Unlike the denied application, the applicants do not propose using PVC pipe in the marine environment; however, they are proposing PVC sheet piles. If the proposed PVC sheet piles were to break into pieces, like PVC piping, they would also contribute to the plastic marine debris problem.

The manufacturer of ShoreGuard™, the proposed PVC product, guarantees a warranty of 50 years, which excludes failure, damage, or malfunction resulting from misuse, abuse, negligence, alteration, modification, accident, excessive loads, normal wear and tear, lack of proper maintenance, impact of foreign objects, tornado, hurricane, flood, or fire; however, PVC sheet piles have not been in existence for 50 years. Thus, there are no examples that can be identified which would demonstrate exactly how long the PVC sheet piles would survive in Seadrift

Lagoon before they would begin to break down. If the proposed bulkhead were installed, the PVC sheet piles would be exposed to ultra violet radiation. The PVC contains stabilizers that are intended to protect the PVC from degradation, which may result from UV exposure. Notwithstanding the protection provided by the stabilizers or the manufacturers guarantee, the potential does exist that the PVC bulkhead would degrade over time. If the sheet piles were to become brittle, they may splinter upon impact and would introduce PVC debris into the lagoon. PVC debris would cause adverse effects to water quality in Seadrift Lagoon, and may migrate into Bolinas Lagoon and the Pacific Ocean. As discussed Bolinas Lagoon supports a great diversity and abundance of wintering and migratory shorebirds, waterfowl, gulls, and other water-associated birds. PVC debris resulting from the proposed project would degrade the water quality and pose threats to the wildlife of the lagoon. Thus the project would result in significant adverse impacts to the biological productivity and quality of coastal waters inconsistent with Sections 30230 and 30231.

Over time, due to the weathering and recreational uses in and around the lagoon, the PVC bulkhead may breakdown into smaller pieces and contribute to the existing plastic marine debris. Plastics in the marine environment create a significant risk of harm to marine resources and to the quality and biological productivity of coastal waters. The Commission therefore finds that the proposed PVC bulkhead project is inconsistent with Coastal Act Sections 30230 and 30231.

3.3.1.1 Response to public comments received on Polyvinyl Chloride (PVC) and Water Quality Impacts

Commission staff has received comments related to concerns of the environmental and health impacts of the manufacturing and disposal of PVC. However, since neither manufacturing nor disposal of PVC is proposed under CDP Application 2-02-01, these issues are not before the Commission. Disposal of PVC or any other construction materials related to the proposed development within the Coastal Zone would require a coastal development permit, which would provide for Commission review of potential impacts of PVC disposal consistent with Chapter 3 of the Coastal Act.

In addition to concerns related to the production and disposal of PVC, Commission staff has received comments on potential water quality and human health impacts related to the use of PVC in Seadrift Lagoon, which include the following:

- The proposed PVC sheet pile would leach and outgas toxic compounds into the marine environment that may cause significant adverse impacts to marine wildlife and the aquatic environment;
- Vinyl chloride monomer, trace component of PVC, would be released into the environment and cause impacts to human health; and
- The proposed PVC bulkhead would release dioxin if burned. [1]

[1] Dioxin is a by-product whenever chlorine gas is used or chlorine-based organic chemicals are burned or processed under reactive conditions.

3.3.1.1(a) PVC Leachates

PVC is comprised of chlorine, carbon, and hydrogen. To create PVC, mineral oil, natural gas and sodium chloride (salt) are manufactured into ethylene and chlorine, which are synthesized into vinyl chloride monomers (VCM) that are then polymerized to polyvinyl chloride (PVC). Once the PVC is created, additives are combined with the PVC to give the finished product desired qualities such as flexibility, strength, and color.

Individuals are concerned that the additives contained in the proposed PVC sheet pile would leach into Seadrift Lagoon and cause significant adverse impacts to human health, marine wildlife, and the aquatic environment. The comments received by Commission staff focused on two additives: (1) plasticizers, which are used to make PVC flexible and (2) stabilizers, which are used to extend the life of the PVC when it is exposed to heat or ultraviolet light and pigments are added for color. Specifically, the stabilizers and plasticizers of concern include the following:

Plasticizers	**Stabilizers**
Phthalates	Lead
Bisphenol A	Cadmium
Alkylphenols	Organotins
Alkylphenol Polyethoxlanol	Derivatives of alkylphenol phosphates

The proposed bulkhead would consist of a rigid PVC. Thus, it is logical to conclude that the proposed material does not contain plasticizers. Nevertheless, to ensure that this is the case, Commission staff contacted the manufacturer regarding the above listed plasticizers and was told that the PVC used in ShoreGuard™ does not contain any of the above listed plasticizers, nor does it contain the following stabilizers: lead, cadmium, and derivatives of alkylphenol phosphates (Kantola, pers. comm.) (Wisner 2002). Thus, the use of the aforementioned stabilizers and plasticizers in PVC is not before the Commission for review of consistency with the Chapter 3 policies of the Coastal Act as part of Coastal Development Permit Application No. 2-02-001.

The ShoreGuard™ material does contain organotin stabilizer compounds. Organotins are compounds which contain at least one bond between tin and carbon. There are three major types of tin stabilizers, which are distinguished by their respective alkyl groups: methyl, butyl, and octyl.

Clear distinctions must also be drawn between the tri-organotin compounds (which have three tin-carbon bonds) used as biocides and pesticides, and the mono- and di- organotin compounds, with one and two tin-carbon bonds, respectively, used in stabilizer, catalyst, and glass coating applications. Biocides are, by definition, toxic and tri-organotin compounds that can be a potent endocrine disruptor causing major damage to marine wildlife populations.[2] However, Tri-

[2] Endocrine disruptor is an exogenous agent that interferes with the synthesis, secretion, transport, binding, action, or elimination of natural hormones in the body which are responsible for the maintenance of homeostasis reproduction,

organotin compounds such as tributyltin (TBT) are not used as PVC stabilizers. Mono- and di-organotins, on the other hand, are much less toxic. In fact, certain mono- and di-organotins have been approved as PVC stabilizers for food contact throughout the world (State of California, Department of Housing and Community Development 1998).

Many of the comments on the project submitted raised concerns with the use of TBT. TBT proved to be a highly effective biocide in preventing the attachment and growth of fouling organisms such as barnacles and tube worms on the hulls of vessels. For this reason, it was widely used in the 1960s and 1970s as a paint additive in antifouling coatings on boats. TBT was initially believed to be toxic only to fouling organisms on the painted surface and the not an environmental risk. However, TBT was later found to cause imposex in mollusks as well as other adverse impacts to aquatic wildlife. In 1988, the United States passed the Organotin Antifouling Paint Control Act, which restricts the use of TBT-based marine antifouling paints to ships greater than 25 meters in length or those with aluminum hulls.

The comments submitted stated that the mono- and di-butyltin compounds used in PVC are contaminated with TBT. This is not the case. Mono- and di-butyltins can exist as PVC stabilizers themselves or as degradation products of TBT. As explained previously, TBT, a tri-organotin, is used either as a biocide or pesticide, and is therefore not a part of the PVC product proposed for use. According to the manufacturer, the ShoreGuard™ product is composed of a mixture of five percent virgin and ninety-five percent recycled PVC resin. The PolyOne Corporation, the supplier of the virgin PVC resin used in the manufacturing of the ShoreGuard™ product, stated in writing that the organotin stabilizer compound used in the virgin PVC resin is at less than 1.0 percent of the chemical make-up of the PVC and is a 50/50 mixture of dimethyltin [$(CH_3)_2Sn(SCH_2COOC_8H_{17})_2$] and monomethyltin [$(CH_3)Sn(SCH_2COOC_8H_{17})_3$] (Kantola 2002). The manufacture has not provided documentation on the chemical make-up of the recycled PVC resin; however, the manufacturer has indicated that it is feasible to produce the PVC sheet piles out of one hundred percent virgin PVC resin. It is therefore logical to conclude that neither mono-butyltins nor di-butyltins would be released to the environment from a one hundred percent virgin PVC sheet pile either as TBT breakdown products or as a result of leaching stabilizer because TBT is not a part of the PVC product proposed for use. Since mono-butyltins, di-butyltins, and TBTs are not present in the proposed PVC material, there is no risk that they would leach into the marine environment as a result of the proposed development.

In addition to concerns raised with TBT, dibutyltins, and monobutyltins, Commission staff received general comments about the effects of organotins on human health and the marine environment, which include the following: (1) heavy metals such as organotins, resist environmental breakdown and have become global pollutants; (2) the immunotoxicity of some organotins in animals has raised concerns about organotin effects in humans; and (3) organotins can suppress immunity, disrupt the endocrine system, cause birth defects, damage liver, bioduct and pancreas, and may pose a threat to aquatic organisms.

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development and/or behavior. Research is being conducted on the relationship between breast cancer and endocrine disruptors.

Studies published in the scientific literature show that low concentrations of organotins leach into water from rigid PVC pipes (State of California, Department of Housing and Community Development 1998; Sadiki and Williams 1999). Thus, it is likely that some organotin compounds would leach from the proposed PVC bulkhead when exposed to marine waters. As such, the Commission must evaluate whether the proposed development would be carried out in a manner that would sustain the biological productivity and quality of coastal waters adequate to maintain healthy populations of all species of marine organisms and for the protection of human health as required by Coastal Act Sections 30230 and 30231.

The likelihood that some organotins would leach from the material does not necessarily render the proposed development inconsistent with Coastal Act Sections 30230 and 30231. Rather, the issue is whether leaching of organotins from the proposed bulkhead would cause the biological productivity and quality of coastal waters to become inadequate to maintain healthy populations of all species of marine organisms and/or to be hazardous to human health.

The Commission finds that the leaching of organotins into Seadrift Lagoon as a result of the proposed development would not significantly affect the biological productivity and quality of coastal waters because:

- Organotins are not generally persistent in the environment as they are broken down rapidly through microbial activity;
- The mono- and di-organotins contained in PVC and the eventual breakdown product of inorganic tin are much less toxic than tri-organotins;
- The concentration of organotin compounds released to the lagoon would be substantially below the levels determined to be safe for drinking water and the levels shown to be toxic to aquatic organisms; and
- Extensive studies have found PVC products containing organotin compounds do not pose a significant risk to human health in such applications as drinking water pipes (State of California, Department of Housing and Community Development 1998).

Studies have shown that biological degradation of methyl-, butyl- and octyl-tin compounds occur in the aquatic environment. Specifically for mono- and di-methyltins (the stabilizers used in the proposed bulkhead), their half lives, in the absence of methylating organisms to reverse the demethylation process, are estimated to be less than a few months (Maguire 1991). Other researchers have offered a half-life range of a few days to several weeks (ORTEP). These studies indicate that organotins do break down.

Acute toxicity data for organotin compounds are also available. A Canadian study has shown that concentrations of monomethyltin that inhibit 50% of growth (i.e., EC_{50}) of bacteria, yeasts, *D. magna* and some algae are generally greater than 1 mg/L. Some diatoms, however, are inhibited at concentrations as low as 0.08 mg/L. Nevertheless, the figure of 0.08 mg/L is still 67 times higher than the highest concentration of monomethyltin observed in water. Similarly, EC_{50} for dimethyltin is estimated at greater than 0.07 mg/L, and usually greater than 1 mg/L, depending on the target organisms. Again, the figure of 0.07 mg/L is about 150 times higher than the highest concentration of dimethyltin observed in water. It therefore appears that the mono- and di-methyltin compounds would not have acute toxic effects to aquatic organisms. It should be noted that this study had investigated findings from other researchers and monitoring

results from harbors, marinas, and shipping channels in Canada and elsewhere. Similar toxicity results appear to hold true for mono- and di- butyltins and octyltins as well. Other studies support these conclusions (Maguire 1991;Walsh et.al. 1985; ORTEP).

In terms of potential chronic effects of organotins on the aquatic environment, a 1993-1994 study of water across Canada concluded that the 13 non-TBT organotin species found appeared to pose no acute or chronic hazards to fresh water or marine organisms (Chau et.al. 1997).

The State's Department of Housing and Community Development (HCD) published a *Draft EIR for CPVC Pipe Use for Potable Water Piping in Residential Buildings* in 1998. The draft EIR examined the potential human and environmental impacts associated with the use of CPVC for potable water piping. CPVC consists of long chains of vinyl chloride, to which chlorine is added. PVC is essentially the parent polymer of CPVC. CPVC is more resistant to chemical attack than PVC and does not soften until it reaches a higher temperature, and thus would be more suitable for use in potable water piping.

CPVC and PVC have been widely used for a variety of things in the existing environment. Some examples include toys, food storage plastics, water filter bodies and garden sprinkler pipe and irrigation pipe commonly used in landscape irrigation and production agriculture. The draft EIR recommended that CPVC be used for potable water piping in residential buildings as well. It had already been approved for that particular use in all of the other 49 states, and many foreign countries.

The National Sanitation Foundation (NSF), a not-for-profit, non-governmental organization, involved in standards development, product certification, education, and risk-management for public health and safety has tested and certified many of the common uses of PVC products. The Maximum Contaminant Levels (MCLs) established by USEPA and Cal DHS form the basis for NSF Standards for Drinking Water System Components Health Effects. The MCLs are levels at which no adverse human health impacts would be expected throughout a lifetime of exposure. The MCLs also incorporate a margin of safety. NSF generally uses 10% of the MCL, which provides an additional margin of safety. For contaminants for which there is no MCL, a risk estimate [Maximum Allowable Level (MAL)] is calculated by NSF, following a standard risk assessment protocol developed in concert with the USEPA.

In laboratory experiments, organotins have been detected in water which has been in contact with CPVC pipe and fittings. Standards for organotins in drinking water have been established by NSF using the MAL approach: Short Term Exposure Level (STEL) of 100 µg/L and Maximum Drinking Water Level (MDWL) of 20 µg/L. The draft EIR stated that no studies found had organotin levels above either of these standards. NSF's extraction tests also yielded organotin concentrations lower than the established standards. It should be noted that these extraction tests were performed at elevated temperatures to actively induce leaching, and so the actual concentrations of organotins in drinking water would be lower than suggested by the test data. The draft EIR concluded that higher concentrations of organotins tended to be a transitory effect of new installations and were not significant. And, leaching occurred more readily in hot water than in cold. The report arrived at a similar "insignificant" determination for

environmental impacts as a result of CPVC use (State of California, Department of Housing and Community Development 1998).

Based on the literature reviewed, the Commission also finds that the evidence does not support a determination that the PVC bulkhead proposed for use in the aquatic environment would be hazardous to human or ecological health. Organotins, the primary leachates of concern, constitute 1% of the PVC chemical make-up. Studies have shown that even though the leaching of organotins does occur, the leachates tend to break down quickly and do not accumulate to levels approaching the reported effective concentrations for the biological indicators used. Similarly, laboratory extraction tests, employing stringent conditions, on CPVC pipes have yielded leached organotin concentrations below even the conservative human health-based criteria. Therefore, even though organotins would leach from the proposed bulkhead, especially immediately upon installation, mitigating factors in the environment such as the constant flushing and dilution provided by the surrounding water and the fact that the bulkhead would not be subject to temperature extremes as the CPVC pipes used in the extraction tests help ensure that the resultant organotin concentrations in the receiving water would be low and not pose significant adverse impacts to either human or ecological health.

In addition to Commission staff's evaluation of the proposed use of PVC in the marine environment, an independent review of product, regulatory, and environmental data associated with the use of PVC as proposed by the applicants was completed by Stellar Environmental Solutions, Inc. for the Seadrift Association. The review includes responses from various regulatory agencies regarding the use of PVC in the marine environment. The Regional Water Quality Control Board, San Francisco Bay Region, did not have any concerns about potential chemical leaching or any other health and safety issues. Terry Oda, Chief of Standards and Permits, Clean Water Act, for the U.S. EPA did not have any knowledge of EPA environmental concerns or limitations on the use of rigid PVC project in the Seadrift Lagoon. The U.S. Army Corps of Engineers was not aware of any concerns related to leachabilty and potential environmental impacts to water quality from the PVC product. The U.S Fish and Wildlife Service not have any environmental concerns about the use of rigid PVC in a lagoon environment (Makdisi 2002).

Therefore, the Commission finds that based on the current information available, the leaching of dimethyltin and monomethyltin from the proposed bulkhead would not cause significant adverse impacts to the biological productivity and quality of coastal waters consistent with Coastal Act Sections 30230 and 30231.

In evaluating the potential cumulative impacts of the proposed development, the Commission must consider reasonably foreseeable future projects. Staff is aware that the Seadrift Association is considering replacing the remaining portions of the Seadrift Lagoon bulkhead with ShoreGuard™. As such, the Commission must consider the potential impacts of the proposed development to the biological productivity and quality of marine waters in combination with the replacement of the entire Seadrift Lagoon bulkhead with ShoreGuard™.

As discussed above, mono- and dimethyltins break down within days to a few months in the environment, and the rate at which these compounds leach from PVC water pipes diminishes

rapidly within the first 24 hours of contact with water. Recent studies (McLellan, 2002) found that concentrations decreased approximately 50% in the first three days, and 98% over 21 days. Thus, the concentration of organotins that would leach from the section of bulkhead proposed to be replaced under this permit application would substantially decrease within a few days to a few weeks following installation. Therefore, in addition to the fact that the concentrations of organotins that would result in lagoon waters would be substantially below the level found to produce harmful effects to aquatic organisms, the highest concentration of organotins would occur in the short-term only.

The Seadrift Association has not submitted a permit application for the replacement of the remaining portions of the bulkhead for Commission review. As such, it is improbable that such a project, if permitted, would be carried out at the same time as the proposed project. Thus, by the time that any future project to replace the remaining portions of the bulkhead occurs, the short-term higher concentration of organotins associated with the proposed project would be substantially diminished due to environmental break down and decreased rate of leaching.

As discussed above, the highest concentration of organotins found to leach from drinking water pipes is approximately 150 times below the level found to be harmful to the most sensitive aquatic organisms studied for such effects. Although data concerning the rate that organotins leach from rigid PVC in seawater is not available, it is reasonable to conclude based on the foregoing that the proposed development would not result in significant adverse individual or cumulative impacts to the biological productivity or quality of coastal waters. Furthermore, studies have reported a leaching rate of 0.0023% per year for PVC for water passing through pipes (Morton, 1998). Taking the most conservative approach, assuming the unlikely scenario that all of the organotins contained in the PVC bulkheads could continue to leach into the lagoon over time, the concentrations would continue to be far below those reported to be harmful to the most sensitive aquatic organisms.[1] However, it is more reasonable to assume, based on the discussions above, that the future installation of bulkheads would likely occur in phases, and that any concentrations of organotins associated with those installations would also degrade quickly, and not result in any long term impacts to coastal resources.

Based on the foregoing the Commission finds that the proposed development would not result in significant adverse individual or cumulative impacts to the biological productivity or quality of coastal waters.

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[1] Assuming 12,000 feet of PVC bulkhead containing 1% organotins by weight:
Panel weight = 5.4 lbs/sq ft
Panel dimension 1 foot x 18 feet (18 Sq ft)
Organotins by weight: .054 lbs/sq ft
Organotins (weight) per panel: 0.972 lbs
Weight of Organotins for entire 12,000 linear feet of installation: 11,664 lbs
Weight of organotins (11,664 lbs) in milligrams: 5,290,790,000 mg
Annual organotin leachate from completed installation (at 0.0023%): 121688.17mg/yr
Lagoon volume 90,000,000 gallons (340,650,000 liters)
Concentration of organotins in lagoon from leachate on an annual basis: 0.00035 mg/L
(121688.17mg/340,650,000 liters = 0.00035 mg/L)

3.3.1.1(b) Health Impacts of Vinyl Chloride Monomers (VCM)

The concern has also been raised that vinyl chloride monomer (VCM), a trace component of PVC, would be released into the environment from the proposed bulkhead and cause impacts to human health. Public comments included information on VCM from a company called TurnerToys™, which states, "VCM does not, theoretically, occur in PVC polymer produced with perfect quality control. However, this highly toxic and carcinogenic compound has been found to be a trace component of PVC. There have been reports of VCM detected in drinking water that has been standing for a period of time in PVC water pipe." TurnerToys™ also states, "the main risk of VCM, however, has been found to be primarily to workers in plants producing PVC or producing PVC resin from the VCM monomer; and also to people living close to such plants"(TurnerToys™). As stated above, the production of PVC is not part of the proposed development and therefore, not before the Commission for review of consistency with the Coastal Act.

However, the information from TurnerToys™ also states that "exposure hazard to users of PVC products is not theoretically inherent in the process, but in fact occurs due to inevitable lapses in production quality control and housekeeping" (TunerToys™). Literature reviewed by staff indicates that exposure of the general public to VCM is considered very low, unless one lives near a PVC plant. These exposures are a result of direct emissions and effluents from the plastic industries. Average daily intake of vinyl chloride through inhalation by local residents ranges from trace amounts to 2,100 μg/day. The average daily intake of vinyl chloride by the remainder of the population, on the other hand, is minimal and essentially zero (NIH, NIEHS, NTP).

Sustained exposure to high concentrations of vinyl chloride during the manufacturing process causes angiosarcoma of the liver, with inhalation being the most likely route of exposure. Comments received by staff also included case studies on angiosarcoma of the hand for workers routinely exposed to pipes and cement containing PVC (Mohler et. al. 1998). In these latter cases, the individuals were exposed to years of routine dermal contact with the pipes and pipe shavings.

Any potential health risk posed by vinyl chloride would depend on both the chemical's toxicity and human's exposure to it. Residents and/or swimmers of Seadrift Lagoon would in no way be subject to the same levels of vinyl chloride exposure as PVC workers. The amount of vinyl chloride uptake by individuals (used along with toxicity to estimate chronic health risks, both carcinogenic and non-carcinogenic) would depend primarily on three factors: (1) chemical concentration in the media that comes in contact with the receptors (i.e., air and water); (2) amount of media that is uptaken or comes in contact with the receptors; and (3) frequency and duration of uptake or contact. The PVC workers mentioned in the examples given either inhaled air with persistently high concentration of vinyl chloride in an environment with limited circulation or handled PVC pipes, exposing their hands to direct skin contact with PVC materials. It can further be assumed that these workers were exposed to vinyl chloride for several hours per day and all the work days in a year, and that kind of media contact was sustained for years of their lives.

In contrast, the amount of residual VCM on the proposed PVC bulkhead would be relatively small to begin with and would decrease over time. Based on the compound's volatility and low solubility, any VCMs released would most likely end up in the atmosphere and disperse, leaving an insignificant vinyl chloride concentration in the water. The water concentration would be further tempered by dilution with the large volume of water available. Vinyl chloride concentration in the air immediately above and around the proposed bulkhead would be low as well due to the very well-circulated environment and certainly nowhere near the air concentration in a manufacturing facility. It is also safe to assume that Seadrift Lagoon residents and swimmers of the Lagoon would not experience the same level of continuous close contact with media containing vinyl chloride like in a work environment. The duration and frequency of vinyl chloride-polluted air uptake or water contact certainly would not approach several hours per day, 240 days per year (approximate number of work days per year), and several years during a lifetime. This would be true for both residents taking a leisurely walk near the bulkhead or swimmers in the Lagoon.

In conclusion, based on the available information, the Commission finds that any vinyl chloride released from the proposed bulkhead would not result in either the frequency or level of exposure that have been shown to be harmful to human health.

3.3.1.1(c) PVC and Dioxins

Another issue raised by the public is the hazards associated with fire and the burning of PVC. When chlorine-based organic chemicals are burned or produced under reactive conditions, dioxins are formed. Dioxins have been characterized by EPA as likely to be human carcinogens and are anticipated to increase the risk of cancer at background levels of exposure (USEPA PBT). As noted in the public comments received by the Commission, the United States is a signatory to the Persistent Organic Pollutants (POP) Treaty, which bans or severely restricts a group of 12 pesticides and industrial chemicals including dioxins. In addition, when vinyl burns, hydrochloric acid is released. Hydrochloric acid can cause severe burns to skin, eyes, and lungs. If the proposed bulkhead were to catch fire while in the Seadrift Lagoon, it would potentially produce both dioxins and hydrochloric acid, releasing them into the air, and into the water, which would result in significant adverse impacts to the biological productivity and the quality of coastal waters, inconsistent with Coastal Act Section 30231. However, a report prepared by the Ministry of the Environment Denmark, titled Environmental Aspects of PVC, stated that the fire performance properties differ from rigid to flexible PVC and that rigid PVC is difficult to ignite and burns only with continuous addition of heat from another source (MED 1995). The proposed material is not only a rigid PVC, but would also be located primarily in water and buried in the sediment of the lagoon. Therefore, there is not significant risk that the proposed bulkhead would catch fire and release dioxins and hydrochloric acid into the air and water.

3.3.1.1(d) Additional PVC concerns

In addition to the four main issues discussed above, Commission staff received various articles related to the heath effects of chemical pollutants on humans and wildlife. An article titled, *Body of Evidence: The effects of chlorine on human health*, discusses in-depth the health effects of organochlorines on humans and wildlife (Allsopp et. al. 1995). Organochlorines are chemicals that have at least one chlorine-carbon bond in their structure. Potential health impacts include

reproductive and developmental effects, effects on the nervous system, immune system and the liver, and cancer. The article includes discussion on the many impacts of dioxins, an organochlorine by-product. As previously mentioned, dioxin is produced when chlorine- based organic chemicals are burned or produced under reactive conditions. In order for dioxins to be released into the environment from the proposed development, the PVC sheet piles would need to be burned. As discussed in Section 3.3.1.1(c), the risk of the proposed development catching fire is assumed to be minimal. Therefore, exposure of humans and wildlife to dioxins by the proposed development is unlikely.

In addition to written comments and articles, Commission staff reviewed two video documentaries that were submitted, titled *Blue Vinyl* and *Bill Moyers "Trade Secrets,"* which discuss issues related to PVC. While the videos address issues related to health impacts of PVC manufacturing, use, and disposal, neither documentaries address nor evaluated the use of PVC as a shoreline protection material in a marine environment and whether such a use would impact the biological productivity and the quality of coastal waters.

Commission staff also received a copy of the Marin County Board of Supervisors Resolution No. 99-168, which encourages the elimination of dioxin emissions and promotes the used of PVC-free plastics. Even though the resolution discourages the use of PVC in Marin County, it does not prevent the Commission from approving the use of PVC as proposed because the resolution is not the standard of review in this case. The standard of review that the Commission must apply to the project is the Chapter 3 policies of the Coastal Act.

Concerned individuals also stated that there are safer alternatives than the proposed material. However, unless PVC is shown to present an unmitigated significant adverse impact to coastal resources inconsistent with the provisions of the Coastal Act, the question of whether PVC is the safest feasible alternative does not raise an issue under the Coastal Act. Coastal Act Sections 30230 and 30231 only require that the proposed development maintain, enhance, and where feasible, restore marine resources and that development not adversely impact the biological productivity and quality of coastal waters. Similar to the question of safer alternatives, is the issue of the percentage of recycled PVC contained in the proposed material. Whether the proposed PVC material is produced from 100% post-consumer waste is not an issue under the Coastal Act unless the proportion of recycled versus virgin PVC contained in the sheet pile were shown to cause significant adverse impacts to biological productivity and quality of coastal waters.

3.4 Alternatives

In a report titled, Alternative Bulkhead Comparisons of the Seadrift Inner Lagoon Bulkhead, Nobel Consultants, Inc. evaluates the design, construction, and environmental performance of alternative bulkhead materials (Exhibit 7, Alternative Bulkhead Comparisons Report). The report is informative regarding the available options and constraints of the various bulkhead materials; however, it does not evaluate marine debris impacts related to the physical breakdown of the PVC and alternative materials.

Feasible, less environmentally damaging alternative materials such as concrete, steel, and wood are available for bulkhead construction. Concrete, steel, and wood have been used in bulkhead applications longer than PVC, and thus, their performance and lifespan expectancy in a marine environment is better understood.

The first alternative, concrete, is a very heavy material, and if broken down in a low energy environment, such as Seadrift Lagoon, would settle on the substrate. If concrete debris were subject to wave action, waves may transport it to other areas of the coast; however, its presence and potential migration would not cause impacts to the marine environment. According to the Artificial Reef Subcommittee of the Technical Coordinating Committee Gulf States Marine Fisheries Commission, concrete materials are extremely compatible with the environment and provide excellent surfaces and habitat for the settlement and growth of encrusting or fouling organisms, which in turn provide forage and refuge for other invertebrates and fish (ARS 1997).

Another alternative available to the applicants is wood. Since humans have been using wood in marine environments for centuries its behavior is well known and understood. Wood, is subject to degradation by marine borers and other natural forces, and as a result can be deposited in marine waters as wood debris; however wood, unlike plastic is biodegradable. If untreated or treated with chemicals that are not harmful to the marine environment, wood debris would not cause significant adverse impacts to the biological productivity or quality of coastal waters.

Lastly, the applicants could use steel as an alternative bulkhead material. A refined metal, steel has a natural tendency to corrode and thereby return to the stable state that it exists in nature as iron ore or form iron oxides. Although steel would corrode and release iron into the water, the end produces are generally nontoxic, and occur naturally in the environment. Similar to wood, if untreated or treated with chemicals that will not impact the marine environment, steel would be a feasible, less environmentally damaging alternative.

By using alternative bulkhead materials such as concrete, steel, or wood, the proposed project would not contribute to plastic marine debris, or impact the biological productivity and quality of coastal waters, and therefore, would be less environmentally damaging. Therefore, the Commission finds that the proposed development would not be carried out in a manner that would sustain the biological productivity and quality of coastal waters to maintain healthy populations of marine organisms in conflict with Coastal Act Sections 30230 and 30231.

3.5 California Environmental Quality Act (CEQA)

Section 21080.5 (d)(2)(i) of the California Environmental Quality Act (CEQA) states:

> *The rules and regulations adopted by the administering agency shall require that an activity will not be approved or adopted as proposed if there are feasible alternatives or feasible mitigation measures available which would substantially lessen any significant adverse impact which the activity may have on the environment.*

The proposed project, as discussed herein, would have significant adverse environmental impacts to coastal resources. Project alternatives and mitigation measures are available which would substantially lessen these adverse environmental impacts, as discussed in Section 3.4 of this report. The Commission therefore finds that the proposed development is not consistent with section 21080.5 (d)(2)(i) of the CEQA.

EXHIBITS:

1. Location map
2. Vicinity map
3. Assessors Parcel Map

4. Site photographs
5. Site plan and typical bulkhead cross section
6. Bulkhead installation plan
7. Alternatives Bulkhead Comparisons Report

APPENDIX A: SUBSTANTIVE FILE DOCUMENT

Allsopp, Michelle et.al. "Body of Evidence: the effects of chlorine on human health," May 1995.

Artificial Reef Subcommittee of the Technical Coordinating Committee Gulf States Marine Fisheries Commission (ARS), "Guidelines for Marin Artificial Reef Materials," January 1997.

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Derraik, Jose. "The pollution of the marine environment by plastic debris: a review," *Marin Pollution Bulletin,"* 44: 842-852, 2002.

Kantola, Barbara. Email to Sarah Borchelt, California Coastal Commission, regarding PolyOne Corporation Product - Geon E3360. September 17, 2002.

Laist, D. W. "Impacts of marine debris: entanglement of marine life in marine debris including a comprehensive list of species with entanglement and ingestion records," Coe., J.M., Rogers, D. B. (Eds.), Marine Debris - Sources, Impacts and Solutions. Springer-Verlag, New York, 99-139, 1997.

Maguire J. "Aquatic Environmental Aspects of Non-Pesticidal Organotin Compounds," *Water Poll. Res. J. Canada*, vol. 26, 243-360, 1991.

Makdisi, Richard, Stellar Environmental Solutions, Inc. Letter to Richard Kamieniecki, Seadrift Association, September 9, 2002.

McLellan, Clifton, J. "The Decrease of Tin Extraction from Chlorinated Polyvinyl and Polyvinyl Chloride Pipe, Fittings, and Materials after continuous Exposure to Water. Presented August 18th, American Chemical Society," April 19, 2002.

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Mohler, D.G. et al. "Angiosarcoma of the Hand Associated with Chronic Exposure to Polyvinyl Chloride Pipes and Cement," *The Journal of Bone and Joint Surgery*, vol. 80-A, No. 9, September 1998.

Moore, C.J. et.al. " A comparison of plastic and plankton in the North Pacific Central Gyre," *Marine Pollution Bulletin*, vol. 42, 1297-1300, 2001

Morton Chemicals "Environmental risk assessment of methyltin heat stabilizer in rigid PVC," Morton International Inc. 1998.

Organotin Environmental Programme, ORTEP Association's Website (http://www.ortepa.org/stabilizers/pages/environment.htm)

National Institutes of Health, National Institute of Environmental Health Sciences, National Toxicology Program's Website (http://ntpserver.niehs.nih.gov/htdocs/ARC/ARC_KC/Vinyl_Chloride.html). "Known Carcinogen: Vinyl Chloride."

Sadiki, A.I., and D.T. Williams. "A Study on Organotin Levels in Canadian Waters Distributed Through PVC Pipes," *Chemosphere* 38, 1541-1548, 1999.

The State of California, Department of Housing and Community Development. "Draft Environmental Impact Report (EIR) for Chlorinated Polyvinyl Chloride (CPVC) Pipe Use for Potable Water Piping in Residential Buildings," June 1998.

TurnerToys™ Website (http://www.turnertoys.com/PVC_framepage1.htm) "OTHER HAZARDS: Dioxin Vinyl Chloride Monomer."

United States Army Corps of Engineers. "Preliminary Analysis the Bolinas Lagoon Study," 1997.

U.S. Environmental Protection Agency (USEPA) Persistent Bioaccumulative and Toxic (PBT) Chemical Program's Website (http://www.epa.gov/opptintr/pbt/dioxins.htm) "Dioxins and Furans."

van Dokkum, H.P. "Environmental Risk Assessment of methyltin chlorides from heat stabilizers in PVC," October 7, 2002.

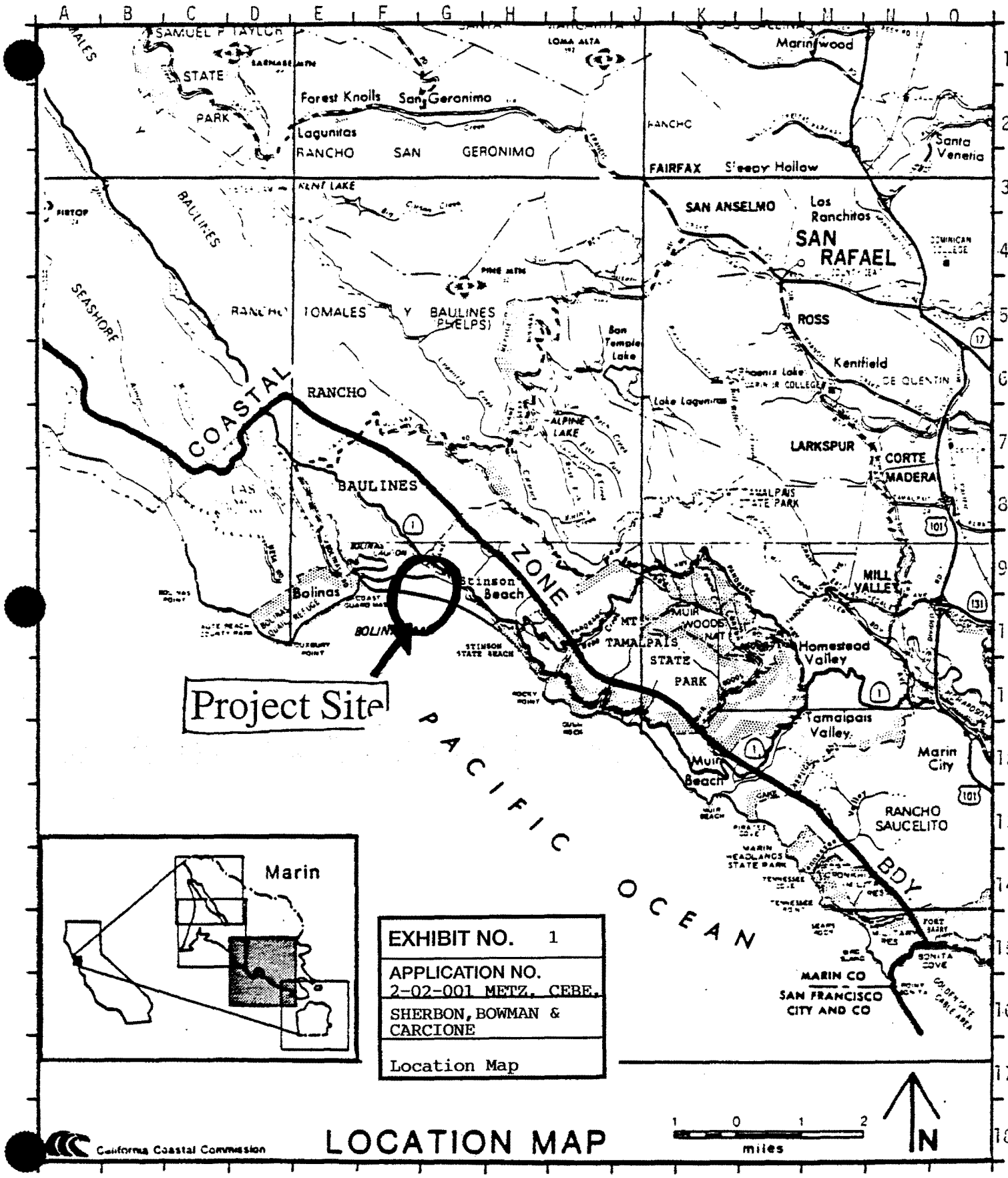
Walsh G.E. et al. "Effects of Organotins on Growth and Survival of Two Marine Diatoms, Skeletonema costatum and Thalassiosira pseudonana," *Chemosphere* 14, 383-392, 1985.

Wisner, D'Lane. Email to Sarah Borchelt, California Coastal Commission, regarding Rigid Vinyl Questions. August 21, 2002.

Personal Communications:

Barbara Kantola, PolyOne Corporation, September 18, 2002.

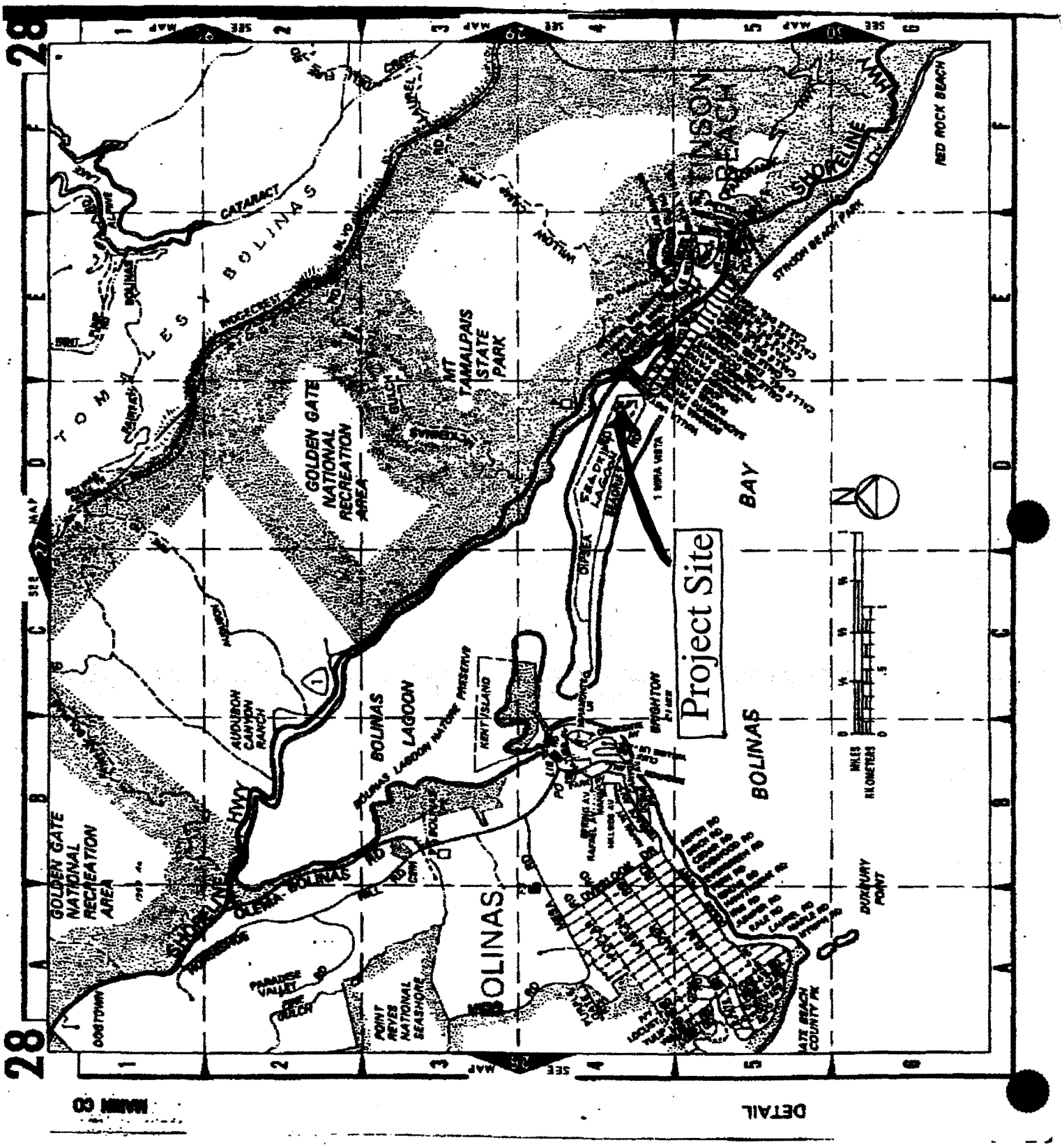
Exhibits



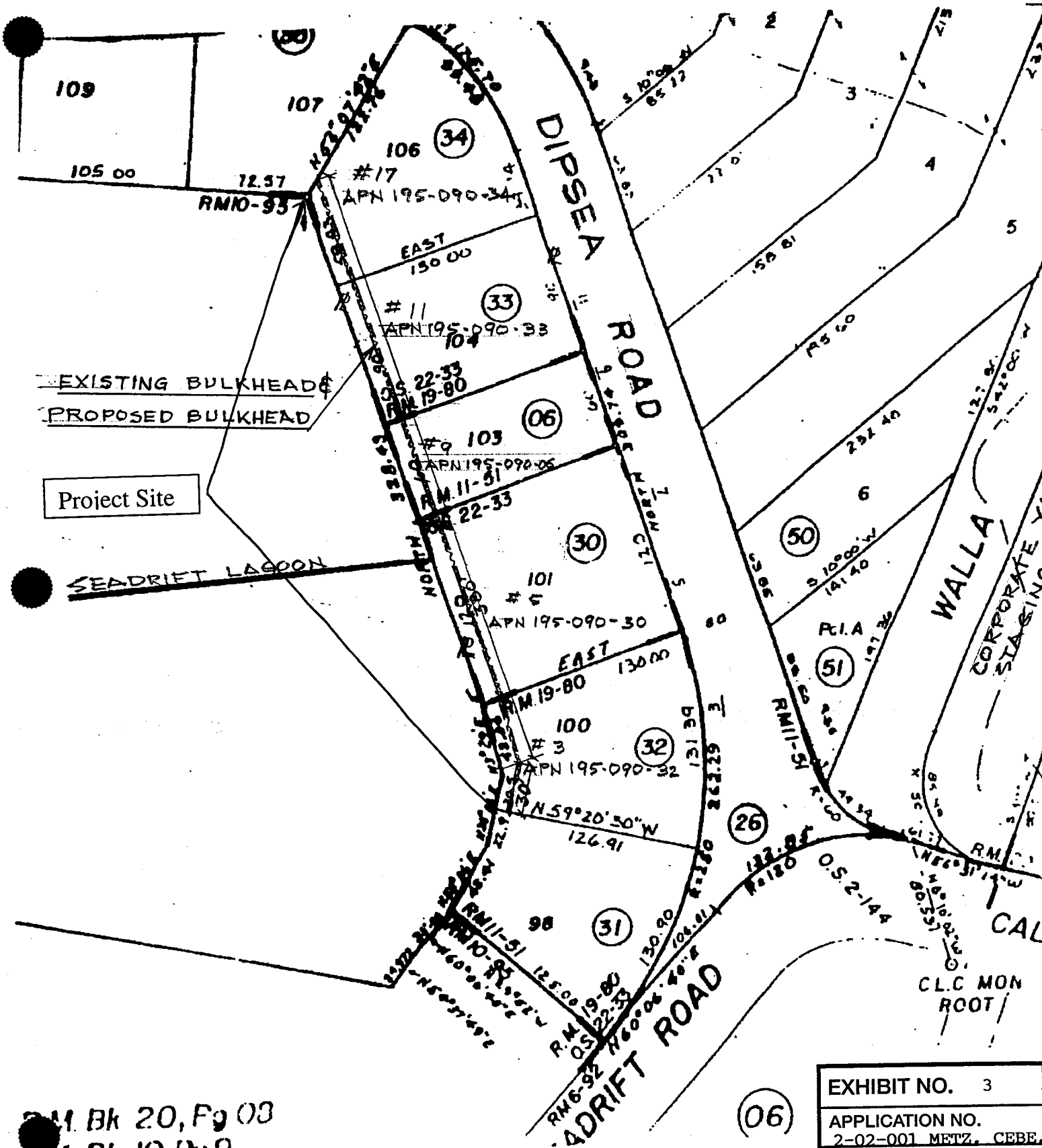
County of Marin

Sheet 3 of 3

EXHIBIT NO. 2
APPLICATION NO. 2-02-001 METZ, CEBE, SHERBON, BOWMAN & CARCIONE
Vicinity Map



PLAT MAP



RM Bk 20, Pg 03
RM Bk 10 Pg 9

06

EXHIBIT NO. 3
APPLICATION NO. 2-02-001 METZ, CEBE, SHERBON, BOWMAN & CARCIONE
Assessors Parcel Map

TOP

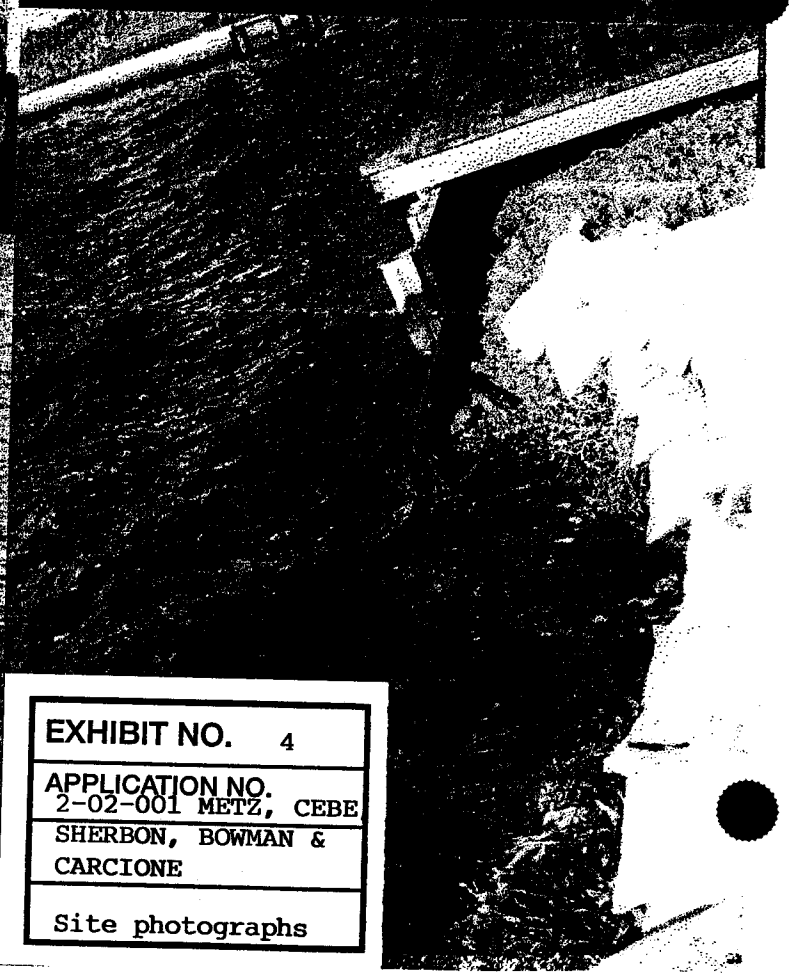
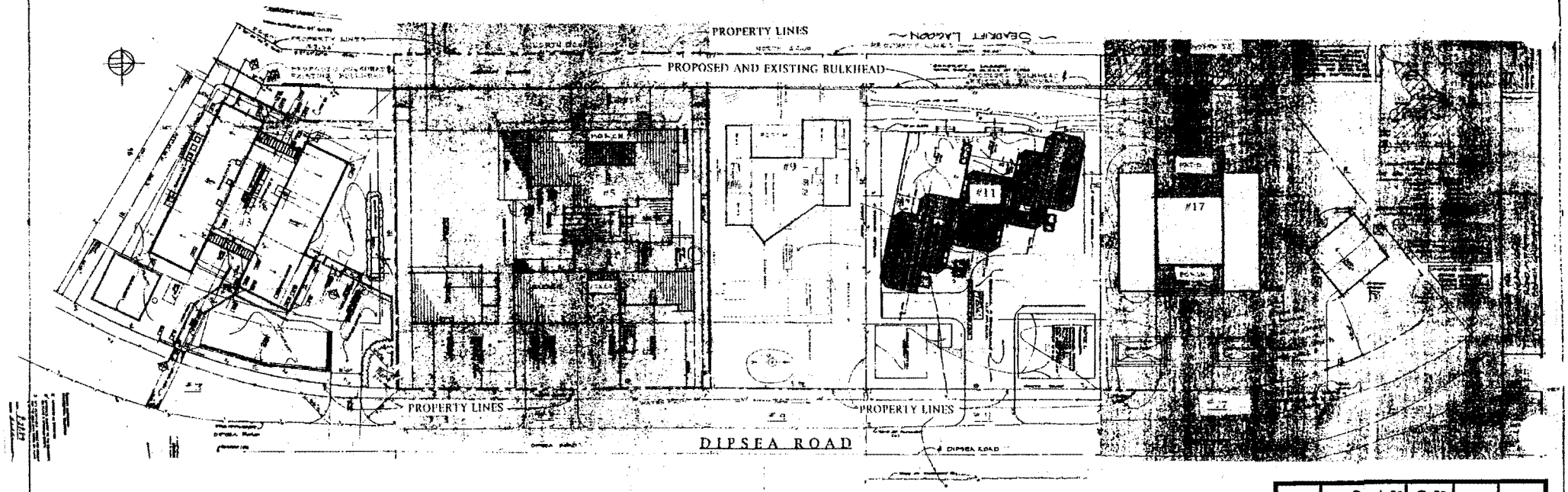


EXHIBIT NO. 4
APPLICATION NO. 2-02-001 METZ, CEBE
SHERBON, BOWMAN & CARCIONE
Site photographs

BOTTOM

SEADRIFT LAGOON



SITE PLAN of PROPERTIES #3, #5, #9, #11, #17
scale 1" = 20'

N

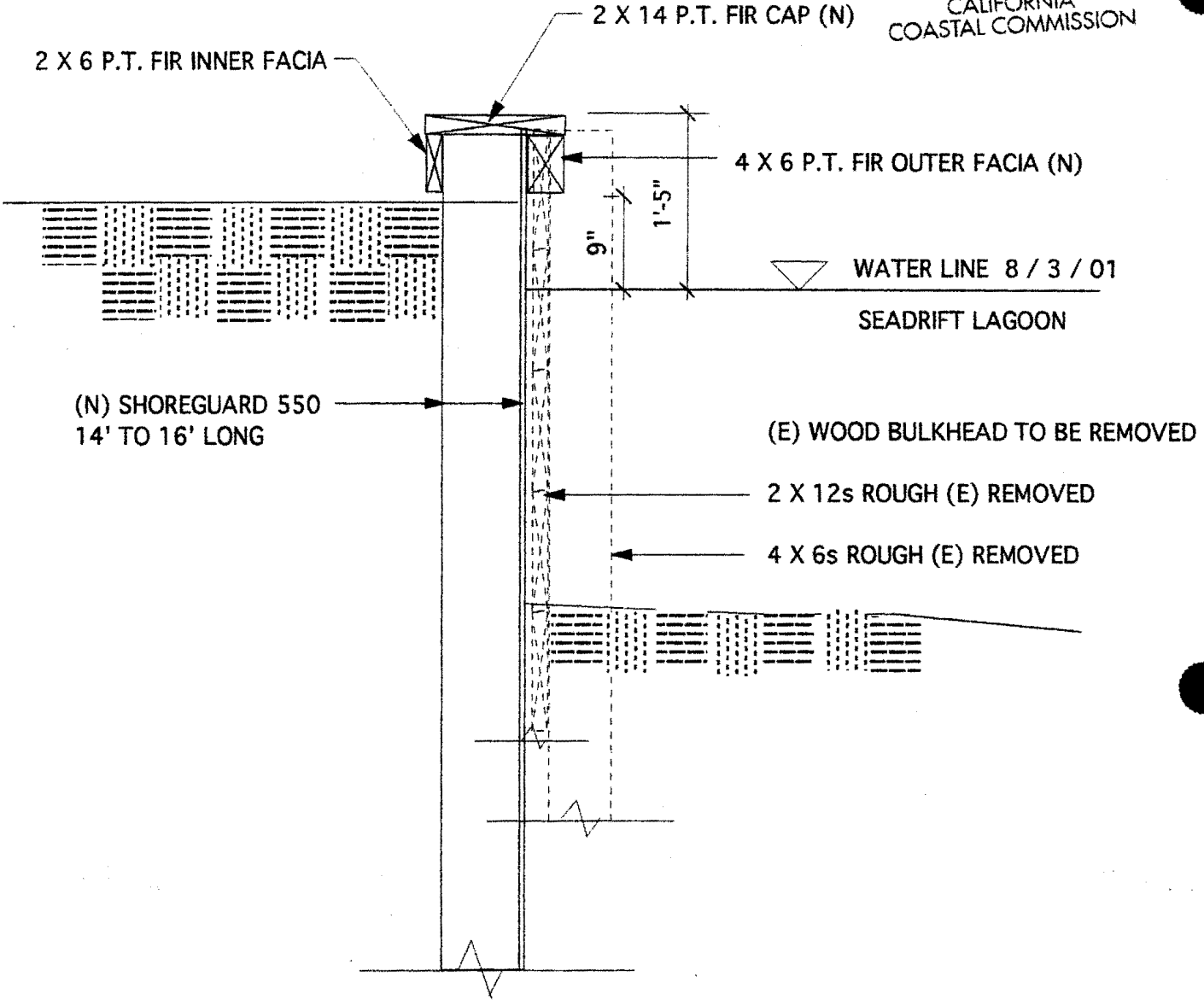
EXHIBIT NO. 5

APPLICATION NO. 2-02-001 METZ, CEBE

SHERBON, BOWMAN & CARCIONE

Site plan and typical bulkhead cross section

(Page 1 of 2)



SECTION THROUGH (N) BULKHEAD (VINYL SHEET PILES)
IN FOOTPRINT OF (E) WOOD BULKHEAD, TO BE REMOVED
SCALE 3/4" = 1'-0

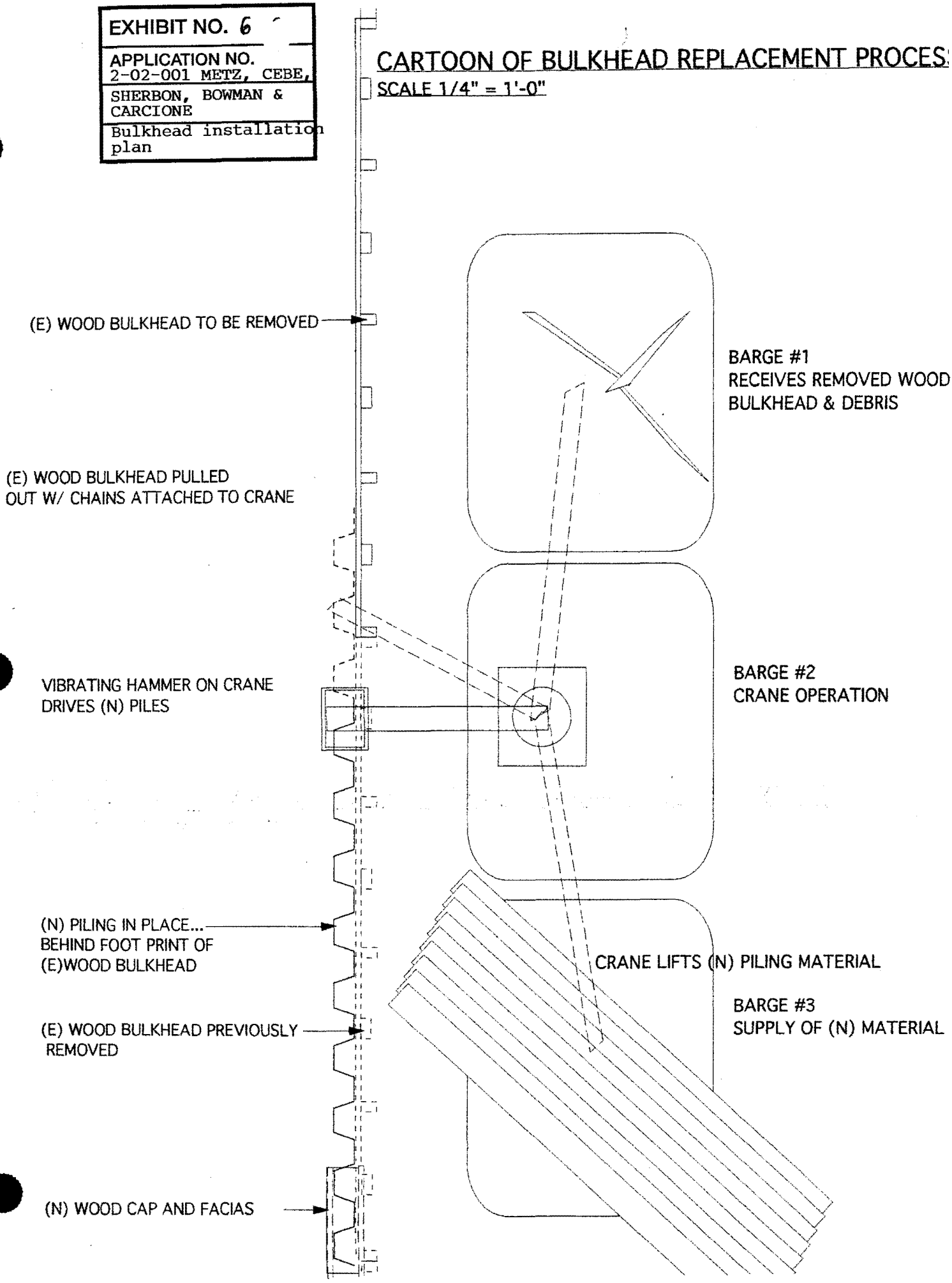
EXHIBIT NO. 6

APPLICATION NO. 2-02-001 METZ, CEBE, SHERBON, BOWMAN & CARCIONE

Bulkhead installation plan

CARTOON OF BULKHEAD REPLACEMENT PROCES

SCALE 1/4" = 1'-0"



NOBLE
CONSULTANTS, INC.

EXHIBIT NO. 7
APPLICATION NO. 2-02-001 METZ, CEBE, SHERBON, BOWMAN, & CARCIONE
Alternative bulkhead Comparisons Report-Page 1 of33

July 31, 2002

473-22

Mr. Richard Kamieniecki
Seadrift Association
P.O. Box 128
Stinson Beach CA 94970

RE: **Alternative Bulkhead Comparisons**
For The Seadrift Inner Lagoon Bulkhead Replacement

Dear Mr. Kamieniecki:

INTRODUCTION

This letter report was prepared to address other potential bulkhead alternatives to the currently proposed cantilever polyvinyl bulkhead for the replacement of the existing deteriorating timber bulkhead lining the shoreline edge within the Seadrift Inner Lagoon. Alternatives considered consist of timber, steel and concrete bulkheads in addition to the polyvinyl bulkhead. These bulkheads have been compared based on their respective design, construction and environmental performance in order to assess the most suitable bulkhead alternative for this project.

PROJECT DESCRIPTION

Project Location:

The proposed project is located in the Inner Seadrift Lagoon in Stinson Beach, California. Figure 1, Vicinity Map, and Figure 2, Site Location, present the location of Seadrift Lagoon. The inner lagoon is bounded by Dipsea Road to the north and Seadrift Road to the south. Bolinas Lagoon is immediately north of Dipsea Road, while Bolinas Bay is to the south of Seadrift Road. The project area includes all 178 properties along the perimeter of the inner lagoon as shown in Figure 3.

Project Purpose:

The purpose of this project is to re-stabilize the landward side of the properties fronting the Inner Bolinas Lagoon by replacing the existing deteriorating timber bulkhead along the perimeter of the Inner Seadrift Lagoon. A survey assessment that was performed in December 2001 showed that 94 percent of the existing property bulkheads require replacement at this time. This is necessary because the existing bulkheads are experiencing deterioration and rotting due to the saltwater environment, weather conditions, change in water levels, marine borers, and

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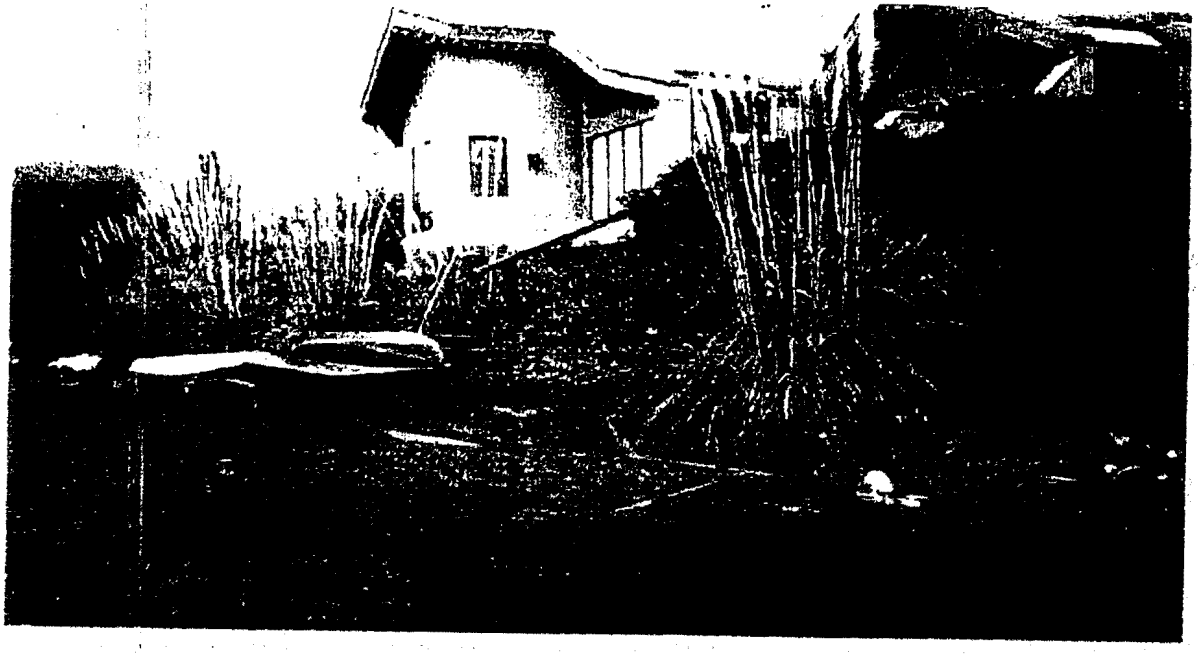
☐ IRVINE: 2201 DUPONT DR., SUITE 620, IRVINE, CA 92612-7509 (949) 752-1530 FAX (949) 752-8381
☐ SAN DIEGO: 9326 OAKBOURNE RD., SANTEE, CA 92071-2314 (619) 596-9510 FAX (619) 448-2022
http://www.nobleconsultants.com

ALTERNATIVE BULKHEAD COMPARISONS FOR THE SEADRIFT INNER LAGOON BULKHEAD REPLACEMENT

Prepared for:

Seadrift Association
P.O. Box 128
Stinson Beach CA 94970



July 2002

PREPARED BY:

Noble Consultants, Inc.
359 Bel Marin Keys Blvd. #9
Novato CA 94949

NOBLE
CONSULTANTS, INC.

extended life of the bulkhead. All these components over time have compromised the structural integrity of the existing timber bulkhead.

Existing Bulkhead:

The original existing bulkhead is of timber construction and was installed in about the year 1965. Therefore, its current life of over 35 years already easily exceeds an expected lifespan for a timber structure of this type that is located in a saltwater environment. The original bulkhead construction consists of 2x12 horizontal planks and 4x6 vertical posts spaced on approximately five feet centers, with 4x8 vertical posts positioned length way at mid-span between the 4x6 vertical posts as shown in Figures 4 and 5 for a typical improved lot with deck improvements. Therefore, the vertical posts (either 4x6 or 4x8) are spaced at approximately 2.5 feet on centers. During the improvement of these lots, the bulkheads typically had other timber members attached across their tops such as 2x caps and/or various types of decks. The number of 2x12 horizontal planks used in the original bulkhead's construction appears to have varied, and probably depended on the bottom (mudline) depth fronting the bulkhead and on the height of bulkhead construction. A majority of the lagoon's bulkhead appeared to have been constructed using three 2x12 horizontal planks; however, some property bulkheads were constructed with only two 2x12 horizontal planks, while some had four 2x12 planks due to higher lot elevations at the lagoon's water edge. It is unknown how deep the vertical timber posts were driven into the lagoon's bottom.

Proposed New Bulkhead:

The proposed project will consist of replacing this existing bulkhead and installing a new bulkhead either in the same location and alignment as the existing bulkhead with removal of the existing bulkhead first occurring, or directly behind the existing bulkhead in the same alignment as the existing bulkhead with the removal of the existing bulkhead occurring after installation of the new bulkhead. This bulkhead replacement project will occur around the entire lagoon's perimeter resulting in approximately 12,000 lineal feet of bulkhead. The proposed new bulkhead will be constructed utilizing interlocking polyvinyl sheet piling as manufactured by Materials International, Inc. The piles will be vibrated to a depth of 12 to 14 feet below the existing bottom. The new bulkhead will be designed as a cantilever wall and will include a timber cap and timber side walers along its top section. This proposed new bulkhead is shown in Figures 6, 7 and 8. In addition, some improvements to the individual residence's docks and decks will be performed in order to replace the existing improvements that require demolition during the installation of the new bulkhead.

Design Considerations:

New bulkhead design criteria was developed utilizing a recent geotechnical engineering investigation and a hydrographic survey performed for this project. In addition, sound engineering principals using both today's standard practice of care and regulatory requirements, that structures are designed to meet life spans in the 50 to 100 year range while minimizing significant maintenance requirements, were employed to develop preliminary engineering and construction cost estimates for the bulkhead alternatives considered in this report.

During February 2002, Noble Consultants, Inc. (NCI) performed landside surveying of control markers, aerial photographic surveying and hydrographic surveying for the Seadrift Inner Lagoon. Digital orthophoto mapping and lagoon water depth mapping were prepared on a series of plots for the entire site, as well as for the entire Seadrift Spit. Based on this survey, existing bulkheads are typically three to four feet in height from the lagoon bottom directly below the bulkhead to the top of bulkhead wall or deck. In May 2002, Miller Pacific Engineering Group, a geotechnical subconsultant to NCI, prepared a geotechnical evaluation for the Seadrift Inner Lagoon Bulkhead. This report presents the recommended geotechnical design criteria for use in the final design of a new bulkhead.

Our preliminary bulkhead design of August 2001 consisted of a cantilever bullhead (free-standing with no tieback anchor) using polyvinyl Shore Guard 550 sheet piles, 18 feet in length, with a timber cap. NCI still recommends 18 feet sheet pile lengths when utilizing the current geotechnical design criteria and water depth information for a cantilever bulkhead design. This design length uses an existing height of four feet from top of bulkhead to the lagoon bottom directly fronting the bulkhead, plus an additional one foot for future variation of the lagoon bottom and an additional one foot depth before taking credit for passive soil pressures that stabilize the bulkhead from landside pressures. This cantilever bulkhead will still be susceptible to lateral movement in a lagoonward direction during high design loading conditions associated with either seismic or other severe events. By comparison, an anchored bulkhead design would require sheet piles of 12 feet in length. In addition, an anchored bulkhead will be less susceptible to lateral movement during higher loading conditions.

COMPARISON OF BULKHEAD ALTERNATIVES

Alternatives Considered:

The following bulkhead alternatives were considered in this evaluation report:

- *Alternative 1*: A cantilever polyvinyl bulkhead constructed of Shore Guard 550 sheets, 18 feet in length, with a timber cap.

- *Alternative 2:* A cantilever coated steel bulkhead constructed of PU6 sheets, 18 feet in length, with a timber cap. If a steel bulkhead is selected for this project, then a concrete cap should be used instead of a timber cap in order to encapsulate its rougher final top elevation after cutting to final height. Alternative 2A presents our opinion of construction cost for a cantilever steel bulkhead with a concrete cap.

- *Alternative 3:* A cantilever concrete bulkhead constructed of 6 inch thick by four feet wide, by 18 feet long, prestressed concrete sheets with a concrete cap.

- *Alternative 4:* A cantilever timber bulkhead constructed of rough-cut 4 inch by 12 inch, by 18 feet long, treated, tongue and groove, Douglas fir number 1 grade or better lumber, with a timber cap.

- *Alternative 5:* An anchored polyvinyl bulkhead constructed of Shore Guard 425 sheets, 12 feet in lengths, with a Chance helical tieback anchor system, a 4 inch by 6 inch structural tube waler, and a timber cap. This alternative was evaluated in order to compare our opinion of construction cost for like bulkhead materials, for a cantilever wall versus an anchored wall.

The above five bulkhead alternatives are illustrated in plan, elevation and cross-sectional view in Figures 9 through 13. These alternatives have been drawn to scale showing only the main structural components, but are presented in a small-scale format for visual reference in comparing these five alternatives.

Bulkhead Location:

The most economical and least disruptive method of constructing a new bulkhead to replace the existing bulkhead is to construct the new bulkhead immediately adjacent to and lagoonward of the existing bulkhead, and leave the existing bulkhead in place. The second most economical and least disruptive method is to construct the new bulkhead immediately lagoonward of the existing bulkhead, and then remove the existing bulkhead. However, after an initial meeting with California Coastal Commission staff and the Gulf of Farallons National Marine Sanctuary, it became very evident that any proposed new bulkhead constructed lagoonward would be extremely difficult, and likely not possible, to gain approval from these permitting agencies. However, if the new bulkhead is constructed in either the same location and alignment as the existing bulkhead, or directly behind the existing bulkhead with the existing bulkhead removed, then these permitting agencies would likely approve the project assuming no lagoon dredging was proposed.

Constructing the new bulkhead in the same location and alignment as the existing bulkhead involves first removing the existing bulkhead prior to installing the new bulkhead. Even though this removal (demolition) operation can occur directly in front of the new installation operation, there are numerous different existing conditions between the lagoon properties that will add uncertainty in final construction cost to adequately safeguard against slippage of landside materials into the lagoon and protect some of the closer improved property's foundation systems. Therefore, the preferred method of construction is to install the new bulkhead directly behind the existing wall and then remove the existing wall. The most economical method is to completely install the new bulkhead and then remove (demolish) the existing bulkhead utilizing the same construction crew and equipment. However, probably the more desirable method would be to have a separate demolition crew and equipment follow behind the new installation crew and equipment to expedite the project. This method of demolition would still require approximately a thirty day lag time since it will move at a faster pace than the new installation operation.

Method of Construction:

The most likely construction methodology for this project would utilize low draft flexi pontoon floats (barges) for both the installation of the new bulkhead and the removal (demolition) of the existing wall from the waterside, since there is no landside access for this project. A vacant Seadrift Lagoon property, such as the vacant Seadrift Association lot that is located at the western end of the Seadrift Lagoon on Dipsea Road, would be utilized as a construction staging area. Construction materials would then be delivered to this staging area and pontoon barges would be utilized to transfer new bulkhead materials, as well as the removed existing wall materials, back and forth between the staging and construction areas. Additional pontoon barges would be used for the required construction equipment and labor for the actual installation of the new bulkhead and removal of the existing wall. The number of pontoon barges and labor crew would depend on the contractor's method of construction, and on the final location of the new bulkhead and removal sequence of the existing wall.

Opinion of Construction Cost:

Our opinion of construction cost is based on estimating the various costs for mobilization, equipment assembly, purchase and delivery of construction materials, method of construction operation and time, and associated labor and equipment for installation and demolition, in the same manner that a construction contractor will prepare his construction bid price. However, at this preliminary point of the project, there are no detailed engineered construction drawings, project specifications, and permit conditions to base our opinion of construction cost. Therefore, our preliminary cost estimates attempt to provide an allowance for final design and permitting conditions based on our past experience. Unusual or unexpected final design and permitting conditions may impact our cost estimates at this time.

Our preliminary opinion of construction cost for Alternatives 1 through 5 is presented in Tables 1 through 7. Certain categories within these tables are more detailed than others; however, the less detailed categories should still include allowances for items not shown. The five main alternatives (numbers 1, 2, 3, 4 & 5) have been cost estimated based on installing the new bulkhead directly behind the existing wall with demolition of the existing wall following approximately 30 days behind the installation of the new bulkhead. Some options to these alternatives have been considered in order to show a cost comparison.

Our preliminary opinion of construction costs is presented for the following alternatives:

- *Alternative 1*: Polyvinyl Cantilever Bulkhead with timber cap, constructed directly behind existing wall with demolition of existing wall following approximately 30 days behind.
- *Alternative 2*: Coated Steel Cantilever Bulkhead with timber cap constructed directly behind existing wall with demolition of existing wall following approximately 30 days behind.
- *Alternative 3*: Prestressed Concrete Cantilever Bulkhead with concrete cap constructed directly behind existing wall with demolition of existing wall following approximately 30 days behind.
- *Alternative 4*: Treated Timber Cantilever Bulkhead with timber cap constructed directly behind existing wall with demolition of existing wall following approximately 30 days behind.
- *Alternative 5*: Polyvinyl Anchored Bulkhead with timber cap constructed directly behind existing wall with demolition of existing wall following approximately 30 days behind.

In addition to the above five alternatives, our preliminary opinion of construction cost is presented for the following variations in the above alternatives:

- *Alternative 1A*: Polyvinyl Cantilevered Bulkhead with timber cap constructed directly behind existing bulkhead with demolition of existing wall after completion of new bulkhead.
- *Alternative 1B*: Polyvinyl Cantilever Bulkhead with timber cap constructed in same location as existing wall with demolition of existing wall preceding the new bulkhead.

- *Alternative 2A:* Coated Steel Cantilever Bulkhead with concrete cap constructed directly behind existing wall with demolition of existing wall following approximately 30 days behind.

Review of the construction costs for Alternatives 1 through 5 indicate that Alternative 1 (Polyvinyl Cantilever Bulkhead) is the least cost at $2,691,255. It also shows that the same bulkhead with an anchored tieback system costs an additional $434,470. The shown costs for these two polyvinyl bulkheads are for either grey color or clay color polyvinyl sheets. For comparison, sandstone colored polyvinyl sheets would add approximately an additional 5% to the materials cost, which would add approximately $51,000 to the cost shown for Alternative 1. Review of Alternatives 1 and 1A show that there could be a construction savings on the order of $54,000 if demolition of the existing bulkhead does not proceed until completion of the new bulkhead, when the new bulkhead is constructed behind the existing wall. Review of Alternatives 1 and 1B show that constructing the new bulkhead in the same location of the existing wall as compared to behind the existing wall could cost approximately an additional $100,000. This assumes there are only minor risks associated with retainage of landside materials, otherwise Alternative 1B could cost an additional $200,000 or more than for Alternative 1. It should be noted that the demolition cost shown for all alternatives assumes the required demolition of existing walls, decks and docks, in order to construct the new bulkhead, require no shoring support or other special construction needs.

Review of Alternatives 2 and 2A show that a concrete cap could cost approximately $535,000 more than for a timber cap for the coated steel cantilever bulkhead. Likewise, if a concrete cap was used on the polyvinyl sheet pile bulkhead, it could cost approximately an additional $500,000 versus the simple timber cap. The steel sheet pile bulkhead alternative includes a cost for a decent marine grade coating application to the sheet piles to protect them from corrosion; however, this cost could vary depending on final regulatory requirements and on the final coating specified. Also, a cathodic protection system would significantly increase the shown cost.

Alternative 3, for a prestressed concrete cantilever bulkhead, does not include a cost for colored concrete. Depending on the color and dosage, this could add at least an additional $100,000 to the shown cost. Alternative 4, for a treated timber cantilever bulkhead, includes a cost for 0.6 pounds per cubic foot of ACQ treatment retention to help preserve the timber in the marine environment. If a treatment level of 2.5 pounds per cubic foot of retention is used versus 0.6 retention, then this could add approximately an additional $324,000 to the shown cost. ACQ, which stands for advanced copper and quat preservative system, is a J.H. Baxter & Co. product that is arsenic-free and chromium-free. Their chemonite ACZA treatment product could also be used, but it is an ammoniacal copper zinc arsenate product. Treatment at the same retention levels as ACQ would cost a little less than the ACQ costs.

Design, Construction & Environmental Issues:

Table 8 presents a comparison of design, construction and environmental issues for the five alternative bulkheads evaluated in this report. Some of the more important design, construction and environmental issues as they relate to the Seadrift Inner Lagoon bulkhead replacement project were selected for this comparison. Even though there could be other issues that are not addressed in this table, the selected issues should provide a fair comparison of the alternative bulkheads for this project.

The four key design-related issues selected for comparison were the available moment capacity (bending strength) of the bulkhead material's section, the amount of lateral deflection at the top of the bulkhead, the difference in expected maintenance, and the expected life of the bulkhead. The first two issues are compared by direct calculation while the second two issues are more subjective, but can be based on past experience. Alternatives 2 and 3 (Steel and Concrete) are the strongest materials, while Alternative 4 (Timber) is the weakest. All alternative materials considered were sized in order to meet the design required moment. The design cantilever moment of 3,000 ft.-lb. per lineal feet of wall and anchored moment of 2,000 ft.-lb. per lineal feet of wall does not include seismic loading. The inclusion of seismic loading, and long-term creep, would increase the bending load, overturning stability and lateral deflection requirements for any selected alternative. The rated moments for Alternatives 1 and 5 (Polyvinyl 550 and 425 sheet piles) are 6,000 and 4,133 ft. lb. per lineal feet of wall, therefore these two alternatives should have additional moment capacity from those values used in Table 8. Alternative 1 (Polyvinyl) will deflect the most at the top of wall under full design conditions (non-seismic); however, all alternatives could experience lateral displacement under seismic loading conditions due to potential surcharge loading, if the site's sandy backfill materials liquefy.

It is expected that Alternatives 1 and 5 (Polyvinyl) will require the least maintenance, while Alternative 4 (Timber) will experience the most maintenance from eventual decay and marine borer attack. A treated timber structure in the saltwater marine environment is normally assigned a 20 to 25 year serviceable life, while coated steel, concrete and improved polyvinyl structures are assigned serviceable life spans ranging from 50 to 75 years, assuming they are adequately designed and constructed.

The four construction issues selected for comparison were construction cost, time period for construction, number of flatbed semi trucks for delivery of main bulkhead material, and rate of new sheet pile installation. All four of these issues are obtained through calculations. Our opinion of construction cost for the five alternatives has previously been addressed. Table 8 shows that Alternative 5 (Polyvinyl Anchored) has the shortest construction period with the least trucks and fastest rate of sheet pile installation. Alternative 3 (Concrete) has the second shortest construction period and second fastest rate of sheet pile installation, but has five times the number of trucks as the alternative with the second most trucks.

Six environmental issues are addressed in Table 8, which are all subjective to some degree. Three of these issues, bulkhead sheet pile color, bio-fouling/cleaning and habitat value, are considered fairly similar for all five alternatives. Construction noise associated with installation of the bulkhead sheets is considered the noisiest for Alternative 3 (Concrete), and second noisiest for Alternative 2 (Steel). Alternative 3 (Concrete) is expected to have the most short-term impact on water quality during the construction operation, since the concrete sheets are displacement piles (solid across their full cross-section), will require the heaviest equipment for construction installation, and have more potential for construction materials, such as concrete, to spill into the water during the forming and pouring of the cast-in-place concrete cap. Alternative 4 (Timber) is expected to have the second most impact on water quality, since 4-inch by 12-inch displacement timbers are driven every twelve inches and could require pressure jetting, due to their weaker strength, in order to reach the design depth.

The last environmental issue addressed pertains to the potential leaching of bulkhead sheet pile material into the water column and bottom sediments, as well as the decay of bulkhead sheet pile material into the water column and bottom sediments. Alternative 4 (Timber) is the most likely alternative to leach treatment chemicals and decayed timber into the lagoon of the five alternatives addressed. The second most likely is Alternative 3 (Concrete), since concrete is an absorbent material. Saltwater chlorides will eventually attack the concrete reinforcement steel (if not adequately blocked), which results in steel corrosion and the spalling of concrete, which in turn results in the release of metal corrosion and concrete debris into the lagoon environment. Alternatives 1 and 5 (Polyvinyl) will have the least impact. The Shore Guard polyvinyl sheet piles are made of polyvinyl chloride that is highly inert and stable, and should result in superior performance in the corrosive marine environment.

Rating of Alternatives:

A rating system of 1 to 5, utilizing 1 for best performance and 5 for worst performance, was assigned to the issues compared for each alternative as shown in Table 8. A tabulation of these numbers shows Alternative 5 (Polyvinyl Anchored Bulkhead) with the best overall rating, followed closely by Alternative 1 (Polyvinyl Cantilever Bulkhead). The main difference between these two alternatives is the cantilever bulkhead is projected to be approximately $435,000 cheaper in cost; however, the anchored bulkhead is more desirable from a design viewpoint since it anchors the top of wall from lateral displacement, but there is an additional risk in unknown costs associated with installing a tieback/anchor system (Chance helical tieback anchor system) twenty feet into the ground around the entire improved lagoon. The main negative for Alternative 1 (Polyvinyl Cantilever Bulkhead) is its potential estimated deflection of 1.7 inches lagoonward at the top of wall under full design load conditions (non-seismic). However, that may be considered an acceptable

risk by the Seadrift Association, especially if it doesn't cause any significant impacts, and also when considering all the other positive aspects of this alternative.

SUMMARY

In summary, this evaluation of alternative bulkheads for replacement of the existing deteriorating timber wall clearly shows that a polyvinyl sheet pile bulkhead, either cantilevered or anchored, will satisfy the requirements for the Seadrift Inner Lagoon bulkhead replacement project for the least cost and least impact. In addition, it is expected that there will be a savings of between $100,000 and $200,000 for constructing the new bulkhead directly behind the existing wall and then removing the existing wall, versus constructing the new bulkhead in the same location as the existing wall by first removing the existing wall. Constructing the new bulkhead directly behind the existing bulkhead should also result in less overall impact to the lagoon.

* * * * *

It has been a pleasure preparing this evaluation report of alternative bulkheads for the Seadrift Association. We are available to discuss any questions or comments you may have regarding this report at your convenience.

Sincerely,

NOBLE CONSULTANTS, INC.

for Ronald M. Noble, P.E.
President

RMN/klm
Attachments: Tables 1 through 8
Figures 1 through 13

Table 1

Alternative 1. Polyvinyl Cantilever Bulkhead

New Bulkhead Installed Directly Behind Existing Bulkhead

Demolition Follows Behind Bulkhead Pile Installation (Approx. 30 Day Lag Time)

Task Description	Quantity	Unit*	Unit Cost	Total	Task Total
Mobilization					
Mobilization of Barges (2 x 6 ld)	12	LD	800	9,600	
CAT 235 (2 x 1 ld)	2	LD	1,500	3,000	
Compressors, ect. (2x 2 ld)	4	DS	500	2,000	
65 Ton Truck Crane (2 x 1 rt)	2	RT	2,500	5,000	
Mobilization of Personnel	1	LS	5,000	5,000	
Setup Yard	1	LS	10,000	10,000	$34,600
Assemble Barges					
65 Ton Truck Crane	16	HR	275	4,400	
7 Man Crew (7 x 16 hr)	112	HR	50	5,600	
Minor Equipment	2	DAY	200	400	
ST&S	1	LS	500	500	
Load CAT 235	-	-	-	-	
Load Sheets	-	-	-	-	$10,900
Drive Piles					
Equipment Barges	9	MO	6,250	56,250	
Material Barges	9	MO	2,100	18,900	
CAT 235	9	MO	7,500	67,500	
Vibratory Hammer	9	MO	2,800	25,200	
7 Man Crew (7 x 1320 hr)	9,240	HR	50	462,000	
Forklift	9	MO	1,500	13,500	
Minor Equipment	9	MO	3,000	27,000	$670,350
Purchase Sheets					
SG 550 Sheets	216,000	SF	4.32	933,120	
Tax	1	LS	0.075	69,984	
Trucking	28	LD	3,000	84,000	$1,087,104
Timber Cap					
Barge	2	MO	2,100	4,200	
Forklift	2	MO	1,500	3,000	
Minor Equipment	2	MO	3,000	6,000	
5 Man Crew (5 x 320 hr)	1,600	HR	50	80,000	
Timber Cap	65	MBM	1,000	65,000	
Hardware	1	LS	15,000	15,000	$173,200
Demolition					
Equipment	1	LS	176,850	176,850	$176,850
				subtotal	$2,153,004
				Overhead and Markup (25%)	$538,251
				Total	$2,691,255

*Note:

LD = Load

RT= Round Trip

MBM = Thousand Board Feet Measure

MO = Month

HR = Hour

LS = Lump Sum

Table 2
Alternative 1A. Polyvinyl Cantilever Bulkhead
New Bulkhead Installed Directly Behind Existing Bulkhead
Demolition After Completion of Bulkhead Pile Installation

Task Description	Quantity	Unit*	Unit Cost	Total	Task Total
Mobilization					
Mobilization of Barges (2 x 6 ld)	12	LD	800	9,600	
CAT 235 (2 x 1 ld)	2	LD	1,500	3,000	
Compressors, ect. (2x 2 ld)	4	DS	500	2,000	
65 Ton Truck Crane (2 x 1 rt)	2	RT	2,500	5,000	
Mobilization of Personnel	1	LS	5,000	5,000	
Setup Yard	1	LS	10,000	10,000	$34,600
Assemble Barges					
65 Ton Truck Crane	16	HR	275	4,400	
7 Man Crew (7 x 16 hr)	112	HR	50	5,600	
Minor Equipment	2	DAY	200	400	
ST&S	1	LS	500	500	
Load CAT 235	-	-	-	-	
Load Sheets	-	-	-	-	$10,900
Purchase Sheets					
SG 650 Sheets	216,000	SF	4.32	933,120	
Tax	1	LS	0.075	69,984	
Trucking	28	LD	3,000	84,000	$1,087,104
Drive Piles					
Equipment Barges	9	MO	6,250	56,250	
Material Barges	9	MO	2,100	18,900	
CAT 235	9	MO	7,500	67,500	
Vibratory Hammer	9	MO	2,800	25,200	
7 Man Crew (7 x 1320 hr)	9,240	HR	50	462,000	
Forklift	9	MO	1,500	13,500	
Minor Equipment	9	MO	3,000	27,000	$670,350
Remove Existing					
Equipment Barge	1	MO	6,250	6,250	
Materials Barge	1	MO	2,100	2,100	
CAT 235	1	MO	7,500	7,500	
4 Man Crew (4 x 192 hr)	768	HR	50	38,400	
Forklift	1	MO	1,500	1,500	
Minor Equipment	1	MO	3,000	3,000	
Disposal	500	CY	150	75,000	$133,750
Timber Cap					
Barge	2	MO	2,100	4,200	
Forklift	2	MO	1,500	3,000	
Minor Equipment	2	MO	3,000	6,000	
5 Man Crew (5 x 320 hr)	1,600	HR	50	80,000	
Timber Cap	65	MBM	1,000	65,000	
Hardware	1	LS	15,000	15,000	$173,200
				subtotal	$2,109,904
				Overhead and Markup (25%)	$527,476
				Total	$2,637,380

Note:
LD = Load
RT= Round Trip
MBM = Thousand Board Feet Measure
MO = Month
HR = Hour
LS = Lump Sum

Table 3
Alternative 1B. Polyvinyl Cantilever Bulkhead
New Bulkhead Installed In Same Location As Existing Bulkhead
Demolition Prior to Bulkhead Pile Installation

Task Description	Quantity	Unit*	Unit Cost	Total	Task Total
Mobilization					
Mobilization of Barges (2 x 6 ld)	12	LD	800	9,600	
CAT 235 (2 x 1 ld)	2	LD	1,500	3,000	
Compressors, oct. (2x 2 ld)	4	DS	500	2,000	
65 Ton Truck Crane (2 x 1 rt)	2	RT	2,500	5,000	
Mobilization of Personnel	1	LS	5,000	5,000	
Setup Yard	1	LS	10,000	10,000	$34,600
Assemble Barges					
65 Ton Truck Crane	16	HR	275	4,400	
7 Man Crew (7 x 16 hr)	112	HR	50	5,600	
Minor Equipment	2	DAY	200	400	
ST&S	1	LS	500	500	
Load CAT 235	-	-	-	-	
Load Sheets	-	-	-	-	$10,900
Purchase Sheets					
SG 550 Sheets	216,000	SF	4.32	933,120	
Tax	1	LS	0.075	69,984	
Trucking	28	LD	3,000	84,000	$1,087,104
Drive Piles					
Equipment Barges	9	MO	6,250	56,250	
Material Barges	9	MO	2,100	18,900	
CAT 235	9	MO	7,500	67,500	
Vibratory Hammer	9	MO	2,800	25,200	
7 Man Crew (7 x 1320 hr)	9,240	HR	50	462,000	
Forklift	9	MO	1,500	13,500	
Minor Equipment	9	MO	3,000	27,000	$670,350
Timber Cap					
Barge	2	MO	2,100	4,200	
Forklift	2	MO	1,500	3,000	
Minor Equipment	2	MO	3,000	6,000	
5 Man Crew (5 x 320)	1,600	HR	50	80,000	
Timber Cap	65	MBM	1,000	65,000	
Hardware	1	LS	15,000	15,000	$173,200
Demolition					
Equipment	1	LS	261,300	261,300	$261,300
				subtotal	$2,237,454
				Overhead and Markup (25%)	$559,364
				Total	$2,796,818

*Note:
LD = Load
RT= Round Trip
MBM = Thousand Board Foot Measure
MO = Month
HR = Hour
LS = Lump Sum

Table 4
Alternative 2. Steel Cantilever Bulkhead
New Bulkhead Installed Directly Behind Existing Bulkhead
Demolition Follows Behind Bulkhead Pile Installation (Approx. 30 Day Lag Time)

Task Description	Quantity	Unit	Unit Cost	Total	Task Total
Mobilization					
Mobilization of Barges (2 x 6 ld)	12	LD	800	9,600	
CAT 235 (2 x 1 ld)	2	LD	1,500	3,000	
Compressors, ect. (2x 2 ld)	4	DS	500	2,000	
55 Ton Truck Crane (2 x 1 rt)	2	RT	2,500	5,000	
Mobilization of Personnel	1	LS	5,000	5,000	
Setup Yard	1	LS	10,000	10,000	$34,600
Purchase Sheets					
PU6 Sheets	1,674	TN	760	1,272,240	
Coating	174,857	SF	2	306,000	
Trucking	78	LD	500	39,000	$1,617,240
Drive Sheets					
20 Doubles/Day; 78 CF/Day = 154 Days					
Add 15 Days; 169 Days = 7.5 Months					
Equipment Barge	9	MO	6,250	56,250	
Materials Barge	9	MO	2,100	18,900	
CAT 235	9	MO	7,500	67,500	
Vibratory Hammer	9	MO	2,800	25,200	
7 Man Crew (7 x 1352 hr)	9,464	HR	50	473,200	
Forklift	9	MO	1,500	13,500	
Minor Equipment	9	MO	3,000	27,000	$681,550
Timber Cap					
Timber Cap**	1	LS	180,200	180,200	$180,200
Demolition					
Equipment	1	LS	261,300	261,300	$261,300
				subtotal	$2,774,890
				Overhead and Markup (25%)	$693,722
				Total	$3,468,612

Alternative 2A. Steel Cantilever Bulkhead
Concrete Cap Instead of Timber Cap

Concrete Cap					
Form and Pour Cap	775	CY	785	608,375	$608,375
				Increase of	$428,175
				new subtotal	$3,203,065
				Overhead and Markup (25%)	$800,766
				Total	$4,003,831

Note:
LD = Load
RT= Round Trip
MBM = Thousand Board Feet Measure
MO = Month
HR = Hour
LS = Lump Sum

** See Breakdown under Alternative 4

Table 5
Alternative 3. Concrete Cantilever Bulkhead
New Bulkhead Installed Directly Behind Existing Bulkhead
Demolition Follows Behind Bulkhead Pile Installation (Approx. 30 Day Lag Time)

Task Description	Quantity	Unit*	Unit Cost	Total	Task Total
Mobilization					
Mobilization of Barges (2 x 6 ld)	12	LD	800	9,600	
CAT 235 (2 x 1 ld)	2	LD	1,500	3,000	
Compressors, act. (2x 2 ld)	4	DS	500	2,000	
66 Ton Truck Crane (2 x 1 rt)	2	RT	2,500	5,000	
Mobilization of Personnel	1	LS	17,600	17,600	
Setup Yard	1	LS	5,000	5,000	
Setup Yard	1	LS	10,000	10,000	$52,200
Purchase Sheets					
Prestressed Concrete Sheets	3,000	EA	730	2,190,000	
Trucking	385	LD	750	288,750	$2,478,750
Drive Sheets					
30 Sheets/Day					
120 LF/Day - 100 Days					
Add 15 Days					
Equipment Barge	6	MO	6,250	37,500	
Materials Barge	6	MO	3,500	21,000	
CAT 235	6	MO	7,500	45,000	
Vibratory Hammer	6	MO	8,000	48,000	
Jet Pump	6	MO	3,500	21,000	
7 Man Crew (7 x 920 hr)	6,440	HR	50	322,000	
Forklift	6	MO	2,500	15,000	
Minor Equipment	6	MO	3,000	18,000	$527,500
Concrete Cap					
Form and Pour Cap	604	CY	785	474,140	$474,140
Demolition					
Equipment	1	LS	261,300	261,300	$261,300
				subtotal	$3,793,890
				Overhead and Markup (25%)	$948,473
				Total	**$4,742,363**

*Note:
LD = Load
RT= Round Trip
MBM = Thousand Board Feet Measure
MO = Month
HR = Hour
LS = Lump Sum

Table 6
Alternative 4. Timber Cantilever Bulkhead
New Bulkhead Installed Directly Behind Existing Bulkhead
Demolition Follows Behind Bulkhead Pile Installation (Approx. 30 Day Lag Time)

Task Description	Quantity	Unit*	Unit Cost	Total	Task Total
Mobilization					
Mobilization of Barges (2 x 6 ld)	12	LD	800	9,600	
CAT 235 (2 x 1 ld)	2	LD	1,500	3,000	
Compressors, ect. (2x 2 ld)	4	DS	500	2,000	
65 Ton Truck Crane (2 x 1 rt)	2	RT	2,500	5,000	
Mobilization of Personnel	1	LS	5,000	5,000	
Setup Yard	1	LS	10,000	10,000	$34,600
Purchase Timber					
Treated 4: x 12" T&G	864	MBM	1,325	1,144,800	
Trucking	78	LD	500	39,000	$1,183,800
Drive Piles					
65 LF/Day - 185 Days					
Add 15 Days = 200 Days = 9 Months					
Equipment Barges	10	MO	6,250	62,500	
Material Barges	10	MO	2,100	21,000	
CAT 235	10	MO	7,500	75,000	
Vibratory Hammer	10	MO	2,800	28,000	
7 Man Crew (7 x 1600 hr)	11,200	HR	50	560,000	
Forklift	10	MO	1,500	15,000	
Minor Equipment	10	MO	3,000	30,000	$791,500
Timber Cap					
Barge	2	MO	2,100	4,200	
Forklift	2	MO	1,500	3,000	
Minor Equipment	2	MO	3,000	6,000	
5 Man Crew (5 x 320 hr)	1,600	HR	50	80,000	
Timber Cap	72	MBM	1,000	72,000	
Hardware	1	LS	15,000	15,000	$180,200
Demolition					
Equipment	1	LS	261,300	261,300	$261,300
				subtotal	$2,451,400
				Overhead and Markup (25%)	$612,850
				Total	$3,064,250

*Note:
LD = Load
RT= Round Trip
MBM = Thousand Board Feet Measure
MO = Month
HR = Hour
LS = Lump Sum

Table 7

Alternative 5. Polyvinyl Anchored Bulkhead

New Bulkhead Installed Directly Behind Existing Bulkhead

Demolition Follows Behind Bulkhead Pile Installation (Approx. 30 Day Lag Time)

Task Description	Quantity	Unit*	Unit Cost	Total	Task Total
Mobilization					
Mobilization of Barges (2 x 6 ld)	12	LD	800	9,600	
CAT 235 (2 x 1 ld)	2	LD	1,500	3,000	
Compressors, ect. (2x 2 ld)	4	LD	500	2,000	
65 Ton Truck Crane (2 x 1 rt)	2	RT	2,500	5,000	
Mobilization of Personnel	1	LS	5,000	5,000	
Setup Yard	1	LS	10,000	10,000	$34,600
Timber Cap					
Barge	2	MO	2,100	4,200	
Forklift	2	MO	1,500	3,000	
Minor Equipment	2	MO	3,000	6,000	
5 Man Crew (5 x 320 hr)	1,600	HR	50	80,000	
Timber Cap	65	MBM	1,000	65,000	
Hardware	1	LS	15,000	15,000	$173,200
Purchase Sheets					
SG 425 Sheets	144,000	SF	3.10	446,400	
Tax	1	LS	0.075	33,480	
Trucking	14	LD	3,000	42,000	$521,880
Drive Sheets					
80 Sheet/Day - 160 LF/Day					
75 Days + 15 = 90 Days; 4 Months					
Equipment Barge	5	MO	6,250	31,250	
Materials Barge	5	MO	2,100	10,500	
CAT 235	5	MO	7,500	37,500	
Vibratory Hammer	5	MO	2,800	14,000	
7 Man Crew (7 x 720 hr)	5,040	HR	50	252,000	
Forklift	5	MO	1,500	7,500	
Minor Equipment	5	MO	3,000	15,000	$367,750
Tie Backs					
10' O.C. - 1200 Each					
Labor - 4 Man Crew	1	LS	240,000	240,000	
Equipment	1	LS	241,850	241,850	
Materials	1,200	EA	550	660,000	$1,141,850
Demobilization					
Equipment	1	LS	261,300	261,300	$261,300
				subtotal	$2,500,580
				Overhead and Markup (25%)	$625,145
				Total	$3,125,725

*Note:

LD = Load

RT= Round Trip

MBM = Thousand Board Feet Measure

MO = Month

HR = Hour

LS = Lump Sum

Table 8
Comparison of Bulkhead Alternatives

		Design					Construction				Environmental					
Alternative	Type of Bulkhead	Required Moment (ft-lb/ft of wall)	Available Moment (ft-lb/ft of wall)	Deflection at Top of Wall (in)	Maintenance	Life (yrs)	Cost ($ Mil)	Time Period (mo)	No. Trucks For Wall Material	Rate of Wall Construction (ft/day)	Color	Construction Noise	Impact On Water Quality During Constr.	Bio-Fouling & Cleaning	Habitat Value	Material Leaching & Decay
1	Polyvinyl Cantilever	3,000	[2] 4,725	[4] 1.7	[1] Least	[1] 50+	[1] 2.69	[3] 9.5	[2] 28	[3] 80	Grey, Clay or Sandstone	[1] Least	[1] Least	Equal	Equal	[1] Least
2	Steel Cantilever	3,000	[1] 22,400	[2] 0.1	[3] 2nd Most	[1] 50+	[4] 3.47	[3] 9.5	[3] 78	[4] 75	Various	[4] 2nd Most	[2] 2nd Least	Equal	Equal	[2] 2nd Least
3	Concrete Cantilever	3,000	[1] 22,400	[1] 0	[2] 2nd Least	[1] 50+	[5] 4.74	[2] 7.5	[4] 386	[2] 120	Grey (color mix)	[5] Most	[4] Most	Equal	Equal	[3] 2nd Most
4	Timber Cantilever	3,000	[4] 3,057	[3] 0.4	[4] Most	[2] 25	[2] 3.06	[4] 10	[3] 78	[5] 65	Brown/Black	[3] 3rd Most	[3] 2nd Most	Equal	Equal	[4] Most
5	Polyvinyl Anchored	2,000	[3] 3,255	[1] 0	[1] Least	[2] 25	[3] 3.13	[1] 6.5	[1] 14	[1] 160	Grey, Clay or Sandstone	[2] 2nd Least	[2] 2nd Least	Equal	Equal	[1] Least

Notes:
Ratings [1] thru [5] (1 best/ 5 worst)

Total Rating Points:
- Alt 1 = 20 2nd Best
- Alt 2 = 29 3rd Best
- Alt 3 = 30 4th Best
- Alt 4 = 37 5th Best
- Alt 5 = 18 1st Best

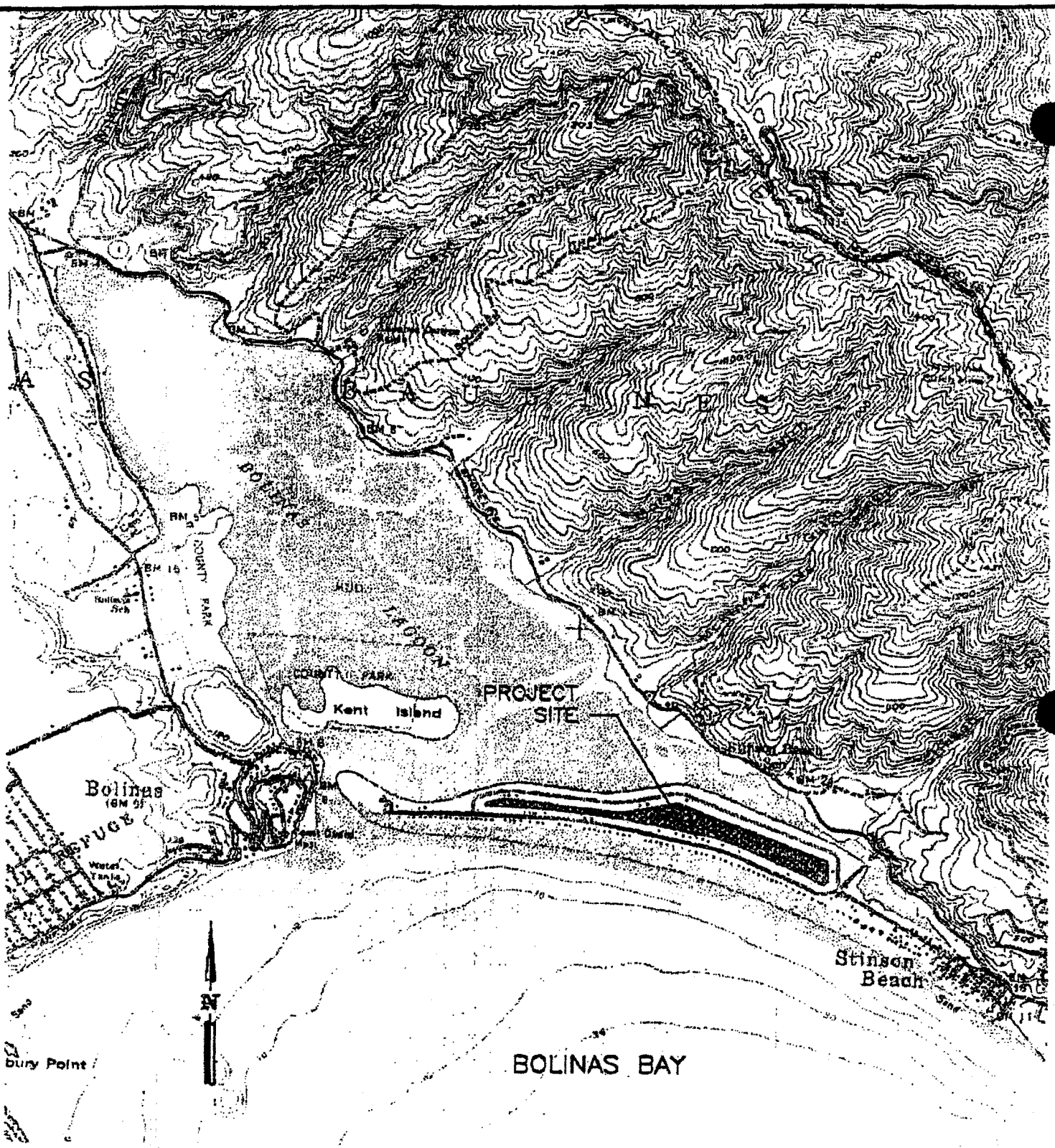
NOBLE CONSULTANTS, INC.

Vicinity Map

SOURCE: USGS, "SAN fRANCISCO, CALIFORNIA"

NOBLE
CONSULTANTS, INC.

Figure 1



Site Location

SOURCE: USGS, "BOLINAS, CALIF."

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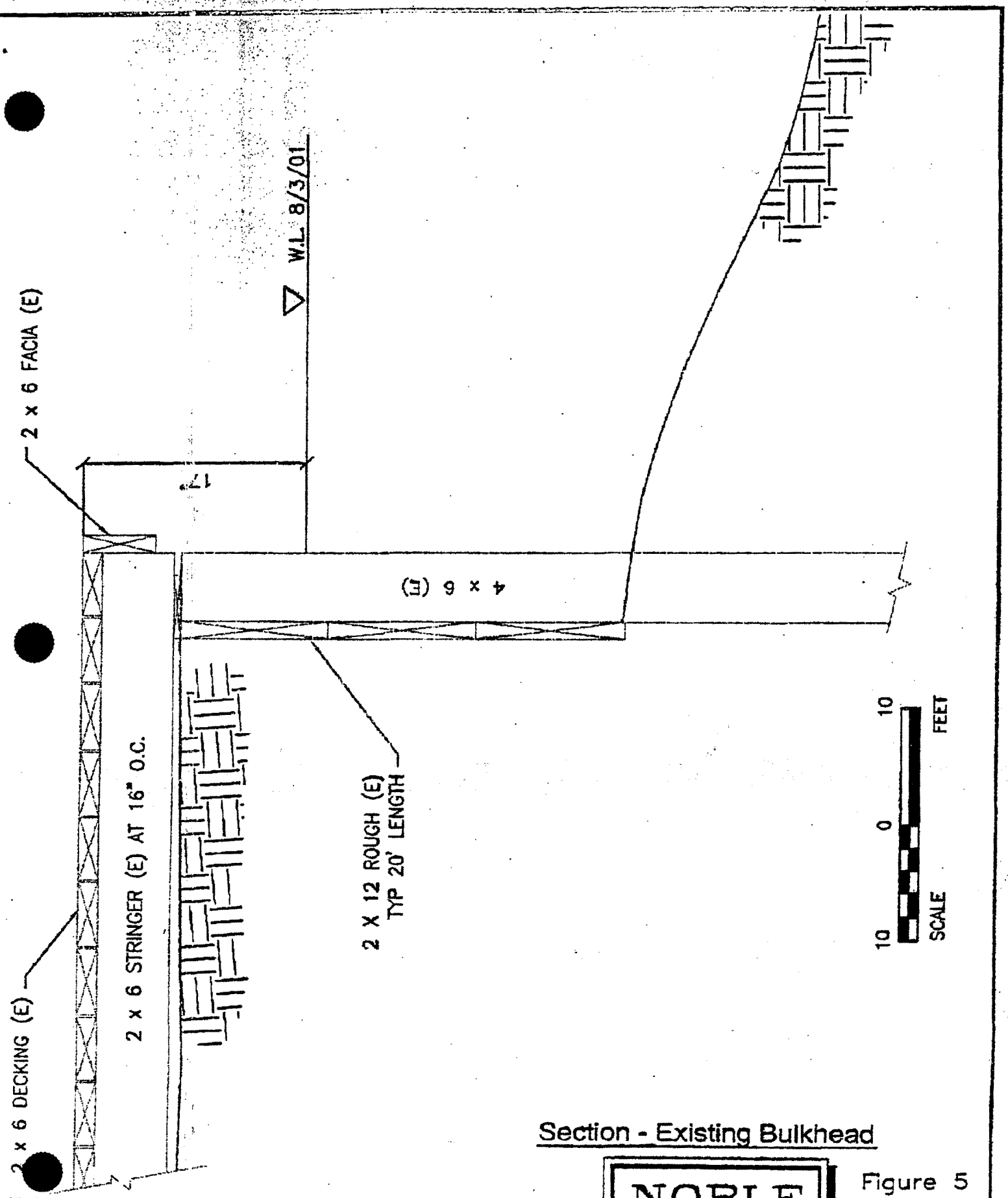
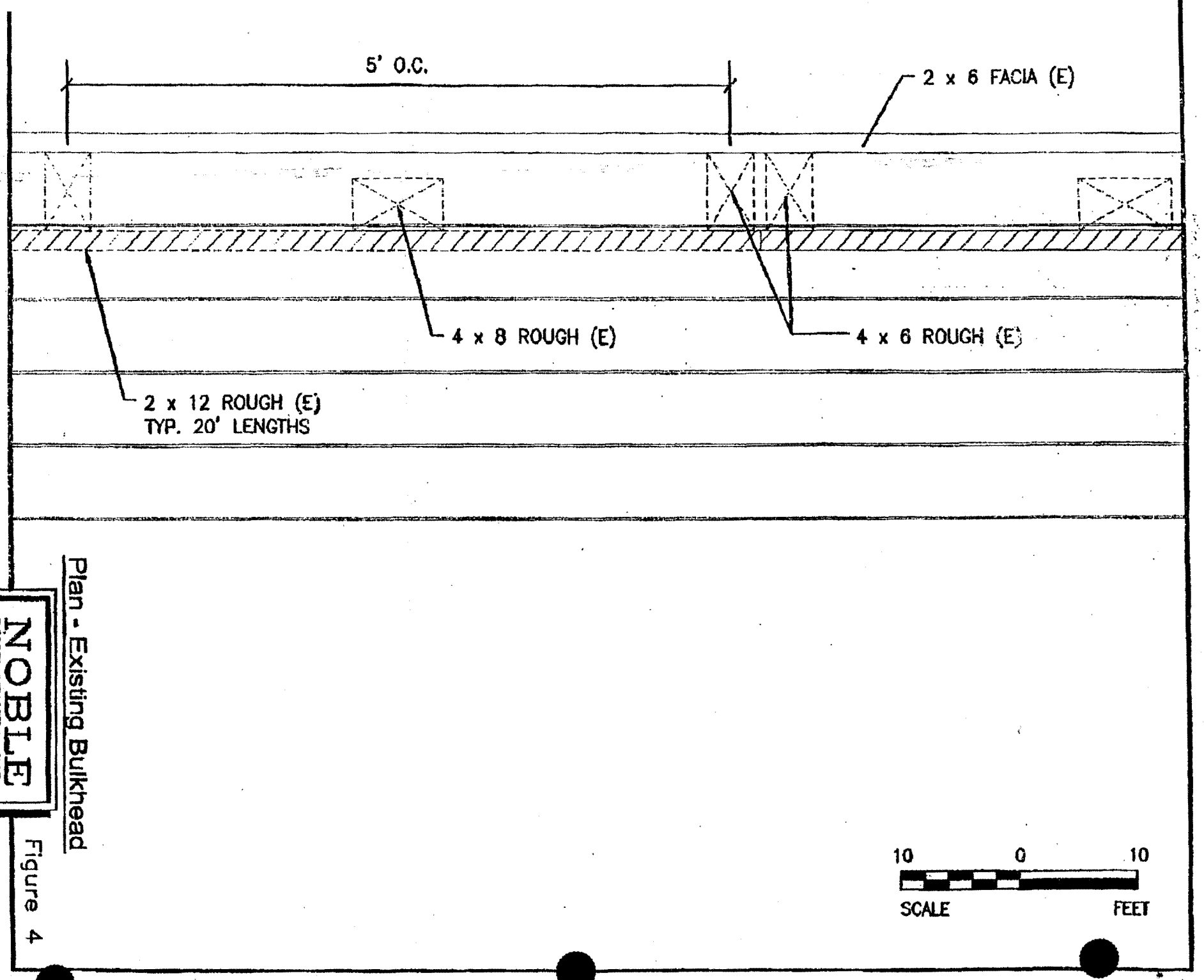
Figure 2



Section - Existing Bulkhead

NOBLE CONSULTANTS, INC.

Figure 5



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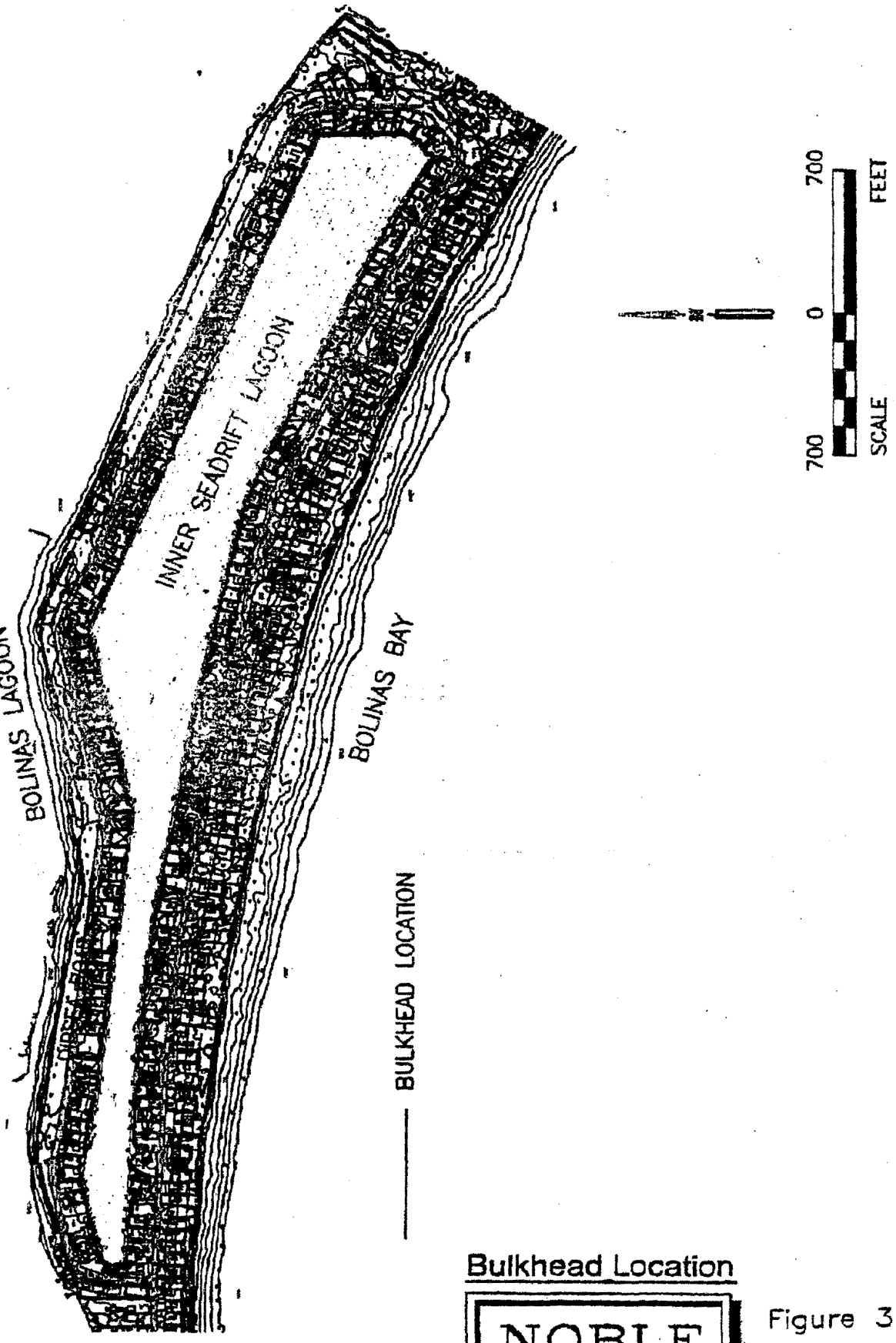
Plan - Existing Bulkhead

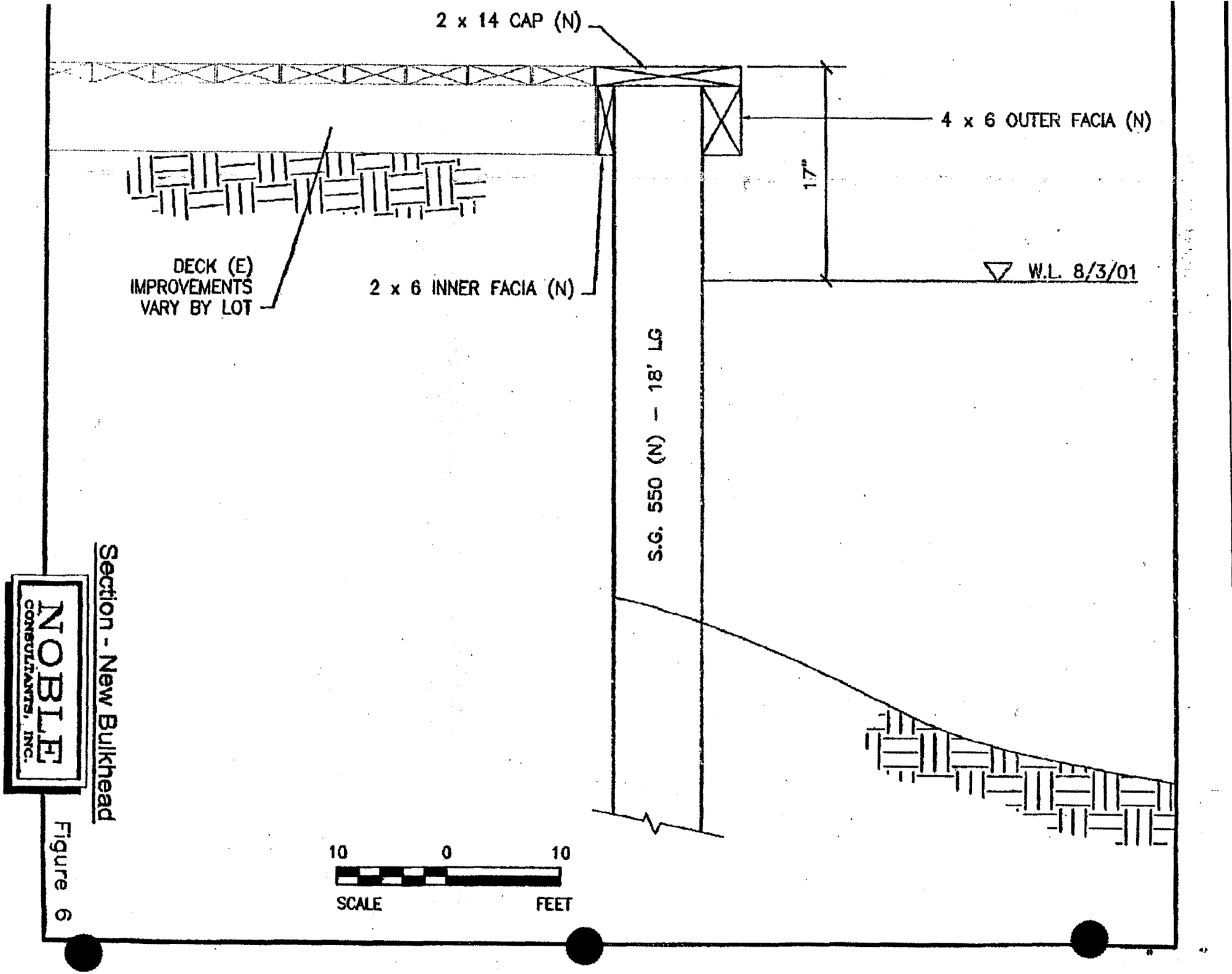
Figure 4



Bulkhead Location

NOBLE CONSULTANTS, INC.

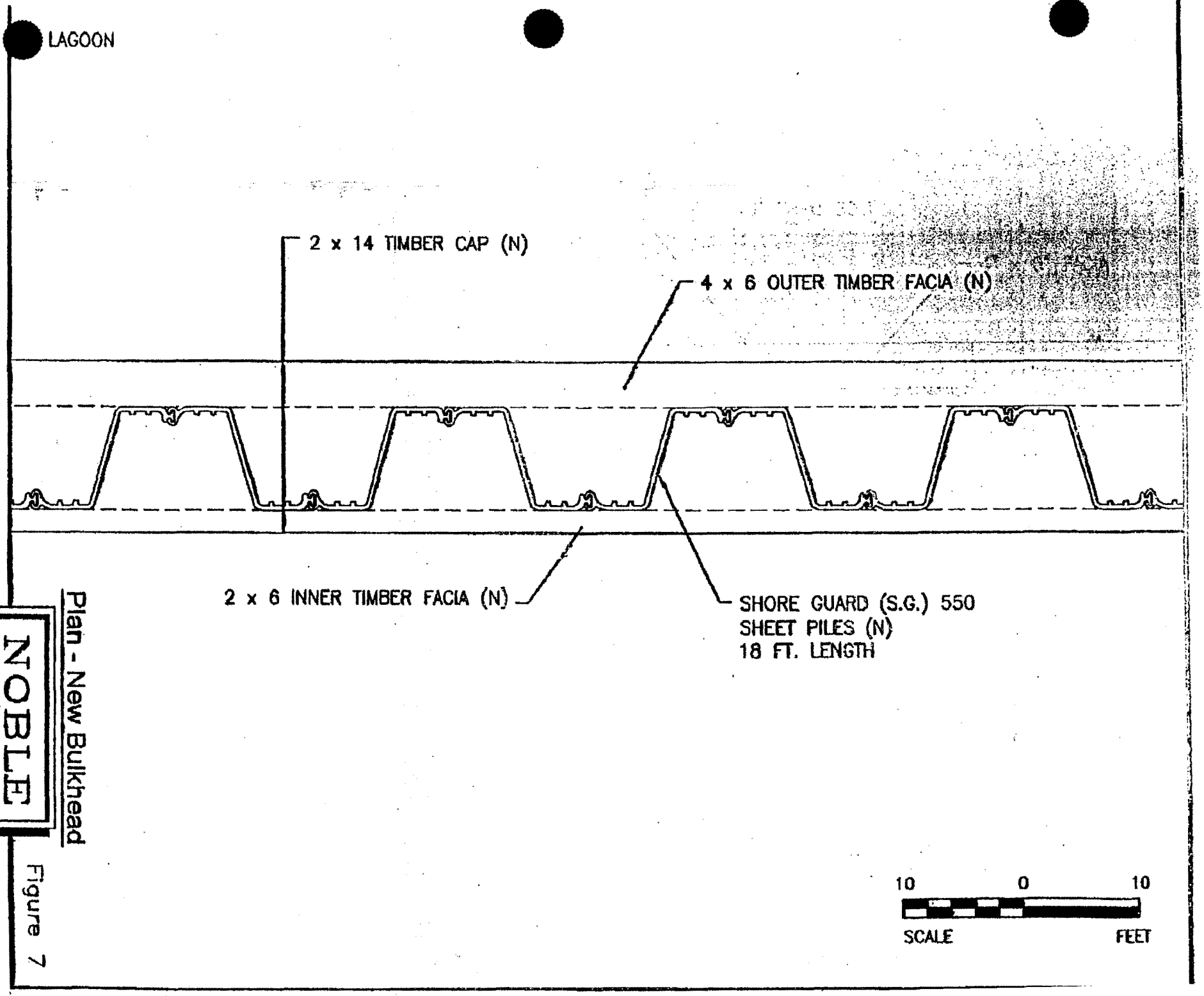
Figure 3



NOBLE CONSULTANTS, INC.

Section - New Bulkhead

Figure 6

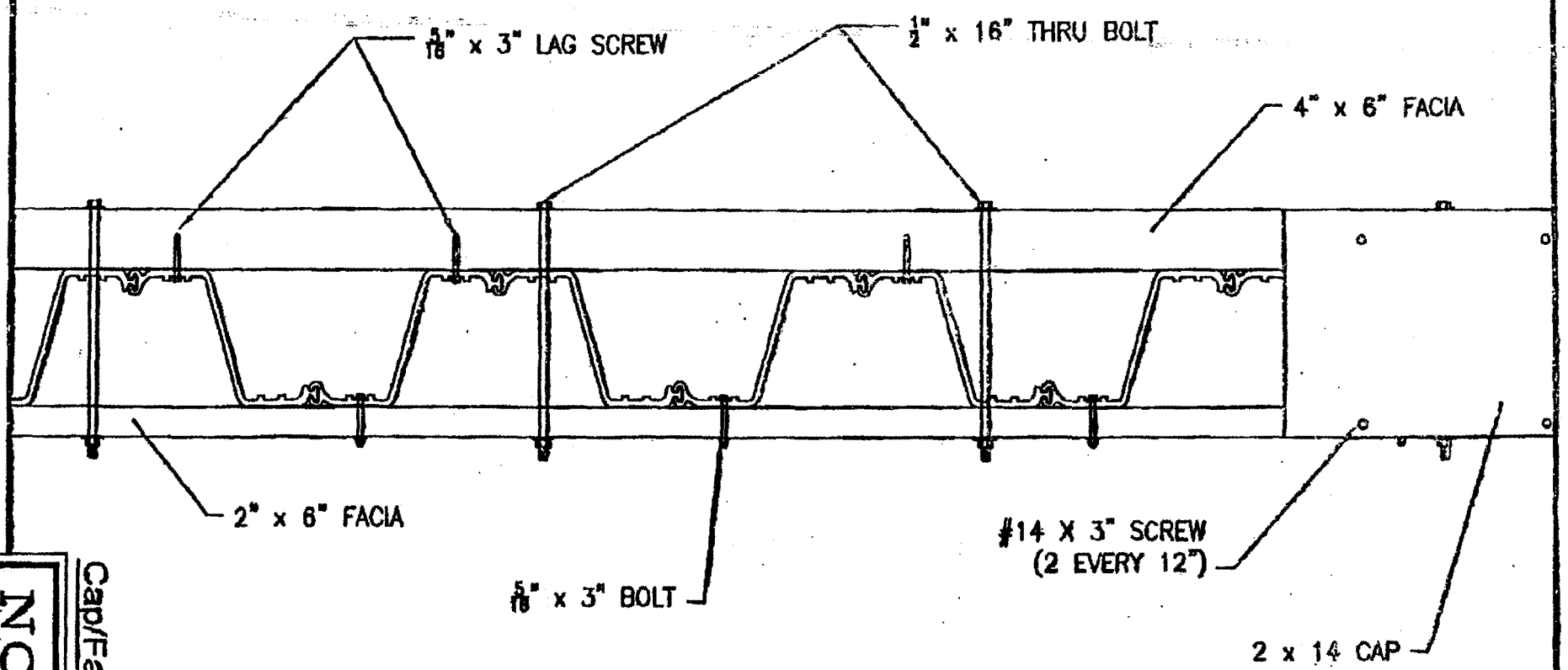


NOBLE CONSULTANTS, INC.

Plan - New Bulkhead

Figure 7

LAGOON



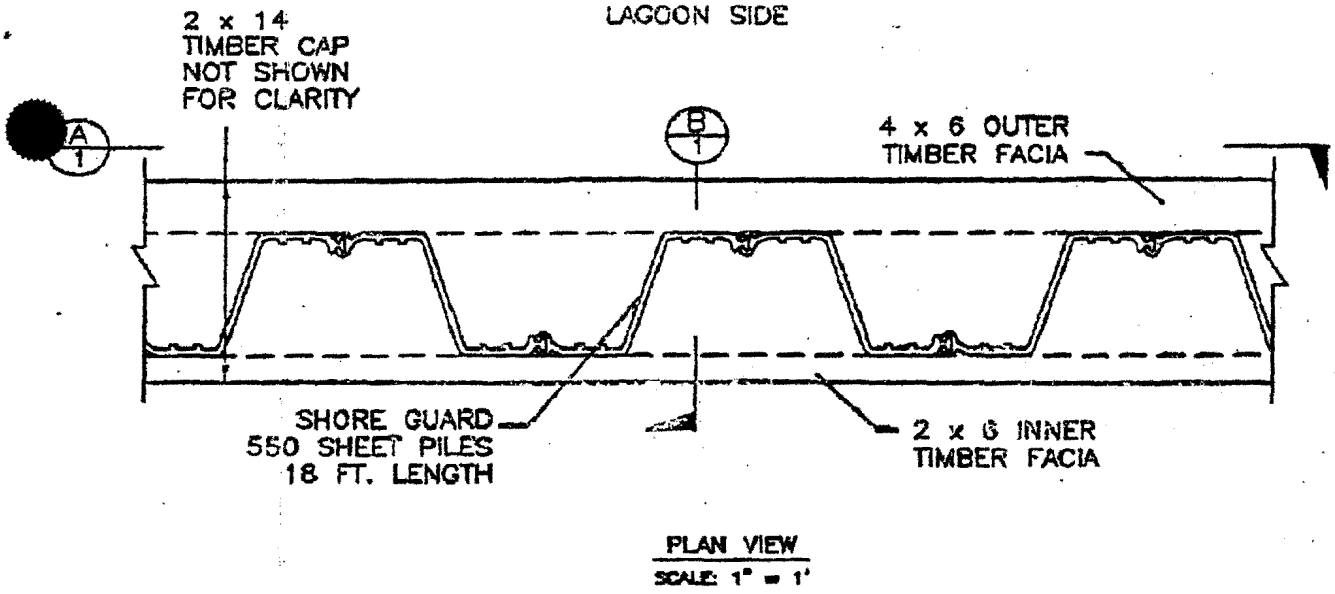
NOBLE CONSULTANTS, INC.

Cap/Facia Detail

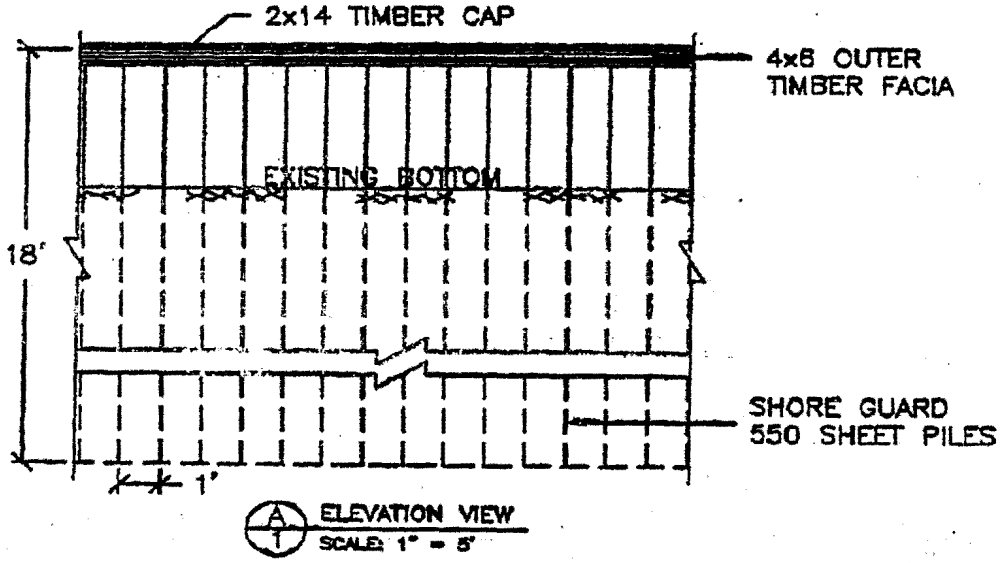
Figure 8

10 0 10

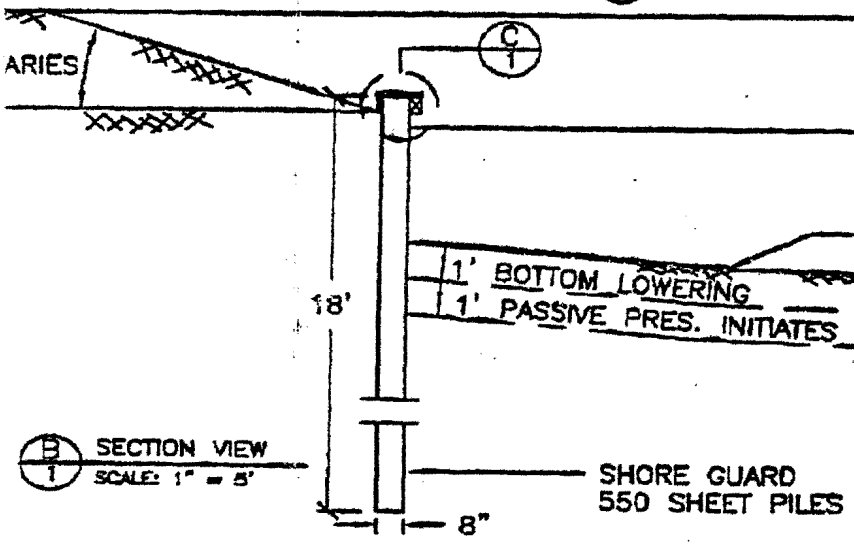
SCALE FEET



PLAN VIEW
SCALE: 1" = 1'



A 1 ELEVATION VIEW
SCALE: 1" = 5'



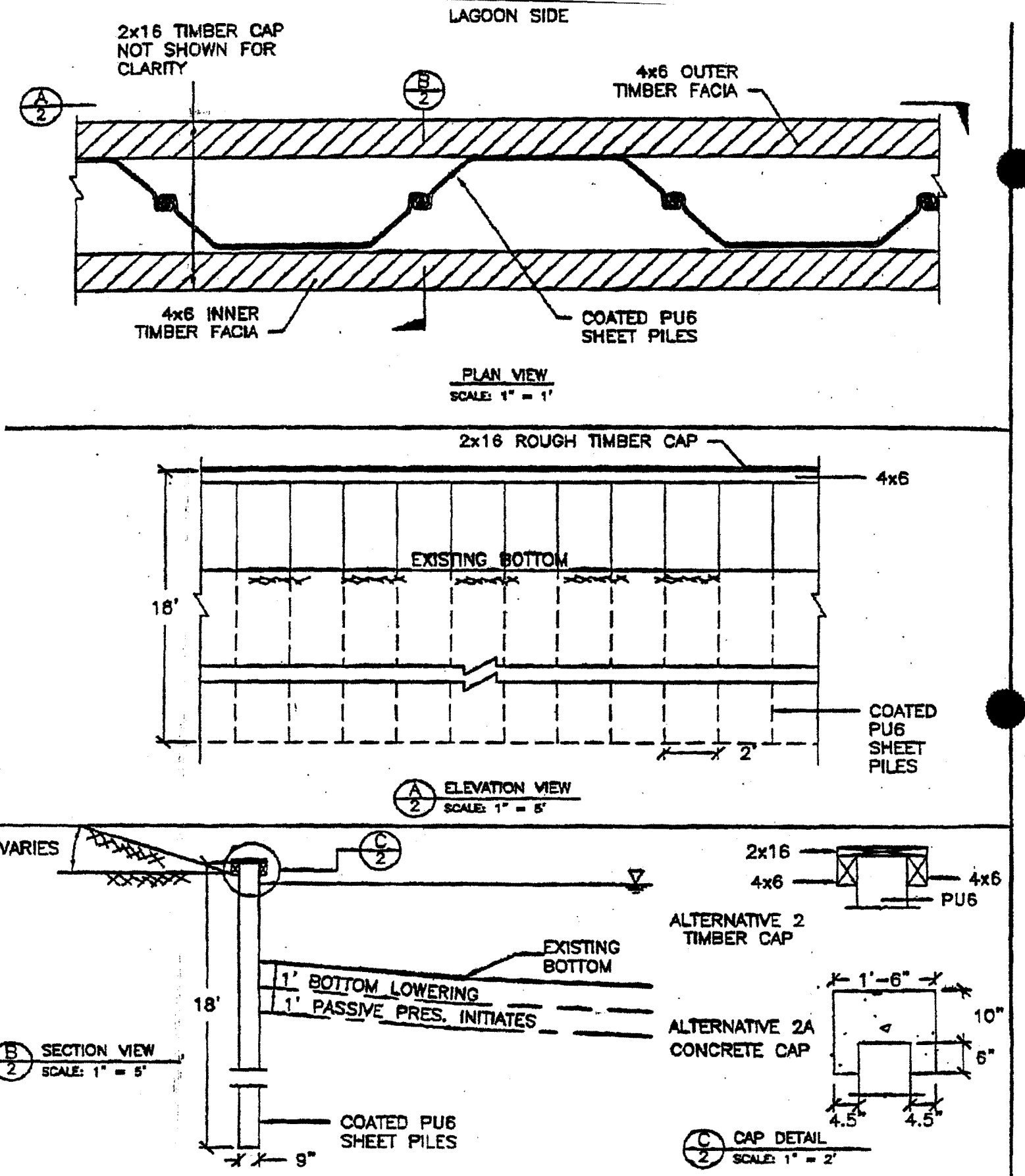
B 1 SECTION VIEW
SCALE: 1" = 5'

C 1 CAP DETAIL
SCALE: 1" = 2'

Alternative 1: Polyvinyl Cantilever Bulkhead

NOBLE CONSULTANTS, INC.

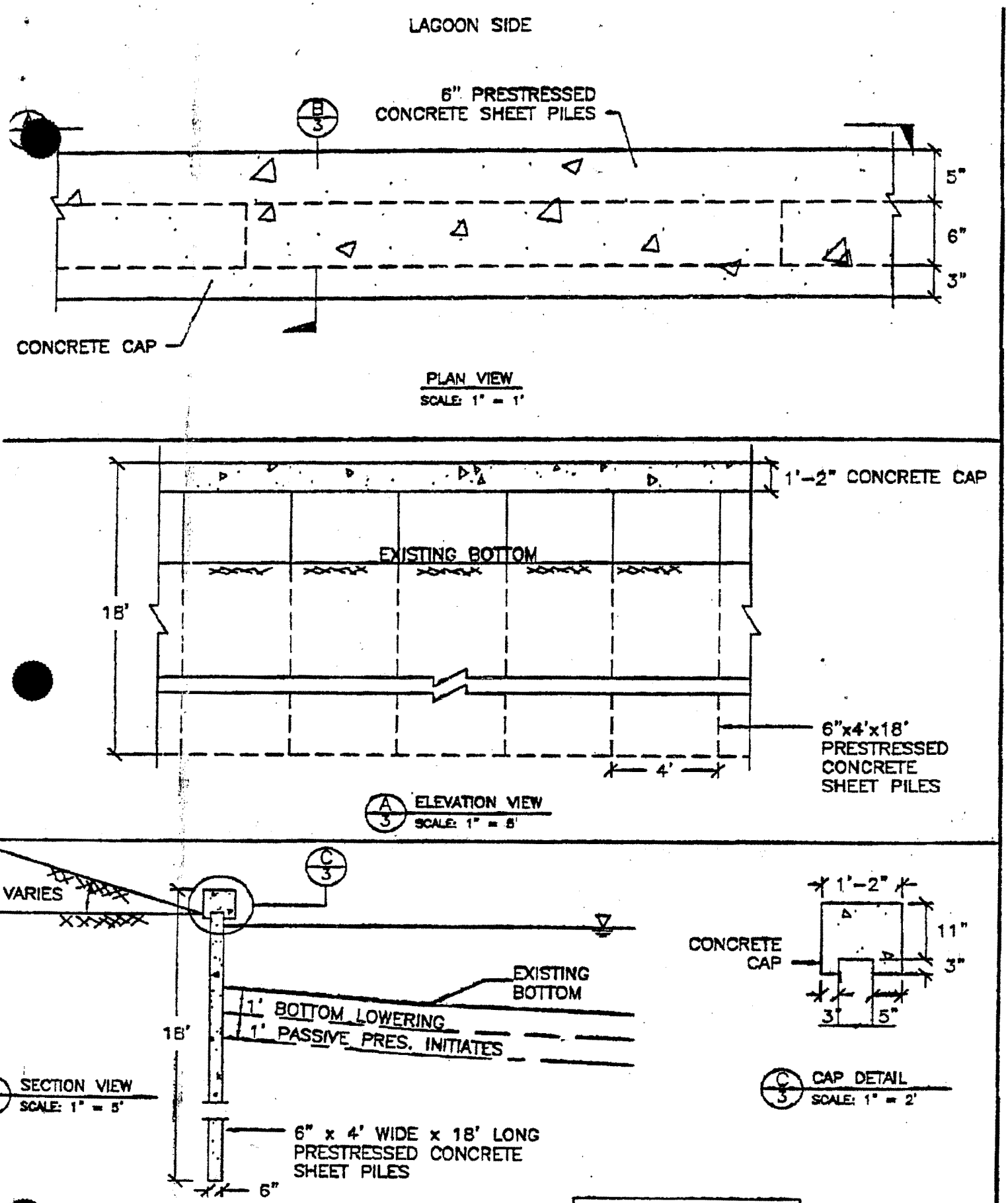
Figure 9



Alternative 2: Steel Cantilever Bulkhead

NOBLE CONSULTANTS, INC.

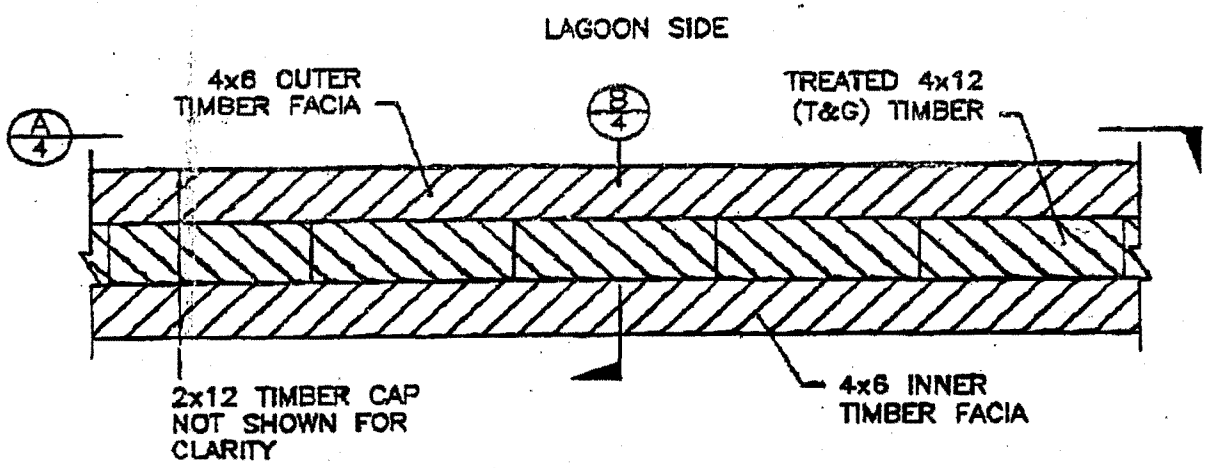
Figure 10



Alternative 3: Concrete Cantilever Bulkhead

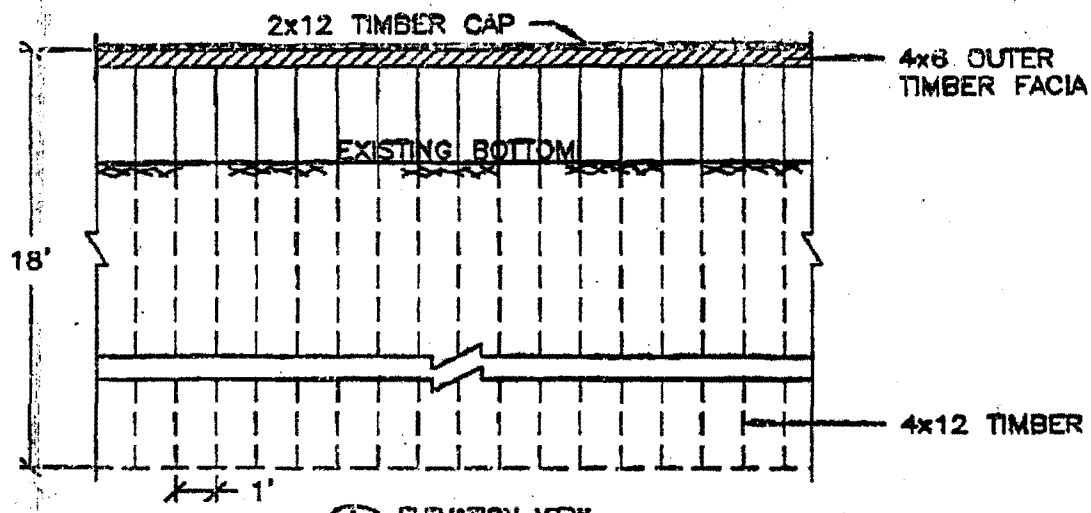
NOBLE CONSULTANTS, INC.

Figure 11

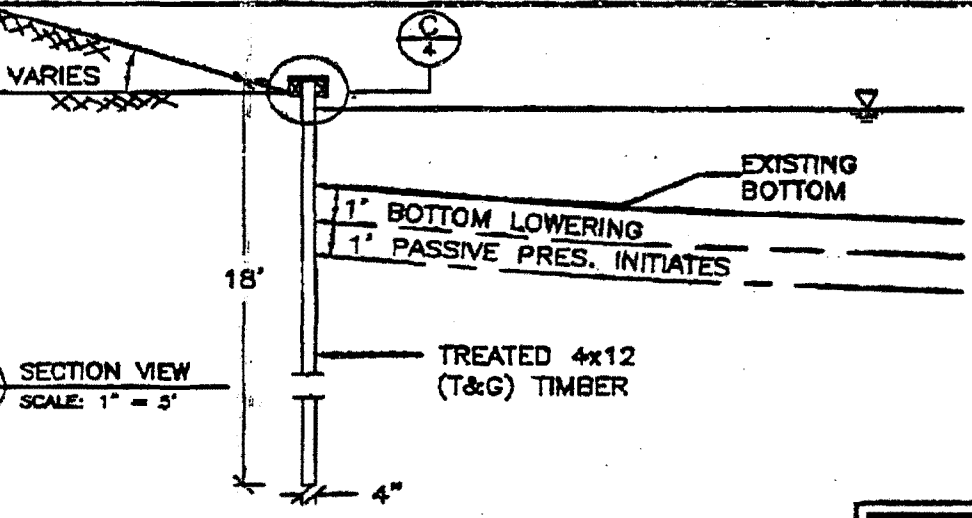


PLAN
SCALE: 1" = 1'

NOTE: ALL TIMBER ROUGH CUT SIZES



ELEVATION VIEW
SCALE: 1" = 5'



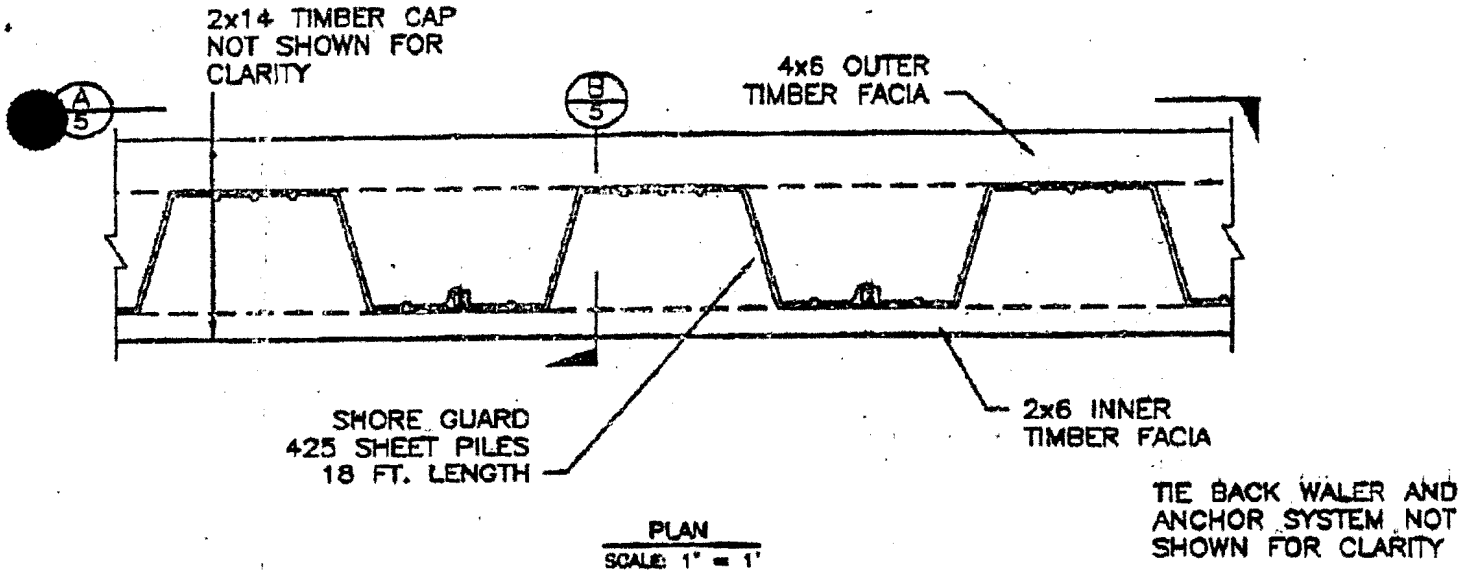
SECTION VIEW
SCALE: 1" = 5'

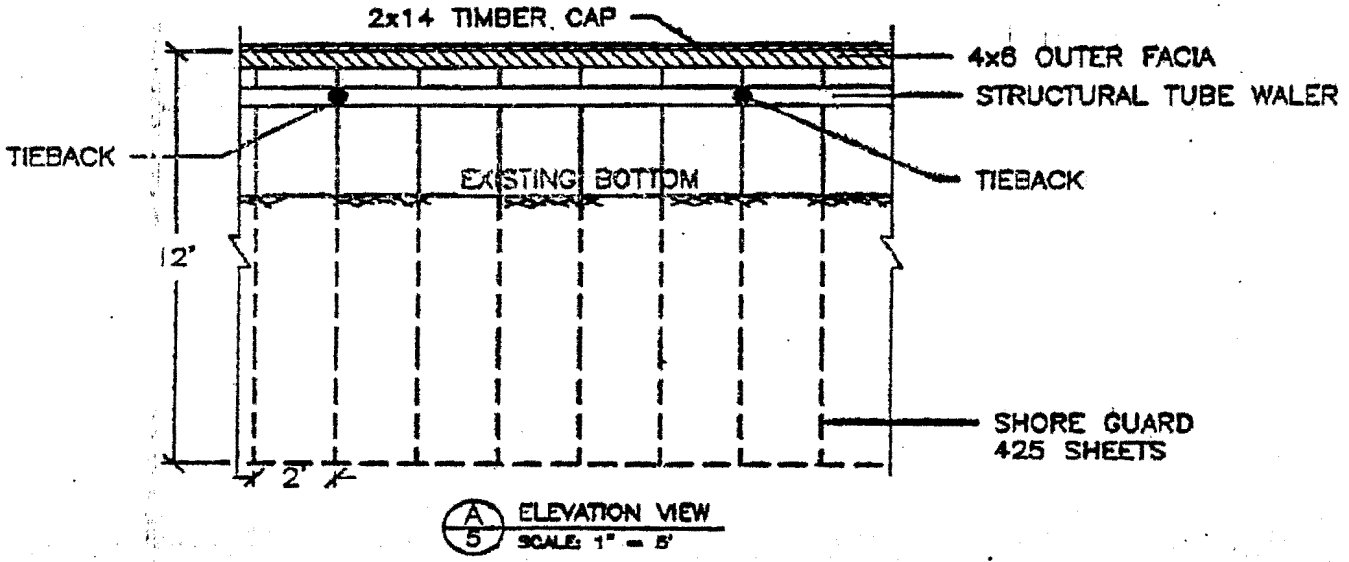
CAP DETAIL
SCALE: 1" = 2'

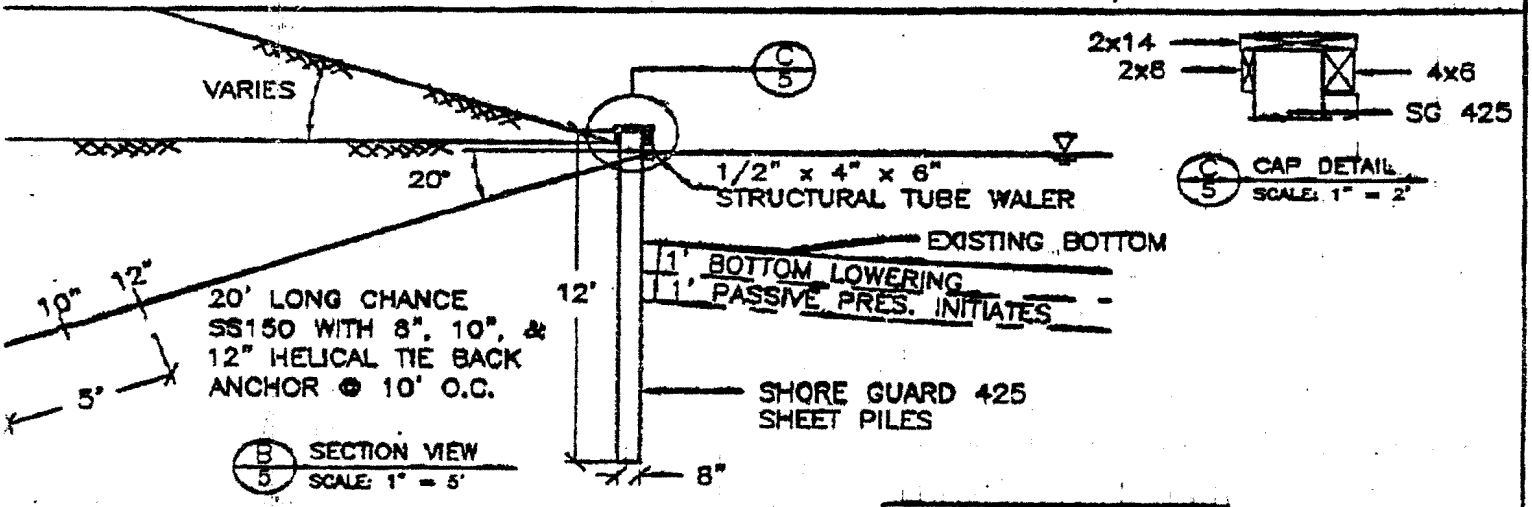
ternative 4: Timber Cantilever Bulkhead

NOBLE CONSULTANTS, INC.

Figure 12







Alternative 5: Polyvinyl Anchored Bulkhead

NOBLE CONSULTANTS, INC.

Figure 13

Table 2

Alternative 1A. Polyvinyl Cantilever Bulkhead

New Bulkhead Installed Directly Behind Existing Bulkhead
Demolition After Completion of Bulkhead Pile Installation

Task Description	Quantity	Unit*	Unit Cost	Total	Task Total
Mobilization					
Mobilization of Barges (2 x 6 ld)	12	LD	800	9,600	
CAT 235 (2 x 1 ld)	2	LD	1,500	3,000	
Compressors, ect. (2x 2 ld)	4	DS	500	2,000	
65 Ton Truck Crane (2 x 1 rt)	2	RT	2,500	5,000	
Mobilization of Personnel	1	LS	5,000	5,000	
Setup Yard	1	LS	10,000	10,000	$34,600
Assemble Barges					
65 Ton Truck Crane	16	HR	275	4,400	
7 Man Crew (7 x 16 hr)	112	HR	50	5,600	
Minor Equipment	2	DAY	200	400	
ST&S	1	LS	500	500	
Load CAT 235	-	-	-	-	
Load Sheets	-	-	-	-	$10,900
Purchase Sheets					
SG 550 Sheets	216,000	SF	4.32	933,120	
Tax	1	LS	0.075	69,984	
Trucking	28	LD	3,000	84,000	$1,087,104
Drive Piles					
Equipment Barges	9	MO	6,250	56,250	
Material Barges	9	MO	2,100	18,900	
CAT 235	9	MO	7,500	67,500	
Vibratory Hammer	9	MO	2,800	25,200	
7 Man Crew (7 x 1320 hr)	9,240	HR	50	462,000	
Forklift	9	MO	1,600	13,500	
Minor Equipment	9	MO	3,000	27,000	$670,350
Remove Existing					
Equipment Barge	1	MO	6,250	6,250	
Materials Barge	1	MO	2,100	2,100	
CAT 235	1	MO	7,500	7,500	
4 Man Crew (4 x 192 hr)	768	HR	50	38,400	
Forklift	1	MO	1,500	1,500	
Minor Equipment	1	MO	3,000	3,000	
Disposal	500	CY	150	75,000	$133,750
Timber Cap					
Barge	2	MO	2,100	4,200	
Forklift	2	MO	1,500	3,000	
Minor Equipment	2	MO	3,000	6,000	
5 Man Crew (5 x 320 hr)	1,600	HR	50	80,000	
Timber Cap	65	MBM	1,000	65,000	
Hardware	1	LS	15,000	15,000	$173,200
				subtotal	$2,109,904
				Overhead and Markup (25%)	$527,476
				Total	$2,637,380

Note:
LD = Load
RT = Round Trip
MBM = Thousand Board Feet Measure
MO = Month
HR = Hour
LS = Lump Sum

Correspondence

Mary S. Metz
5 Dipsea Road
P.O. Box 686
Stinson Beach, CA 94970

November 20, 2002

California Coastal Commission
North Central District Office
45 Fremont Street, Suite 2000
San Francisco, CA 94105

Re: Application File Number 2-02-001
Project: Removal and replacement of a 410-foot section of a bulkhead on Seadrift Lagoon

Dear Commissioners:

I am writing to request your approval of our application to replace a 40 year old, rotting creosote-treated wooden bulkhead with rigid, interlocking polyvinyl sheet-piling that has been used extensively in marine environments. This product was selected by the Board of Directors of the Seadrift Homeowners' Association after more than two years of study, informed by engineering and environmental consultants who concluded that this product would be superior in performance to wood, concrete, or steel as judged by life-span, maintenance, impact on water quality during construction, bio-fouling and cleaning, habitat value, and material leaching and decay. **The engineering report concluded that the polyvinyl piles are highly inert and stable and should result in superior performance in the corrosive marine environment**.

Last spring, the Board of the Seadrift Homeowners' Association presented its recommendation to use the polyvinyl sheet-piling product to the members of the association and requested their approval of a special assessment to cover the cost of the installation of a new bulkhead for the entire lagoon, ending the forty-year practice of individual homeowners repairing the original chemically treated wooden bulkhead with more chemically treated wood. Of the 178 homeowners, 149 (86%) voted affirmatively to be assessed and to have the failing bulkhead replaced by the recommended polyvinyl sheet-piling. Only 21 (14%) voted in the negative. Initially, their opposition focused on the cost of installing the polyvinyl sheet-piling; they wanted to continue the practice of individually repairing the wooded bulkhead with more chemically treated wood. More recently, they have focused their opposition on the recommended product itself.

In response to the concerns of the minority, the Board of the Seadrift Homeowners' Association hired an independent, qualified environmental consulting firm to study the health and environmental issues related to the polyvinyl sheet-piling. **The report from Stellar Environmental Solutions concluded that there were no health or environmental safety problems with regard to the polyvinyl for use in the Seadrift Lagoon.** In reaching its

conclusion, Stellar Environmental Solutions, Inc. reviewed the scientific literature and contacted as many regulators as possible who would have information on or concerns about the product. No agency opposed the use of the polyvinyl sheet-piling; one or two indicated that they had no jurisdiction over the project and had no opinion. Several stated emphatically that they had no concerns about the use of polyvinyl in a marine environment, including the Regional Water Quality Control Board, San Francisco Bay Region; U. S. Fish and Wildlife Service; U. S. Army Corps of Engineers; U. S. Environmental Protection Agency; Resource Conservation District, Marin County.

It would be inappropriate for the California Coastal Commission to dismiss a viable product from consideration because of the objections of a few, ill-informed opponents. You will have no doubt noticed that the Resolution of the Marin County Board of Supervisors (Resolution No. 99-168) which they sent to you and have used as the foundation of their arguments against the polyvinyl sheet-piling focuses on **emission of dioxin to the atmosphere**. The polyvinyl sheet-piling product is made from **recycled vinyl**. There are no emissions associated with the production of the sheet-piling. If the opponents of the sheet-vinyl are truly opposed to the emission of dioxins, they should also be campaigning against the production of gasoline, the use of wood burning fireplaces and the manufacture of steel. Dioxins are generated during the combustion process when chlorine is present in the materials being burned. This includes oil refineries, metal smelting, incinerators, engines, fireplaces, forest fires.

The polyvinyl that the Seadrift Homeowners' Association Board is recommending has been approved and installed in numerous locations in Northern California, including the Foster City bulkhead replacement (1998), San Francisco Airport shoreline protection restoration project (2000), shoreline bulkhead wall for San Quentin State Prison (2001), Santa Clara Water District Los Gatos Creek Project (2001), City of Vallejo North Harbor Breakwater Project (2001).

In summary, the scientific literature, environmental consultants and the regulators conclude that rigid polyvinyl is inert and does not interact with the surrounding environment. This is one of the reasons that polyvinyl is used in pipes to convey drinking water, in medical tubing, in toys, and in thousands of products that humans use every day. If the California Coastal Commission were to dismiss polyvinyl as an approvable material for bulkhead use, it would severely limits its choices of appropriate materials and might force the use of other materials which could be less benign in a marine environment. I urge you to approve the affirmative recommendation of your staff for the use of the polyvinyl sheet-piling product in Seadrift Lagoon.

Thank you for considering my perspective on this matter.

Sincerely,

Mary S. Metz

ROGER BOAS
3329 WASHINGTON STREET
SAN FRANCISCO, CALIFORNIA 94118
TEL 415-441-2000
FAX 415-567-4120

November 18, 2002

California Coastal Commission
North Central District Office
45 Fremont, Suite 2000
San Francisco, California 94105

Dear Sir or Madam:

As owners of lagoon property (299 Seadrift Road) at Stinson Beach, California, we write to support the plan of the Seadrift Association to install Rigid Polyvinyl Interlocking Sheet Piling as a bulkhead.

Very truly yours,

Roger Boas

Nancy Boas

Paul & Kathy Bissinger
3477 Pacific Avenue
San Francisco, CA 94118
(415) 931-3477

November 18, 2002

California Coastal Commission
North Central District Office
45 Fremont Street, Suite 2000
San Francisco, CA 9405

Re: Application File #2-02-001
Seadrift Lagoon Bulkhead Replacement Plan, Stinson Beach, CA

Dear Sir/Madam:

We are the owners of a home at 151 Dipsea Road in Stinson Beach. Our Seadrift Lagoon bulkhead will be included in the replacement plan (the "Plan") that has been developed by the Seadrift Homeowners' Association Board of Directors (the "Association"). The Plan has been duly approved by 86% of the voting members of the Association.

This letter will affirm our strong support for the Plan proposed by the Association, involving the use of rigid polyvinyl interlocking pylons as the preferred solution, taking into consideration environmental issues, cost, appearance and durability.

We also feel strongly that the entire Plan should be applicable to all property owners with Seadrift Lagoon frontage in the interest of uniform appearance. It would also be our preference that the entire Plan by implemented at one time and by one contractor, as we believe this would be more efficient and economical with respect to permit requirements as well as demolition and construction costs per lot. Notwithstanding, we understand a few homeowners wish to replace their bulkheads sooner, and we do not object, provided the materials and appearance match those proposed in the Plan.

We urge your approval of the Plan submitted by the Association.

Sincerely,

Paul A Bissinger, Jr.

cc: Seadrift Homeowners' Association Board of Directors

SHUTE, MIHALY & WEINBERGER LLP
ATTORNEYS AT LAW

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CARMEN J. BORG
URBAN PLANNERS

ELIZABETH M. DODD
DAVID NAWI
OF COUNSEL

November 18, 2002

VIA HAND DELIVERY

California Coastal Commission
45 Fremont Street
Suite 2000
San Francisco, CA 94105

Re: Application File No. 2-02-001

Dear Commissioners:

On behalf of Concerned Citizens Group, residents of Seadrift who are concerned about the environmental impacts of the proposal to install new bulkheads constructed of polyvinyl chloride ("PVC") in the Seadrift Lagoon, we submit the enclosed Environmental Assessment of Shoreguard and Alternative Bulkhead Materials (November 18, 2002) prepared by Petra Pless, D.Env. and Phyllis Fox, Ph.D., P.E., DEE. This environmental assessment report analyzes, in detail, the significant environmental and public health effects of using PVC as a bulkhead material in lagoon water. The report establishes the long term effects of the proposed PVC installation, including release of hazardous materials into lagoon waters and air, the short term construction effects, as well as propensity of the material to degrade over time and lose its effectiveness for the proposed bulkhead use.

The enclosed environmental assessment report also analyzes the comparative environmental and public health effects of alternatives to PVC. Of the materials analyzed, a feasible alternative that lacks the unacceptable environmental and public health effects of PVC, steel or concrete is the use of certain identified tropical hardwoods such as greenheart.[1] Concerned Citizens Group requests the Commission to require substitution of one or more of

[1] Please note that this outcome would be more consistent with the Seadrift Association Architectural Guidelines (1995), Guideline I(E) and Drawings D and E, which specify that bulkheads should be constructed of wood (albeit 16 lb. creosote planking, which is not favored by Concerned Citizens Group).

these tropical hardwoods for PVC in the pending application and in all future bulkhead construction in Seadrift Lagoon, if such wood has been obtained through methods that maintain or restore the health and integrity of forest ecosystems.

This letter and the enclosed materials supplement Concerned Citizens Group's previous submittals to the Commission. As we have stated in our prior correspondence, the significant effects on the environment of the proposed project must be adequately analyzed by the Commission and mitigated as required by the California Environmental Quality Act. While an addendum to the staff report was issued on October 9, 2002, it does not adequately analyze the cumulative impacts of the larger 12,000 lineal foot bulkhead restoration project, which is reasonably foreseeable, as well as the ecological and public health effects detailed in the Pless and Fox environmental assessment report. The staff report also does not analyze the construction related impact to air quality, noise impacts, and visual impacts of the PVC installation.

In view of the foregoing and the attached analysis, we respectfully request the Commission (1) to deny the project as currently proposed (i.e., using PVC); (2) to require the use of tropical hardwood; and (3) to conduct additional environmental review and to require changes in the project that will mitigate the project's significant environmental and public health effects.

Very truly yours,

SHUTE, MIHALY & WEINBERGER LLP

Ellen J. Garber

cc: Peter Douglas (Enclosure w/out attachments)
Sharon Call, Concerned Citizens Group

Enclosures

[P:\SEADRIFT\EJG001.LTR.COMM2.WPD]

ENVIRONMENTAL ASSESSMENT

OF

SHOREGUARD

AND

ALTERNATIVE BULKHEAD MATERIALS

Prepared by

Petra Pless, D.Env.
Leson Environmental Consulting
Berkeley, CA

and

J. Phyllis Fox, Ph.D., P.E., DEE
Consulting Engineer
Berkeley, CA

November 18, 2002

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LIST OF EXHIBITS

ENVIRONMENTAL ASSESSMENT OF SHOREGUARD AND ALTERNATIVE BULKHEAD MATERIALS

The applicants, Metz, Cebe, Sherbon, Bowman, and Carcione ("applicant"), have applied to the California Coastal Commission ("Commission") for a permit to remove 410 linear feet of wooden bulkhead and replace it with a rigid polyvinylchloride ("PVC") product named ShoreGuard™, produced by Materials International in Georgia. ShoreGuard is manufactured by co-extruding two streams of molten plastic, 5% virgin PVC and 95% recycled pre-consumer PVC.[1] (Wallace 7/18/02.[2]) A study prepared for the Seadrift Association indicates that a total of about 12,000 feet of the existing bulkhead is in poor repair and must also be replaced. (Noble 7/02.[3]) The following analysis assumes that all 12,000 feet of bulkhead will be replaced with the same material.

The Commission evaluated the environmental impacts of ShoreGuard and presented its finding in a September 26, 2002 Staff Report[4] ("SR") and an October 9, 2002 Amended Staff Report[5] ("Amended SR"). Commission staff also evaluated replacement of all 12,000 feet of bulkhead and recommended conditional approval of ShoreGuard, concluding that it would result in no significant environmental impacts.

We were retained by homeowners in Seadrift Lagoon to evaluate the environmental impacts of ShoreGuard and to identify viable alternatives that preclude these impacts. Our analysis indicates that ShoreGuard may leach organotin compounds into the lagoon in high enough concentrations to result in significant public health and ecological impacts. ShoreGuard also photodegrades, weakening its mechanical properties and releasing toxic acids, hydrocarbons, aldehydes, ketones, chloroketones, chlorinated alkanes, and other chemicals into the atmosphere and lagoon waters. Some of the detected chemicals are carcinogenic, e.g., benzene, chloroform, methylene chloride, vinyl chloride.

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[1] Pre-consumer recycled materials are generated as scrap or waste material from a production run. These materials are also referred to as "post-industrial."

[2] Letter from Mike Wallace, Materials International, to Sara Borchelt, California Coastal Commission, July 18, 2002.

[3] Noble Consultants, Inc., Alternative Bulkhead Comparisons for the Seadrift Inner Lagoon Bulkhead Replacement, Prepared for Seadrift Association, Stinson Beach, CA, July 2002.

[4] California Coastal Commission, Staff Report, Application File No. 2-02-001: Removal and Replacement of a 410 Foot Section of a Bulkhead on Seadrift Lagoon, September 19, 2002.

[5] California Coastal Commission, Addendum to the Staff Report for Permit Application No. 2-02-001 (Mertz, Cebe, Sherbon, Bowman, Carcione), October 9, 2002.

We also evaluated concrete, coated steel, and several woods as alternatives to ShoreGuard. Concrete, coated steel, and chemically treated woods would leach high concentrations of contaminants into the lagoon and thus are not viable options. However, several untreated, sustainably harvested tropical hardwoods are viable alternatives to ShoreGuard and pose little environmental risk beyond short-term construction impacts, which are common to all alternatives.

The bases for our conclusions are presented below. We first discuss the key environmental issues that have been raised about ShoreGuard in previous submittals and hearings before the Commission. We then present several alternatives and briefly review their key environmental strengths and weaknesses.

I. ENVIRONMENTAL IMPACTS OF SHOREGUARD

I.A Leaching Of Alkyltin Compounds

Stabilizers are added to PVC to protect against heat-induced degradation during manufacturing and degradation through exposure to ultraviolet light during the useful life of the product. The principle groups of stabilizers used for PVC are lead compounds, alkyltin[6] compounds, barium-zinc compounds, barium-cadmium compounds, calcium-zinc compounds, and antimony compounds. Materials International, for example, indicates that ShoreGuard is "packed with heavy concentrations of the additives that further prevent weathering and ultra violet (UV) damage."[7] The supplier of the stabilizer used in ShoreGuard (PolyOne Geon E3360) indicates that a 50/50 mixture of monomethyltin and dimethyltin is used. (Amended SR, p. 8; Kantola 9/17/02.[8])

The Commission Staff Report concluded that "the evidence does not support a determination that the PVC bulkhead proposed for use in the aquatic environment would be hazardous to human or ecological health." (SR, p. 11.) We have conducted additional investigations that suggest that leaching of organotins would result in significant public health and aquatic impacts.

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[6] Alkyltins are often referred to as organotins; they include methyl-, ethyl-, butyl-, propyl-, and phenyltins.

[7] www.materialsintl.com/manufacturing.html, accessed November 12, 2002.

[8] E-mail from Barbara J. Kantola, PolyOne Corp., to Sarah Borchelt, California Coastal Commission, Re: PolyOne Corporation Product - Geon E3360, September 17, 2002.

Mono- and dialkyltins are used as heat stabilizers in the production of PVC. Numerous leaching studies of PVC pipe used in drinking water service indicate that these stabilizers are soluble in freshwater. These studies have reported levels of different alkyltins up to 291 nanograms measured as tin per liter ("ng Sn/L") in drinking water. The following table summarizes results from a literature search on leaching of alkyltins from PVC into water. These results clearly demonstrate the possibility of release of alkyltins from a PVC product into an aquatic environment.

Water Source	Maximum Concentration*	Reference
Drinking water	≤291 ng Sn/L MMT ≤49.1 ng Sn/L DMT ≤28.5 ng Sn/L MBT ≤52.5 ng Sn/L DBT	Sadiki and Williams 1999[9]
Drinking water	≤257 ng Sn/L MMT ≤6.5 ng Sn/L DMT	Sadiki et al. 1996[10]
Test water, stagnant	≤200 ng Sn/L Total Sn	Quevauviller et al. 1991[11]
Test water, flowing	≤35 ng Sn/L DMT	Boettner et al. 1982[12]
Test water, flowing	≤5.9 ng Sn/L organotins	Wu et al. 1989[13]
Drinking water, heated (65°C)	≤13.4 ng Sn/L MBT ≤100.4 ng Sn/L DBT	Forsyth and Jay 1997[14]

* Monomethyltin ("MMT"), Dimethyltin ("DMT"), Monobutyltin ("MBT"), Dibutyltin ("DBT")

[9] A.-I. Sadiki and D.T. Williams, A Study on Organotin Levels in Canadian Waters Distributed through PVC Pipes, Chemosphere, v. 38, n. 7, 1999, pp. 1541-1548.

[10] A.-I. Sadiki, D.T. Williams, R. Carrier, and B. Thomas, Pilot Study on the Contamination of Drinking Water by Organotin Compounds from PVC Materials, Chemosphere, v. 32, no. 12, pp. 2389-2398, 1996.

[11] Ph. Quevauviller, A. Bruchet, and O.F.X. Donard, Leaching of Organotin Compounds from Poly(vinylchloride) (PVC) Material, Applied Organometallic Chemistry, v. 5, 1991, pp. 125-129.

[12] E.A. Boettner, G.L. Ball, Z. Hollingsworth, and R. Aquino, Organic and Organotin Compounds Leached from PVC and CPVC Pipe, U.S. EPA, Health Effects Research Laboratory, Cincinnati, OH, Report PB 82-10833, 1982.

[13] W. Wu, R.S. Roberts, Y.-C. Chung, W. Ernst, and S.C. Havlicek, The Extraction of Organotin Compounds from Polyvinyl Chloride Pipe, Archives of Environmental Contamination & Toxicology, v. 18, 1989, pp. 839-843.

[14] D.S. Forsyth and B. Jay, Organotin Leachates in Drinking Water from Chlorinated Poly(vinylchloride) (CPVC) Pipe, Applied Organometallic Chemistry, v. 11, 1997, pp. 551-558.

We are not aware of any studies that simulate the leaching behavior of PVC in a marine environment. However, it can be reasonably anticipated that the combination of stagnant conditions, exposure to ultraviolet radiation, wetting and drying cycles from fluctuating water levels, and salt water found in Seadrift Lagoon would increase the leachability of organotin compounds compared to plastic pipe used to convey drinking water, particularly if the Bolinas Lagoon Ecosystem Restoration Project results in more frequent and more extensive fluctuations in water level.

Several factors may contribute to an increase in leachability of alkyltins from ShoreGuard in a marine-water lagoon environment, compared to the freshwater pipe leaching studies cited above. Thus, concentrations of organotins leached from ShoreGuard into the marine lagoon environment may be higher than those reported above for freshwater flowing through PVC pipes.

First, seawater is a biologically active medium that contains a large number of microscopic and macroscopic organisms. A bacterial/algal film forms relatively quickly on ShoreGuard, based on observations of existing installations. (Ex. 1: Golden Hinde, Inverness.) Specifically, PVC has a surface charge that attracts bacterial growth. The biofilm produces a number of organic byproducts, including organic acids, hydrogen sulfide, and protein-rich polymeric materials commonly known as slime. This growth on the PVC material alters the microenvironment at the interface of the surrounding water and the PVC sheets, enhancing the leaching and degradation of PVC.[15] The acids, for example, would reduce the pH, which would enhance leaching of alkyltins from PVC.

Second, long-term exposure to sunlight results in the formation of a pigment-rich surface layer that is highly granular. Compare, for example, the photographs of fresh and 11-year-old, outdoor rigid PVC panels shown in Figure 4 of Ex. 2 (Carlsson et al. 1998[16]). The reduced particle size and increased surface area would increase leaching from the aged material, compared to the fresh, relatively smooth material in PVC drinking water pipe.

Third, velocity is a key factor influencing leachability. Stagnant conditions at the face of the bulkhead (compared to drinking water pipe) can result in the buildup of acids and settling of deposits, facilitating attack of PVC.[17]

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[15] B.D. Craig, Handbook of Corrosion Data, Sea Water, ASM International, Metals Park, OH, 1989, pp. 448-475.

[16] D.J. Carlsson, M. Krzymien, G. Pleizier, D.J. Worsfold and M. Day, Volatile Release from Photodegrading, Pigmented PVC: Kinetic Changes, Polymer Degradation and Stability, v. 62, 1998, pp. 413-419.

[17] P.R. Roberge, Handbook of Corrosion Engineering, McGraw-Hill, New York, 1999, pp. 140-141.

Under its current management plan, stagnant conditions are common in the lagoon, which is cut off from tidal influences much of the year. Fourth, ligands and ions in sea water, such as chlorides, could react with tin compounds in the PVC, increasing their solubility compared to freshwater.[18] Therefore, it is reasonable to anticipate that larger amounts of organotin compounds would be leached from PVC bulkhead in a marine lagoon than from PVC drinking water pipe.

I.A.1 Public Health Impacts

Residents of Seadrift use the lagoon for boating, fishing and swimming. (ES 3/88,[19] p. 2.) In comments on the proposed use of ShoreGuard, Dr. Barry commented, "I often swim in the lagoon as do many others." (Barry 7/26/02.[20]) These activities can result in human exposure to leached organotins through ingestion of contaminated water, ingestion of contaminated fish and dermal absorption from body contact with contaminated water, from inhalation of contaminated aerosols, and from inhalation of volatile organic compounds outgased from PVC by photodegradation. Organotin compounds are readily absorbed through the skin and thus swimmers could be uniquely exposed.[21]

The Commission did not evaluate these impacts, instead relying on a 1998 draft environmental impact report ("DEIR") prepared by the State's Department of Housing and Community Development ("HCD"). (SR, pp. 10-11.) However, extensive comments and a CEQA lawsuit were filed, challenging the conclusions in this DEIR. In response, the certification of this DEIR was withdrawn in a settlement. Ex. 3.[22] Therefore, the Commission cannot legally rely on the 1998 EIR. We also note that California has *not* certified the use of CPVC for potable water piping in residential buildings due in part to health concerns related to the leaching of mono- and dialkyltin compounds into the water supply.

The Commission's conclusion of no adverse public health impacts was based on the assumption that only mono- and dialkyltin compounds are present

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[18] O.F.X. Donard and J.H. Weber, Behavior of Methyltin Compounds under Simulated Estuarine Conditions, Environmental Science & Technology, v. 19, 1985, pp. 1104-1110.

[19] Engineering-Science, Management Plan, Seadrift Lagoon, Stinson Beach, California, Prepared for The Seadrift Homeowner's Association, March 1988.

[20] Letter from Peter Barry to Architecture Committee, July 26, 2002.

[21] S.E. Manahan, Environmental Chemistry, 5th Ed., Lewis Publishers, Chelsea, MI, 1991, p. 155.

[22] Richard Cuffe et al, Petitioners, v. California Department of Housing and Community Development, Respondents, and B.F. Goodrich Co., Inc., Real Party in Interest, Notice of Entry of Joint Stipulation and Order Approving Settlement and Providing for Dismissal with Prejudice, County of San Francisco, Case No. 300221,December 6, 2000.

in ShoreGuard, while the allegedly much more toxic trialkyltin compounds are absent, based on an e-mail from the stabilizer vendor. (SR, p. 8.) However, as discussed below, trialkyltins are present at 0.1% to 0.33% by weight in mono- and dialkyltins as a result of comproportionation reactions.[23] Further, while the vendor may not add trialkyltins to the virgin PVC used to formulate ShoreGuard, other organotins may be present in the recycled PVC stream, which comprises 95% of ShoreGuard. (Wallace 7/18/02.) Finally, as noted below, mono- and dialkyltin compounds are sometimes more toxic to mammals than the trialkyl forms, depending on the target organ and toxic endpoint.

The Commission's health impact conclusion is not substantiated by any published data and references to the literature, but instead relies on a withdrawn DEIR. As we demonstrate below, exposure to organotin compounds leached from ShoreGuard product may result in significant public health impacts to residents who use the lagoon for recreational purposes and consume fish caught in the lagoon.

The toxicological properties of organotin compounds are dependent upon the nature and number of organic groups attached to the tin atom. In the series R_nSnX_{4-n} (R=organic group, X=inorganic anion), the maximum biological activity frequently, but not always, occurs when n=3 for triorganotins with the same alkyl group, regardless of the nature of the X group, which does not usually influence the toxicity level.

The toxicity within each class of organotin compounds is determined by the number of carbon atoms in the organic side chain (R_n). Within the series of trialkyltin compounds (R_3), for example, the lower homologs, trimethyltin and triethyltin, are more toxic than tributyltin. (Snoeij et al. 1987,[24] pp. 337-338.) Dialkyltin compounds also show the same trend of increasing toxicity with decreasing alkyl chain length. (Maguire 1991,[25] p. 327.) Thus, dimethyltin, used in ShoreGuard, is more toxic than dibutyltin, the compound that has been most studied in the diorganotin series. Similarly, trimethyltin, formed by comproportionation reactions, is more toxic than tributyltin, which has been

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[23] Comproportionation, the reverse of disproportionation, describes any chemical reaction of the type A+A → A′ + A″, where A, A′ and A″ are different chemical species. Here, monobutyltin and tributyltin compounds are formed from dibutyltin in a reversible spontaneous comproportionation reaction according to 2 DBT → MBT + TBT.

[24] N.J. Snoeij, A.H. Penninks, and W. Seinen, Biological Activity of Organotin Compounds -- An Overview, Environmental Research, v. 44, 1987, pp. 335-353.

[25] R.J. Maguire, Aquatic Environmental Aspects of Non-Pesticidal Organotin Compounds, Watér Pollution Research Journal of Canada, Special Issue, v. 26, no. 3, 1991, pp. 243-360.

most studied in the triorganotin series. Presumably, the same is true for monoalkyltins, but we found no supporting experimental data.

The target organs of exposure to organotins are the central nervous system, skin, liver, bile duct, immune system, and reproductive system. (WHO 1980.[26]) The diorganotins are the most toxic tins to the liver, bile duct, immune system, and reproductive system. (Seinen et al., 1977;[27] Snoeij et al. 1987; Ueno et al. 1994.[28]) They are also the most potent developmental toxins that have been tested among the organotin compounds. (Ema et al. 1995.[29]) Diorganotins are irritants to the skin and eyes and are powerful metabolic inhibitors. (Snoeij et al., 1987; WHO, 1980.) They are also potent teratogens (Ema et al. 1992,[30] 1995, 1996;[31] Noda et al. 1992,[32] 1993[33]), embryotoxic, and cause malformations in offspring (Ex. 4: Lopipero and Smith 1998,[34] pp. 16-17), thus potentially posing a significant hazard to pregnant women who may use the lagoon.

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[26] World Health Organization (WHO), Environmental Health Criteria 15, Tin and Organotin Compounds: A Preliminary Review, International Programme on Chemical Safety, World Health Organization, Geneva, Switzerland, 1980.

[27] W. Seinen et al., Toxicity of Organotin Compounds. II. Comparative In Vivo and In Vitro Studies with Various Organotin and Organolead Compounds in Different Animal Species with Special Emphasis on Lymphyocyte Cytotoxicity, Toxicology and Applied Pharmacology, v. 42, 1977, pp. 197-212.

[28] S. Ueno, N. Susa, Y. Furukawa, and M. Sugiyama, Comparison of Hepatotoxicity Caused by Mono- Di- and Tributyltin Compounds in Mice, Archives of Toxicology, v.. 69, 1994, pp. 30-34.

[29] M. Ema, Amano H. Kurosaka, and Y. Ogawa, Comparative Developmental Toxicity of Butyltin Trichloride, Dibutyltin Dichloride, and Tributyltin Chloride in Rats, Journal of Applied Toxicology, v. 15, 1995, pp. 297-302.

[30] M. Ema, T. Itami, and H. Kawasaki, Susceptible Period for the Teratogenicity of Di-n-Butyltin Dichloride in Rats, Toxicology, v. 73, 1992, pp. 81-92.

[31] M. Ema, R. Kurosaka, H. Amano, and Y. Ogawa, Comparative Developmental Toxicity of Di-, Tri- and Tetrabutyltin Compounds after Administration during Late Organogenesis in Rats, Journal of Applied Toxicology, v. 16, no. 1, 1996, pp. 71-76; M. Ema, T. Iwase, Y. Iwase, N. Ohyama, and Y. Ogawa, Change of Embryotoxic Susceptibility to Di-n-butyltin Dichloride in Cultured Rat Embryos, Archives of Toxicology, v. 70, 1996, pp. 297-302.

[32] T. Noda and others, Teratogenic Effects of Various Di-n-butyltins with Different Anions and Butyl(e-hydroxybutyl)tin Dilaurate in Rats, Toxicology, v. 85, 1993, pp. 149-160.

[33] T. Noda and others, Comparative Teratogenicity of Di-n-butyltin Diacetate with n-Butyltin Trichloride in Rats, Archives of Environmental Contamination and Toxicology, v. 23, 1992, pp. 216-222.

[34] Peggy Lopipero and Martyn T. Smith, Comments on the Draft Environmental Impact Report for Chlorinated Polyvinyl Chloride (CPVC) Pipe Use for Potable Water Piping in Residential Buildings, Final Report, August 1998.

Monomethyltin and trimethyltin, on the other hand, induce learning deficiencies in young rats. (Norland et al., 1982.[35]) Concentrations present in CPVC leachate exceed the short term exposure limits derived from the results of the Norland study (Boettner et al., 1982), refuting the Commission's conclusion that leached concentrations do not exceed any health thresholds. Dimethyltin impairs renal and urinary bladder function, while trimethyltin is neurotoxic.[36] Trimethyltin, which is likely to be present through comproportionation reactions, is a more potent neurotoxicant than di- and tributyltin.[37]

The butyltins are also immunotoxic at environmental concentrations. They debilitate the immune system of animals, making them vulnerable to infectious diseases. The immunotoxicity follows the order of TBT>DBT>MBT. (Whalen et al. 1999.[38]) The methyltins used in ShoreGuard would likely be more immunotoxic than the butyltins evaluated in this study. (Snoeij et al. 1987, pp. 337-338; Maguire 1991, p. 327.)

University of California researchers concluded, based on some of the above-cited studies, that "significant adverse health effects resulting from exposure to diorganotins would not be unexpected. These effects include toxicity to the immune system, liver and bile duct, and the reproductive system. Also, diorganotins are potent teratogens and exposure to mono-organotins *in utero* can result in behavioral effects. Furthermore, the genotoxicity of organotins suggest that they are potentially carcinogenic." Ex. 4 at 18.

The 1998 DEIR (and the Commission) relied on a maximum drinking water level ("MDWL")[39] of 20 µg/L to conclude that leaching was not a concern because maximum concentrations of organotin reported in drinking water are

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[35] E.A. Norland, D.H. Taylor, and R.J. Bull, Monomethyl- and Trimethyltin Compounds Induce Learning Deficiencies in Young Rats, Neurobehavioral Toxicology and Teratology, v. 4, 1982, pp. 539-544.

[36] Y. Xiao, G.J. Harry, and K.R. Pennypacker, Expression of AP-1 Transcription Factors in Rat Hippocampus and Cerebellum after Trimethyltin Neurotoxicity, Neurotoxicology, v. 20, 1999, pp. 761-766; D.C. Dorman, An Integrative Approach to Neurotoxicity, Toxicology and Pathology, v. 28, 2000, pp. 37-2000.

[37] I.J. Boyer, Toxicity of Dibutyltin, Tributyltin and Other Organotin Compounds to Humans and to Experimental Animals, Toxicology, v. 15, 1989, pp. 253-298.

[38] M.M. Whalen, B.G. Loganathan, and K. Kannan, Immunotoxicity of Environmentally Relevant Concentrations of Butyltins on Human Natural Killer Cells *in Vitro*, Environmental Research, Section A, v. 81, 1999, pp. 108-116.

[39] For contaminants for which there is no U.S. EPA or CA DHS maximum contaminant level, the National Sanitation Foundation uses a standard U.S. EPA risk assessment procedure to estimate a MDWL.

much lower. However, this MDWL was challenged by Dr. Martyn Smith, a professor of toxicology, and his colleague at the School of Public Health, University of California at Berkeley. They concluded, based on more recent toxicologic data than considered in the DEIR, that the MDWL for diorganotins should be 0.35 µg/L, which is 57 times lower. Ex. 4 at 4. This MDWL was based on dibutyltin. Because dimethyltins are likely more toxic, the MDWL for the methyltins used in ShoreGuard may be even lower. As noted above, the concentrations of mono- and diorganotins found in drinking water are much higher than this MDWL.

The Commission itself estimated that a maximum annual concentration of 0.35 µg/L of organotin could potentially leach from 12,000 linear feet of PVC bulkhead. (Amended SR, p. 3, note 1.) This concentration is equal to the revised MDWL based on dibutyltin. As noted above, the methyltins used in ShoreGuard may be more toxic than the butyltins used to derive this MDWL. Thus, leachates from a ShoreGuard bulkhead could result in significant public health impacts. Further, the Commission's calculations are based on three assumptions that do not appear to represent worst-case conditions. Impacts could conceivably be greater.

First, the Commission assumed ShoreGuard 550 would be used for all 12,000 linear feet of bulkhead, based on the application for only five homes, and thus used a panel weight of 5.4 lb/ft^2. However, the design parameters for the bulkhead did not consider seismic loading and long-term creep, both of which may require stronger material than ShoreGuard 550. (Noble 7/02, p. 8.) The site lies about 0.5 miles east of the active San Andreas Fault Zone. Strong to violent ground shaking must be expected at the site from significant seismic activity along this fault zone over the life of the bulkhead.[40] Thus, we believe it would be unwise to ignore seismic loading and long-term creep when designing with PVC.

Further, the Bolinas Lagoon Ecosystem Restoration Project ("Bolinas Project") may alter the design basis of the bulkhead, requiring a stronger material. The Seadrift Lagoon is connected to the Bolinas Lagoon by two 36-inch diameter intake pipes, which draw water into Seadrift at high tides. As the tide recedes, flap valves prevent water from returning to Bolinas Lagoon. Water is only drawn into Seadrift Lagoon at high tides during winter and spring season and is maintained at a level above that of Bolinas Lagoon at low tides. (ES 3/88,

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[40] PGSoils, Inc., A Geotechnical Investigation for the Proposed Residence on the Bechtle Property, 293 Seadrift Road, Stinson Beach, California, March 2002.

pp. 1-2.) Throughout the year, water levels in Seadrift Lagoon vary between 1 foot and 3 feet above the mud line, measured at the current bulkhead.[41]

One of the alternatives being considered by the Bolinas Project is to leave the connection between Bolinas and Seadrift Lagoons open, thus exposing Seadrift Lagoon to normal tidal fluctuations. Three variations are currently proposed that would affect the currently almost stagnant water levels in Seadrift Lagoon: a) open Seadrift Lagoon to tidal flushing by placing larger culverts at the two existing culvert locations; b) create two 20-foot open channels; and c) open only the northwest end of the Seadrift Lagoon to tidal flushing.[42]

Any of these alternatives would require altering the design basis of the bulkhead and likely would require a stronger material than currently proposed. Engineering design data on Material International's website indicates that ShoreGuard 700, a stronger material, has a panel weight of 8 lb/ft^2. Ex. 5. Thus, unless the Commission imposes a condition requiring the use of 5.4 lb/ft^2 material for all 12,000 linear feet of bulkhead, the higher value should be used for a worst-case calculation.

Second, the Commission assumed 1% organotin by weight, based on an e-mail from PolyOne, the supplier of stabilizers to Material International. However, ShoreGuard is manufactured from 95% recycled plastics. (Wallace 7/18/02.) While Material International may only use the PolyOne product, Geon E3360, recycled PVC may contain higher concentrations of organotins or other stabilizer formulations.

Apparently, Material International purchases recycled material from several sources. The Commission indicates that it requested that Material International supply information on the organotin composition and levels in these recycled material, but had not received a response at the time of this writing.[43] Generally, however, it is difficult to control the composition of recycled materials, unless a single source is used, the same identical organotin stabilizer is used, and a rigorous quality control program, including analysis of each batch, is in place. The record contains no evidence, and we were unable to

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[41] P. Pless, Personal communication with Dick Kameniecki, Manager Seadrift Lagoon, November 13, 2002.

[42] L. Romanoski and J. Winkelmann, U.S. Army Corps of Engineers, San Francisco District, Bolinas Lagoon Ecosystem Restoration, Water Resources Appendix, http://www.spn.usace.army.mil/projects/waterresourcesappx.pdf, accessed November 15, 2002.

[43] P. Fox, Personal communication, Sarah Borchelt, California Coastal Commission, November 12, 2002.

obtain information from the vendor, to support such practices. A review of the literature indicates that a typical application level for organotin stabilizers is up to 2% of the plastic weight. Ex. 6.[44] PolyOne quoted the same upper range for organotin stabilizers.

Third, organotins measured in natural waters are highly concentrated by factors of up to 100,000 in the surface microlayer. (Maguire et al. 1982.[45]) This layer would be mostly ingested by swimmers, aerosolized by boating and other water sports, and inhaled. Thus, residents using the lagoon could potentially be exposed to much higher concentrations than the maximum annual average estimated by the Commission.

The maximum annual concentration of organotin in the lagoon would be 1.1 µg/L, assuming a panel weight of 8 lb/ft^2 and 2% organotin by weight. This value is three times higher than the MDWL of 0.35 µg/L estimated by University of California researchers for diorganotins. Ex. 4 at 4. Actual concentrations could be up to 100,000 times higher because organotin compounds concentrate in the surface microlayer. Further, as discussed in Section I.B, the concentrations of vinyl chloride, a carcinogen, that are leached from PVC in the presence of sunlight are high enough to exceed the California and federal drinking water standards. Thus, we believe it would be prudent for the Commission to reconsider its conclusion that there is no evidence that PVC bulkhead would be hazardous to human health. (SR, p. 11.)

The Commission also argued that organotin compounds are not persistent because they are broken down rapidly by microbial activity. (SR, p. 9; Amended SR, p. 2.) However, this is inconsistent with the literature. It appears that methyltin species, used in ShoreGuard, are constantly methylated and demethylated, resulting in a continuous supply in the water column. The breakdown products, inorganic tin compounds, would be cycled into the sediments or aquatic biota, where they could be methylated by both biotic and abiotic pathways to yield a variety of methyltin compounds and released back into the water column. (Cooney 1988;[46] Maguire 1991, pp. 320-326.) See also review in Yemenicioğlu et al. (1997)[47] at 739. Methylation to mono-, di-, and

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[44] www.ortepa.org/stabilizers/pages/markets.htm, accessed November 11, 2002.

[45] R.J. Maguire and others, Occurrence of Organotin Compounds in Ontario Lakes and Rivers, Environmental Science & Technology, v. 16, no. 10, 1982, pp. 698-702.

[46] J.J. Cooney, Interactions Between Microorganisms and Tin Compounds, In: The Biological Alkylation of Heavy Elements, P.J. Craig and F. Glockling (Eds.), Royal Society of Chemistry, 1987.

[47] S. Yemenicioğlu, S. Tuğrul, N. Kubilay and I. Salihoğlu, The Distribution of Methyltin Species in Different Seas, Marine Pollution Bulletin, v. 34, no. 9, 1997, pp. 739-744.

trialkyltins has been observed in studies of natural water systems. (Ex. 7: Maguire and Tkacz 1985;[48] Tuğrul et al. 1983;[49] Yemenicioğlu et al. 1997.) This is evidenced by elevated concentrations of mono-, di-, and trialkyltins commonly found in the rivers, lakes, estuaries, and marine environments.[50,51]

Further, inorganic and organic tin compounds are bioconcentrated. Thus, organotin compounds could be present at elevated concentrations in aquatic biota, including fish consumed by residents and micro-organisms in the lagoon water itself, which in turn may be ingested by residents during swimming. Through adsorption processes, bacteria can concentrate up to 120 mg Sn/kg dry matter, which corresponds to a bioconcentration factor of >7,000.[52] For phytoplankton, bioconcentration factors of 5,500 to 30,000 have been reported; mollusks show bioconcentration factors of up to 16,000. In fish, bioconcentration factors vary among species and depending on the type of tissue; the highest bioconcentration factors of up to 52,000 are found in liver tissue.[52]

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[48] R.J. Maguire and R.J. Tkacz, Degradation of Tri-n-butyltin Species in Water and Sediment from Toronto Harbor, Journal of Agricultural Food Chemistry, v. 33, 1985, pp. 947-953.

[49] S. Tuğrul, T.I. Balkas, and E.D. Goldberg, Methyltins in the Marine Environment, Marine Pollution Bulletin, v. 14, no. 8, 1983, pp. 297-303.

[50] R. James Maguire and others, Occurrence of Organotin Compounds in Ontario Lakes and Rivers, Environmental Science & Technology, v. 16, no. 10, 1982, pp. 698-701; R.J. Maguire and others, Occurrence of Organotin Compounds in Water and Sediment in Canada, Chemosphere, v. 15, 1986, pp. 253-274; R.J. Maguire and R.J. Tkacz, v. 33, J. Agric. Food Chem., 1985, pp. 947-953; R.J. Maguire, Water Poll. Res. J. Canada, 1991; L.W. Hall, Jr. and others, Evaluation of Butyltin Compounds in Maryland Waters of Chesapeake Bay, Marine Pollution Bulletin, v. 18, no. 2, 1987, pp. 78-83; A.O. Valkirs and others, Measurement of Butyltin Compounds in San Diego Bay, Marine Pollution Bulletin, v. 17, no. 7, 1986, pp. 319-324; Tuğrul et al., Marine Pollution Bulletin, v. 14, no. 8, 1983, pp. 297-303; N. Kubilay et al., Distribution of Organotin Compounds in the North-Eastern Mediterranean, Marine Pollution Bulletin, v. 32, no. 2, 1996, pp. 238-240; J.J. Cleary and A.R.D. Stebbing, Organotin and Total Tin in Coastal Waters of Southeast England, Marine Pollution Bulletin, v. 16, no. 9, 1985, pp. 350-355. R.J. Huggett, M.A. Unger, and D.J. Westbrook, Organotin Concentrations in the Southern Chesapeake Bay, Oceans 1986, Proceedings Organotin Symposium, Washington, D.C., v. 4, 1986, pp. 1262-1265.

[51] ToxNet, Tin Compounds.

[52] E.g., C. Alzieu, Biological Effects of Tributyltin on Marine Organisms, In: De Mora, S.J. (ed.), Tributyltin: Case Study of an Environmental Contaminant, Cambridge, University Press, 1996, pp. 167-211; K. Fent, Ecotoxicology of Organotin Compounds, Critical Reviews in Toxicology, v. 26, 1996, pp. 1-117; W. Kalbfus, A. Zellner, and E. Stanner, Gewässergefährdung durch Organozinnhaltige Antifouling-Anstriche, Umweltbundesamt Berlin, UBA-Texte 44-91, 1991; all in: Arbeitsgemeinschaft für die Reinhaltung der Elbe, Herkunft und Verteilung von Organozinnverbindungen in der Elbe und Elbenebenflüssen, 1999, http://www.arge-elbe.de/wge/Download/Berichte/TBTX.pdf, accessed November 12, 2002.

I.A.2 Ecological Impacts

The Commission concluded that triorganotin compounds are more toxic to aquatic organisms than mono- or diorganotin compounds, but assumed that triorganotin compounds are not present in ShoreGuard and thus did not evaluate their impacts. (SR, p. 8.) We believe it is likely that triorganotin compounds are present in ShoreGuard at high enough concentrations to result in significant ecological impacts.

First, ShoreGuard is manufactured from 95% recycled PVC. Because triorganotin compounds are frequently used as biocides in some PVC materials, it is not possible to assure that no triorganotin compounds are present in ShoreGuard without presenting reliable and representative analytical data.

Second, alkyltin compounds undergo comproportionation reactions, resulting in a mixture of mono-, di-, and organotin compounds. (Neumann 1970, p. 53-57.[53]) See discussion in footnote 23. This was recently demonstrated in research funded by the Consortium of Butyltin Manufacturers and several individual producers at the University of Southern Mississippi's Gulf Coast Research Laboratory. The manufacturers were unable to prepare a sample of 100% dibutyltin. Typically, about 0.1% tributyltin was present in all samples, regardless of the efforts at purification.[54] The authors wrote that "[b]ased upon our experience these impurities [tributyltin] cannot be reduced to levels much below 0.1% of the DBT." Ex. 8.[55] The same reactions occur for methyltins. (Neumann 1970.)

Chronic flow-through saltwater life-cycle toxicity tests using sheepshead minnow suggested that most of the chronic toxicity of dibutyltin is due to the presence of tributyltin, formed by comproportionation reactions. Ex. 8. The presence of triorganotin "contamination" up to 0.33% has also been widely reported in the literature,[56] though is likely due to comproportionation reactions.

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[53] W.P. Neumann, The Organic Chemistry of Tin, Interscience, New York, 1970.

[54] P. Fox, Personal communication, Tom Lytle, University of Southern Mississippi, Gulf Coast Research Laboratory, November 11, 2002.

[55] C.S. Manning et al., Life-Cycle Toxicity of Butyltin to the Sheepshead Minnow (*Cyprinodon variegatus*), Draft Report, University of Southern Mississippi, Gulf Coast Research Laboratory, November 2002.

[56] P.W. Wester and J.H. Canton, Histopathological Study of *Poecilia reticulata* (Guppy) after Long-term Exposure to Bis(tri-n-butyltin)oxide (TBTO) and Di-n-butyltindichloride (DBTC), Aquatic Toxicology, v. 10, 1987, pp. 143-165; J. Widdows and D.S. Page, Effects of Tributyltin on the Physiological Energetics of the Mussel, *Mytilus edulis*, Marine Environmental Research, v. 35, 1993, pp. 233-249.

Canada has established a water quality guideline of 0.001 µg/L to protect marine aquatic life from tributyltin. The Canadian guideline is based on the most sensitive marine organism, spat of the oyster *Crassostrea gigas*, which exhibited a significant reduction in their ability to compensate for hypoxia in the presence of 0.01 µg/L bis(tributyltin) oxide. Ex. 9.[57] We found no toxicity data on trimethyltin. However, a similar guideline to protect marine aquatic life from trimethyltin, which would likely be present by comproportionation in ShoreGuard, would likely be lower because the methyltins are generally more toxic than the butyltins. See above discussion.

If it is assumed that 0.1% to 0.33% of the 1.1 µg/L organotin leached from ShoreGuard is present as trialkyltin, the maximum annual concentration in Seadrift Lagoon would range from 0.0011 to 0.0036 µg/L. This exceeds the Canadian marine water quality guideline of 0.001 µg/L, suggesting that significant aquatic impacts are likely.

Further, some aquatic organisms live and/or feed in the surface microlayer, including copepods and larvae and fry of many species. The concentrations of organotin compounds are highly concentrated in this microlayer and likely routinely exceed the Canadian marine guideline of 0.001 ug/L. The concentrations of organotin compounds in the microlayer likely exceed toxicity thresholds (e.g., LC_{50}s, EC_{50}s) for many organisms that rely on the microlayer. Some of these thresholds have been summarized and reviewed by others, e.g., Exs. 7, 9, and 10.[58] A sampling of those organisms that may use the microlayer, are very sensitive to organotin compounds, and thus are likely to be placed at risk are as follows:

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[57] Canadian Water Quality Guidelines, March 1992, Appendix X.

[58] L.W. Hall, Jr. and A.E. Pinkney, Acute and Sublethal Effects of Organotin Compounds on Aquatic Biota: An Interpretative Literature Evaluation, CRC Critical Reviews in Toxicology, v. 14, issue 2, 1985, pp. 159-209.

Species	Test/End Point[59]	Concentration (µg Sn/L)	Source
Sheep sturgeon larvae	egg fertilization	0.01	Ex. 10, p. 178
dog-whelk	imposex	0.019	Ex. 9, p. X-4
copepod nauplii	6-day LOEL	0.023-0.024	Ex. 9, p. X-4
mussel larvae	LC_{50}	0.04	Ex. 7, Table VI
rainbow trout yolk sac fry	growth retardation	0.07	Ex. 7, p. 952
various algal species	reduction in growth	0.1	Ex. 9, p. X-4
Skeletonema costatum	72-hr EC_{50}	0.30-0.36	Ex. 9, p. X-4
copepods	96-hr LC_{50}	0.4-0.8	Ex. 7, Table VI
sheepshead minnow	14-21 day LC_{50}	0.4	Ex. 7, Table VI
juvenile mysid shrimp	LC_{50}	0.42	Ex. 9, p. X-4

These concentrations could be readily exceeded in the surface microlayer of Seadrift Lagoon. Thus, the Commission should reconsider its conclusion of no adverse impact to aquatic ecosystems.

I.B Degradation of PVC

When rigid PVC is exposed to outdoor environments, it undergoes very slow, long-term degradation due to exposure to ambient pollutants (*e.g.*, ozone, NO_2), rain, fungi, mechanical stress, and ultraviolet radiation. The ultimate result is a marked loss of additives, discoloration, embrittlement, erosion, and finally loss in mechanical properties.[60]

All plastics degrade in the environment by chain scission promoted by natural daylight and usually oxygen to yield low molecular weight fragments,[61]

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[59] The LOEL is the "lowest observed effect level," or the lowest level (concentration) at which adverse effects are observed. The LC_{50} is defined as the amount of a compound present per liter of aqueous solution that is lethal to 50% of the test organisms within the stated study time. The EC_{50} is the effective concentration of a compound that produces a specific measurable effect in 50% of the test organisms within the stated study time. The measurable effect is lethality for zooplankton and a reduction in photosynthetic activity by 50% for phytoplankton.

[60] N. Belhaneche-Bensemra and N. Ouazene, Study of the Influence of Atmospheric Pollutants on the Natural Ageing of Rigid Polyvinyl Chloride, Macromolecular Symposia, v. 180, 2002, pp. 181-189; C. Decker, Degradation and Stabilization of PVC, Elsevier Applied Science Publishers, London and New York, 1984, p. 81; B.D. Gupta and J. Verdu, Weatherability of Polyvinyl Chloride, Journal of Polymer Engineering, v. 8, nos. 1-2, 1988, pp. 73-92.

[61] J.I. Kroschwitz and M. Howe-Grant (Eds.), Kirk-Othmer Encyclopedia of Chemical Technology, 4th Ed., v. 19, John Wiley & Sons, New York, 1996, p. 977.

which degrades mechanical properties,[62] resulting in sloughing and marine debris. These reactions occur over the lifetime of the material.[63] The photographs in Ex. 2, Figure 4 compare fresh PVC and the same material after 11-years of sun exposure. The exposed surface is pigment-rich, highly granular, and chalky. This chalky material can be sloughed off in the lagoon and contribute to marine debris. The highly granular surface likely accelerates leaching, compared to relatively smooth, fresh PVC. In the bulkhead application, the PVC would be directly exposed to UV radiation. We found no degradation data for ShoreGuard per se. However, it can be reasonably anticipated, based on tests of other, similarly rigid PVC materials, that photodegradation will occur.

Ultraviolet radiation, such as occurs from natural sunlight exposure, releases acids and acid chlorides (*e.g.*, formic acid, hydrochloric acid) and a wide range of organic compounds, including hydrocarbons (*e.g.*, n-butane, benzene), ketones and chloroketones (e.g., butanol, 1-chlorobutane-2-one), aldehydes (e.g., acetaldehyde, butyraldehyde), and chlorinated alkanes (*e.g.*, methylene chloride, chloroform).[64] Exs. 2 and 11.[65] The detected chemicals include several carcinogens, including benzene, acetaldehyde, 1,2-dichloropropane, methylene chloride, and chloroform.[66] Those chemicals produced below the water surface would migrate into lagoon waters and those produced above the water surface would outgas into the atmosphere, potentially resulting in significant public health and ecological impacts.

Other studies have demonstrated that the parent compound of PVC, vinyl chloride monomer ("VCM"), is also leached from PVC in the presence of ultraviolet radiation. This compound is listed as a carcinogen by California, as well as the Occupational Safety & Health Administration ("OSHA") and the National Institute of Environmental Health.[67] Polyvinylchloride is produced

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[62] L.P. Real and J.-L. Gardette, Ageing and Characterisation of PVC-based Compounds Utilised for Exterior Applications in the Building Construction Field 1: Thermal Ageing, Polymer Testing, v. 20, no. 7, 2001, pp. 779-787.

[63] W. James and E.B. Rabinovitch, Weatherability of Plastics Compared at Different Exposure Locations, Journal of Vinyl and Additive Technology, v. 8, no. 1, 2002, pp. 55-60; G.E. Zaikov et al., Kinetic Aspects of Aging of Poly(vinyl chloride)-based Polymer Materials, Polymer-Plastics Technology and Engineering, v. 39, n. 3, 2000, pp. 567-650.

[64] D.J. Carlsson, M. Kryzymien, D.J. Worsfold, and M. Day, Volatiles Released During the Weathering of PVC, Journal of Vinyl and Additive Technology, v. 3, no. 2, 1997, pp. 100-106.

[65] M.E. Kryzymien, M. Day, D.J. Worsfold, and D.J. Carlsson, PVC Photo-Oxidative Degradation: Identification of Volatiles, Macromolecular Symposia, v. 115, 1997, pp. 27-40.

[66] California Environmental Protection Agency, Criteria for Carcinogens, April 4, 1995.

[67] National Institute of Environmental Health, Eighth Report on Carcinogens, Perspectives, v. 105, no. 9, September 1997.

from VCM via a polymerization process; the reaction is terminated when about 90% of the VCM has polymerized. The leftover gaseous and highly volatile VCM is drawn off using a vacuum and subsequently air-stripped to remove most of the residual monomers. However, traces of VCMs are found in all PVC materials, with most outgasing occurring right after the polymerization reaction. Additional VCM is formed by photodegradation. Vinyl chloride has been associated with tumors of the liver, brain, lung, lymphatic and haematopoietic system.

Vinyl chloride concentrations of up to 2.5 mg/L have been detected in leachates of PVC pipes in the presence of ultraviolet radiation, while no vinyl chloride was detected in the absence of ultraviolet radiation.[68] Another study found that after 30 days of exposure, vinyl chloride concentrations leached from PVC pipe were generally greater than 2.5 ug/L, exceeding the California primary drinking water standard of 0.5 ug/L and the federal primary drinking water standard of 2 ug/L. Vinyl chloride concentrations increased with increasing concentrations of total dissolved solids, temperature, and decreasing pH.[69] Thus, leaching of vinyl chloride into lagoon waters can be reasonably anticipated, particularly on warm summer days when recreational activity is likely to be highest.

PVC used to line ponds, water storage reservoirs, landfills, and in other similar applications is typically covered with soil or other materials to prevent ultraviolet light degradation.[70] We note that, while the manufacturer claims a 50-year lifetime for ShoreGuard, the product has only been in the marketplace for about 15 years. Further, it is not clear that the manufacturer actually guarantees this 50-year lifetime. It is stated in the ShoreGuard Warranty that the "purchaser is solely responsible for determining the effectiveness, suitability, and safety for any application using our product." And further, that "Materials International does not warrant any design, or engineering of specific structures, components (other than ShoreGuard), any aspects of installation, or workmanship of installation on any particular application utilizing ShoreGuard." Ex. 12.

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[68] M.H. Al-Malack and S.Y. Sheikheldin, Effect of Solar Radiation on the Migration of Vinyl Chloride Monomer from Unplasticized PVC Pipes, Water Research, v. 35, no. 14, 2001.

[69] M.H. Al-Malack, Effect of Water Quality Parameters on the Migration of Vinyl Chloride from Unplasticized PVC Pipes, Water, Air & Soil Pollution, v. 120, no. 1-2, 2000.

[70] R.M. Koerner, Designing with Geosynthetics, Prentice Hall, Englewood Cliffs, New Jersey, 1994.

Finally, breaking off of small pieces of PVC during its useful life due to brittleness, additionally accelerated by impacts from boating, would add to marine debris. Breakage was observed at the Golden Hinde, Inverness, installation. See photographs in Ex. 1. Plastic debris can obstruct the mobility, feeding, or breathing of marine animals. Also, birds, fish and mammals often mistake plastic for food, which can have fatal results.

I.C Life Cycle Issues

The manufacturing of PVC is known to result in a wide array of impacts, including to workers, members of the public living downwind of production facilities,[71] and the aquatic environment.[72] The manufacture of polyvinyl chloride monomer, used to produce PVC, and of PVC itself, for example, release vinyl chloride and dioxins to the environment.[73] Both are potent carcinogens. Angiosarcoma, an extremely rare vascular neoplasm, has been reported in workers in vinyl chloride monomer production facilities, as well as from chronic skin contact with PVC pipe and cements containing PVC.[74]

Generally, post-consumer PVC, such as ShoreGuard, cannot be recycled,[75] since it is not usually possible to achieve consistent quality. According to the U.S. EPA, the plastics industry recycled about 5.2% of its product in 1997 and that margin was only expected to grow to 6% or 7% by the year 2000. Recycling rates, even when feasible, for construction plastics such as ShoreGuard, are even lower, primarily because of the prevalence of low-cost construction and demolition waste landfills. Thus, most spent PVC is landfilled, and because it is non-biodegradable, consumes landfill capacity. Spent PVC is rarely incinerated

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[71] G. Markowitz and D. Rosner, Deceit and Denial of Industrial Pollution, University of California, Berkeley, and Milbank Memorial Fund, New York, 2002.

[72] U.S. EPA, Plastic Pellets in the Aquatic Environment: Sources and Recommendations, Report EPA 842-B92-010, December 1992; D. Fabbri, D. Tartari, and C. Trombini, Analysis of Poly(vinyl chloride) and Other Polymers in Sediments and Suspended Matter of a Coastal Lagoon by Pyrolysis-gas Chromatography-mass Spectrometry, Analytical Chimica Acta, v. 413, 2000, pp. 3-11.

[73] R. Stringer and P. Johnston, Chlorine and the Environment: An Overview of the Chlorine Industry, Kluwer Academic Press, March 2001; U.S. EPA, The Inventory of Sources of Dioxin in the United States, Report EPA/600/P-98/002Aa, External Review Draft, April 1998, Sec. 8.3.4. Polyvinyl Chloride.

[74] D. G. Mohler et al., Angiosarcoma of the Hand Associated with Chronic Exposure to Polyvinyl Chloride Pipes and Cement, The Journal of Bone and Joint Surgery, v. 80-A, no. 9, 1998, pp. 1349-1354.

[75] E-mail, Bill Walsh, National Coordinator, Healthy Building Network, Re: ShoreGuard, August 2, 2002.

due to problems it causes at municipal solid waste incinerators. Further, incineration of PVC releases a number of toxic gases, including carbon monoxide, hydrochloric acid, phosgene, and dioxins. (Van Zanten 1986;[76] Wilson and Yost 2001.[77])

II. ALTERNATIVES TO SHOREGUARD

The use of ShoreGuard would result in significant public health, ecological, and air quality impacts. Therefore, we identified several alternatives to ShoreGuard and prepared a brief analysis of their potential impacts. This work indicates that several hardwoods are viable alternatives that eliminate the public health and ecological impacts associated with ShoreGuard, but not the construction air quality impacts, which are similar for all alternatives.

We revised the alternatives analysis prepared by the applicant (Noble 7/02), expanding it to include additional hardwoods and additional areas of environmental concern and revising it where we did not agree with the authors. We evaluated three alternative materials: coated steel, concrete, and a number of tropical hardwood species.

The results of our analysis are summarized in Table 1. This table shows that both concrete and coated steel would leach contaminants and release debris into the lagoon from corrosion of coated steel and spalling, *i.e.* breaking apart, of concrete. Most of the evaluated hardwood species, which are naturally resistant to marine borers and do not leach toxic materials or shed debris, are viable alternatives. The construction impacts of all materials are similar.

We recommend sustainably harvested tropical hardwoods for the bulkhead. Unlike domestic wood, the recommended tropical hardwoods do not require any chemical treatment. A number of tropical hardwood species have excellent properties for this application. Recommended species for the Seadrift Lagoon bulkhead installation include greenheart (*Chlorocardium rodiei*), Abiurana (*Pouteria sp.*), Castanharana (*Holopyxidium sp.*), and Mata mata (*Eschweileria sp.*). The use of Acaricuara (*Minquartia guianensis*) is recommended with restrictions depending on the design of the bulkhead. Domestic, treated wood was not evaluated because it was not considered a viable alternative. Chemicals used to treat the wood, *e.g.*, creosote, would leach toxic contaminants into the lagoon (Noble 7/02).

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[76] R.V. Van Zanten, Geotextiles and Geomembranes in Civil Engineering, John Wiley & Sons, New York, 1986, Chapter 5.

[77] A. Wilson and P. Yost, Plastics in Construction, Environmental Building News, July/August 2001.

These tropical hardwoods have been used extensively in marine environments in similar applications, *e.g.*, by German agencies for shoreline protection. The Totland Pier on the Isle of Wight, constructed of greenheart, has been in continuous service since 1880. Greenheart installations in the U.S. include Grace Harbor Project, Washington; Castle Island Pier, Berth 17, Massachusetts Port Authority; and Pier 39 in San Francisco. In addition to their outstanding physical properties, the above hardwood species are naturally resistant to the marine borer, *Teredo navalis*, which has caused substantial destruction and losses of marine installations constructed from treated domestic wood. (Ex. 13: Precious Woods). Greenheart, for example, requires no chemical treatment, has the highest fire rating of any wood used in marine construction, the best grades are more durable than coated steel, and is three to four times stronger than pine, teak, or fir. Ex. 14.

Several hardwood species, initially also considered for this analysis, are not recommended or are recommended with restrictions: Ipe, or Ironwood, which has excellent physical properties, is not recommended for submerged marine applications because it is less resistant to marine borer attacks. It is, however, well suited for capping and decks, constructed atop the bulkhead. Angelim pedra (*Hymenolobium excelsum*) is not recommended because it has a distinct, and to some, objectionable scent when wet. Acaricuara, due to its highly undulating internal structure, is recommended for piling-type designs, but not for board-type applications.[78]

Use of tropical hardwoods raises concerns about unsustainable harvesting practices and destruction of the world's forests. Several vendors of tropical hardwoods voluntarily submit to the guidelines of accreditation institutions, which promote forestry practices that maintain or restore the health and integrity of forest ecosystems. One of these, the Forest Stewardship Council ("FSC") is an international non-profit organization that supports environmentally appropriate, socially beneficial, and economically viable region-specific management of the world's forests. Independent certification bodies, accredited by the FSC in the application of these standards, conduct impartial, detailed assessments of on-the-ground forestry operations. All of the recommended hardwood species are available as "certified wood" with FSC certification. If tropical hardwoods are used, we recommend a vendor with an exclusive Chain-of-Custody certificate, *i.e.* who uses only woods sourced from certified forests.

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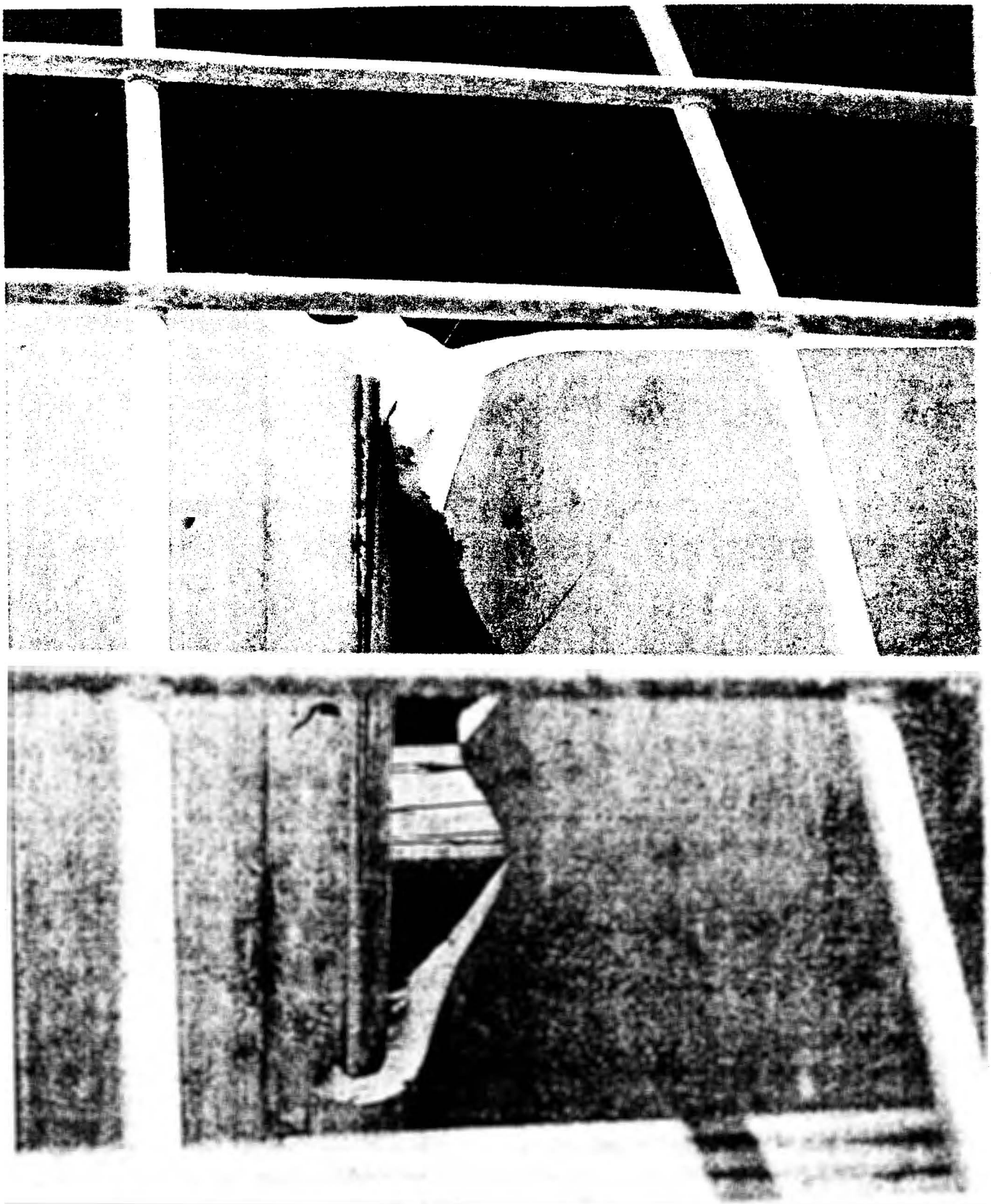
[78] P. Pless, Personal communication with Paul Fuge, Sylvania Certified, Santa Fe, NM, November 15, 2002.

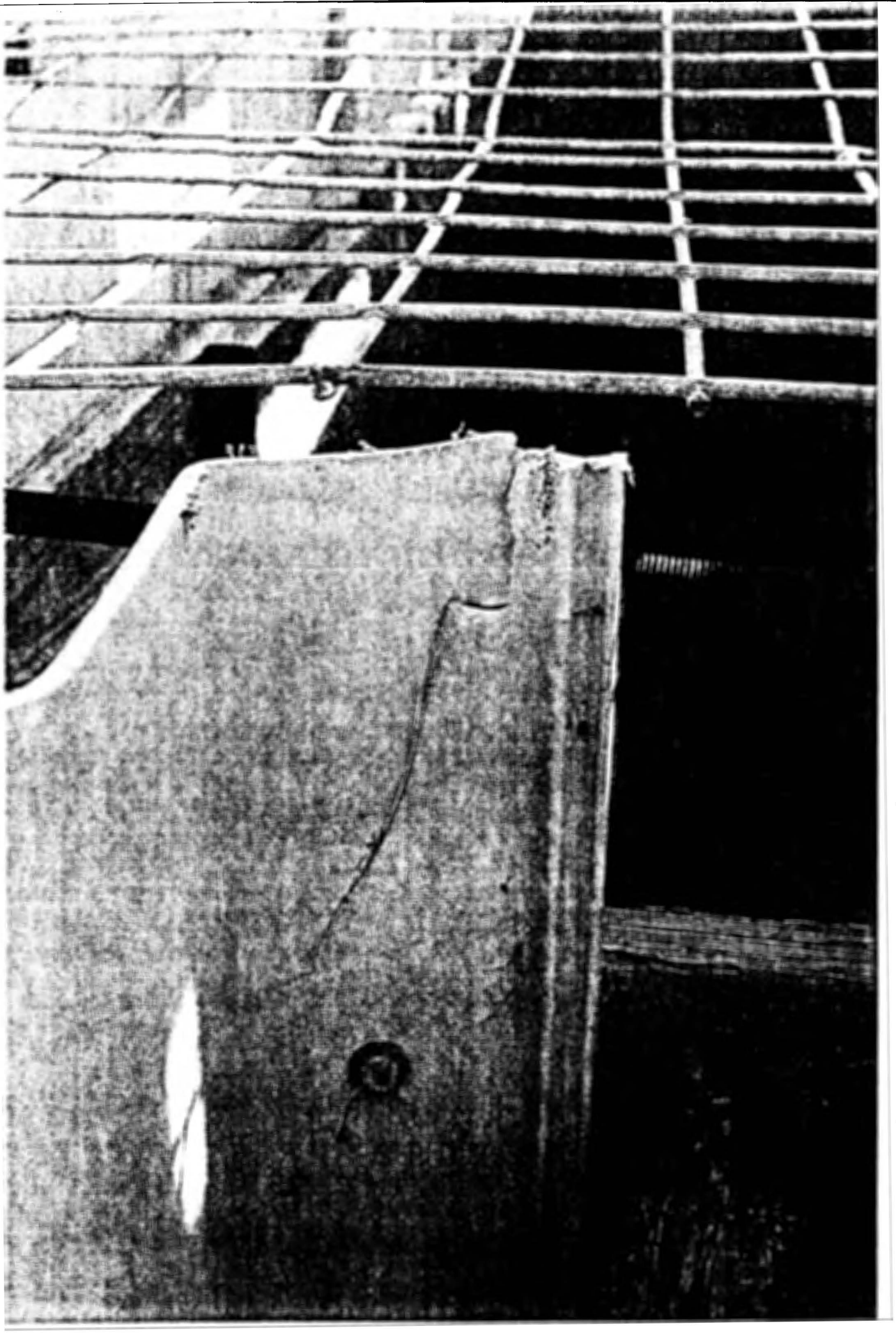
TABLE 1
Alternatives Analysis[a]

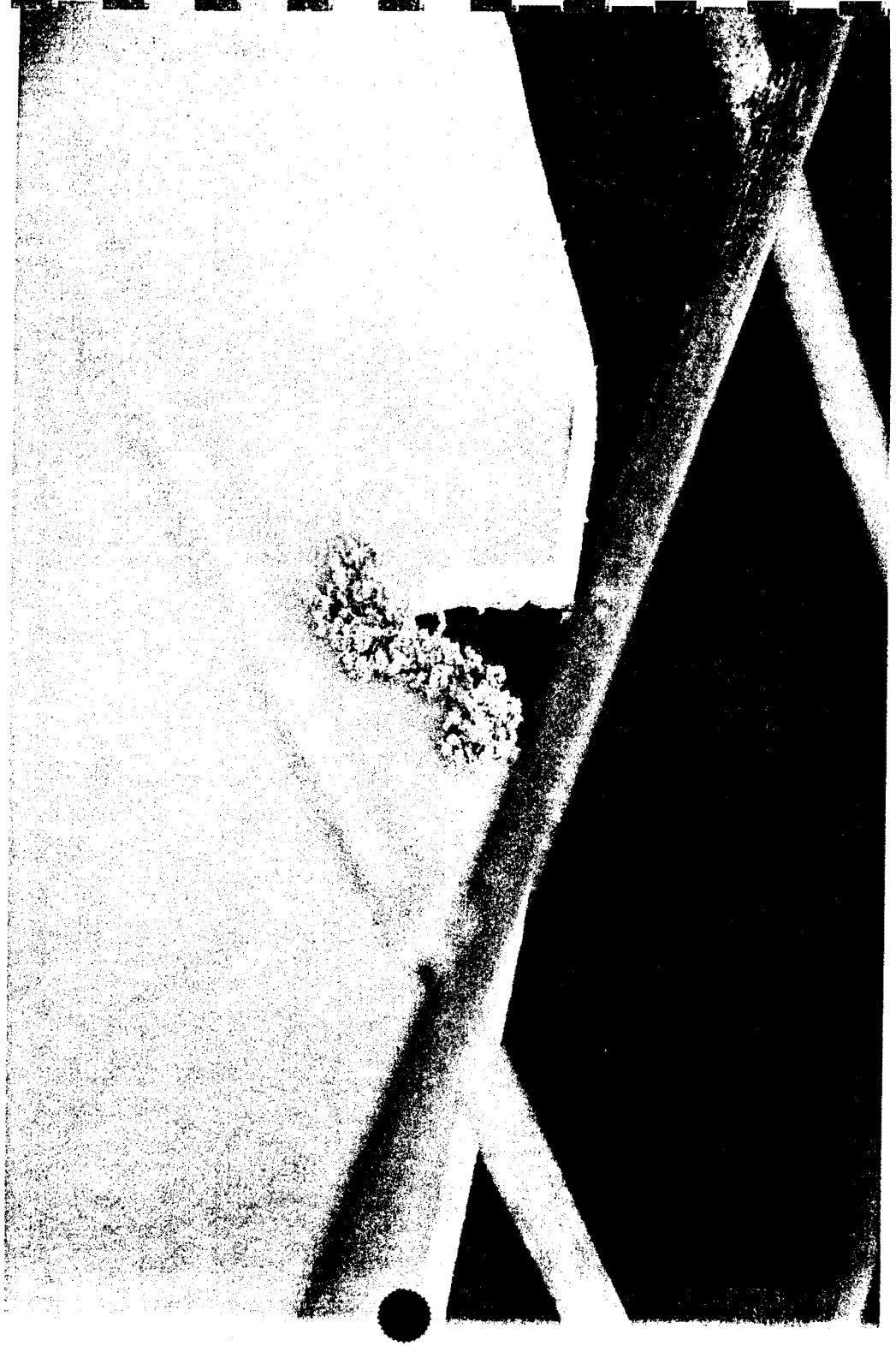
	COATED STEEL	TROPICAL HARDWOOD	CONCRETE	SHOREGUARD
CONSTRUCTION IMPACTS				
Air Quality:[b] NOx	88 ton/yr	105 ton/yr	62 ton/yr	97 ton/yr
PM10	5.6 ton/yr	6.8 ton/yr	4.0 ton/yr	6.2 ton/yr
Water Quality	Next to longest construction duration (9 mos) and next to most heavy equipment, which could results in oil spills into lagoon and sediment suspension	Second most. Longest construction duration (10 mos). Requires large amount of heavy equipment, which could result in oil spills into lagoon and sediment suspension. May require pressure jetting, which could disturb sediments	Most. Next to longest construction duration (9 mos), requires heaviest equipment, and could result in concrete and oil spills into lagoon and sediment suspension	Next to longest construction duration (9 mos) and next to most heavy equipment, which could result in oil spills into lagoon and sediment suspension
Noise	Second most	Third most	Most	Least
Traffic	Second least, 78 trucks	Second least, 78 trucks	Most, largest number of trucks (385)	Least, smallest number of trucks (28)
OPERATIONAL IMPACTS				
Public Health	Corrosion byproducts include Fe, Cr, Ni, Cd, Zn, Pb will leach into lagoon and may pose risk to recreational users and consumers of fish.	None	Sea water will attack concrete, leaching Ba, Fe, Mn, Mo, Rb, Sr, U, and other elements into lagoon	Alkyltin compounds exceed MDWL, impairing beneficial uses of swimming, fish consumption, and boating. Vinyl chloride exceeds drinking water standards.
Ecological	Corrosion byproducts may be toxic to aquatic organisms and bioaccumulate in food chain, posing risk to consumers	None; slow release of humic substances from decaying wood	Leached by-products, especially U, may be toxic to aquatic organisms and bioaccumulate in food chain, posing risk to consumers. Saltwater will attack reinforcing steel, resulting in steel corrosion and spalling of concrete, releasing metal corrosion products and concrete debris into lagoon	Alkyltin compounds exceed Canadian marine aquatic life guideline
Air Quality	None	None	None	Photodegrades, outgassing toxic organic compounds. Earthquake-induced propane fire could release dioxins and other toxic pollutants
LIFE CYCLE				
Stability	Corrodes	Resistant to marine borer attacks	Spalling	Photodegrades, becoming brittle and splintering; boat damage possible
Resource Sustainability	Mfg uses nonreplaceable mineral resources and fuels	Use of sustainably harvested wood avoids ecological impacts	Mfg uses nonreplaceable mineral resources and fuels	Mfg uses nonreplaceable resources
Waste Disposal	Can be recycled	Biodegradable	Consumes landfill capacity	Consumes landfill capacity. Emits toxic fumes if incinerated. Small amount may be recycled
Manufacturing	Releases toxic pollutants to air, water, and land, potentially causing significant air quality and worker/public health impacts	None	Releases toxic pollutants to air, water, and land, potentially causing significant air quality and worker/public health impacts	Releases toxic pollutants to air, water, and land, potentially causing significant air quality and worker/public health impacts

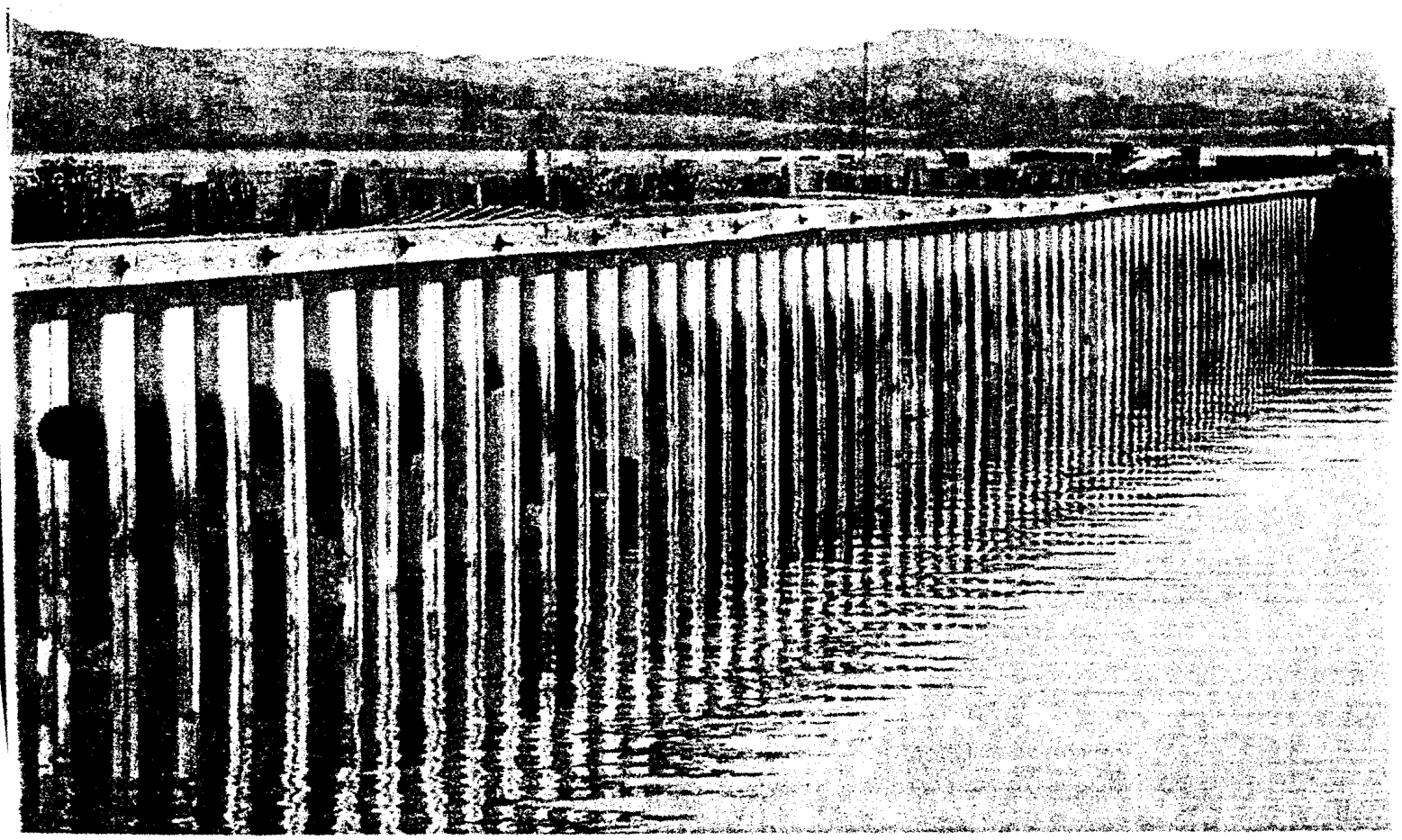
a Modified from Noble (7/02).

b Off-road emissions were calculated using equipment inventories in Noble (7/02) and emission factors, loads, and equipment hp from U.S. EPA, *Nonroad Engine and Vehicle Emission Study -- Report*, November 1991. On-road truck emissions were calculated using EMFAC2002 v.2.2 emission factors, assuming an average speed of 65 mph, MHD diesel trucks, and 30 mi roundtrip. Worker commute trips and mobilization emissions are excluded.









November 18, 2002

California Coastal Commission
North Central District Office
45 Fremont Street Suite 2000
San Francisco, Ca. 94105

Re: Application File No.2-02-001

Dear Commissioners:

There is a growing body of evidence that indicates there is a connection between breast cancer and some of the 85,000 synthetic chemicals in our environment today.

I attended the Senate Health and Human Services Committee and Assembly Health Committee Joint Informational Hearing on Breast Cancer and the Environment, October 23, 2002. I respectfully submit some of the literature from that Public Hearing, specifically 1) testimony of Dr. Ana M. Soto, an "Overview of: *"State of the Evidence: What is the Connection between Chemicals and Breast Cancer?"* " 2) ***State of the Evidence**: What is the Connection Between Chemicals and Breast Cancer?* I would draw your attention initially to page v and vi, the Executive Summary and to the discussion calling for the use of the precautionary principle.

Also included is literature on the 3) **Precautionary Principle** as well as 4) excerpts from three articles run in the Marin County Independent Journal dated October 20, 2002, October 21, 2002 and November 15, 2002. The articles suggest chemicals in plastic mimic estrogen and might explain the increase in breast cancer, and the articles further emphasize the importance of the precautionary principle in connection with chemicals and breast cancer.

PVC production is one of the major sources of dioxin, a known human carcinogen and estrogen mimic. "Of all toxic chemicals, dioxin may be the most prevalent. The body fat of every human being, including every newborn, contains dioxin." 2)

The October 20, 2002 article discusses 'Healthy Purchasing'. "Healthy purchasing refers to the practice of buying products that are free from chemicals linked to breast cancer, such as plastic products made with polyvinyl chloride."

We must discourage manufacturers who still produce this deadly chemical and we must place the onus of proving its safety on the manufacturer and remove the onus of proving its harm from its opponents.

We need to stop risking chemicals in the environment that are harmful or may be harmful and opt for safer alternatives.

Please deny the use of PVC in the above mentioned application.

Respectfully submitted,

Sharon Call

Sharon Call

Testimony of Ana M. Soto, M.D., Professor, program of Cell, Molecular and Developmental Biology at Tufts University

Senate Health and Human Services Committee and Assembly Health Committee
Joint Informational Hearing on Breast Cancer and the Environment
October 23, 2002

"Overview of: *"State of the Evidence: What is the Connection between Chemicals and Breast Cancer?""*

I am a professor at Tufts Medical School. My main research interest for the last 28 years has been breast cancer. In 1989, together with my research partner Dr. Carlos Sonnenschein, we accidentally discovered that some laboratory plastic ware leached chemicals that mimicked the female hormone estradiol, causing breast cells to proliferate. Since then, we have been investigating the health effects, including breast cancer, of environmental chemicals that mimic estrogen. I am going to provide an overview of the State of the Evidence Document, which summarizes the scientific research linking chemicals to the development of breast cancer. This peer-reviewed document was initiated by The Breast Cancer Fund and released at the first informational hearing on breast cancer and the environment convened last February by Senator Deborah Ortiz and the Senate Health and Human Services Committee.

My testimony will make the following points: 1) emerging evidence points to the role of environmental chemicals in causing breast cancer, 2) the controversy about epidemiological studies on the link between environmental exposures and breast cancer is due to incorrect design, and 3) animal studies clearly indicate that environmentally relevant doses of these estrogen mimicking chemicals produce measurable negative effects.

Breast cancer is now the most frequent type of cancer in women. During the past half-century, a swift increase of the lifetime risk of breast cancer has been observed in the US. In the 1940s, a woman's lifetime risk of breast cancer in the US was 1 in 22. Today, the risk is 1 in 8. Breast cancer is also the leading cause of death in women ages 34 to 54. This swift increase cannot be attributed to genetic causation. Yet, the genetic causes of cancer continue to be the main topic of study in breast cancer research. Factors known to increase the risk of breast cancer including reproductive history, genetic factors, alcohol and exercise, account for less than 50% of all cases. I believe it is high time to seriously consider environmental chemicals as the most likely cause of this sudden increase in risk. Unlike genetic causation, searching for

environmental agents may produce evidence that can be used to prevent cancer. The State of the Evidence report summarizes our present knowledge and makes a well-balanced argument linking exposure to environmental chemicals to this increase in breast cancer incidence. This peer-reviewed document brings together, for the first time, several decades worth of research on breast cancer and the environment. I was one of the reviewers of this document and I fully endorse its content.

The increasing risk of breast cancer and other cancers has paralleled the proliferation of synthetic chemicals since World War II. An estimated 85,000 synthetic chemicals are registered in the USA, yet toxicological screening data are available for only 7 percent of these chemicals. Since many of these chemicals are endocrine disruptors, it is immediately apparent that the task of linking synthetic chemicals to breast cancer is going to be daunting. This is because we only know how to study one chemical at a time, and we are instead exposed to complex mixtures of hundreds, if not thousands, of synthetic chemicals.

The most compelling evidence linking chemicals and breast cancer is based on the fact that lifetime exposure to natural estrogen increases the risk of breast cancer, and that the use of hormone-replacement therapy and oral contraceptives also increase the risk. It has recently been proposed that this cumulative risk starts during fetal development. In fact, animal studies showed that exposure to DES during fetal life increases the risk of mammary cancer. Similarly, fetal exposure to dioxins also results in increased risk.

There are strong epidemiological data linking the synthetic estrogen DES and the estrogenic pesticides dieldrin and DDT to breast cancer. Several studies have found significant correlations between exposure to a given chemical and breast cancer, while others did not. It is becoming clear that many studies showing negative results measured exposure at the time of cancer diagnosis. However, we know that causal agents must have acted many years before the cancer was diagnosed. For example, recently published data on the Seveso, Italy dioxin accident measured TCDD dioxin blood levels at the time of the accident in 1976 and correlated it with breast cancer incidence, which occurred decades later. A 10-fold increase in TCDD blood level was associated with a 2.1 increase in risk for breast cancer (95% confidence interval, 1.0-4.6). More recently, at the International Society for Environmental Epidemiology in Vancouver in early August, Cohn et al. reported on a study that examined DDT and DDE levels in blood samples taken between 1959 and 1967. They demonstrated a significantly increased risk of

breast cancer among women with higher levels of DDT (and not DDE), but only among women who were exposed to DDT *before* age 15.

All women carry persistent pollutants in their bodies. Data by Dr Olea and collaborators show that these chemical mixtures, rather than single chemicals, correlate with breast cancer risk. Indeed, the results from these new studies are very alarming and support the conclusions of the State of Evidence document.

More research is needed to better understand the problem. And it must be a different kind of research. We need to develop adequate methodology to assess the effects of very complex mixtures of chemicals. We need to focus on timing of exposure—critical windows of vulnerability such as fetal life, puberty, pregnancy and menopause. And we need to study ubiquitous chemicals recently found to be endocrine disruptors. For example, very recent data in animals show that environmentally relevant doses of a ubiquitous plastic component, bisphenol A, causes significant effects in the mammary gland of animals exposed during fetal development. Among these changes is an increase in the structures that give rise to mammary cancer.

Negative results that have been obtained using wrong assumptions about when exposure should be measured, or about which marker should be measured, are being used to dismiss the notion that exposure to hormonally active environmental chemicals may be the underlying cause of the present breast cancer epidemic. It is time to stop repeating the same inconclusive experiments that measure exposure at the time of diagnosis. Animal studies suggest that we should look, instead, at exposures during fetal development and puberty.

Pursuing the research that will lead to more precise answers about exposure to complex mixtures and windows of vulnerability will take many long years. Meanwhile, it would be irresponsible to wait until all the evidence is gathered before articulating a preventive policy. It is time to shift the burden of proof from the exposed people to the manufacturers of these chemicals. Governments should articulate a public health policy that protects citizens in the first place, regardless of the economic consequences of the policy. As a physician, I am bound to the "do no harm" oath regarding individual patients. The aim of public policy should also be "do no harm." As elected officials, you have an immensely important role in formulating policy that will reverse the epidemic. I think that the "State of Evidence" document provides the bases for a rational and effective preventive policy.

State of the Evidence

WHAT IS THE CONNECTION BETWEEN CHEMICALS AND BREAST CANCER?

EDITED BY NANCY EVANS

HEALTH SCIENCE CONSULTANT, THE BREAST CANCER FUND

PRESENTED BY

THE BREAST CANCER FUND

AND

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State of the Evidence

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Executive Summary

Breast cancer rates have been climbing steadily in the United States and other industrialized countries since the 1940's. Billions of dollars have been spent in an effort to stem this unrelenting tide, yet more than 50 percent of breast cancer cases remain unexplained by the characteristics and risk factors associated with the disease.

Ionizing radiation is the only proven environmental cause of human breast cancer. But powerful circumstantial evidence indicates that some of the 85,000 synthetic chemicals in use today are responsible for many of the unexplained cases of the disease. While scientists have not yet developed an ideal method for linking chemical exposures to breast cancer, several types of research—experimental, body burden and ecological studies—provide strong evidence of the connection between chemicals and breast cancer.

Because the types of evidence vary, the strength of the evidence linking chemicals and breast cancer also varies. The strongest evidence linking chemicals to breast cancer—based on the fact that lifetime exposure to natural estrogens increases the risk of breast cancer—concerns natural and synthetic estrogens, including drugs like diethylstilbestrol (DES), plastic additives like bisphenol-A (BPA), polyvinyl chloride (PVC) (found in many consumer products), dieldrin and some pesticides.

Other synthetic substances strongly linked to breast cancer through experimental evidence are: organic solvents (used in many manufacturing processes, including the manufacture of computer components), polycyclic aromatic hydrocarbons (PAHs) (created in soot and fumes from burning diesel, fuels or cigarettes) and 1,3 butadiene (a by-product of internal combustion engines and certain industrial processes).

There are also chemicals for which the evidence indicates a probable but less certain link to breast cancer. These chemicals include dioxin (created when plastics or other materials containing chlorine are burned), the pesticide DDT (dichloro-diphenyl-trichloroethane) and its metabolite, DDE and PCBs (polychlorinated biphenyls), previously used in the manufacture of electrical equipment and other industrial and consumer products.

Finally, there is evidence of chemicals that affect how the body functions in ways that suggest a possible link between these substances and breast cancer. These chemicals include the insecticide heptachlor and phthalates, used to make plastic soft and flexible.

We clearly have major gaps in our current knowledge about the links between breast cancer and the environment. Therefore, we need to focus our research efforts in areas that are most likely to provide useful information

for framing public policies related to chemical exposures and our health. The types of research most likely to produce useful evidence will be those examining: (1) workplace exposures, (2) household exposures and (3) breast milk as a marker for human contamination.

While we pursue the research that will lead to more definitive answers, the existing evidence linking chemicals to breast cancer demands that we act now as a society to begin removing many of these substances from our environment. Considerable resources are spent encouraging women to make changes in their personal lives in an effort to reduce their risk of breast cancer. But breast cancer is not just a personal tragedy; it is a public health crisis that demands action by society as a whole.

This crisis must be addressed by beginning now to implement the precautionary principle. Under this principle, evidence of harm, rather than definitive proof of harm, is the trigger for policy action. In addition, the precautionary principle mandates that the burden of proof with regard to chemicals rests with the manufacturers to demonstrate that the substances are safe, rather than with the public to show that they are harmful. Finally, the precautionary principle rests on the democratic principle that government officials are obligated to serve the public's interest in human health and environmental protection.

THE FOLLOWING 5-POINT PLAN WILL HELP US REDUCE THE RISK OF BREAST CANCER AND ULTIMATELY END THE EPIDEMIC:

1. **Phase out toxic chemicals** that are omnipresent in the lives of so many people.

2. **Enact "sunshine" laws and enforce existing environmental protection laws** to reduce the use of toxics by requiring companies to report how many tons of chemicals they use.

3. **Practice healthy purchasing**, with local, state and federal governments leading the way in purchasing environmentally preferable products, thereby creating an example for individuals to follow.

4. **Offer corporate incentives** that encourage businesses to eliminate the use of harmful chemicals in their products and processes.

5. **Monitor breast milk** through a comprehensive community program that identifies the chemicals present in breast milk, establishes links to geographic areas and initiates a plan to eliminate these contaminants.

We ignore at our peril the increasing evidence that chemicals are contributing to the rising tide of breast cancer. The obligation to understand this evidence, and begin to address it through the implementation of public policies that put health first, rests with all of us. It is in our power to change the course we are on. Now is the time.

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Introduction

Breast cancer now strikes more women in the world than any other type of cancer. During the past half-century, the lifetime risk of breast cancer has nearly tripled in the United States. In the 1940s, a woman's lifetime risk of breast cancer in the USA was 1 in 22. In the year 2002, the risk is 1 in 8. Breast cancer is the leading cause of death in women ages 34 to 54.[1,2] Although breast cancer in men accounts for less than 1% of the disease, in the USA the number of cases increased from 1,000 cases in 1998 to 1,500 cases in 2002.[3]

More American women have died of breast cancer in the last 20 years than the number of Americans killed in World Wars I and II, the Korean and Vietnam wars combined.

Alcohol consumption is associated with a higher risk of breast cancer, as are personal characteristics such as early puberty, age at first full-term pregnancy or late menopause and social factors such as higher income. However, even when all known risk factors and characteristics including family history and genetics are added together, more than 50 percent of breast cancer cases remain unexplained.[4,5]

. . . A SIGNIFICANT BODY OF EVIDENCE SUGGESTS THAT SYNTHETIC CHEMICALS IN THE ENVIRONMENT MUST BE FACTORED IN AS POSSIBLE CAUSES OF BREAST CANCER.

THE PURPOSE OF THIS PAPER

The effort to understand and explain the major reasons for today's high incidence of breast cancer has produced an ongoing, unsettled debate with differing findings in the epidemiological and biological research conducted thus far. However, a significant body of evidence suggests that synthetic chemicals in the environment must be factored in as possible causes of breast cancer.

This paper summarizes that evidence—in experimental, body burden and ecological studies—and recommends new directions for future research. It also outlines a 5-part plan to act on the evidence and reduce synthetic chemicals in our environment and in our bodies. This plan is based primarily on *the precautionary principle*,[6] which says that evidence of harm rather than proof of harm should be the trigger for action.

What Do We Mean By Environment?

Even though federal breast cancer research spending increased dramatically in the past decade from $90 million in 1990 to $800 million in 2001,[7] less than 3 percent of those monies have been directed toward finding environmental connections to breast cancer. In many cases, the relatively few environmental studies have defined the environment broadly, to include nutrition, exercise and other lifestyle factors, focusing largely on voluntary exposures and individual behaviors. So it is not surprising that many questions about environmental links to breast cancer remain unanswered.

We recognize that the environment includes the totality of living and working conditions as well as the physical, biological, social and cultural responses to these conditions. For purposes of this document, we are concerned with environmental exposures involving activities that subject people to agents that they, as individuals, cannot control, such as pesticides, dioxin, secondhand tobacco smoke and other chemicals. Some of these agents may be present in air, food, water, medications and soil.

- Environmental exposures can occur at home, at school, in the workplace, in health care facilities and other settings of daily life.
- Environmental exposures are often influenced by social, economic and cultural factors such as employment, income, housing, access to food and how food is produced and processed.
- These exposures may be either chronic (related to occupation or residence, for example) or acute (related to an industrial accident, such as release of radioactive materials or other hazardous substances).

Why Chemicals?

Some of the evidence connecting chemicals and breast cancer is circumstantial, but it is nonetheless very powerful. Breast cancer rates continue to rise around the world. Within this broad demographic picture, there is a discernible relationship between the rates of breast cancer and the widespread use of man-made chemicals. The highest rates of breast cancer are found in the industrialized nations of North America and northern Europe, and the lowest rates are in Asia and Africa.[8]

The increasing risk of breast cancer and other cancers has paralleled the proliferation of synthetic chemicals since World War II. An estimated 85,000 synthetic chemicals are registered for use today in the USA. Another 2,000 are added each year. Complete toxicological screening data is available for only 7 percent of these chemicals. More than 90 percent of these chemicals have never been tested for their effects on human health.[9] Many chemicals persist in the environment, accumulate in body fat and remain in breast tissue for decades. Studies of women's body burden show that all of us carry persistent pollutants in our bodies. Some of these pollutants, commonly used as fuels, solvents and in other industrial applications, have been linked to mammary tumors in animals.[10,11]

AN ESTIMATED 85,000 SYNTHETIC CHEMICALS ARE REGISTERED FOR USE TODAY IN THE USA. ANOTHER 2,000 ARE ADDED EACH YEAR.

(See Appendix for a complete listing of chemicals shown to induce mammary tumors in animals.)

People who move to industrialized countries from countries with low breast cancer rates soon develop the higher rates of the industrialized country. For example, women who emigrate to the USA from Asia, where the rate is four to seven times lower, experience an 80 percent increase in their risk within one generation.[12] A generation later, the rate for their daughters approaches that of USA-born women. Part of the increased risk may result from changes in diet among those who emigrate as they adopt a Westernized diet. However, it is difficult to know whether the dramatic increase in risk comes from the nutritional content of food itself, contaminants in the food or other factors. Emigration to the USA also may affect reproductive behavior, including use of oral contraceptives, as well as general environmental exposures.[13]

Inherited genetic mutations have received much attention recently but they account for only a small fraction—5 to 10 percent—of the breast cancer epidemic. Women with an inherited mutation on the BRCA1 or BRCA2 genes have a 60 to 80 percent probability of getting breast

cancer in their lifetime. While these families are devastated by cancer, all families share more than genetic mutations. They also share a common environment. A study in 1988[14] found that adopted children whose adoptive parents died of cancer had five times the chance of getting the same disease, revealing a connection to common exposures and lifestyles independent of inherited genes.

In the largest study ever conducted among twins, researchers found that inherited genes contributed 27 percent of the breast cancer risk, shared environmental factors 6 percent, and non-shared environmental factors 67 percent of the risk.[15] In other words, most breast cancer is acquired, not inherited.

There is only one proven environmental cause of human breast cancer—exposure to ionizing radiation.[16,17,18] However, research also shows a strong correlation between breast cancer and exposure to estrogens and other hormones.[19] Additional studies suggest other possible causes of breast cancer, including exposure to synthetic organic chemicals. In one such study, researchers who looked at the 339 U.S. counties with hazardous waste sites and contaminated groundwater found consistently higher rates of death from breast cancer than in counties without such contamination.[20] Studies like these make it clear that chemical exposures matter.

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While the scientific community has undertaken relatively few research studies in humans aimed at identifying specific links between breast cancer and cancer-causing chemicals, there is strong evidence from laboratory studies that links do exist. Tests performed on laboratory animals—a standard for public health research—implicate 43 chemical compounds in breast cancer formation.[21,22,23] Other research has demonstrated that low levels of chemicals often found in the environment can act synergistically with ionizing radiation, creating an effect greater than the sum of the individual effects.[24] Combinations of chemicals can also produce multiplied effects creating a more toxic chemistry.[25]

In today's complex, constantly changing world, absolute proof linking a particular chemical to human breast cancer may never be possible. Rather than wait for proof that may be decades in coming, we believe it is time to act on the evidence to make public policy changes to reduce or eliminate exposure to these chemicals.

Types of Evidence: A Primer

Three types of research have been used to study possible connections between breast cancer and environmental factors: laboratory studies, body burden studies and ecological studies. Each type has both advantages and limitations, as explained below.

1. LABORATORY RESEARCH

One method of investigating possible links between synthetic chemicals and breast cancer is laboratory experiments in which laboratory animals or human breast cancer cells are exposed to particular chemicals. Some of these compounds are eliminated quickly from the body, leaving no residue. Others are lipophilic (fat-seeking) and once they enter the body through diet or other means can remain in body fat for decades. Although studies of cancer in animals have not always provided information that can be extrapolated to humans, science has found consistently that substances causing cancer in animals also cause cancer in humans. The International Agency for Research on Cancer (IARC) recommended that:

> *In the absence of adequate data on humans, it is biologically plausible and prudent to regard agents and mixtures for which there is sufficient evidence of carcinogenicity in experimental animals as if they presented a carcinogenic risk to humans.*[26]

The U.S. National Toxicology Program adheres to the same principle in evaluating chemicals and considers chemicals shown to cause cancer in animals, in the absence of human evidence of cancer causation, as being "reasonably anticipated to be carcinogenic to humans."[27]

In addition, laboratory animals are generally exposed to one or two chemicals under controlled conditions, whereas humans are exposed to a complex array of chemicals in uncontrolled conditions, making it more difficult to prove cause and effect in cancer. By the same token, the behavior of cells in a laboratory dish cannot duplicate the behavior of cells within a living organism. However, studying breast cancer cells allows scientists to observe how various chemicals affect cell proliferation, a process essential to tumor formation.

2. BODY BURDEN RESEARCH

A second method of studying possible connections between chemicals and breast cancer is by comparing levels of suspect chemicals in the blood and body fat of women with breast cancer to levels in women without breast cancer. The presence of these chemicals is referred to as *body burden*. Although body burden studies have their limitations, this kind of analysis provides a picture of the cumulative internal contamination of the breast itself, the target organ for breast cancer.

One limitation of body burden studies is that they can produce "false negative" effects because they can only measure those residues that persist years after exposure. Measuring the current body burden does not show whether the level of a chemical was always low or whether it was once high and simply decayed over time or was reduced by breastfeeding one or more infants, or by yo-yo dieting or other changes in body weight.

Another limitation of body burden studies is that they are unable to show the *timing of exposure* to a chemical, which scientists now know is as critical as the dose of that chemical.[28] The female breast is most vulnerable to chemical insult during prenatal development, adolescence, pregnancy and peri-menopause.[29] Thus, exposure at age 12 may lead to cancer at age 32 or 42. Body burden measurement at or near the time of diagnosis will not reflect the levels at the time of exposure. In addition, some chemicals known to cause cancer, such as methylene chloride, benzene, some phthalates, chlorinated organic solvents and certain prescription drugs, do not linger in the body but are excreted without a trace.[30] Science has no reliable method for measuring exposures to these chemicals although they may be implicated in the development of breast cancer and other diseases.

Despite these limitations, body burden studies show that human contamination with multiple chemicals is both persistent and ubiquitous. Thus, body burden studies give scientists a tool to help understand whether environmental factors are linked to unusually high rates of disease in particular communities.

3. ECOLOGICAL RESEARCH

A third method of studying possible links between chemicals and breast cancer involves ecological studies. This type of research looks at environmental and socioeconomic characteristics in geographic areas with a high incidence of breast cancer compared to areas of low incidence of the disease. Ecological studies alone are not considered strong evidence of a causal link to breast cancer but are often used to justify doing analytical studies that involve measurements on individuals.

None of the research to date has found complete proof that synthetic chemicals are responsible for the current breast cancer epidemic. Yet all three types of research have yielded compelling evidence indicating that some of these chemicals contribute to increased risk of breast cancer.

ALL THREE TYPES OF RESEARCH HAVE YIELDED COMPELLING EVIDENCE INDICATING THAT SOME OF THESE CHEMICALS CONTRIBUTE TO INCREASED RISK OF BREAST CANCER.

Evidence That Chemicals Cause Breast Cancer

We now turn to a discussion of the range of evidence linking synthetic chemicals to breast cancer. These chemicals include estrogens, progestins, synthetic estrogens, solvents, polycyclic aromatic hydrocarbons and 1,3-butadiene.

1. ESTROGENS, PROGESTINS AND BREAST CANCER

Although estrogens are necessary for childbearing and for healthy bones and hearts, research has established that women who have prolonged exposure to estrogens are at higher risk for breast cancer. This includes women who begin to menstruate before age 12, do not reach menopause until after age 55, have children late in life or not at all, do not breast-feed or who use hormone replacement therapy after menopause. When women's own estrogens are supplemented by oral contraceptives and/or hormone replacement therapy, hyperestrogeny (abnormally high levels of circulating estrogens) results, increasing the risk of breast cancer for some women.[31,32,33] Women who have used both oral contraceptives and later hormone replacement therapy face an even greater risk than those who have not used either.[34]

Estrogen may not be the only hormone associated with increased breast cancer risk. Two recent studies by California researchers showed that hormone replacement therapy that included progestins (EPRT) increased the risk of breast cancer approximately 24 percent for each 5 years of use. This effect was more than 212-fold greater than the effect of estrogen replacement therapy (ERT). Progestins are often combined with estrogen in hormone replacement therapy based on the idea that it would help decrease the known cancer risk of estrogen, which by itself significantly increases the risk of cancer in the lining of the uterus.[35]

One predictor of higher risk for breast cancer is the amount of body fat in women who have passed complete menopause. Studies of postmenopausal women have correlated a higher proportion of body fat to higher amounts of free circulating estrogens and an increased risk of the disease.[36,37] Moreover, body fat becomes a reservoir for *organochlorines*, synthetic chemicals that mimic the effects of natural estrogens. Breasts are composed primarily of fat, making them repositories for these contaminants.

The issue of body fat as a predictor of breast cancer risk may also be related to the level of physical activity. Women who are more physically active, particularly during adolescence and early adulthood, are less likely to be obese and tend to have lower levels of circulating estrogens and a lower risk of breast cancer. A number of studies have validated this premise.[38,39,40,41]

The most fundamental evidence linking estrogens to increased risk of breast cancer is seen in animal studies in which chemicals known to cause breast cancer in animals produce a significant cell proliferation *only* if estrogens are present.[42] Cell proliferation is necessary for tumor development. These studies indicate that women are the most vulnerable to harm from estrogens or substances that behave like estrogens.

2. SYNTHETIC ESTROGENS (XENOESTROGENS)

In the early 1990s, researchers at Tufts University discovered that a chemical leaching from polystyrene laboratory tubes was causing breast cancer cells to grow, even though no estrogens had been added to the culture medium. Subsequent investigation showed that the substance leached was *p*-nonyl-phenol, an additive commonly used in plastics.[43]

This landmark study created widespread interest in *xenoestrogens*, both among scientists and the breast cancer community. Xenoestrogens are synthetic agents that mimic the actions of estrogens and are contained in many pesticides, fuels, plastics, detergents and prescription drugs.[44]

In 1993, a team of researchers developed the hypothesis that xenoestrogens played a role in some significant portion of breast cancer cases.[45] Because xenoestrogens mimic naturally occurring estrogens, they may also cause breast cells to proliferate, increasing the risk of breast cancer. Since many of the personal characteristics associated with breast cancer (early puberty, late menopause, delayed childbearing or no children) were related to increased total lifetime exposure to estrogens, the scientists reasoned that environmental chemicals that affected estrogen metabolism also contributed to the disease.

The research on xenoestrogens intensified in 1994 when the Tufts University researchers identified other chemicals as xenoestrogens because they caused breast cancer cells to proliferate in culture.[46] By 1997 a number of studies from other laboratories reported on compounds that act like estrogens when put in contact with breast cancer cells in tissue culture and therefore may act as estrogens in humans.[47,48,49] Recent studies are finding a broad array of chemicals in the environment that interfere with hormonal metabolism.[50]

THESE STUDIES INDICATE THAT WOMEN ARE THE MOST VULNERABLE TO HARM FROM ESTROGENS OR SUBSTANCES THAT BEHAVE LIKE ESTROGENS.

Meanwhile, on Cape Cod, where nine of 15 towns have breast cancer rates 20 percent higher than average for the state of Massachusetts, researchers at the Silent Spring Institute are engaged in a study that preliminarily has raised suspicions about synthetic estrogens in the water.[51] The vast sandy beaches of the Cape create a fragile ecosystem that allows contaminants to seep quickly through porous soil into underground aquifers. Pesticides used on forests, cranberry bogs, golf courses and lawns make their way into the water supply. In the first stage of the Cape Cod study, synthetic estrogens were found in septage (septic tank contents), in groundwater contaminated by waste and in some private wells.[52] This ecological study by the Silent Spring Institute led to a study funded by the Massachusetts Department of Health in which researchers are studying 2,100 Cape Cod women,

both with and without breast cancer, and data from Geographic Information System (GIS) to determine possible links between environmental pollution and the high rates of breast cancer on the Cape.

Below is a list of chemicals that disrupt hormone function and the evidence linking them to breast cancer.

a. Bisphenol-A (BPA)

Several studies have shown drastic changes in the development of the reproductive system and mammary glands when laboratory animals are exposed to xenoestrogens *in utero*. Researchers at Tufts University exposed mice *in utero* to low doses of *bisphenol-A* (BPA), a chemical commonly found in some types of plastic food containers, including some baby bottles. When the researchers examined the mammary glands of the female animals at 10 days, one month and six months after birth, they found that the development of the animals' mammary glands had been altered in ways that are associated with the development of breast cancer in rodents and in humans.[53] This evidence suggests that fetuses and embryos, whose growth and development are exquisitely regulated by the endocrine system, are the most vulnerable to and may have the most lasting effects from exposure to synthetic estrogens.

Researchers have theorized that chronic exposure to a number of widespread and persistent xenoestrogens—such as BPA—may help explain the increase in breast cancer in industrialized countries. Studies also show that BPA may leach into food from containers made of *polycarbonate* plastics and from the lining of metal food cans.[54]

RESEARCHERS HAVE THEORIZED THAT CHRONIC EXPOSURE TO A NUMBER OF WIDESPREAD AND PERSISTENT XENOESTROGENS—SUCH AS BPA—MAY HELP EXPLAIN THE INCREASE IN BREAST CANCER IN INDUSTRIALIZED COUNTRIES.

b. Polyvinyl chloride (PVC)

Polyvinyl chloride (PVC) is used extensively in the manufacture of food packaging, as well as in medical products, appliances, cars, toys, credit cards and rainwear. During the manufacture of PVC, vinyl chloride may be released into the air or into wastewater. Vinyl chloride has also been found in the air near hazardous waste sites and landfills, and in tobacco smoke. Animal studies of long-term exposure to low levels of airborne vinyl chloride have shown an increased risk of mammary tumors.[55] Vinyl chloride has also been linked to increased mortality from breast and liver cancer among workers involved in the PVC manufacturing process.[56,57]

c. Dieldrin

One body burden study showed a clear relationship between breast cancer incidence and a pesticide called *dieldrin*, now banned in the USA. Conducted by the Copenhagen Center for Prospective Studies in collaboration with the U.S. Centers for Disease Control and Prevention, the study examined a rare bank of blood samples taken prior to the development of breast cancer.[58] During the 1970s, approximately 7,500 Danish women, ranging from 30 to 75 years of age had blood samples taken. Organochlorine compounds were

detected in a majority of the samples from 240 women who subsequently were diagnosed with breast cancer. Dieldrin, a pesticide compound that has shown estrogenic activity during *in vitro* assays (studies of cells in a laboratory dish), was found in 78 percent of the samples. Women who had the highest levels of dieldrin years before cancer developed had at least a doubled risk of breast cancer compared to women with the lowest levels.

This Danish study also showed that exposure to dieldrin made breast cancer more aggressive. Higher levels of dieldrin were associated with higher breast cancer mortality.[59]

d. Pesticides

Research evidence also suggests that *simazine,* a widely used herbicide in Florida, California and the Midwest, which contaminates surface and groundwater after being applied to farmlands, also may contribute to breast cancer. Simazine is one of the triazine herbicides, which also include atrazine and cyanizine, all of which have been shown to cause mammary cancer in animals. In 1994, the U.S. EPA banned the use of simazine as an algaecide in swimming pools, hot tubs and whirlpools, citing "unacceptable cancer and non-cancer health risks to children and adults."[60] Lawn chemicals also may contain simazine. One study reported an increase of breast tumors in female rats that were fed simazine.[61] Although simazine-treated animals did not have elevated levels of estrogens, they did have elevated levels of another hormone called prolactin, which is known to play a role in the development of breast tumors in animals.[62] Researchers are now trying to determine if simazine changes the levels of hormones in animals, resulting in breast tumor formation.

In the Massachusetts town of Newton, researchers at Silent Spring Institute have pointed to "hormone mimicking" compounds in pesticides as a possible explanation for why breast cancer risk is higher among affluent women. The researchers surveyed 1,350 residents living in areas where breast cancer incidence was either high or low. They found that women in the high-incidence areas generally had larger disposable incomes and reported regular use of professional lawn services, termite treatments or home pesticides.[63]

e. Household products

Chemicals that either mimic estrogen or are otherwise hormonally active—that is, they interfere with normal hormone metabolism—particularly cleaning agents and pesticides, can be found in many household products. For example, spray paints and paint removers may contain *methylene chloride,* known to cause mammary cancer in laboratory animals. Insecticides in current use include estrogenic compounds such as *methoxychlor, endosulfan* and *lindane.*[64]

f. Diethylstilbestrol (DES)

The most convincing evidence that synthetic chemicals can act like hormones and produce delayed detrimental effects is the tragic experience with *diethylstilbestrol (DES).* Between 1941 and 1971, DES was prescribed for millions of pregnant women to prevent miscarriages. The drug was banned when daughters of women who took the drug were found to have higher rates of an extremely rare vaginal cancer than those who were not exposed to DES in the womb.[65,66,67] Research indicates that DES may also have increased the risk of breast cancer in some of the women who took it during the 1950s.[68]

3. THE PHYTOESTROGENS (PLANT ESTROGENS) HYPOTHESIS

The prevailing evidence against synthetic estrogens must also be understood in the context of evidence about the effects of plant estrogens *(phytoestrogens)*, another type of estrogen mimic. Such foods as whole grains, dried beans, peas, fruits, broccoli, cauliflower and especially soy products are rich in these phytoestrogens. Although scientific evidence suggests that humans may benefit from plant-based estrogens, these substances are not totally benign.

Science continues to investigate the hypothesis that phytoestrogens are generally beneficial, and some research indicates that they may counteract the effects of synthetic xenoestrogens. Adding soy products to the diets of women has led to lower levels of harmful estrogens in their bodies compared to women whose diets do not include soy products.[69] Some human and laboratory studies suggest that plant-based estrogens may help reduce a woman's risk of breast cancer, citing the Asian diet as evidence.[70] Women in Asian countries who traditionally consume more soy products than most women in the USA have a higher concentration of phytoestrogens in their blood and urine and a lower risk of breast cancer. These findings need to be interpreted cautiously, however, because soy content is not the only difference between Asian and American diets. The Asian diet includes more fiber and less meat than the typical American diet, which may also be protective for Asian women.

Both timing and dosage can also influence the effect of phytoestrogens. In laboratory research, high concentrations of *genistein*, a type of phytoestrogen, can inhibit the growth of isolated breast cancer cells. At low concentrations, however, genistein can stimulate the proliferation of cancer cells *in vitro*. A recent study showed a greater incidence of uterine cancer in newborn mice given genistein during the first five days of life than in mice given DES, a known carcinogen, during the same time period, suggesting that exposure to genistein during critical periods of development may cause cancer.[71]

DANISH WOMEN EMPLOYED IN SOLVENT-USING INDUSTRIES SUCH AS FABRICATED METAL, WOOD AND FURNITURE, PRINTING, CHEMICAL, TEXTILES AND CLOTHING INDUSTRIES, HAD A TWO-FOLD INCREASED RISK OF BREAST CANCER.

4. SOLVENTS

Industrial use of organic solvents has increased over the last several decades, particularly in the manufacture of computer components. Some of those solvents have been shown to cause mammary tumors in laboratory animals.[72] Many organic solvents have been detected in human breast milk.[73]

In many occupations, it may be difficult to identify actual or probable carcinogenic exposures. However, a 1995 study suggested an increased breast cancer risk associated with occupational exposure to styrene, several organic solvents (methylene chloride, carbon tetrachloride, formaldehyde) and several metals, metal oxides

and acid mists.[74] These results have been validated by studies in Finland, Sweden and Italy.[75,76,77,78] In addition, Danish women (ages 20-55) employed in solvent-using industries (fabricated metal, wood and furniture, printing, chemical, textiles and clothing industries) had a two-fold increased risk of breast cancer.[79]

5. 1,3-BUTADIENE

1,3-butadiene is an air pollutant created by internal combustion engines, petroleum refineries, and by the manufacture and processing of synthetic rubber products and some fungicides. The U.S. Environmental Protection Agency (EPA) is in the process of revising its risk assessment for 1,3-butadiene, and has identified several rodent bioassays (evaluations of concentration or potency of compounds by testing their effect) in which female mice and rats developed tumors not seen in males, including mammary and ovarian tumors. These studies indicate more severe toxic effects of this pollutant in younger rodent populations.[80,81]

Evidence Indicating a Probable Link Between Chemicals and Breast Cancer

In addition to the experimental, body burden and ecological evidence indicating a strong link between certain types of chemicals and breast cancer, there is evidence indicating a probable link between certain chlorinated chemicals and breast cancer.

1. DDT/DDE AND PCBs

Two types of chemicals known to disrupt hormone function are the organochlorine pesticide *DDT (dichloro-diphenyl-trichloroethane)* and *polychlorinated biphenyls (PCBs)* used in the manufacture of electrical equipment and a host of other industrial and consumer products. Both DDT and PCBs are organochlorines that have been banned in the USA since the 1970s yet both can be found in the body fat of humans and animals and in human breast milk.[82,83]

BOTH DDT AND PCBs ARE ORGANOCHLORINES THAT HAVE BEEN BANNED IN THE USA SINCE THE 1970S YET BOTH CAN BE FOUND IN THE BODY FAT OF HUMANS AND ANIMALS AND IN HUMAN BREAST MILK.

For more than 30 years prior to the EPA's ban on domestic use of DDT in 1972, the pesticide was sprayed for control of insects on farm fields and in swampy areas. The early version of DDT, containing an estrogen-like form called o,p'-DDT, also reached many homes as a residue on food, a situation that continues to this day because DDT deteriorates very slowly in the soil and much farmland is still contaminated. In fact, a 1995 study reported measurable levels of DDT residue in house dust in 82 percent of homes studied.[84] Although banned in many countries for agricultural use, DDT is still used in Mexico and other countries for malaria control and may contaminate food crops exported to the USA.[85]

Many of the highly toxic synthetic chemical compounds known as polychlorinated biphenyls (PCBs) have been identified as carcinogenic in a number of studies. Although new products containing PCBs were banned by the EPA in 1976, as many as two-thirds of all the insulation fluids, plastics, adhesives, paper, inks, paints, dyes and other products containing PCBs that were manufactured before 1976 remain in daily use. The other one-third persists in soil and water, as well as in living tissue of humans and animals.[86]

One of the difficulties in studying PCBs and breast cancer is the diversity within this broad class of compounds. PCBs can be classified in three types, based on their

effect on cells. One type acts like an estrogen. A second type acts like an anti-estrogen. The third type appears not to be hormonally active. Unfortunately, research studies have generally looked at total PCB levels without identifying individual types. But in 1999, researchers showed that certain types of PCBs promote breast cancer tumor growth in cell cultures, by stimulating the production of key proteins or structures in the cancerous tissue.[87]

Researchers have done more than 20 body burden studies involving DDT and PCBs since the mid 1980s. These studies have yielded conflicting results, depending on the design and methodology of the various studies as well as the interpretation of the findings. For example, some researchers measured only DDE, the principal metabolite of DDT, some of which is stored in body fat, including breast fat.[88] Other studies measured both DDE and several PCBs, but did not distinguish between estrogenic PCBs and other types of this contaminant.

While some studies have shown that women with breast cancer had higher levels of some chlorinated compounds when compared with healthy women,[89,90] most of the recent body burden studies have shown no relationship between organochlorine contaminant levels and breast cancer risk.[91,92,93,94]

The most recently published study concerning DDT, PCBs and breast cancer was a meta-analysis of five 1993 studies of women in the Northeastern United States.[95] (A meta-analysis is a re-analysis of combined data from many studies in a common format.) Although the original studies had suggested higher breast cancer risk from PCBs in certain groups of women categorized by reproductive and breastfeeding history, the combined data did not show a relationship between PCB levels and breast cancer. This does not mean that a connection between PCBs and breast cancer should be dismissed. Pooling data from different studies and combining data from premenopausal and postmenopausal women, in whom risk factors for breast cancer have a quantitatively different impact, tends to distort the results for specific groups. In this case, combining the data distorted the evidence in a way that may have led to a faulty conclusion. For example, high body weight decreases breast cancer risk before menopause and increases the risk after menopause.

Despite studies that fail to show a connection between organochlorines and breast cancer, it appears that certain compounds may carry a higher risk than others for women in specific age groups. For example, certain chemical compounds may make breast cancer more aggressive. A Canadian study measuring plasma concentrations of organochlorine compounds found that higher levels of DDE were associated with lymph node involvement and large tumors.[96]

A connection was also established by laboratory studies that found that the estrogen-like form of DDT enhances the growth of estrogen-dependent breast tumors,[97,98] the most common type of breast cancer. Estrogen-dependent breast cancer has been increasing in the USA since 1970.[99]

Another Canadian study published in 2000 measured DDE and specific types of PCBs in breast biopsy tissue and showed that, compared with healthy women, premenopausal women with breast cancer had significantly higher levels of PCBs 105 and 118, and postmenopausal women with breast cancer had higher levels of PCBs 170 and 180.[100]

A Swedish study of postmenopausal women also found increased risk of breast cancer for women with higher residues of certain PCBs, compared to women with

benign breast disease.[101] In Germany, researchers measured PCBs, DDT, DDD, DDE and hexachlorocyclohexane (lindane) in breast tissue samples from 65 women. Of the 65 women, 45 were diagnosed with breast cancer. After statistical adjustment for age differences, higher levels of all contaminants were detected in tissue from women with breast cancer than in tissue from the control group of women without breast cancer.[102]

2. POLYCYCLIC AROMATIC HYDROCARBONS (PAHs)

Polycyclic aromatic hydrocarbons (PAHs), compounds found in soot and fumes from the burning of diesel and other fuels, appear to play a role in the development of breast cancer. In July 2000, researchers at Columbia University reported finding a close relationship between DNA damage from exposure to PAHs in breast tissue and increased risk of breast cancer.[103]

Tobacco smoke also contains PAHs, which may explain a potential link between increased breast cancer risk and both active and passive smoking. Although smoking was once thought to act as an anti-estrogen,[104] the evidence is still incomplete.[105] Two studies suggest that women who begin smoking cigarettes as adolescents face an increased risk of breast cancer.[106,107] However, some recent studies suggest that the breast cancer risk from exposure to secondhand smoke may be even greater than the risk from active smoking.[108,109] As mentioned earlier, tobacco smoke also contains vinyl chloride, a known human carcinogen.

OF ALL TOXIC CHEMICALS, DIOXIN MAY BE THE MOST PREVALENT. THE BODY FAT OF EVERY HUMAN BEING, INCLUDING EVERY NEWBORN, CONTAINS DIOXIN.

3. DIOXIN

When PVC products, PCBs, or other chlorinated compounds are incinerated, among the chemicals released is *dioxin*, a known human carcinogen and hormone mimic. Dioxin is the name given to a group of toxic by-products of incineration and other industrial processes that use chlorine. One of these chemicals (2,3,7,8-tetra chlorodibenzo-para-dioxin) has been classified by The International Agency for Research on Cancer (IARC) as a Group 1 carcinogen.[110] Dioxin was officially declared a known carcinogen by the US Environmental Protection Agency in 2000 after more than a decade of controversy.

Of all toxic chemicals, dioxin may be the most prevalent. The body fat of every human being, including every newborn, contains dioxin. The primary exposure to dioxin is through food, specifically animal products: meat, poultry, dairy products and human breast milk.[111] Dioxin enters the food chain when diesel exhaust or soot from incineration falls on the grass, cows and other animals eat the grass, and people drink the milk and/or eat the meat of the cow or other animals.

Although dioxin has not been conclusively linked to breast cancer, a recent study in England implicated dioxin in the development of mammary tumors in laboratory mice.[112]

Evidence Indicating a Possible Link Between Chemicals and Breast Cancer

Finally, there are chemicals that affect how the body functions in ways that suggest a possible link to increased breast cancer risk. These include the insecticide heptachlor and the group of chemicals known as phthalates, found in many plastics and other products.

1. HEPTACHLOR

Heptachlor epoxide is a breakdown product of the insecticide *heptachlor,* now banned by the EPA but widely used throughout the 1980s and known to accumulate in breast fat. Although heptachlor itself does not act like estrogen, it does affect the way the liver processes estrogen. Heptachlor also has been shown to disrupt cell-to-cell communication in human breast cells in the laboratory.[113] The body's cells need to communicate with each other to regulate their growth. By disrupting this growth regulation mechanism, heptachlor could increase the risk of breast cancer. (There is clear evidence that heptachlor can increase the risk of liver tumors.)
Heptachlor continues to contaminate soil around buildings where it was poured for termite control and to contaminate food grown on soil where heptachlor was used to kill insects.

2. PHTHALATES (ENDOCRINE DISRUPTING CHEMICALS IN PLASTICS)

Phthalates, used to render plastics soft and flexible, are a family of hormone mimicking chemicals used in common household products. Phthalates are found in soft plastic "chew toys" marketed for infants and also in some varieties of nail polish, perfumes, skin moisturizers, flavorings and solvents. In 2000, scientists with the Centers for Disease Control reported that levels of some phthalates (including dibutyl phthalate [DBP]) in women of childbearing age exceed the government's safety standards.[114]

The earlier in life breast development begins, the greater the risk of breast cancer. This is of particular concern because in the USA and in Puerto Rico, many girls are developing breasts even before age 8, a condition called *precocious thelarche.* Scientists studying this phenomenon in Puerto Rico found that girls with premature breast development had higher levels of several phthalates, including diethyl phthalate (DEP), dibutyl phthalate (DBP) and di-(2-ethylhexyl) phthalate (DEHP), than girls with no evidence of precocious thelarche.[115] These phthalates are known to disrupt hormonal processes, raising concern about their implications for breast cancer risk. The researchers focused on phthalates because infant formula, many other food products and water are imported to the island in plastic containers.

Moving Forward: Getting from Here to There in the Research Agenda

It is not only possible but also essential, based on the existing scientific evidence, to move ahead with policy changes that will reduce exposure to synthetic chemicals linked to increased breast cancer risk. Failing to act on the evidence summarized in this document would ignore the costly lesson learned from tobacco and lung cancer in the 20th century.

At the same time, research into possible environmental causes of breast cancer must continue and expand, including the testing and screening of industrial chemicals and pesticides for their toxicity and hormone mimicking effects, measuring and tracking the body levels of these chemicals in the American public and investigating how girls and women are exposed to these chemicals. In addition, studies are needed that will evaluate childhood cancer, breast cancer in young women and major developmental and structural defects as combined indications of possible prenatal and early childhood exposures to hormone mimicking chemicals.

IT IS NOT ONLY POSSIBLE BUT ALSO ESSENTIAL, BASED ON THE EXISTING SCIENTIFIC EVIDENCE, TO MOVE AHEAD WITH POLICY CHANGES THAT WILL REDUCE EXPOSURE TO SYNTHETIC CHEMICALS . . .

Two decades of research on DDT, PCBs and breast cancer have produced controversy in the scientific community, confusion in the public and strong opinions in all concerned. More research on these specific chemicals is unlikely to change the situation. It is far more important to study the effects of exposures to substances currently in use in the USA and other industrialized countries.

We urgently need breast cancer research that matches the reality of human exposure to environmental chemicals. We are all exposed to hundreds, perhaps thousands, of chemicals every day, many of which may interact, so studying one or two chemicals at a time will not yield meaningful results. Xenoestrogens offer an example of how research needs to change. Scientists need to find a method that will measure an individual's total cumulative exposure to environmental xenoestrogens and how that total exposure relates to breast cancer risk. As a 1999 National Academy of Science report recommended, "Markers of total xenoestrogen exposure and chemical

concentrations in blood or adipose tissue should be measured to provide an accurate assessment of internal dose and, therefore, to identify groups experiencing different exposures."[116] Some scientists have begun that search and their work can serve as a model for future studies.[117,118,119]

In the face of an ever-rising tide of breast cancer, research is needed that will help us fully understand the causes of the disease and move toward preventing it. The evidence we have points to the evidence we need.

1. WORKPLACE EXPOSURES

Since World War II, the number of women employed outside the home has increased steadily as has the risk of breast cancer. Yet few studies have been carried out in the USA to identify occupational risk factors for breast cancer. The limited research evidence to date shows an increased risk of breast cancer among two broad categories of workers—(1) those who regularly work with toxic chemicals such as chemists, clinical laboratory technicians, dental hygienists, paper mill workers, meat wrappers and cutters, microelectronics workers and telephone workers and (2) professionals generally in higher socioeconomic groups such as school teachers, social workers, physicians, dentists and journalists.[120,121,122]

FEW STUDIES HAVE BEEN CARRIED OUT IN THE USA TO IDENTIFY OCCUPATIONAL RISK FACTORS FOR BREAST CANCER.

Elevated breast cancer incidence among professional women is often explained in terms of reproductive factors, primarily delayed childbearing or no children. While the role of higher social class recently has been challenged,[123] the challenge ignores the possibility that occupational exposures may play a role in increasing risk. Future studies should address where women work and what risk factors are present in these environments. In addition, the possibility that occupational exposures may play a role in increasing risk should be further explored.

a. Melatonin, light at night and non-ionizing radiation

Melatonin is a hormone secreted by the pineal gland during darkness. Some studies show that melatonin may have anti-cancer properties. For example, adding melatonin to cancer cells in a laboratory dish will make them stop growing.[124] Because exposure to light at night decreases levels of melatonin, scientists developed the hypothesis that working at night in a lighted environment decreases melatonin levels and thereby increases the risk of breast cancer. Although this hypothesis remains controversial, at least three studies suggest a link between night shift work and increased risk of breast cancer,[125,126,127] which may be related to the change in melatonin levels created by light at night.

Another factor in the work environment that deserves further study is exposure to *electromagnetic fields (EMF)*, a type of non-ionizing radiation emitted by fluorescent lights, computers and other electric and electronic equipment. EMFs may also interact with the hormonal effects of shift work to affect melatonin levels. A number of studies indicate that EMF exposure may increase the risk of breast cancer in both men and women.[128] As mentioned above, melatonin will halt the growth of breast cancer cells in culture, but if the cell culture is exposed to an electromagnetic field, the cells will start to grow again.[129]

These preliminary studies indicate that more must be learned about the effects of night-shift work and exposure to non-ionizing radiation on human health.

b. Solvents

It can be difficult to identify which organic solvents may be contributing to increased breast cancer risk in workers because industries often use combinations of solvents and their formulations change frequently. Further study is needed to identify precisely which solvents increase the risk of breast cancer and other cancers.

c. Household exposures

Homemakers face an increased risk of breast cancer.[130] Thus research is needed to determine what conditions and exposures may be linked to increased breast cancer risks.

Many women in the USA have two workplaces: home and an office or other workplace away from home. To accurately assess the environmental exposures that may increase the risk of breast cancer, research needs to consider exposures at both sites, individually and collectively.

2. BREAST MILK AS A MARKER FOR HUMAN CONTAMINATION

Although comprehensive testing of American women's breast milk has yet to be done, many studies in the USA and throughout the world have discovered PCBs, dioxins, DDT and other organochlorine compounds in human breast milk.[131] In Europe, a common flame retardant, polybromodiphenyl ether, has been found at increasing levels in breast milk.[132]

MANY STUDIES IN THE USA AND THROUGHOUT THE WORLD HAVE DISCOVERED PCBs, DIOXINS, DDT AND OTHER ORGANOCHLORINE COMPOUNDS IN HUMAN BREAST MILK.

The widespread presence of these contaminants in breast milk is a major cause for concern, not only for nursing infants but for their mothers as well. Women are therefore faced with a quandary with regard to breast-feeding. Although breast milk is a source of important nutrients, breast-feeding also transmits undesirable amounts of foreign chemicals and contaminants to the infant. Ironically, this "downloading" of the mother's body burden of foreign chemicals may be one of the reasons why breast-feeding helps lower the mother's risk of breast cancer. Whether these chemicals increase the daughters' risk of breast cancer remains to be seen. Despite the contamination of breast milk, however, scientists still consider it the best nutrition for infants because of immunologic and neurologic benefits.[133,134,135,136]

It is essential that we study breast milk to identify these contaminants and make policy changes to eliminate them from the food chain.

Stop Fiddling While Rome Burns: Activists Call for Change

Studies of the health effects of some of the 85,000 synthetic organic chemicals introduced since World War II are currently underway but will take decades, perhaps centuries to complete. Nearly 3,000 of those chemicals are produced in excess of 1 million pounds annually. Yet little data is publicly available about even the basic toxicity of 75 percent of these high production volume chemicals, much less their effects on the development of breast cancer.

There is no shortage of advice for women about things they can do in their personal lives to possibly reduce the risk of breast cancer. But breast cancer is more than a personal issue; it is a public health crisis that demands action by society as a whole. A major public education campaign is underway to help people understand the mounting evidence linking synthetic chemicals with breast cancer and other cancers. Once informed, the public can be mobilized to action, using this evidence to support allocation of resources to protect human health and the health of future generations.

THERE IS NO SHORTAGE OF ADVICE FOR WOMEN ABOUT THINGS THEY CAN DO IN THEIR PERSONAL LIVES TO POSSIBLY REDUCE THE RISK OF BREAST CANCER. BUT BREAST CANCER IS MORE THAN A PERSONAL ISSUE: IT IS A PUBLIC HEALTH CRISIS THAT DEMANDS ACTION BY SOCIETY AS A WHOLE.

The public's health cannot and should not have to wait for absolute proof. Too many people will suffer from this disease if we wait to act until we meet the scientific standard of proof—a standard requiring a 95 percent certainty of cause and effect. While this standard is supported by industry when the action under consideration would have an impact on profits, in other settings, less stringent standards are set. For example, legal remedies in the civil setting require only a "preponderance of the evidence"—a more than 50 percent likelihood—that the challenged action is the result of the behavior in question. And California's Environmental Quality Act (CEQA) requires only the "potential for significant impact"—10 to 30 percent likelihood—as a basis for action.

What works for science and industry does not work for the public's health. The public deserves protection from environmental hazards based on a standard that acknowledges that some evidence—not conclusive proof—is sufficient.

Public health policy based on the precautionary principle says that evidence of harm, rather than proof of harm, serves as the trigger for action. By that standard, there is ample evidence of the need to reduce, or in some cases, eliminate certain toxic chemicals. Understood by doctors as "first, do no harm," the precautionary principle is sometimes abbreviated as "better safe than sorry."

As explained by the Science and Environmental Health Network, the principle provides that:

> *When an activity raises threats of harm to the environment or human health, precautionary measures should be taken even if some cause and effect relationships are not fully established. Implementing the principle requires exploring alternatives to possibly harmful actions; placing the burden of proof on proponents of an activity rather than on victims or potential victims of the activity; and using democratic processes to carry out and enforce the principle.*

To reduce the risk of breast cancer and ultimately end the epidemic, we must make fundamental and immediate changes in public policy, based on this principle. We can no longer afford to wait. Below is a 5-point plan that will help us accomplish this goal:

1. PHASE OUT TOXIC CHEMICALS

There is ample evidence of the need to phase out unnecessary use of toxic chemicals, by requiring toxic use reduction planning and clean production planning by all polluters and government agencies. Programs should be put in place to encourage, and, if necessary, require such planning by government agencies and companies doing business with government agencies.

At the same time, efforts should move forward to implement the Persistent Organic Pollutants (POPs) treaty.[137] This global treaty targets hexachlorobenzene, endrin, mirex, toxaphene, chlordane, heptachlor, DDT, aldrin, dieldrin, PCBs, dioxins and furans. Ratification by at least 50 countries will be required before the treaty enters into force, a process that may take 3 to 4 years. The USA has signed the POPS treaty and now needs to lead the way in ratifying this treaty and expanding the list of toxic chemicals to be phased out.

2. ENACT "SUNSHINE" LAWS AND ENFORCE EXISTING ENVIRONMENTAL PROTECTION LAWS

Federal and state governments should follow the example of Massachusetts by passing a Toxics Use Reduction Act, requiring corporations to disclose what chemicals they use. Since passing the Toxics Use Reduction Act in 1990, the amount of toxic chemicals released into the environment in Massachusetts has dropped from 20.6 million pounds to 5.5 million pounds, a decrease of 73 percent.[138]

We also need to strengthen and enforce existing environmental protection laws. Existing environmental protection laws such as the Clean Air Act and the Federal Insecticide, Fungicide, and Rodenticide Act must be strengthened, not weakened. Sufficient funding must be appropriated for regulatory agencies and commissions, such as the Environmental Protection Agency and the Consumer Products Safety Commission, to increase environmental surveillance and enforcement of existing regulations.

3. PRACTICE HEALTHY PURCHASING

Consumers, businesses and hospitals should purchase products that are free from chemicals that are linked to breast cancer, such as chlorine-free paper or plastic products made without polyvinyl chloride. These subtle changes in purchasing practices will mean fewer cancer-causing chemicals will enter our homes, be disposed of in our landfills, or be released into our air or water. Further, these actions will encourage industry to provide the products that consumers want—products that are not hazardous to our health.

State and federal governments should lead the way by adopting environmentally preferable purchasing practices, thereby creating an example for individuals, businesses and hospitals to follow.

4. OFFER CORPORATE INCENTIVES

Companies should not only be punished for releasing cancer-causing chemicals into our environment and therefore into our bodies; they should also be rewarded for instituting new policies and processes that are healthier for our environment. Many companies are already learning that being "green" increases consumer loyalty and increases profitability. Offering additional incentives to corporations that encourage them to eliminate harmful chemicals in their products and processes will help them initiate new policies.

Such incentives might include: non-monetary public awards; a labeling system to highlight companies that use pollutant-reducing technology; prioritizing green companies when awarding government contracts; investigating new tax credits for companies that reduce their use of natural resources; or providing grants to small businesses for one-time purchases of equipment or materials that would help them reduce their use of cancer-causing chemicals.

5. MONITOR BREAST MILK

Chemicals from a variety of sources enter the human body and contaminate breast milk, the nourishment provided to 60 percent of newborns in the USA. The presence of more than 200 contaminants in human breast milk provides evidence of exposure of both mother and infant to potential harm.

Breast milk—once the purest food on the planet—has become unacceptably contaminated. This argues for a comprehensive community program of breast milk monitoring that identifies the chemicals that are present in breast milk, establishes links to geographic areas and initiates a plan to eliminate these contaminants.

We ignore at our peril the evidence that chemicals are contributing to the rising incidence of breast cancer. Stemming that tide requires that we take action now, based on the evidence we have now, to protect the health of people and the planet. Waiting for absolute proof only means more funerals. It is in our power to change the course we are on. Now is the time to act on the evidence.

Appendix

CHEMICALS SHOWN TO INDUCE MAMMARY TUMORS IN ANIMALS

(National Toxicology Program, 2001)
http://ntp-server.niehs.nih.gov/htdocs/Sites/MAMM.html

- ACRONYCINE
- BENZENE
- 2,2-BIS(BROMOMETHYL)-1,3-PROPANEDIOL
- 1,3-BUTADIENE
- 2-CHLOROACETOPHENONE (CN)
- CHLOROPRENE
- C.I. ACID RED 114
- C.I. BASIC RED 9 MONOHYDROCHLORIDE
- CLONITRALID
- CYTEMBENA
- 2,4-DIAMINOTOLUENE (2,4-TOLUENE DIAMINE)
- 1,2-DIBROMO-3-CHLOROPROPANE
- 1,2-DIBROMOETHANE
- 2,3-DIBROMO-1-PROPANOL
- 1,1-DICHLOROETHANE
- 1,2-DICHLOROETHANE
- 1,2-DICHLOROPROPANE(PROPYLENE DICHLORIDE)
- DICHLORVOS
- 3,3'-DIMETHOXYBENZIDINE DIHYDROCHLORIDE
- 3,3'-DIMETHYLBENZIDINE DIHYDROCHLORIDE
- 2,4-DINITROTOLUENE
- ETHYLENE OXIDE
- FUROSEMIDE
- GLYCIDOL
- HYDRAZOBENZENE
- INDIUM PHOSPHIDE
- ISOPHOSPHAMIDE
- ISOPRENE
- METHYLENE CHLORIDE
- METHYLEUGENOL
- NITHIAZIDE
- 5-NITROACENAPHTHENE
- NITROFURAZONE
- NITROMETHANE
- O-NITROTOLUENE
- OCHRATOXIN A
- PHENESTERIN
- PROCARBAZINE HYDROCHLORIDE
- RESERPINE
- SULFALLATE
- 2,4- & 2,6-TOLUENE DIISOCYANATE
- O-TOLUIDINE HYDROCHLORIDE
- 1,2,3-TRICHLOROPROPANE

Glossary

CARCINOGEN – Any substance or process known to cause cancer.

DIOXIN – The name given to a group of highly toxic chemicals created by industrial processes that involve chlorine, such as the manufacture of paper or the incineration of polyvinyl chloride plastics. Dioxin is an endocrine (hormone) disrupting chemical linked to several types of cancer, birth defects, learning disabilities, infertility, endometriosis and suppression of the immune system. Dioxin persists in the environment and accumulates in the food chain. It is found everywhere, in Arctic snow, in the bloodstream of newborn babies, in breast milk and in the body fat of every human being.

ENDOCRINE DISRUPTING CHEMICALS (EDCs) – Chemicals such as dioxin that disturb the body's finely tuned hormonal (endocrine) balance. Any disruption in hormonal activity can interfere with an organism's ability to grow and develop and function normally. Some EDCs act like the female hormone estrogen and may be referred to as xenoestrogens. These chemicals may be linked to increased rates of testicular cancer in young men and such birth defects as cryptorchidism (undescended testicles) and hypospadias (misplaced urinary opening on the penis), the incidence of which has doubled between 1970 and 1993.

ELECTROMAGNETIC FIELDS (EMFs) – Non-ionizing radiation that includes electrical fields, magnetic fields, radio frequency transmissions and microwaves. A growing body of research evidence suggests an association between EMF exposure and many cancers, including breast cancer and childhood leukemia.

ORGANOCHLORINES – Any chemical composed of carbon and hydrogen atoms and chlorine. Many pesticides such as DDT and chlordane are organochlorines. Organochlorines persist in body fat for years. They may also be endocrine disruptors and xenoestrogens, and, like naturally occurring estrogens, are believed to promote growth of cancer cells.

PERSISTENT ORGANIC POLLUTANTS (POPs) – Organic chemicals that are persistent in the environment and in our bodies, usually in fatty tissues. These include polychlorinated biphenyls (PCBs) and organochlorines.

PHTHALATES – A group of chemicals used to render plastics soft and flexible and found in many household products. Phthalates have been found in women's bodies at high levels and because of their hormone-mimicking properties, are suspected of causing early puberty.

PHYTOESTROGENS – Plant estrogens that mimic the estrogen hormones and are commonly found in whole grains, dried beans, peas, fruits, broccoli, cauliflower and soy products.

POLYCHLORINATED BIPHENYLS (PCBs) – A group of highly toxic synthetic chemical compounds once used as insulation fluid in electrical transformers, lubricating oil in pipelines, made into plastics or mixed with adhesives, paper, inks, paints and dyes. When PCBs are burned, as in transformer explosions and fire, dioxin is released. Sale of PCBs was banned in the USA in 1976. However, as much as two-thirds of all PCBs ever produced are still in use. The other third persists in the environment; all living animals, including humans, contain PCBs in their fat. PCBs are implicated in breast cancer, brain cancer, melanoma, lymphoma and soft tissue sarcomas.

POLYVINYL CHLORIDE (PVC) – A type of plastic also referred to as vinyl, used in construction, packaging, medical products, appliances, cars, toys, credit cards and rainwear. The life cycle of PVC is toxic from beginning to end. PVC is linked to liver and breast cancer among workers who manufacture it. It contains heavy metals such as lead and cadmium as well as phthalates, all of which can be ingested by children when vinyl toys are sucked or chewed. When PVC is incinerated, for example, in medical waste, it releases dioxin as well as heavy metals into the environment.

RADIATION – Energy transmitted in the form of rays, waves or particles. There are two types of radiation: ionizing radiation and non-ionizing radiation. Ionizing radiation can strike our genetic material and break off ions, thereby changing the way new cells are formed. Exposure to ionizing radiation occurs during medical procedures such as x-rays and other diagnostic tests, during mining and processing of uranium or other radioactive ores, from nuclear weapons manufacture and testing, from nuclear "accidents" such as Chernobyl and Three Mile Island and from hazardous waste produced by nuclear power plants. Non-ionizing radiation includes electromagnetic fields (EMF) and radio frequency (RF) transmission, explained earlier. How non-ionizing radiation affects our health is not clearly understood but is believed to be related to hormone function.

SYNERGY – The interaction of two or more elements or forces that creates an effect greater than the sum of the individual effects. In other words, when 2 plus 2 equals not 4 but 8 or 12 or more. This is a key concept in understanding why the current regulation of hazardous chemicals does not relate to real world exposures. Chemicals are regulated as though we were exposed to them one at a time when, in fact, we have multiple chemical exposures every day—in air, water, food, whether at home or in the workplace. Research studies have shown that chemicals can act synergistically with each other as well as with radiation, either ionizing or non-ionizing.

XENOESTROGENS – Chemicals that mimic the action of the female hormone estrogen but come from outside the body (xeno means foreign), such as organochlorine pesticides.

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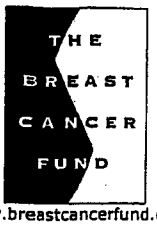

www.breastcancerfund.org

We are still gathering endorsements of this document. Adding additional names to the endorsement list clearly demonstrates that a great many people believe the evidence listed in this document warrants action to reduce synthetic chemicals in our bodies and our environment.

This document represents a first step in our public policy agenda to get toxic chemicals out of our breasts and the rest of our bodies. It was entered as evidence in a public hearing on Breast Cancer and the Environment in the California State Legislature on February 20, 2002, and is being used to educate the public, media and legislators on environmental links to breast cancer.

Due to its success, the California Senate and Assembly Health and Human Services Committees will convene a second informational hearing on breast cancer and the environment, **October 23rd, 2002, 10:00am – 12:30pm** at City Hall in San Francisco. Prominent researchers, academicians and advocates actively investigating the relationship between environmental toxins and breast cancer will testify at the hearing and submit research and public policy recommendations.

We hope that you will consider endorsing *State of the Evidence: What is the Connection Between Chemicals and Breast Cancer?* If you would like to be listed as an endorser, please contact:

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Communications Manager
The Breast Cancer Fund
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BAY AREA WORKING GROUP ON THE PRECAUTIONARY PRINCIPLE

The Bay Area Precautionary Principle Working Group is a collaborative formed to promote the implementation of the **Precautionary Principle** in the Bay Area. The goal of the Working Group is to correct fundamental flaws in government policies that *allow harm* to our health and environment. We will advocate for proactive policies to *prevent harm* before the damage is done, and to democratically choose the safest alternatives.

August 2002 Steering Committee
• Bayview Hunters Point Community Advocates • Breast Cancer Action • The Breast Cancer Fund • Center for Environmental Health • Clean Water Action • Clean Water Fund • Commonweal • Redefining Progress • Urban Habitat • Women's Cancer Resource Center

"When an activity raises threats of harm to human health or the environment, precautionary measures should be taken even if some cause and effect relationships are not fully established scientifically. In this context the proponent of an activity, rather than the public, should bear the burden of proof. The process of applying the Precautionary Principle must be open, informed and democratic and must include potentially affected parties. It must also involve an examination of the full range of alternatives, including no action."

-Definition created at the Wingspread Conference on the Precautionary Principle, January, 1998

The Problem

• The places we live, work, play, learn and worship, the water we drink, and the food we eat contain toxic chemicals, radioactive materials, heavy metals, genetically altered organisms, and more. We know that many potentially toxic substances are stored in our bodies and passed on to our children.

• We know very little about the toxicity of 75% of the most heavily used industrial chemicals. Of the 85,000 synthetic chemicals now in use, fewer than 10% have been tested for their effects on human health. These substances, in addition to chemical pesticides, are widely released in large quantities into our environment.

• Yet we have good scientific evidence that these exposures are already affecting our health and the health of our children: cancer, asthma, learning disabilities, and other illnesses have been linked to environmental exposures, and the incidence of many other health problems is on the rise. In 1950, it was predicted that about 25% of all Americans would be diagnosed with cancer; by 1997 that figure had risen to 40%. Asthma's prevalence is now doubling every 20 years. Rates of autism and attention deficit disorder also appear to be rising rapidly in children.

• Releasing potentially harmful substances into our surroundings and food is legal and permitted by government authorities, even though we have an increasing understanding of how dangerous they really are.

• Many laws and regulations require strong evidence or proof of a cause-effect link between each pollutant and its health effects before preventive actions are taken.

• Science has so far been unable to assess the impact of multiple exposures: the daily toxic soup to which we are exposed, and the interactions and cumulative effects of these exposures. Many people are being harmed as we wait for science to be able to prove direct links between chemical exposure and illness.

The Precautionary Principle

What does it say?

The Precautionary Principle says that our first priority is protecting our health. It asserts our right to air, water, land and food that won't hurt us. It says, "Better safe than sorry," acknowledging that in our complex world, scientists often cannot predict what impact toxic exposures will have on our health. The Precautionary Principle calls for us to seek out the safest ways to accomplish our activities while recognizing the limits of our scientific knowledge.

What does it do?

It is a guiding principle for government officials, companies, and citizens to use in making decisions about potentially hazardous activities. It demands more rigorous, honest, and complete scientific analysis of possible

The Precautionary Principle *continued*

hazards and alternatives. It encourages us to be both cost-effective and caring, by preventing harm before it happens, rather than by trying to cure illness or clean up pollution after they occur. It can protect our health in ways that current laws do not.

How will it help change things?

Incorporating the Precautionary Principle into laws, regulations, and policies would fundamentally change the way that environmental, land-use and health decisions are made, so that we can:

- Take more health protective actions in the face of scientific uncertainty;
- Select the safest alternative technologies and materials to meet our needs;
- Require that producers, not the public, demonstrate that they have selected the safest alternative;
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- Move closer to creating sustainable communities by preventing harm from the outset.

How is it already used?

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Many polluting industries oppose the Precautionary Principle because it forces them to take responsibility for their actions and change business as usual. It's time to move quickly to define how precaution should be integrated into laws and policies and effectively implemented.

The time to act is now.

Contact Us

For information on efforts in San Francisco, please speak to Janet at the Breast Cancer Fund, 415.346.8223 x24 or Lena at Clean Water Action, 415.369.9160 x302.

About the Working Group

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What do we want to do?

•We want to change environmental and public health laws, policies, and regulations in the Bay Area to adhere to the Precautionary Principle, and to use those changes as a model for the nation.

•We want to educate the public and decision-makers about the limitations of science in predicting harm to health and the environment, and about the need for new approaches that integrate a broader vision for science and democratic values.

•We want government policy-makers and industry to work toward ending careless and harmful activities and to develop and implement safer alternatives to them.

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•We want people who are affected by these exposures to have a say in decisions affecting whether and how much exposure is allowed and in the development and use of technologies that might harm health.

Join Us

We are actively seeking partners to support these efforts and become members of this coalition. This is an excellent time to get involved: the City and County of San Francisco introduced a draft precautionary principle ordinance in August. The City of Berkeley is in the early stages of ordinance development.

Please join us to see how precautionary principle advocacy relates to your community, your neighborhood or your campaigns and programs.

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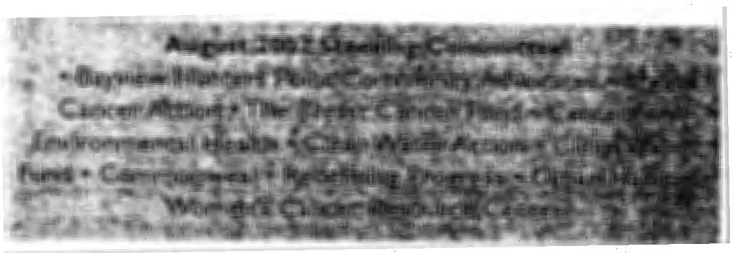

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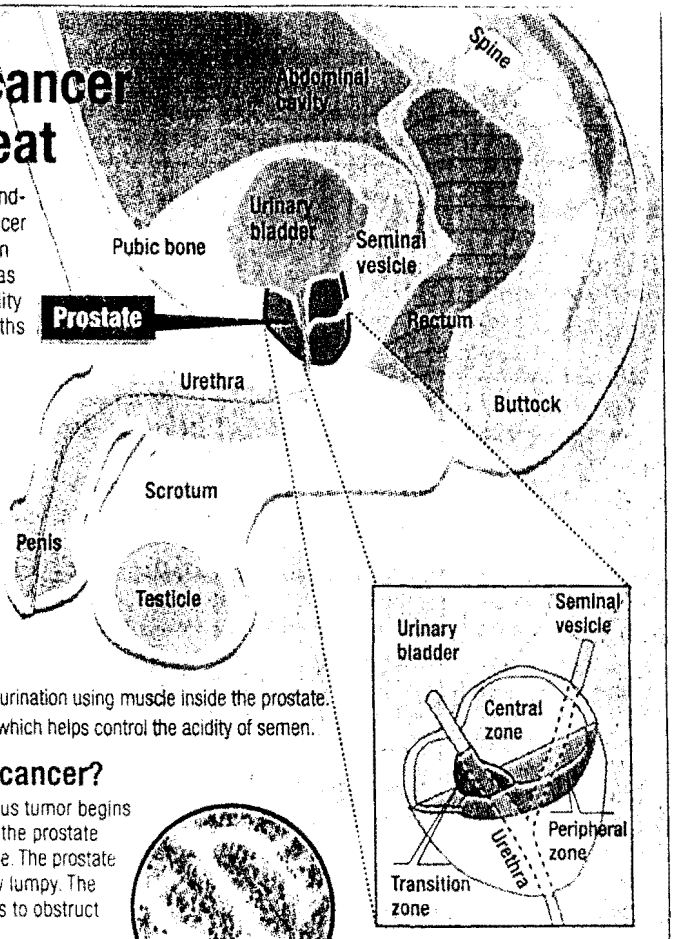
Prostate cancer poses threat

Prostate cancer is the second-most diagnosed form of cancer among Marin and U.S. men after skin cancer. It also has the second-highest mortality rate of cancer-related deaths after lung cancer.



Where is it?

A man's prostate is a walnut-sized solid organ immediately below the bladder. It surrounds the urethra, which is the tube connecting the bladder and penis.

What does it do?

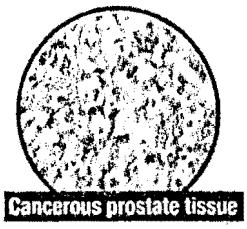
It has two main functions:

1. To help control the rate of urination using muscle inside the prostate.
2. To secrete prostatic fluid, which helps control the acidity of semen.

What is prostate cancer?

Most of the time, a cancerous tumor begins to grow in the outer part of the prostate known as the peripheral zone. The prostate gland will enlarge and grow lumpy. The tumor may grow so large as to obstruct the urethra.

Normal prostate tissue


Cancerous prostate tissue

Photos courtesy of University of Michigan Medical School

What are the symptoms?

Often a tumor may exist for years without symptoms, and a man may have prostate cancer but not die from it. However, the cancer may spread faster and move to other vital organs. Symptoms can include problems urinating, excessive need to urinate and abdominal pain.

The most common way a doctor can diagnose prostate cancer is by feeling the back of the prostate via a **digital rectal exam (DRE)**. Other ways to find the cancer are through a **prostate-specific antigen (PSA)** blood test, ultrasound and other imaging technology.

How is it treated?

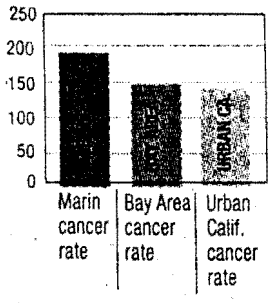
If the cancer is small many doctors recommend "watchful waiting," to keep track of the tumor before taking invasive action. Treatment of cancer depends on the stage of the disease, the patient's age and overall health. Surgery is usually reserved for men in good health who are under the age of 70. Radiation, chemotherapy and hormone therapy are other options.

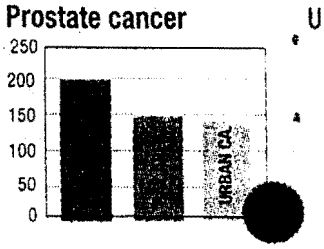
Source: The American Cancer Society, American Cancer Society Kaiser Permanente

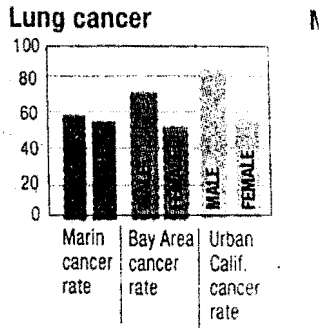
IJ graphic/Dennis Bolt

Cancer rates

The average incidence rates per 100,000 white non-Hispanics for 1995-1999:







Source: Northern California Cancer Center

graphics that gives us increased risk.'"

The growth of prostate tumors is triggered in part by the male hormone testosterone; consequently, many such tumors are treated before radiation therapy, with testosterone blockers, called hormone depletion therapy, to increase the treatment's effectiveness. Hormone depleters are given to men whose prostate cancer has spread beyond the prostate to other parts of the body. Most prostate cancers are eventually able to grow with little or no male hormones. When that happens, the treatment is no longer effective.

Similarly, oncologists often prescribe the drug Tamoxifen to women with advanced and early stage breast and uterine cancer because the drug interferes with the activity of estrogen, which encourages some estrogen-sensitive cancer cells to grow and divide.

A growing body of scientific research now suggests that xenoestrogens, chemicals contained in plastic that mimic estrogen, might trigger the growth of estrogen-sensitive cancer cells. This might explain the increase in breast and uterine cancer cases.

But what about the growing number of prostate cases? So far, no "xenotestosterones" have been identified.

Although breast cancer and prostate cancer share some risk factors, prostate cancer is not linked with higher socioeconomic status, as is breast cancer.

"Prostate cancer is not an income variable," said Rochelle Ereman, epidemiologist for the Marin Department of Health and Human Services. "It confuses the picture of whether there is an association between breast cancer and prostate cancer in Marin."

Researchers at University Hospital of San Louis, in Brest, France, have found evidence of a genetic link between breast and prostate cancers. They've discovered that the development of early onset prostate cancer in younger men, which is far less common than the diagnosis in men 50 and above, significantly increases the risk that a female relative will develop breast cancer.

Dr. Gary Nicolaisen, chief of urology at Kaiser Permanente Medical Center, believes Marin's elevated rates of prostate cancer reflect the more advanced age of Marin's residents.

"We're an older population, and they get super health care in Marin and you would expect to find more," he said. "Beyond that, I don't know."

The American Cancer Society recommends that men over 50 take a simple blood test each year to measure the level of PSA, prostate-specific antigen, a protein produced by the prostate. Other groups, such as the United States Preventive Services Task Force, have recommended against PSA tests, arguing that because many prostate tumors are very slow growing, some men diagnosed by PSA tests might suffer serious side effects, such as impotence or incontinence, from aggressive treatment of tumors that might never have bothered them.

Carroll agrees that physicians have "overtreated some men because of PSA testing, but he also points to a new Scandinavian stud

IJ 10/21/2002

Cancer

From page A1

Keon urged residents to adopt a plant-based, vegetarian diet, to drink lots of chlorine-free water, exercise "frequently and vigorously" and lower stress.

All of the panelists said prevention is key to reducing the lifetime risk of cancer.

"Prevention is the gold standard," said Marin's director of Health and Human Services Larry Meredith. "It's a journey we want to take."

One thing women can do, Meredith said, is limit their alcohol intake.

"Seventy percent of women in Marin drink alcohol," Meredith said. "That compares with 53 percent of women in California and 46 percent of women in the U.S."

One drink of alcohol a day increases the risk of breast cancer by 10 percent, two drinks by 20 percent, Keon explained.

Much of the panel discussion focused on the risks presented by the 70,000 chemicals currently being released into the environment, many of which have not been tested for their long term effects on human, plant and animal life.

Dr. Georgianna Farren, a breast cancer survivor and principal research investigator on Marin Breast Cancer Watch's adolescent risk factor study, emphasized the importance of the "precautionary principle," which means, she said, "eliminating chemicals that might be harmful to environmental health even when it's not proven that they're harmful."

Acupuncturist and epidemiologist Michael McCulloch of the Pine Street Benevolent Association clinic in San Anselmo said lifestyle, health and diet changes are crucial because "breast cancer and many forms of cancer will develop over a long period of time, which means the things you do every day will make a difference."

McCulloch urged eating well, avoiding foods with chemical additives and reducing fat intake. He said the risks of exposure to environmental toxins increase if they occur in hormonally active life phases, particularly during in utero development and adolescence.

Kaiser San Rafael Medical Center surgeon and epidemiologist Dr. Mary Mockus, president elect of the Susan G. Komen Breast Cancer Foundation, recommended changes in "modifiable risk factors" including avoiding obesity, particularly in postmenopausal years, eliminating hormone replacement therapy when appropriate, raising bone density through weight lifting, and getting regular mammograms, clinical breast exams and self-breast exams.

Keon urged the audience to use its "consumer power" to let corporations know it won't buy and won't tolerate chemical toxins.

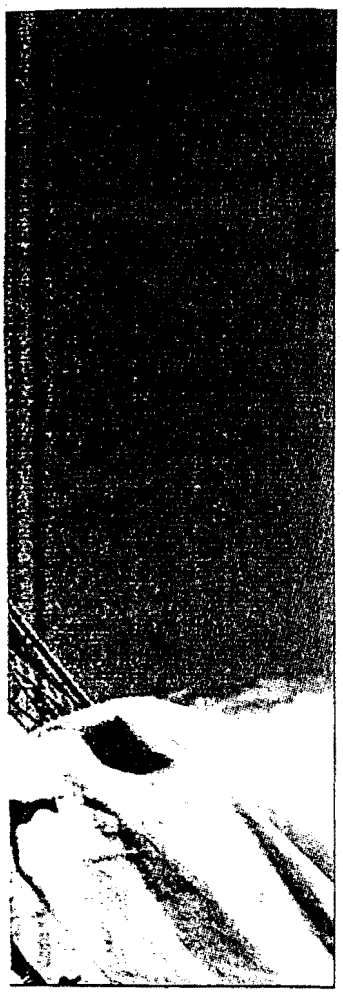
Farren said personal lifestyle changes, such as reducing the amount of refined carbohydrates in the diet are important, but that political activism is also needed.

Contact Jane Futcher via e-mail at jfutcher@marinij.com

FORUM ON TV

An edited version of last night's "Confronting Cancer" community forum will be broadcast on Channel 50 at 7:30 p.m. Nov. 26 and again at 7:30 p.m. Dec. 1.

;nvironment



IJ photo/Marian Little Utley

fields from huge transmitter towers breast cancer.

external and internal reasons for the over-exposure to estrogen, including the effects of modifiable "lifestyle choices" on estrogen, such as having children after 30, having fewer pregnancies and taking hormone replacement therapy.

"If there was something (environmental) that was increasing, starting from the early '90s and getting worse, as we're seeing, the uterine cancer rates should follow the same way if it was truly due to an unopposed environmental estrogen," Benz said.

Branson School sophomore Elizabeth Adams of Kentfield is so concerned about breast cancer in Marin that she organized a school American Cancer Society "Relay for Life" team that raised $5,000 for breast cancer research, and

natural estrogens. Such chemicals are contained in many pesticides, fuels, plastics, detergents and prescription drugs. A Silent Spring Institute study on Cape Cod, where nine of 15 towns have breast cancer rates 20 percent higher than the Massachusetts average, found that synthetic estrogens, which may cause breast cells to proliferate, may have entered the water table.

Monitoring breast milk samples would be one of the best ways to determine the role and presence of environmental toxins and exposures in women, according to Nancy Evans, editor of "State of the Evidence: What is the Connection Between Chemicals and Breast Cancer," a publication of the Breast Cancer Fund and Breast Cancer Action in San Francisco.

Evans notes that more than 85,000 synthetic chemicals are in use today and many more are added each year. Complete toxicological studies are available for only 7 percent of those chemicals.

85,000 chemicals

"Chemicals from a variety of sources enter the human body and contaminate breast milk, the nourishment provided to 60 percent of newborns in the USA," states Evans' report. "The presence of more than 200 contaminants in human breast milk provides evidence of exposure to both mother and infant to potential harm."

At this month's town hall meeting, Evans warned that if society waits until the links between toxic chemical exposures and breast cancer can be proven absolutely, the nation is in danger of going down "Tobacco Road."

"It took approximately 50 years from the time that evidence first appeared that smoking causes cancer until we got a label on cigarettes," she explained. Evans rec-

'Healthy purchasing'

Evans urges Marin adopt a "healthy purchasing" resolution similar to the one the San Francisco Board of Supervisors is poised to adopt later this month. Healthy purchasing refers to the practice of buying products that are free from chemicals linked to breast cancer, such as plastic products made with polyvinyl chloride.

Elizabeth Adams is already practicing healthy purchasing at home.

"I take precautionary steps to avoid any type of cancer," she said. "I wear sunscreen every day. I know precautionary measures — read the ingredients of personal care products, be aware of what you're putting in or on your body, buy organic produce."

Help from the federal government may be on the way.

Earlier this month, Kenneth Olden, director of the National Institute of Environmental Health Science of NIH told the San Rafael town hall meeting on breast cancer that his agency is seeking federal money to create eight "Centers of Excellence" across the nation designed to "build a database of chemical/environmental interactions in relation to breast cancer." Marin, he said, is a strong candidate.

Marin's director of Health and Human Services, Larry Meredith, has appealed to Rep. Lynn Woolsey, D-Petaluma, to make a $1.5 million line item in the new budget to help Marin find clues to the cancer epidemic.

Promises of federal aid to Marin could take months, or years, to materialize.

In the meantime, many homeowners and residents like Judi Scott want answers.

"I am very concerned," Scott repeated. "I want it explored."

Contact Jane Futcher via e-mail at jfutcher@marinij.com

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She will be going door-to-door Nov. 9 for the Marin Cancer Project's "Search for the Cause" campaign, polling residents on cancer and asking a donation of $1 per household that will go toward helping map the cancer incidence in Marin.

"Breast cancer and prostate cancer have been in my family," Adams said. "My family and I are very directly affected."

Many scientists and breast cancer activists fear the proliferation of "xenoestrogens," synthetic agents that mimic the actions of

danger of going down "Tobacco Road."

It took approximately 50 years from the time that evidence first appeared that smoking causes cancer until we got a label on cigarettes," she explained. Evans recommended governments and individuals practice the "precautionary principle," which mandates that evidence of harm rather than definitive proof of harm trigger government policy changes. Furthermore, she said, "The burden of proof with regard to chemicals rests with the manufacturers to demonstrate the substances are safe rather than with the public to show they are harmful."

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Marin Independent Journal

Marin County
Community Development Agency

Alex Hinds, Director

Post-it® Fax Note 7671	Date 10/8/02	# of pages ▶ 3
To Sarah Borchelt	From Tom Lai	
Co./Dept. Coastal Commission	Co. Marin County Planning	
Phone # 904-5260	Phone # 499-6292	
Fax # 904-5400	Fax #	

October 8, 2002

Sarah Borchelt
California Coastal Commission
North Central Coast District Office
45 Fremont, Suite 2000
San Francisco, CA 94105

RE: Item No: Th 8b; California Coastal Commission Agenda for October 10, 2002
Bulkhead Replacement for Metz, Cebe, Sherbon, Bowman, Carcione (Permit Number 2-02-001)
3, 5, 9, 11, 17 Dipsea Road, Stinson Beach

Dear Ms. Borchelt:

Thank you for sending the Community Development Agency a copy of the staff report and recommendation for the above-referenced bulkhead replacement project. The attached Resolution 99-168 was adopted by the Marin County Board of Supervisors in 1999 to encourage elimination of dioxin emissions, which represent one of the products created during the manufacture of polyvinyl chloride ("PVC"), and to promote use of less toxic non-chlorinated, and sustainable alternative products and processes. Since the proposed bulkhead replacement would utilize a PVC material, I thought the Resolution may be of use to the Coastal Commission in its deliberation on the merits of the proposed project.

Please call me at (415) 499-6292 if you have any questions regarding this matter.

Sincerely,

Thomas Lai, AICP
Principal Planner

Attachment: Marin County Board of Supervisors Resolution No. 99-168

RESOLUTION NO. 99-168

RESOLUTION OF THE MARIN COUNTY BOARD OF SUPERVISORS

WHEREAS, dioxin is a chemical which is a known human carcinogen, and has also been linked to endocrine disruption, endometriosis, reproductive abnormalities, decreased fertility, testicular atrophy, immune system impairment, and neurotoxicity. Children, infants and fetuses are especially vulnerable to dioxin exposure; and

WHEREAS, dioxin has no commercial or industrial use. It is created and released to the environment when chlorinated waste is burned, and when other organic chemicals that contain chlorine are manufactured, including polyvinyl chloride ("PVC"); and

WHEREAS, dioxin is now ubiquitous in the worldwide environment and is found in the tissue of all people, regardless of where they live on earth. Ambient environmental concentrations are already at levels which cause effects in laboratory animals. Dioxin is both persistent in the environment and bioaccummulates in the body fat of humans and animals; and

WHEREAS, over ninety percent of people's body burden comes through their diet. Human breast milk is among the most contaminated foods. Dioxin is found in the breast milk of women worldwide, and nursing infants take in 50-100 times more dioxin than adults; and

WHEREAS, the U.S. Environmental Protection Agency ("EPA") estimates that the lifetime risk of getting cancer from dioxin exposure is above generally accepted safe levels. The EPA has designated dioxin in San Francisco Bay as a high priority for immediate action to restore water quality and protect public health. Dioxin contamination in fish reaches health advisory levels throughout the Bay Area; and

WHEREAS, many professional associations have already passed resolutions which agree on the need to reduce or eliminate dioxin in the environment, including the American Public Health Association, the International Joint Commission on the Great Lakes, the California Medical Association, the Chicago Medical Society, and the Minnesota Medical Association; and

WHEREAS, the Bay Area city governments of Oakland, San Francisco and Berkeley have already passed resolutions whose intent is the elimination of dioxin emissions wherever possible; and

WHEREAS, because dioxin is a clear threat to public health and the environment, a precautionary approach with a goal of zero exposure is the only strategy that truly protects public health.

NOW, THEREFORE, BE IT RESOLVED that the County of Marin will encourage elimination of dioxin emissions wherever possible and will work with other local governments to convene a regional task force to identify and quantify the sources of regional dioxin pollution, including sources from all municipal practices; to develop dioxin pollution prevention strategies along with any associated cost implications, and to make any further recommendations to implement the intent of this resolution to eliminate dioxin emissions.

BE IT FURTHER RESOLVED that the County of Marin will promote less toxic non-chlorinated, sustainable alternative products and processes, such as chlorine free paper and PVC free plastics to the extent possible.

BE IT FURTHER RESOLVED that the County of Marin will urge Marin health care institutions to reduce PVC use and eventually become PVC-free and will send a letter to Marin-based health care institutions to encourage them to phase out the use of PVC products without sacrificing patient care or worker safety.

BE IT FURTHER RESOLVED that the County of Marin will forward this resolution to Marin cities, encouraging them to adopt a similar resolution.

BE IT FURTHER RESOLVED that the County of Marin will send a letter to the Bay Area Air Quality Management District ("BAAQMD") supporting zero dioxin emissions and zero dioxin exposure and urging the BAAQMD to eliminate dioxin pollution into the air.

BE IT FURTHER RESOLVED that the County of Marin will send a letter to the Regional Water Quality Control Board ("RWQCB") recommending the RWQCB exercise its full power and jurisdiction, as intended by the Porter-Cologne Water Quality Act and the federal Clean Water Act, to protect the quality of water from degradation and to implement a plan to phase out dioxin at its sources.

BE IT FURTHER RESOLVED that the County of Marin will form a committee on environmental public health issues, including dioxin, which the Department of Health and Human Services will return to the Board of Supervisors with recommendations 120 days after first convening.

PASSED AND ADOPTED at a regular meeting of the Board of Supervisors of the County of Marin held on this 14th day of December, 1999, by the following vote:

AYES: SUPERVISORS Cynthia L. Murray, Harold C. Brown, Jr., Steve Kinsey, John B. Kress, Annette Rose

NOES: NONE

ABSENT: NONE

PRESIDENT, BOARD OF SUPERVISORS

ATTEST:

CLERK

October 17, 2002

California Coastal Commission
North Central District Office
45 Fremont Street, Suite 2000
San Francisco, Ca. 94105

RE: Polyvinyl chloride (PVC) proposed material for 12,000 linear feet Seadrift Lagoon Bulkhead

Dear Commissioners:

I/We will not have polyvinyl chloride (PVC) on my/our private property.

We must act responsibly to uphold Resolution No. 99-168 of the Marin County Board of Supervisors dated December 14, 1999 which calls for becoming PVC-free in Marin County, thus joining the city governments of Oakland, San Francisco and Berkeley and many other governmental bodies as well as medical and corporate groups.

The Bush Administration signed a treaty, May 22, 2001, at the Stockholm Convention calling for the elimination of 12 Persistent Organic Pollutants (POPS Convention), **dioxin,** being one of those toxic chemicals. **Dioxin** is extremely toxic, accumulates in body fat, does not readily degrade in the environment and has the ability to travel great distances. PVC is a major source of dioxin.

The stabilizers and additives contained in PVC, recycled and virgin, are also toxic and not bonded to the polymer, thus can potentially make their way into the Lagoon waters.

Respectfully yours,

C Claudia Chapline

Cc: Seadrift Association
P.O. Box 128
Stinson Beach, Ca. 94970

P.O.Box 594 - 131 Seadrift
Stinson Beach, CA 94970
Nov. 5, 2002

California Coastal Commission
45 Fremont, Suite 2000
San Francisco, CA 94105-2219

Re: PVC bulkhead in Seadrift lagoon
Permit no.2-02-001

Dear Commissioner:

I am deeply concerned at the possible outcome of installing a PVC bulkhead in the five lots that have requested permission. Should that permission be granted it means shortly all 12,000 linear feet of bulkhead will be PVC. The scope of this issue goes far beyond the little lagoon in my backyard.

If PVC goes into the lagoon, then all California waterways would have equal right to its use. PVC is both cheap in its material cost and since non-union workers can install it, the construction costs are lower. We would expect a lot of PVC to be used.

When incinerated, PVC releases dioxins. Dioxins are seriously harmful to humans as well as to the atmosphere. In May of this year the Bush administration signed an agreement at the Stockholm Convention to ban the use of a number of chemicals including PVC.

At a time when our nation is on the verge of war and we have among us people who would do harm, to line any waterways with an inflammable material that is highly toxic doesn't make sense. Even an accidental oil spill that ignites, an electrical fire on a boat, a lightening strike or other natural disaster, or heaven forbid, an act of terrorism, would have disastrous consequences for our health and our environment.

.I ask you to consider long and hard and weigh the merits of the product against the potential danger to the people of California and the world. The use of PVC constitutes a threat to our health and our homeland. It should be banned.

Thank you for letting me express my deepest fears.

Joan W. Yandell

October 17, 2002

California Coastal Commission
North Central District Office
45 Fremont Street, Suite 2000
San Francisco, Ca. 94105

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The stabilizers and additives contained in PVC, recycled and virgin, are also toxic and not bonded to the polymer, thus can potentially make their way into the Lagoon waters.

Respectfully yours,

Mrs. Mary Stapler (Mrs. James B.)

Cc: Seadrift Association
P.O. Box 128
Stinson Beach, Ca. 94970

October 17, 2002

...RY B. SKINNER M.D., F...
7 MORRO BAY
IRVINE, CA 92602

California Coastal Commission
North Central District Office
45 Fremont Street, Suite 2000
San Francisco, Ca. 94105

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Cc: Seadrift Association
P.O. Box 128
Stinson Beach, Ca. 94970

October 17, 2002

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Respectfully yours,

Jeanne L. Powell

Cc: Seadrift Association
P.O. Box 128
Stinson Beach, Ca. 94970

October 17, 2002

California Coastal Commission
North Central District Office
45 Fremont Street, Suite 2000
San Francisco, Ca. 94105

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Respectfully yours,

Nils Ingmanson
P.O. Box 264, Stinson Beach, CA. 94970

Cc: Seadrift Association
P.O. Box 128
Stinson Beach, Ca. 94970

October 17, 2002

California Coastal Commission
North Central District Office
45 Fremont Street, Suite 2000
San Francisco, Ca. 94105

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Respectfully yours,

Cc: Seadrift Association
P.O. Box 128
Stinson Beach, Ca. 94970

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45 Fremont Street, Suite 2000
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Cc: Seadrift Association
P.O. Box 128
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Respectfully yours,

x

x

Cc: Seadrift Association
P.O. Box 128
Stinson Beach, Ca. 94970

October 17, 2002

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Respectfully yours,

Kathleen Rogers

157 SEADRIFT
STINSON BEACH,

Cc: Seadrift Association
P.O. Box 128
Stinson Beach, Ca. 94970

October 17, 2002

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45 Fremont Street, Suite 2000
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Respectfully yours,

Edward C. Emrich

Cc: Seadrift Association
P.O. Box 128
Stinson Beach, Ca. 94970

October 17, 2002

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45 Fremont Street, Suite 2000
San Francisco, Ca. 94105

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Respectfully yours,

Arthur Evans
79 Dipsea Rd
Stinson Beach, Ca. 94970

Cc: Seadrift Association
P.O. Box 128
Stinson Beach, Ca. 94970

Mail address
44 Oak Ridge Rd.
Berkeley, Ca, 94705

October 17, 2002

California Coastal Commission
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45 Fremont Street, Suite 2000
San Francisco, Ca. 94105

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Respectfully yours,

Nancy Simon Kathleen Strauss

85 DIPSEA ROAD, STINSON BEACH, CA.
WORK (415) 362-3144

Cc: Seadrift Association
P.O. Box 128
Stinson Beach, Ca. 94970

October 17, 2002

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San Francisco, Ca. 94105

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Janice D. Barry, M.D. 171 Seadrift

Petty A Barry MD. 171 Seadrift

Cc: Seadrift Association
P.O. Box 128
Stinson Beach, Ca. 94970

October 17, 2002

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(A. Lufkin)

(J. Faber)

Cc: Seadrift Association
P.O. Box 128
Stinson Beach, Ca. 94970

RESOLUTION NO. 99-168

RESOLUTION OF THE MARIN COUNTY BOARD OF SUPERVISORS

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WHEREAS, dioxin has no commercial or industrial use. It is created and released to the environment when chlorinated waste is burned, and when other organic chemicals that contain chlorine are manufactured, including polyvinyl chloride ("PVC"); and

WHEREAS, dioxin is now ubiquitous in the worldwide environment and is found in the tissue of all people, regardless of where they live on earth. Ambient environmental concentrations are already at levels which cause effects in laboratory animals. Dioxin is both persistent in the environment and bioaccummulates in the body fat of humans and animals; and

WHEREAS, over ninety percent of people's body burden comes through their diet. Human breast milk is among the most contaminated foods. Dioxin is found in the breast milk of women worldwide, and nursing infants take in 50-100 times more dioxin than adults; and

WHEREAS, the U.S. Environmental Protection Agency ("EPA") estimates that the lifetime risk of getting cancer from dioxin exposure is above generally accepted safe levels. The EPA has designated dioxin in San Francisco Bay as a high priority for immediate action to restore water quality and protect public health. Dioxin contamination in fish reaches health advisory levels throughout the Bay Area; and

WHEREAS, many professional associations have already passed resolutions which agree on the need to reduce or eliminate dioxin in the environment, including the American Public Health Association, the International Joint Commission on the Great Lakes, the California Medical Association, the Chicago Medical Society, and the Minnesota Medical Association; and

WHEREAS, the Bay Area city governments of Oakland, San Francisco and Berkeley have already passed resolutions whose intent is the elimination of dioxin emissions wherever possible; and

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28

October 17, 2002

California Coastal Commission
North Central District Office
45 Fremont Street, Suite 2000
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Respectfully yours,

Jeffrey G. McKinley

Cameron C. McKinley

Cc: Seadrift Association
P.O. Box 128
Stinson Beach, Ca. 94970

Owners:
167 Seadrift
Stinson Beach, CA

Mailing Address
PO Box 1414
Ross, CA 94957

WALKUP, MELODIA, KELLY & ECHEVERRIA
Law Offices, A Professional Corporation

October 28, 2002

RECEIVED
OCT 2 9 2002
CALIFORNIA
COASTAL COMMISSION

California Coastal Commission
North Central District Office
45 Fremont Street, #2000
San Francisco, CA 94105

Re: Polyvinyl Chloride (PVC) Proposed Material for 12,000 Linear Feet Seadrift Lagoon Bulkhead

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Very truly yours,

PAUL V. MELODIA
SHARON MELODIA

PVM\hdr

cc: Seadrift Association

650 California Street, 26th Floor
San Francisco, California 94108

Paul V. Melodia
pmelodia@walkuplawoffice.com

Telephone (415) 981-7210
Facsimile (415) 391-6965

October 17, 2002

California Coastal Commission
North Central District Office
45 Fremont Street, Suite 2000
San Francisco, Ca. 94105

RE: Polyvinyl chloride (PVC) proposed material for 12,000 linear feet Seadrift Lagoon Bulkhead

Dear Commissioners:

I/We will not have polyvinyl chloride (PVC) on my/our private property.

We must act responsibly to uphold Resolution No. 99-168 of the Marin County Board of Supervisors dated December 14, 1999 which calls for becoming PVC-free in Marin County, thus joining the city governments of Oakland, San Francisco and Berkeley and many other governmental bodies as well as medical and corporate groups.

The Bush Administration signed a treaty, May 22, 2001, at the Stockholm Convention calling for the elimination of 12 Persistent Organic Pollutants (POPS Convention), **dioxin,** being one of those toxic chemicals. **Dioxin** is extremely toxic, accumulates in body fat, does not readily degrade in the environment and has the ability to travel great distances. PVC is a major source of dioxin.

The stabilizers and additives contained in PVC, recycled and virgin, are also toxic and not bonded to the polymer, thus can potentially make their way into the Lagoon waters.

Respectfully yours,

Cc: Seadrift Association
P.O. Box 128
Stinson Beach, Ca. 94970

October 17, 2002

California Coastal Commission
North Central District Office
45 Fremont Street, Suite 2000
San Francisco, Ca. 94105

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Respectfully yours,

Michael Parish
293 Seadrift

Cc: Seadrift Association
P.O. Box 128
Stinson Beach, Ca. 94970

October 17, 2002

RECEIVED
OCT 23 2002
CALIFORNIA
COASTAL COMMISSION

California Coastal Commission
North Central District Office
45 Fremont Street, Suite 2000
San Francisco, Ca. 94105

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Respectfully yours,

[illegible] Hess
Wolfback Ridge
Sausalito CA 94965

(re: 83 Dipsea
Stinson Beach
Ca 94970)

Cc: Seadrift Association
P.O. Box 128
Stinson Beach, Ca. 94970

October 6, 2002

Marin County, California

To: North Central Coast Regional Division-
California Coastal Commission

Dear Commissioners,

I am opposed to a PVC Bulkhead in the Seadrift Lagoon. I do not feel it has been researched enough to be considered a "safe" material, and I do not feel it should be permitted in an enclosed area where families, pets & children play and swim.

I am aware there are safer materials, both for human health and for the environment.

I am in favor of ***any*** safer alternative to PVC.

Thank you for your consideration,

Louis Hawthorne

October 1, 2002

Erik Ingemansson
San Rafael, California

Dear Commissioners,

WE ARE OPPOSED TO PVC IN THE SEADRIFT LAGOON!!

We would ask that the California Coastal Commission NOT approve any permit for Polyvinyl Chloride,(PVC), to be used in any way, shape or form In the Seadrift Lagoon. We swim and boat in there and are concerned with The hazards that a PVC bulkhead would pose.

Thank You,
Erik Ingemansson
Erik, Skyler & Bronson Ingemansson

OCTOBER 3, 2002

TO: THE CALIFORNIA COASTAL COMMISSION
NORTH CENTRAL COAST REGIONAL DIVISION

DEAR COMMISSIONERS,

PLEASE, PLEASE, PLEASE DO NOT APPROVE ANY PERMITS FOR BULKHEADS MADE OUT OF PVC,(POLYVINYL CHLORIDE), IN THE SEADRIFT LAGOON!

WE ARE OPPOSED TO PVC!

THANK YOU VERY MUCH,

STEPHANIE & AMY ELWOOD

October 4, 2002

Kristel A. Ingemansson
Bloomfield, California

To: California Coastal Commission (North Central Coast Region)

Dear Commissioners,

We are opposed to a PVC Bulkhead. We do not feel it has been researched enough to be considered a "safe" material - especially in an enclosed area, where my family & friends and I play and swim.

We are in favor of ***any*** material that will be safer to the environment and to human health than PVC.

Thank You for your consideration,

Kristel Ingemansson

October 17, 2002

California Coastal Commission
North Central District Office
45 Fremont Street, Suite 2000
San Francisco, Ca. 94105

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Respectfully yours,

Robert and Judy Gotch

Cc: Seadrift Association
P.O. Box 128
Stinson Beach, Ca. 94970

131 Seadrift
Stinson Beach, Ca. 94970
October 17,2002

California Coastal Commission
North Central District Office
45 Fremont Street, Suite 2000
San Francisco, Ca. 94105

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Respectfully yours,

Jeanne Powell

Cc: Seadrift Association
P.O. Box 128
Stinson Beach, Ca. 94970

October 17, 2002

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North Central District Office
45 Fremont Street, Suite 2000
San Francisco, Ca. 94105

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Respectfully yours,

Sharon Call

SHARON CALL
P.O. Box 852
Stinson Beach, CA 94970

Cc: Seadrift Association
P.O. Box 128
Stinson Beach, Ca. 94970

October 17, 2002

California Coastal Commission
North Central District Office
45 Fremont Street, Suite 2000
San Francisco, Ca. 94105

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Respectfully yours,

Kyra M. Ingemansson, Attorney in Fact for Nils A.H. Ingemansson

Cc: Seadrift Association
P.O. Box 128
Stinson Beach, Ca. 94970

October 17, 2002

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North Central District Office
45 Fremont Street, Suite 2000
San Francisco, Ca. 94105

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Respectfully yours,

John and Eileen Donahoe
#141 Seadrift

Cc: Seadrift Association
P.O. Box 128
Stinson Beach, Ca. 94970

October 17, 2002

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North Central District Office
45 Fremont Street, Suite 2000
San Francisco, Ca. 94105

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Respectfully yours,

Henry Raab

Cc: Seadrift Association
P.O. Box 128
Stinson Beach, Ca. 94970

October 17, 2002

California Coastal Commission
North Central District Office
45 Fremont Street, Suite 2000
San Francisco, Ca. 94105

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Respectfully yours,

Catherine Raab

Cc: Seadrift Association
P.O. Box 128
Stinson Beach, Ca. 94970

SURGICAL ONCOLOGY ASSOCIATES
MEDICAL CORPORATION
3232 ELM STREET
OAKLAND, CALIFORNIA 94609

SURGICAL ONCOLOGY
ROBERT J. SCHWEITZER, M.D.
JAI BALKISSOON, M.D.

HEAD AND NECK SURGERY-ONCOLOGY
LAURIE E. SCHWEITZER, M.D.

TELEPHONE (510) 547-5223
FAX (510) 547-3160

California Coastal Commission
North Central District Office
45 Fremont Street Suite 2000
San Francisco Calif. 94105

To whom it may concern.

It has been brought to my attention that the Seadrift association proposes to build a new bulkhead on all properties surrounding the lagoon utilizing a polyvinyl chloride material (PVC).

This is an unacceptable material that leaches out a known carcinogen and ~~toxin~~ into the lagoon. This carcinogen would contaminate and pollute the lagoon over subsequent years with the possible consequences of causing cancer to the residents.

There are environmentally safe alternates for the bulkhead lagoon. Therefore I urge you to vote against a bulkhead made of PVC and choose a safe material instead.

Sincerely,
Robert J. Schweitzer M.D.

P.S. I am a surgical oncologist,
Former president of the American Cancer Society (National)
Former president of the Society of Surgical Oncology
Trained at Memorial Sloan Kettering Cancer Hospital N.Y.C.

October 7, 2002

Via Facsimile

The Honorable Sara Wan, Chair
California Coastal Commission
North Central Coast District
45 Fremont Street, Suite 2000
San Francisco, CA 94105

Re: Application File No. 2-02-001

Dear Chairperson Wan and Commissioners:

On behalf of Defenders of Wildlife and our more than 100,000 members in California, I am writing to express our concern about the staff recommendation to approve the replacement of a wooden bulkhead in Seadrift Lagoon with a bulkhead composed of PVC material. Defenders of Wildlife is dedicated to preserving biodiversity primarily through habitat restoration and protection. Our California program encompasses work involving both marine and terrestrial environments.

We have reviewed the staff report recommending the use of the PVC bulkhead. Despite the research conducted by Commission staff, we continue to have serious concerns about the use of PVC material in this manner. As your staff report details, the PVC bulkhead will be placed in an area connected with the Bolinas Lagoon, which is within the Gulf of Farallones National Marine Sanctuary and an area of great importance to marine biodiversity.

It is because this area is so important for numerous bird, fish and invertebrate species that Defenders has reviewed this application and urges the Commission to take a more precautionary approach in approving this application. Indeed, as it is pointed out by Theo Colburn in his book, "Our Stolen Future," given that current regulatory practices give chemical manufacturers the benefit of the doubt, we must adopt a precautionary principle in dealing with chemicals, especially endocrine disrupting chemicals, which are at issue here. (See Attachment 1).

The portion of the staff report that most concerns our organization is the apparent dismissal of concerns raised about the fact that the PVC material contains mono- and di-methlytins, which are organotins. (See, staff report at 9-11). The staff report fails to mention that the U.S. Environmental Protection Agency Drinking Water Contaminant Candidate List continues to contain organotins on this list. The reason given by the EPA is that "organotins, including mono-and di-organotins which are used . . . in PVC . . . are of sufficient concern to warrant further investigations." 63 Federal Register 10273, 10282 (Attachment 2). To

California Office
926 J Street
Suite 522
Sacramento, CA 95814
Telephone: 916-313-5800
Fax: 916-313-5812

National Headquarters
1101 Fourteenth Street, N.W.
Suite 1400
Washington, D.C. 20005
Telephone: 202-682-9400
Fax: 202-682-1331
www.defenders.org
www.kidsplanet.org

date, the EPA has not revised this list to remove organotins. Thus, it is inappropriate for Commission staff to assume that PVC material admittedly containing organotins do not pose of potential threat to human health and wildlife.

In addition, the staff report relies upon a 1991 Maguire study (staff report at p. 10) to support the assertion that this PVC bulkhead does not pose a toxicity threat. However, there is a later Maguire study which raised concerns about leaching of organotins from PVC water systems in Canada. (See Attachment 3, citing R.J. Maguire, et al., Canadian Environmental Protection act priority substances list assessment report (1993)).

While the staff report does recommend that if new information comes to light that shows that the use of this PVC material is a threat, then the Commission will take steps to correct the problem, such a proposal is quite risky given that by the time the information comes to light, the damage to this important marine resource may have already occurred. This proposal fails to deal with the fact that if this PVC material does indeed leach sufficient quantities of organotins into the environment, the result will be the introduction of long-lasting endocrine disrupting chemicals in the food chain. Such a problem cannot be remedied by simply removing the bulkhead; the damage will already have been done and will continue to affect the marine food chain.

Thus, Defenders recommends that the Commission delay approving this application until a more complete investigation is made into the use of PVC materials as bulkheads or alters its approval of the application to require non-PVC material, such as wood, to be used as the replacement bulkhead. It is our belief that approval of this application at this time is inconsistent with Section 30230 and 30231 of the Coastal Act.

Thank you for your attention to this matter. If there are any questions, please feel free to contact me at (916) 313-5809.

Sincerely,

Kimberley Delfino
California Program Director

Our Stolen Future: Recommendations for action

[redacted]

What we recommend:

1. **A significant commitment of federal research dollars** to resolve scientific questions and determine *which of these potential risks are real and which ones are not.* Industry should be encouraged to support research on these issues, but the funds should be placed in a trust fund overseen by a governing body including appropriate representation of all major stakeholders to insulate researchers from the pressures of special interests.
2. **Improvement of existing protections.** Regulations should protect the most vulnerable members of our community, especially children, the unborn and the elderly. They should explicitly recognize that compounds interact unpredictably in the real world and they come from many sources. Enough information is already available to warrant dramatic strengthening of the constraints on use and distribution of a number of persistent organic pollutants, known as POPs, by implementing international protocols. Far more stringent testing should be required before allowing new compounds to enter into widespread commercial use. New products should be designed with the goal of reducing exposure. And there should be an accelerated research program to test compounds now in use that have escaped scrutiny.
3. **Fulfill the public's right to know.** People want to make informed decisions for themselves about these issues and right now a variety of laws and practices prevent access to crucial information.
4. **Build the capacity** in the United States to monitor contamination levels, health impacts, and the links between them. The National Center for Environmental Health at the US Centers for Disease Control is an extraordinary national resource and needs public support to ensure it can do its job.
5. **Support implementation of the precautionary principle.** Current regulatory practices give chemical manufacturers the benefit of the doubt. Substances can be removed from the

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[redacted]

market only if their health impacts can be demonstrated with scientific certainty. This burden of proof needs to be shifted. If plausible doubt can be justified about the safety of chemical compounds, their use should be allowed only if the manufacturer can prove they represent no inappropriate threat to human or ecosystem health. **This is especially important for endocrine disrupting chemicals because increasingly it appears that aspects of their modes of action make it very difficult for epidemiological science to demonstrate causality with certainty.** On the contrary, epidemiological studies of endocrine disruption in humans are biased toward finding false negatives.

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Drinking Water and Health Basics

Frequently Asked Questions

Local Drinking Water Information

Drinking Water Standards

List of Contaminants & MCLs

Regulations & Guidance

Public Drinking Water Systems

Source Water Protection

Underground Injection Control

Data & Databases

Drinking Water Academy

Safe Drinking Water Act

National Drinking Water Advisory Council

Water Infrastructure Security

Announcement of the Drinking Water Contami

Federal Register Document

Related Material

- Other Related Documents

[Federal Register: March 2, 1998 (Volume 63, Number 40)]
[Notices]
[Page 10273-10287]
From the Federal Register Online via GPO Access [wais.access.gpo.g
[DOCID:fr02mr98-137]

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Part III

Environmental Protection Agency

Announcement of the Drinking Water Contaminant Candidate List; Not

[[Page 10274]]

ENVIRONMENTAL PROTECTION AGENCY

[W-97-11; FRL-5972-5]

Announcement of the Drinking Water Contaminant Candidate List

AGENCY: U.S. Environmental Protection Agency (EPA).

ACTION: Notice.

SUMMARY: The Safe Drinking Water Act (SDWA), as amended in 1996, requires the Environmental Protection Agency (EPA) to publish a li contaminants which, at the time of publication, are not subject tc proposed or promulgated national primary drinking water regulatior (NPDWR), that are known or anticipated to occur in public water sy and which may require regulations under the SDWA [section 1412(b)(

action should be with respect to MTBE. Placing MTBE in this categc does not prevent the Agency from selecting it to make a determinat of whether or not to regulate by 2001; however, at this time, it i likely that the necessary data will be collected and evaluated in to make a determination by this date.

To facilitate data collection and evaluation efforts for MTBE, Agency-wide task force has been formed and has prepared a draft Oxygenates in Water Research Strategy. The Strategy identifies cur or soon to be started, research in areas that include environmente occurrence, source characterization, transport and transformation, exposure, toxicity, and treatment. The Strategy will also identify areas of research that are still necessary to build a stronger, mc informed scientific database to support health risk assessment anc management decisions with respect to fuel oxygenates, including MT

On October 7, 1997, EPA convened a day-long meeting of over 5C experts--including representatives from industry, academia, consultants, and other government agencies--to review a draft of t Strategy. The information produced in this workshop is being used help revise the draft of the Strategy, which will serve as a bluep to assist in coordinating efforts by various organizations, public private, in addressing the issues related to oxygenates in water. Agency will also publish the Strategy in the Federal Register this Spring, to seek additional public comment on the research prioriti identified.

J. Organotins

Four commenters argued that organotins, specifically the mono- di-organotins, the only types used as polyvinyl-chloride (PVC) hea stabilizers, should not be included on the CCL. The commenters maintained that, due to evidence of low toxicity and low migratior (thus, low risk to consumers), mono- and di-organotins, especially mono- and di-methyltins, should not be of concern to drinking wate particularly in light of the National Sanitation Foundation (NSF) certification program for plumbing materials. Other commenters indicated that it was premature for the Agency to regulate organot but thought it prudent that the Agency keep informed of the issue.

EPA Response

EPA disagrees with the commenters who suggest that organotins should be deleted from the CCL. It should be emphasized that retai organotins on the CCL does not necessarily mean that they will be regulated. The Agency believes that organotins, including mono- ar organotins which are used as heat stabilizers in PVC and chlorinat polyvinyl-chloride (CPVC) pipes, are of sufficient concern to warr further investigation. The Agency is aware of the NSF certificatic program, and has noted that many States require the use of NSF-certified material in the construction of new buildings. The Agenc agrees with the NDWAC Working Group recommendation that an assessm of the toxicological data underlying the action levels establishec the NSF needs to be made along with assessment of other available information on organotins, before these compounds can be disregarc of concern. The Agency requested this information from the NSF, ar learned that due to confidentiality agreement, NSF cannot disclose information, therefore we have not yet been able to assess the toxicological data.

There are numerous concerns about the occurrence and toxicoloc significance of various species of organotins in drinking water. A recent report indicates that unlike PVC systems, new CPVC systems the potential to contaminate drinking water with organotin compour for a longer period of time after installation (Forsyth and Jay 19

There has been a report concerning tributyltin contamination of drinking water from PVC pipes, and tributyltin is of far more toxicological significance than mono- and di-organotins (Sadiki et 1996). There is also concern about the recent reports of teratoger potential of dibutyltin (Ema et al, 1996). The Canadian Government concerned about organotin contamination of drinking water and has launched a national survey.

In view of these concerns, the Agency believes that organotins including mono- and diorganotins, should remain on the CCL until t Agency can perform its own in-depth evaluation of the occurrence a toxicological data of the contaminants of this class.

K. Perchlorate

The majority of comments on perchlorate indicated support for inclusion on the CCL. Commenters pointed out that the information the occurrence of perchlorate in drinking water supplies was suffi to raise concern over the potential impact on public health. A few commenters expressed concern that perchlorate should not be regula or that there was not sufficient information at present to warrant regulation, and that a health advisory would be more appropriate.

EPA Response

The Agency agrees with commenters that sufficient information exists to raise concern over the potential health effects and occurrence of perchlorate in drinking water supplies. Despite significant data gaps regarding health effects, occurrence, and treatment technologies, perchlorate has been found in a number of drinking water supplies at levels of health concern, and as a resu included on the final CCL.

The Agency understands that the extent of actual or even poter perchlorate contamination is unclear for many parts of the country that for some areas of the country perchlorate contamination may r an issue. However, perchlorate has been detected in a number of drinking water supplies to date and warrants further evaluation. Placement of perchlorate on the CCL means that the Agency will mak a priority to conduct further investigation and evaluation of the health effects and national occurrence of perchlorate in drinking supplies.

Perchlorate has been placed in the categories of needing addit health effects, treatment research, and occurrence information. Se toxicological and occurrence studies are planned or are underway, will assist the Agency in filling these data

[[Page 10283]]

gaps on perchlorate. At this time, the Agency has not made a determination to issue a health advisory or to regulate perchlorat The additional data obtained from these health effects and occurre studies will provide a sound scientific basis for future EPA decis of whether to regulate perchlorate or not, to prepare a health adv or guidance, or to include perchlorate in the Unregulated Contamir Monitoring rulemaking. Placing perchlorate in these categories doe preclude the Agency from selecting it to make a determination of whether or not to regulate by 2001, but at this time it is unlikel that perchlorate will be included among those for which determinat will be made by 2001.

L. Rhodamine WT

A few commenters argued that Rhodamine WT be removed from the

Tributyl tin: The Case for Virtual Elimination in Canada

World Wildlife Fund Canada

June 1999

WWF

Attachment 3

Acknowledgements

This report was prepared for WWF Canada by Dr. Richard St-Louis, Ph.D.

We would also like to thank Dr. James Maguire, Ph.D., Environment Canada (National Water Research Institute) for his assistance in reviewing this report.

The elevated concentrations of TBT measured in the liver of marine mammals from numerous regions of the world,[34] demonstrated the extent of TBT contamination in the marine environment. The high levels of butyltins recently measured in the liver of beluga whales found stranded on the shores of the St. Lawrence Estuary,[35] during the 1995-1998 period, demonstrated that marine mammals inhabiting the Canadian coastal waters are at risk of TBT contamination.

3.3 PVC plastic

Monobutyltin (MBT) and dibutyltin (DBT) are used in the plastic industry as stabilizers in PVC products. TBT is occasionally a contaminant of DBT and MBT stabilizers of TBT, and consequently might be found in leachates. In Canada, these chemicals are identified as non-pesticidal organotin compounds by the federal government.[36] The concern about their release from PVC used in industrial and municipal water systems to the aquatic environment is growing; they can be leached from the plastic by running water.[36]

3.4 Water and sewage plants

Recent data on the presence of butyltin compounds in eleven Canadian sewage treatment plants had shown that the three highest levels of contamination were measured in the liquid sludge of Winnipeg, Toronto and Hamilton.[20] TBT was present in all samples (influent, effluent and sludge) collected at the sewage treatment plants surveyed in this study. The influent ranged from 1900 to 20 600 ng Sn l^{-1} and the effluent from 700 to 14 500 ng Sn l^{-1}. These levels exceeded hundreds times the Canadian water criterion for the protection of aquatic life in freshwater ecosystems (3 ng Sn l^{-1}).However, the level of organotins in drinking water was not measured. TBT is not deliberately part of the stabilizer formulations; it is probably a contaminant resulting from the production of these formulations. In addition, the contaminztion of influents due to release of TBT from the lumber industry cannot be ruled out.

3.5 Wood preservation facilities

TBT is used as a fungicide in wood preservation. TBT leaching from treated wood is considered to be negligible if it has been applied by vacuum treatment.[17] The potential environmental risk from TBT use as a lumber preservative arises primarily from spillage of the chemical at the plant. Very few studies have been published about environmental pollution by TBT originating from timber treatment plants. However, a severe case of such pollution happened in New Zealand, in 1992: an estimated 500 to 800 L of solvent, containing approximately 40 per cent TBT, was discharged deliberately in a freshwater stream close to a timber treatment plant.[37] The immediate consequence was the death of a number of ducks in the stream. Notable contamination was evident up to seven kilometres from the discharge site. The removal of a large amount of sediment was necessary to decrease the level of sediment contamination from 44,400 ng g^{-1} down to 530 ng g^{-1} in the river bed adjacent to the plant.

To our knowledge, at the time of publication, no study was available on the contribution of the timber treatment industry to the contamination by TBT of the aquatic environment in Canada.

30. (source: *the web site of Port de Montréal, www.port-montreal.com*).

31. Stewart C. & Thompson J.A.J. (1994). Extensive butyltin contamination in Southwestern Coastal British Columbia, Canada. *Mar. Pollut. Bull.*, 28, 601-606.

32. St. Louis R., Gobeil C. & Pelletier E. (1997). Occurrence of butyltins in the deep sedimentary basin of the St. Lawrence Estuary and Saguenay Fjord, Canada. ***Presentation at the 5th International Symposium on Model Estuaries***, Rimouski, PQ, Canada.

33. de Mora S.J. (1997). The tributyl tin debate: ocean transportation versus seafood harvesting. *In: Tributyl tin: case study of an environmental contaminant.* S.J. de Mora Ed., Cambridge University Press, U.K., chap.1.

34. Tanabe S., Prudente M., Mizuno T., Hasegawa J., Iwata H. & Miyazaki N. (1998) Butyltin contamination in marine mammals from North Pacific and Asian coastal waters. *Environ. Sci. Technol.*, 32, 193-198.

35. St. Louis R., de Mora S.J., Pelletier E. & Mikaelian I. (1998) Recent butyltin contamination in beluga whales (*Delphinapterus leucas*) from the St. Lawrence Estuary. *Proceedings of the 25th Annual Aquatic Toxicity Workshop*, Québec, PQ, Canada.

36. Canadian Environmental Protection Act priority substances list assessment report - non-pesticidal organotin compounds. R.J. Maguire, G. Long, M.E. Meek and S. Savard, Department of the Environment, Commercial Chemicals Evaluation Branch, Ottawa, Ont. K1A 0H3, Canada, 32+ pp., ISBN 0-662-20719-X (1993).

37. de Mora S.J. & Phillips D.R. (1997). Tributyl tin (TBT) pollution in riverine sediments following a spill from a timber treatment facility in Henderson, New Zealand. *Environ. Technol.*, vol. 18, 1187-1193.

38. Forsyth D.S. & Cléroux C. (1991) Determination of butyltin, methyltin and tetraalkyltin in marine food products with gas chromatography-atomic absorption spectrometry. *Talanta*, 38, 951-957.

39. Forsyth D.S. & Jay B. (1997) Organotin leachates in drinking water from chlorinated poly(vinyl chloride) (CPVC) pipe. *Appl. Organometal. Chem.*, 11, 551-558.

40. Forsyth D.S., Weber D. & Dalglish K. (1992) Survey of butyltin, cyclohexyltin, and phenyltin compounds in Canadian wines. *J. AOAC Inter.*, 75, 964- 973.

41. Forsyth D.S., Weber D. & Cléroux C. (1992) Determination of butyltin, cyclohexyltin, and phenyltin compounds in beers and wines. *Food Add. Contam.*, 9, 161-169.

42. Forsyth D.S., Weber D. & Barlow L. (1992) The determination of organotin compounds in fruit juices using gas chromatography-atomic absorption spectrometry. *Appl. Organometal. Chem.*, 6, 579-585.

October 5, 2002

California Coastal Commission
North Central District Office
Attn: Sarah Borchelt
45 Fremont Street, Suite 2000
San Francisco, Ca. 94105-2219

Re: File No. 2-02-001, October 10, 2002 Item Th-8b, Seadrift Lagoon Bulkhead

Dear Commissioners:

The above referenced application was discussed at our regular meetings of September 7, 2002, and October 5,2002. We already supplied staff with a copy of our Minutes of the September 7 meeting. Please add these comments from our October 5 meeting to the record on this application.

Eight months ago five Seadrift property owners requested exemption from County Title Permit and Design Review to repair their bulkheads. Without notice to the SBVA, County Community Development granted the exemptions. Now the 5 owners are before the Coastal Commission for permit hearings in Eureka on October 10, which will set a precedent for the repair of the remaining 173 bulkheads (approximately 12,000 linear feet or approximately 180,000 feet of PVC sheeting material). A permit application is being prepared for submission for the 173 bulkheads in January, 2003.

Environmental issues and health concerns were raised as to the safety of PVC. Dioxin, a known human carcinogen, endocrine disruptor and one of the most dangerous toxins in our environment today is created in the manufacture, use and disposal of PVC. Of specific concern to the proposed use in the Lagoon, is the degradation of PVC on install, as it ages and as it is subjected to sun exposure, creating potential loss of material and leaching. Stabilizers such as lead, cadmium and organotins can potentially leach and enter the food chain.

The Seadrift Association hired an independent consultant for an opinion on the safety of PVC. The concern was raised that the scope of work given is not adequate for Seadrifters to make an informed decision regarding alternative products available.

Several alternatives to PVC were named: greenheart wood, steel, concrete, pre-stressed concrete, combinations of these with fiberglass piers, as well as cleaner plastics made with polyethylene versus polyvinyl chloride and even small rip-rap.

It was also noted that because of its adverse environmental health impacts, many progressive governments, corporations and medical and health institutions have already forth a Resolution calling for the phase out and eventual end of PVC and dioxins in our environment and medical facilities.

The SBVA does not believe enough is known about the total impact of this project to the environment and human health. Further investigation is sorely needed, particularly in light of the fact the Seadrift Lagoon feeds in and out of the already environmentally challenged Bolinas Lagoon and which will be significantly impacted by anything done in the inner Lagoon.

Additionally, further study is needed to identify the best bulkhead material, construction and engineering to use should the Seadrift Lagoon be opened to tidal flushing. The Coastal Commission in its September 30, 2002, letter to Tim Haddad, Marin County Community Development, stated (at page 4) regarding the Bolinas Lagoon Ecosystem Restoration Project, that: "The option to opening Seadrift Lagoon to tidal flushing should be revisited as a viable alternative considering there is evidence in the recent Watershed Study that concludes that the development of Seadrift is responsible for alterations in the natural hydrology of the lagoon." The commission should anticipate this possibility and not approve a bulkhead which cannot be proven to withstand tidal flushing of the Seadrift Lagoon. The Seadrift property owners and the marine environment should be subjected, only once, to the expense of bulkhead replacement designed to do the job.

The Village Association urges the Coastal Commission to deny the 5 permits before you and return jurisdiction to the Marin County Planning and Development, that it may ascertain the full environmental impact of the total scope of the 178 proposed bulkheads. That it may investigate the harm or safety of PVC, measure alternatives that may be safer and channel the project through all the appropriate governing and permitting agencies; that they may be made aware of the larger scope and ramifications of this project.

Respectfully submitted,

Roger Hurt

Roger Hurt, Co-coordinator Stinson Beach Village Association

Cc: Seadrift Property Owner's Association, P.O. Box 128, Stinson Beach, Ca. 94970-00128; Stinson Beach County Water District, Box 245, Stinson Beach, Ca. 94970; and the Honorable Steve Kinsey, Supervisor, 4th District, 3501 Civic Center Drive, Room 225, San Rafael, Ca. 94903

October 2-2002

California Coastal Commission

Dear Commissioners,

I am aware that you have a hearing on October 10th, as to whether you will grant permission for putting PVC sheet piling as a bulkhead in Seadrift Lagoon. I oppose using this toxic material in the Lagoon and create a possible health hazard.

I have been involved in a marine environment, shipping and ship management, for over 50 years, and of this time, over 30 years in executive positions, and also as a consultant in harbor projects, with Port Authorities in New Westminster, B.C., Tacoma, Portland, Oregon, Oakland and Long Beach, CA. We never contemplated to use PVC or any harmful substances into wharfs, piers or stringers. We used reinforced concrete in all the projects. In Coos Bay, Oregon wood was used. I urge the Commissioners to consider the proven health hazards of PVC and deny a permit to use PVC at Seadrift. I will not allow a toxic material to be used for a Bulkhead near our house in Seadrift

Sincerely

Nils Ingemann
P.O.Box 264, Stinson Beach, CA. 94970

Dear Commissioners,

We are opposed to Polyvinyl chloride (PVC), in the Seadrift Lagoon.

In an attempt to determine what effect the introduction of roughly 180,000 ft. of Polyvinyl Chloride, (PVC), would have on an ecosystem as unique & sensitive as ours,(at Seadrift), we have searched, albeit in vain, for *some* sort of test results (of similar applications) which would provide us some insight as to the safety of ShoreGuard. We have not come across ANY information, printed or otherwise, which indicates that there has *ever* been ANY test performed on the Sediment, or the Water, or Micro/Macro Organisms, or Fish, or Birds, or Seals, or Leopard Shark, or Stingrays, or any other indigenous animal,(including Humans), or mammal or plantlife or Marine Vegetation, which has been exposed to the ShoreGuard material in a Marine Habitat; - A Marine Habitat which receives water *from* an environmentally sensitive habitat, (The Bolinas Lagoon) and flows water INTO the same Environmentally Sensitive Habitat. Therefore, one MUST take into consideration the utter lack of information as to HOW any of these species, some of which are *already* Endangered, are going to be affected. One CANNOT assume that "lack of information" equates with "lack of effect." When Materials Intl. was approached on this subject, their Representative responded that he was: "not aware of any research", and furthermore suggested that there was "no need to test"(water or sediment) for leachates, because- "It Doesn't Leach." - ?

I respectfully urge the Commission to refrain from approving this, or any PVC product until more is *known* about its potential to significantly effect, adversely, the already precariously balanced ecosystem which exists in the area where it is to be installed.

Sincerely,

Kyra Ingemansson

Eileen and John Donahoe
10 Palmer Lane
Portola Valley, CA 94028

Phone: 650-851-9263
FAX: 650-851-2797
E-MAIL:
DONAHOE6@DNAI.COM

October 1, 2002

To Whom It May Concern:

We are homeowners at #141 Seadrift.

We are totally AGAINST the proposed plan to require homeowners to replace the existing bulkhead on our property with a vinyl alternative. Our concerns are environmental and aesthetic. The vinyl is **toxic** and **ugly**. It will **damage the value of our property**, as well as ruin the natural beauty of the lagoon.

We would be willing to make any changes necessary to secure the lagoon environment that are both environmentally and aesthetically sound. We are aware of an alternative wood material that is consistent with the aesthetics of the area and is environmentally friendly. We would support use of such a material.

We are disheartened that a decision of such significance to the lagoon would be made without considering the aesthetic and environmental impact. Homeowners at Seadrift lagoon place great value on the environmental health and natural beauty of our properties. We would like to know how a decision about such an important feature of our property was made in total disregard of our concerns.

Very truly,

Eileen and John Donahoe

RECEIVED
OCT 07 2002
CALIFORNIA
COASTAL COMMISSION

21 Sept. 2002

California Coastal Commission
Attn. Ms. Sara Borchelt

Dear Commissioners,

As a resident in Stinson Beach and homeowner at 102 Seadrift Road, I want to object to the plan for the ~~installation~~ of the PVC bulkhead wall surrounding the lagoon. This material is known to be carcinogenic with dioxin a by-product in it that is cancer inducing. Many doctors oppose any use of this product, especially in such a huge amount. Children as well as adults do not not need any more exposure to cancer causing agents. Please do not use this product and find other safer product to use for this bulkhead.

Yours Truly,
Nancy J. McCarthy

102 Seadrift Rd
Stinson Beach, Ca 94970
ph. 415-868-0471

MARTIN TERPLAN. M.D., F.A.C.P.
490 POST STREET
SAN FRANCISCO 94102
362-6398

September 26, 2002

Coastal Commission

I understand you are assessing the environmental impact of using PVP as a bulkhead. I have no independent information about the possible ill effects on marine life, a subject as important to consider as the effects on human life. Hoping you will learn and wishing you every success,
I remain,

Yours truly,

Martin Terplan, M.D.

MT:lt

7-2-02

Memo

July 2, 2002

To: Board of Directors,
Seadrift Association
Stinson Beach, Ca

From: Richard Strauss
Kathleen H. Strauss
85 Dipsea Rd.

Re: Proposed replacement of Seadrift Lagoon Bulkhead

Dear Members,

Over the past month we have had conversations and attended meetings with various people both in favor and against the proposed replacement of the bulkhead. I am prompted to write this letter because of information I have discovered since the original proposed letter was sent out to the members and funding for an initial study was approved. For the following reason I now believe the Board should stop any specific design work until alternatives are reviewed.

After receiving the Raab letter dated May 6, 2002 I had a telephone conversation with Dick Kamieniecki expressing some concerns and was invited to attend a meeting to discuss the issues with Noble Engineering. The following is a brief summary of concerns and issues:

1. **Location of sheet pile**—No longer in front of existing bulkhead because it is considered a taking of wetlands, therefore bulkhead should be replaced or repaired in same location (lengthy permit process if it were to go in front). Therefore rather than adding deck material we would now be required to cut back our decks with increased cost for removal and repair, and additional cost of existing bulkhead removal and disposal.
2. **Repair of individual docks and decks**—The coordination of each individual deck needs to be addressed. What if one homeowner or multiple homeowners do not prepare for the sheet pile driver to come through? Perhaps it should be done on individual basis contracted directly with the homeowner?
3. **Horizontal/vertical alignment of wall**—It is generally agreed that an engineering solution can be found for some variable between neighboring decks.
4. **Is it the right material**:--PVC (plastic) as proposed has a terribly long shelf life, placing this in an environmentally sensitive area is questionable. In addition, the manufacturing of this material is detrimental to the environment. I would like a solution that is environmentally correct and therefore, alternatives need to be addressed. They might include wood, steel, or concrete.

5. **Environmental issues**—Tests need to be conducted on the existing bulkhead to determine the toxicity and if removed, what dump it can go to. Removal of deteriorated wood and replacement with wood or concrete post and planking (wood or concrete) may be a viable alternative. With proper guidelines this may be done on an individual basis with each homeowner contracting directly with a contractor.
6. **Shifting sand**—With the removal of the existing bulkhead will each lot have to be shored to prevent sand sluffing out and settlement of the house? Some older homes may not have deepened footings or grade beams. This need to be studied on an individual home by home basis to avoid any settlement and potential law suits.
7. **Schedule, timing and cost**-- Building a new bulkhead in the same location is more difficult since coordination of decks and bulkhead must be cut back to allow for the pile driving. To coordinate ~178 homeowners will have to be carefully thought out. Some owners will want to do this themselves, others will want to hire their own contractor to cut back and repair or replace decks once the new wall is in place. A cost benefit analysis for various materials should also be considered prior to approving final decision.

Materials	Environmental Issues	Life Expectancy	Cost Detail	Cost Amounts
PVC (plastic)	Not good—see attached		60' wide lot removal of deck removal of bulkhd dump old wood replace/repair deck repair fence	$14,000.00 ? ? ? ? ?
Wood	Preservatives may be banned—see attached			
Concrete	OK			
Steel	OK			
Wood/Conc.	?/OK			

Based on what we have learned to date we could proceed as follows:

1. Notify Homeowners that alternatives are being reviewed not only material but other issues identified herewith.
2. Determine a solution and guidelines so an individual lot owner or group can have the work completed. The Association/design review board would assist but not contract for the work. The design review board or independent consulting engineer would review the bulkhead prior to replacement and after completion, to assure work completed is in the best interest for a healthy lagoon and the Association.

3. Our thoughts on the material rated 1-3 (3 being best)

Material	Environ.	Cost	Schedule	Life	Total
PVC	1	1	1	3	6
Wood	2	3	3	1	9
Steel	3	1	1	3	8
Concrete	3	1	2	3	9
Conc./Wood	2	2	2	2	8

The above represents my thoughts and I would be happy to discuss, correct, and continue to find the right solution, knowing that we must proceed in a timely fashion.

Respectfully submitted,

Richard Strauss
Work: (415) 362-3144
Home: (415) 459-0859

Attachments: Sketches of possible alternatives, 1 page
Information on PVC (plastic), 1 page
Information on wood preservatives, 3 pages

Seadrift Association
P.O. Box 128
Stinson Beach, CA 94970-0128

August 9,2002

I am Bill Harkness. I am a long time supporter of Seadrift activities and plans concerning the residents of Seadrift. My home is at 191 Seadrift Road.

The points of my concern are:

°Set back area

°It is not right to put any bulkhead on my easement, or to eliminate access to the water

°There should be at least three alternatives to the proposal for the owners to select

°The rustic charm of the wood bulkhead would be lost by the use of Polyvynl Cloride (PVC)

°The water easement would be protected with a wooden bulkhead in front of the old bulkhead

°I am opposed to any changes to the bulkhead structure and existing private property improvements

Yours truly,

Eileen and John Donahoe
10 Palmer Lane
Portola Valley, CA 94028

Phone: 650-851-9263
FAX: 650-851-2797
E-MAIL:
DONAHOE6@DNAI.COM

June 10, 2002

To Whom It May Concern:

We are homeowners at #141 Seadrift.

We are totally AGAINST the proposed plan to require homeowners to replace the existing bulkhead on our property with a vinyl alternative.

We would be willing to make any changes necessary that would secure the lagoon environment. Our concerns are **environmental and aesthetic**.

Please advise us as to what we can do to prevent this proposed change.

Very truly,

Eileen and John Donahoe

P.S.
We are very disheartened about the mailing we received supporting the proposed vinyl changes – which made it sound as though such changes were environmentally sound and required!

6-11-02

WARREN GLASS
INSURANCE AGENCY

WOLFBACK RIDGE
Sausalito, Ca. 94965
Phone (415) 332-2210
Fax (415) 331-8548

June 11,02

Dick Kamienicki, Mgr
Seadrift Homerowners Assoc.

Re: Lagoon Bulkhead
Replacement

Dear Dick,

I understand there are more meetings scheduled regarding new lagoon bulkhead, and I won't be able to attend as they're usually on Saturdays when I go out of town.

Therefore, I'm writing this to be hand carried to a meeting to reiterate my first suggestion to you that it be made out of concrete and steel -- that's a tried and true material: plastic is not. POssibly current wooden bulkhead could be part of a form for it.

After all. huge bridge tower foundations and seawalls have been poured under water for years and survived. It should be entirely feasible and long lasting for our project.

Yours

Ida Lou Glass

83 Dipsea

TO: THE CALIFORNIA COASTAL COMMISSION

WE, THE UNDERSIGNED, SAY NO ON POLYVINYL CHLORIDE, PVC, IN THE SEADRIFT LAGOON.

AND YES ON USING AN ENVIRONMENTALLY SAFE ALTERNATIVE.

NAME	ADDRESS	SIGNATURE	DATE
Kelly Drohan	15 North Ave 1B SR		10/6/02
Christoph S Bal	30 North Ave #1-B SR		10/6/02
Justin Graham	3690 Mosswood dr.		10/6/02
Anna Boccia	300 Gateway Dr #244 Pacifica		10.6.02
DAVID LEWIS	300 GATEWAY DR. #244 PACIFICA, CA		10/6/02
SARAH SCHAUER	1638 VIRGINIA DRIVE	REDWOOD CITY	10/6/02
David K Brown	15 Woodcreek Ct, San Mateo		10/06/02
WILLIAM FINK	2615 Marshfield Rd Vallejo		10/6/02
RICK PETERS	1816 BAHIA ST. S.M	94403	
Maria Mora	1106 Rumblewood way S. Mateo	94403	10/6/02

TO: THE CALIFORNIA COASTAL COMMISSION

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NAME	ADDRESS	SIGNATURE	DATE
Myron Warren	241 Samantha Dr Windsor CA	Myron Warren	10/6/02
Lanna Warren	241 Samantha Dr Windsor CA	Lanna Warren	10/06/02
Greg Greenway	7 Creekwood Ct Clovis CA	Greg Greenway	10/6/02

TO: THE CALIFORNIA COASTAL COMMISSION

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NAME	ADDRESS	SIGNATURE	DATE
Susan Vickery	4520 Shoreline Hwy, SB,		Sept 13, 2002
DR Clark Jr.	51 MARIN WAY BOLINAS		"
SAM MYERS, MD	1611 BAKER ST SAN FRANCISCO	CA	9/13/02
Mike DiPalo	3215 Hwy 1	Mike DiPalo	S.B. CA 94970

TO: THE CALIFORNIA COASTAL COMMISSION

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NAME	ADDRESS	SIGNATURE	DATE
Jennifer Ice	4043 Louis Krohn Dr.		9/23/02
Linda Candelaria	209 Downey St		9/23/02
Sean McAlister	56 mooring RD		9/23/02
NICK MASAROCH	1500 Lucas Valley RD		
ABRAHAM MASAROCH	"		
GREG KEELER	905 SUNNYBANK LN NOVATO		9/23/02
CHARLES LEE	257 S TEMELEC CIR SONOMA CA.	Charles E Lee	
Craig H Corwin	2042 Center Rd Novato, Ca. 94947		9-24-02
GREG WYRSCH	4 SANTIAGO CT NOVATO		9/24/02
ADAM ANDERSON	830 WILMAR AVE. NOVATO. CA. 94947		9/24/02

TO: THE CALIFORNIA COASTAL COMMISSION

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(PRINT) NAME	(RESIDENT) ADDRESS	(SIGN) SIGNATURE	DATE
ELIZABETH PHILCOX	150 RIDGEWAY AVE, FAIRFAX (CA 94930	E. Philcox	9/14/02
Sydney W. Philcox	150 Ridgeway Ave Fairfax		9/14/02
Edda Pecaut	285 Cascade Dr. Fairfax		
Louis Hawthorne	531 Midway Way Mill Valley, CA 94941	Louis Hawthorne	9/25/02
Heidi Ryerson	3455 Shoreline Hwy Stinson Beach	Heidi Ryerson	9/28/02
Patty Peterson	PO BOX 628 NAPA CA 94559		
Kristi Johansson	6690 Lincoln St. Bloomfield		9/28/02
Angelique Samantha Waller	P.O. Box 204 Stinson Beach 94970		09/29/02
EM Simpson	PO Box 801 Bolinas 94224	EM Simpson	9/29/02

TO: THE CALIFORNIA COASTAL COMMISSION

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NAME	ADDRESS	SIGNATURE	DATE 10/5/02
Teresa Foxworthy	PO Box 151633 SF 94915	Teresa Foxworthy	
Steve Locke	1956-15th St SF 94114	Steve Locke	10/5/02
Cathi Goth.	Diasto 7 Wynau/CH	Cathi Goth	10/5/02
Phil Steiner, Zelgstr. 62; 8134 Adliswil; Switzerland			
Lola Lopez	1250 Cleveland Ave #112	SD CA 92103	10/5/02
Tom Hubbard	368 Bush #28		102502
Staci Walker	25520 Foggy Glen Dr Castro Valley	Staci Walker	10/5/02
Richard A Lee	1411 Morning Glory, Petaluma 949-4		
Helen Diages	"	"	"
	2381 33rd Ave SF	James Gurlick	10/5/02

TO: THE CALIFORNIA COASTAL COMMISSION

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NAME	ADDRESS	SIGNATURE	DATE
Irene Gabbouchi	Fremont		10-5-02
Irene Yablonski	SIMI VALLEY		
ENID STEVENS	S.B		10-5-02
JESSE VANDERLIFF	CHICO		10/5/02
Ashley Allen			10/5/02
Lyndsay Watkins	Novato		10/5/02
Don Fain	Novato		10/5/02
Marcus Rossi	Novato		10/5/02
JOHN ZISSIMOS	SACRAMENTO		10/5/02
Pam Harbidge	San Francisco		10/5/02

TO: THE CALIFORNIA COASTAL COMMISSION

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AND YES ON USING AN ENVIRONMENTALLY SAFE ALTERNATIVE.

NAME	ADDRESS	SIGNATURE	DATE
Danielle Rodoni	365 Valparaiso Ave		9/29/02
AL Rodoni	P.O. Box 598 Pt. Reyes		9/24
Staci Burns	265 Monte Vista Ave Healdsburg CA 95448		10/4/02
Lance Burns	" "		10/4/02
Laura Zosa	2080 Thornberry Rd Sonoma 95476		10/4/02
Marcia Hamlin	5220 12th Ave	Seattle WA 98105	
Tara Bernstein	"		" 10/5/02
J. Bernstein	Telegraph Pl	SF, CA.	
Marjorie Cheaton	143 Victoria Street		SF CA 94131
J. Jablonski	510 Sonoma Way		C Sinitallet CA

TO: THE CALIFORNIA COASTAL COMMISSION

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AND YES ON USING AN ENVIRONMENTALLY SAFE ALTERNATIVE.

NAME	ADDRESS	SIGNATURE	DATE
John J. Liparini	81630 LAF APT 2 Gtatt	John Liparini	10/1/02
Angela Bennett	3496 San Sonita S.R. 95403	Angela Bennett	10/1/02
Donna Kerr	1026 Santa Cruz Hwy Rohnert Park 95428	Donna Kerr	10/1/02
Hope R. Robichaud	465 Stony Pt Rd #153 SANTA ROSA, CA 95401		10-1-02
Kayla Meredith	2389 mcbride Ln #13 santa Rosa Ca 95403	Kayla Meredith	10-1-02
RICHARD I. HUNTER	1308 LOMBARDI LN. SANTA ROSA, CA 95407		
JANE JONES	504 Millbrae Ave. S.R., Calif. 95407	Janie Jones	
STORMIE GILLAM	826 Tupper Ave Santa Rosa Ca		10-01-02.
Dana Molles	7590 Adrian Dr RP CA 94928		10-1-02
JEREMIAH MCNAMARA	5625 DEMPSEY PL. SANTA ROSA CA. 95401		10-1-02

To: Board of Directors,
Seadrift Association
Stinson Beach, CA

June 17, 2002

PETITION

The undersigned Seadrift Lagoon lot owners are opposed to the replacement of the Lagoon bulkhead as outlined in the recent Memorandum of the Association. We understand from inquiries made with government agencies, contractors, etc. that as long as the bulkheads are repaired (not replaced) by the individual owners on the land-ward side of the existing bulkheads – without demolition of present structures – owners have the right to proceed with this work without any special permit. In order to achieve uniformity of appearance of all bulkheads and to avoid possible complaints by neighbors or government agencies, it is important we abide by the Guidelines of the Architectural Committee (Drawings D & E) using EPA approved, pressure-treated wood.

We request, therefore, that the Association rescind the mandatory Assessments regarding the bulkhead construction, as outlined in the recent Memorandum.

Property Owner	Seadrift Rd. Lot#	Dipsea Rd. Lot#	Signature
H B SKINNER	289 Seadrift		
Henry Raab	30		
Catherine Raab	30		Catherine Raab

fax 1-415-255-7152

To: Board of Directors,
Seadrift Association
Stinson Beach, CA

June 17, 2002

PETITION

The undersigned Seadrift Lagoon lot owners are opposed to the replacement of the Lagoon bulkhead as outlined in the recent Memorandum of the Association. We understand from inquiries made with government agencies, contractors, etc. that as long as the bulkheads are repaired (not replaced) by the individual owners on the land-ward side of the existing bulkheads – without demolition of present structures – owners have the right to proceed with this work without any special permit. In order to achieve uniformity of appearance of all bulkheads and to avoid possible complaints by neighbors or government agencies, it is important we abide by the Guidelines of the Architectural Committee (Drawings D & E) using EPA approved, pressure-treated wood.

We request, therefore, that the Association rescind the mandatory Assessments regarding the bulkhead construction, as outlined in the recent Memorandum.

Property Owner	Seadrift Rd. Lot#	Dipsea Rd. Lot#	Signature
Longwell	247		

Jun 18 02

To: Board of Directors,
Seadrift Association
Stinson Beach, CA

June 17, 2002

PETITION

The undersigned Seadrift Lagoon lot owners are opposed to the replacement of the Lagoon bulkhead as outlined in the recent Memorandum of the Association. We understand from inquiries made with government agencies, contractors, etc. that as long as the bulkheads are repaired (not replaced) by the individual owners on the land-ward side of the existing bulkheads – without demolition of present structures – owners have the right to proceed with this work without any special permit. In order to achieve uniformity of appearance of all bulkheads and to avoid possible complaints by neighbors or government agencies, it is important we abide by the Guidelines of the Architectural Committee (Drawings D & E) using EPA approved, pressure-treated wood.

We request, therefore, that the Association rescind the mandatory Assessments regarding the bulkhead construction, as outlined in the recent Memorandum.

Property Owner	Seadrift Rd. Lot#	Dipsea Rd. Lot#	Signature
James E. & Jean L. Palmer		Parcel # 195-070-05 109 Dipsea Rd	
Herb Nadai	221 & 223	–	
~~Bruce & Susan Bull~~	#183		~~Susan Bull~~
Lola Bush Lantz	195-070-22 23		Lola Bush Lantz

FAX to 255-7152

To: Board of Directors,
Seadrift Association
Stinson Beach, CA

June 17, 2002

PETITION

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We request, therefore, that the Association rescind the mandatory Assessments regarding the bulkhead construction, as outlined in the recent Memorandum.

Property Owner	Seadrift Rd. Lot#	Dipsea Rd. Lot#	Signature
TERPLAN	219		M. Ten
Although we will almost surely replace the bulkhead in concert with the Assoc. plan, we also want to support an individual property owners who wishes to perform the work independently (so long as it meets general guidelines). In part, we support individual solutions since, we believe, a minority of property owners already have bulkheads that conform and don't require work or assessments			
	Thanks		
			Martin

To: Board of Directors,
Seadrift Association
Stinson Beach, CA

June 17, 2002

PETITION

The undersigned Seadrift Lagoon lot owners are opposed to the replacement of the Lagoon bulkhead as outlined in the recent Memorandum of the Association. We understand from inquiries made with government agencies, contractors, etc. that as long as the bulkheads are repaired (not replaced) by the individual owners on the land-ward side of the existing bulkheads – without demolition of present structures – owners have the right to proceed with this work without any special permit. In order to achieve uniformity of appearance of all bulkheads and to avoid possible complaints by neighbors or government agencies, it is important we abide by the Guidelines of the Architectural Committee (Drawings D & E) using EPA approved, pressure-treated wood.

We request, therefore, that the Association rescind the mandatory Assessments regarding the bulkhead construction, as outlined in the recent Memorandum.

Property Owner	Seadrift Rd. Lot#	Dipsea Rd. Lot#	Signature
191 Seadrift Road	7		Stanley E. Hartshorn

To: Board of Directors,
Seadrift Association
Stinson Beach, CA

June 17, 2002

PETITION

The undersigned Seadrift Lagoon lot owners are opposed to the replacement of the Lagoon bulkhead as outlined in the recent Memorandum of the Association. We understand from inquiries made with government agencies, contractors, etc. that as long as the bulkheads are repaired (not replaced) by the individual owners on the land-ward side of the existing bulkheads – without demolition of present structures – owners have the right to proceed with this work without any special permit. In order to achieve uniformity of appearance of all bulkheads and to avoid possible complaints by neighbors or government agencies, it is important we abide by the Guidelines of the Architectural Committee (Drawings D & E) using EPA approved, pressure-treated wood.

We request, therefore, that the Association rescind the mandatory Assessments regarding the bulkhead construction, as outlined in the recent Memorandum.

Property Owner	Seadrift Rd. Lot#	Dipsea Rd. Lot#	Signature
Karen Rogers	157		Karen Rogers
Gail Rogers	157		Gail Rogers

RECEIVED
OCT 07 2002
CALIFORNIA
COASTAL COMMISSION

To: Board of Directors,
Seadrift Association
Stinson Beach, CA

June 17, 2002

PETITION

The undersigned Seadrift Lagoon lot owners are opposed to the replacement of the Lagoon bulkhead as outlined in the recent Memorandum of the Association. We understand from inquiries made with government agencies, contractors, etc. that as long as the bulkheads are repaired (not replaced) by the individual owners on the land-ward side of the existing bulkheads – without demolition of present structures – owners have the right to proceed with this work without any special permit. In order to achieve uniformity of appearance of all bulkheads and to avoid possible complaints by neighbors or government agencies, it is important we abide by the Guidelines of the Architectural Committee (Drawings D & E) using EPA approved, pressure-treated wood.

We request, therefore, that the Association rescind the mandatory Assessments regarding the bulkhead construction, as outlined in the recent Memorandum.

Property Owner	Seadrift Rd. Lot#	Dipsea Rd. Lot#	Signature
George T. Hasler	77		George T. Hasler
Joanna T. Hasler	77		Joanna T. Hasler

To: Board of Directors,
Seadrift Association
Stinson Beach, CA

June 17, 2002

PETITION

The undersigned Seadrift Lagoon lot owners are opposed to the replacement of the Lagoon bulkhead as outlined in the recent Memorandum of the Association. We understand from inquiries made with government agencies, contractors, etc. that as long as the bulkheads are repaired (not replaced) by the individual owners on the land-ward side of the existing bulkheads – without demolition of present structures – owners have the right to proceed with this work without any special permit. In order to achieve uniformity of appearance of all bulkheads and to avoid possible complaints by neighbors or government agencies, it is important we abide by the Guidelines of the Architectural Committee (Drawings D & E) using EPA approved, pressure-treated wood.

We request, therefore, that the Association rescind the mandatory Assessments regarding the bulkhead construction, as outlined in the recent Memorandum.

Property Owner	Seadrift Rd. Lot#	Dipsea Rd. ~~Lot#~~ LOT 110	Signature
BARBARA HUNT		#125	Barbara Hunt

To: Board of Directors,
Seadrift Association
Stinson Beach, CA

June 17, 2002

PETITION

The undersigned Seadrift Lagoon lot owners are opposed to the replacement of the Lagoon bulkhead as outlined in the recent Memorandum of the Association. We understand from inquiries made with government agencies, contractors, etc. that as long as the bulkheads are repaired (not replaced) by the individual owners on the land-ward side of the existing bulkheads – without demolition of present structures – owners have the right to proceed with this work without any special permit. In order to achieve uniformity of appearance of all bulkheads and to avoid possible complaints by neighbors or government agencies, it is important we abide by the Guidelines of the Architectural Committee (Drawings D & E) using EPA approved, pressure-treated wood.

We request, therefore, that the Association rescind the mandatory Assessments regarding the bulkhead construction, as outlined in the recent Memorandum.

Property Owner	Seadrift Rd. Lot#	Dipsea Rd. Lot#	Signature
Ida Lou Glass		83	Ida Lou Glass

To: Board of Directors,
Seadrift Association
Stinson Beach, CA

June 17, 2002

PETITION

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We request, therefore, that the Association rescind the mandatory Assessments regarding the bulkhead construction, as outlined in the recent Memorandum.

Property Owner	Seadrift Rd. Lot#	Dipsea Rd. Lot#	Signature
Ivan J Madrigal		91	Ivan J Madrigal

To: Board of Directors,
Seadrift Association
Stinson Beach, CA

June 17, 2002

PETITION

The undersigned Seadrift Lagoon lot owners are opposed to the replacement of the Lagoon bulkhead as outlined in the recent Memorandum of the Association. We understand from inquiries made with government agencies, contractors, etc. that as long as the bulkheads are repaired (not replaced) by the individual owners on the land-ward side of the existing bulkheads – without demolition of present structures – owners have the right to proceed with this work without any special permit. In order to achieve uniformity of appearance of all bulkheads and to avoid possible complaints by neighbors or government agencies, it is important we abide by the Guidelines of the Architectural Committee (Drawings D & E) using EPA approved, pressure-treated wood.

We request, therefore, that the Association rescind the mandatory Assessments regarding the bulkhead construction, as outlined in the recent Memorandum.

Property Owner	Seadrift Rd. Lot#	Dipsea Rd. Lot#	Signature
SHARon CALL		L-149	Sharon Call

To: Board of Directors,
Seadrift Association
Stinson Beach, CA

June 17, 2002

PETITION

The undersigned Seadrift Lagoon lot owners are opposed to the replacement of the Lagoon bulkhead as outlined in the recent Memorandum of the Association. We understand from inquiries made with government agencies, contractors, etc. that as long as the bulkheads are repaired (not replaced) by the individual owners on the land-ward side of the existing bulkheads – without demolition of present structures – owners have the right to proceed with this work without any special permit. In order to achieve uniformity of appearance of all bulkheads and to avoid possible complaints by neighbors or government agencies, it is important we abide by the Guidelines of the Architectural Committee (Drawings D & E) using EPA approved, pressure-treated wood. (or concrete) N.S.

We request, therefore, that the Association rescind the mandatory Assessments regarding the bulkhead construction, as outlined in the recent Memorandum.

Property Owner	Seadrift Rd. Lot#	Dipsea Rd. Lot#	Signature
Nils Ingemanson		155	Nils Ingemanson

To: Board of Directors,
Seadrift Association
Stinson Beach, CA

June 17, 2002

PETITION

The undersigned Seadrift Lagoon lot owners are opposed to the replacement of the Lagoon bulkhead as outlined in the recent Memorandum of the Association. We understand from inquiries made with government agencies, contractors, etc. that as long as the bulkheads are repaired (not replaced) by the individual owners on the land-ward side of the existing bulkheads – without demolition of present structures – owners have the right to proceed with this work without any special permit. In order to achieve uniformity of appearance of all bulkheads and to avoid possible complaints by neighbors or government agencies, it is important we abide by the Guidelines of the Architectural Committee (Drawings D & E) using EPA approved, pressure-treated wood.

We request, therefore, that the Association rescind the mandatory Assessments regarding the bulkhead construction, as outlined in the recent Memorandum.

Property Owner	Seadrift Rd. Lot#	Dipsea Rd. ~~Lot#~~	Signature
WILLIAM GOODMAN		ADDRESS 183 DIPSEA	WM Good
		LOT #189	

To: Board of Directors,
Seadrift Association
Stinson Beach, CA

June 17, 2002

PETITION

The undersigned Seadrift Lagoon lot owners are opposed to the replacement of the Lagoon bulkhead as outlined in the recent Memorandum of the Association. We understand from inquiries made with government agencies, contractors, etc. that as long as the bulkheads are repaired (not replaced) by the individual owners on the land-ward side of the existing bulkheads – without demolition of present structures – owners have the right to proceed with this work without any special permit. In order to achieve uniformity of appearance of all bulkheads and to avoid possible complaints by neighbors or government agencies, it is important we abide by the Guidelines of the Architectural Committee (Drawings D & E) using EPA approved, pressure-treated wood.

We request, therefore, that the Association rescind the mandatory Assessments regarding the bulkhead construction, as outlined in the recent Memorandum.

Property Owner	Seadrift Rd. Lot#	Dipsea Rd. Lot#	Signature
MR & MRS RC JANSON		605 Dipsea	RC Janson

To: Board of Directors,
Seadrift Association
Stinson Beach, CA

June 17, 2002

PETITION

The undersigned Seadrift Lagoon lot owners are opposed to the replacement of the Lagoon bulkhead as outlined in the recent Memorandum of the Association. We understand from inquiries made with government agencies, contractors, etc. that as long as the bulkheads are repaired (not replaced) by the individual owners on the land-ward side of the existing bulkheads – without demolition of present structures – owners have the right to proceed with this work without any special permit. In order to achieve uniformity of appearance of all bulkheads and to avoid possible complaints by neighbors or government agencies, it is important we abide by the Guidelines of the Architectural Committee (Drawings D & E) using EPA approved, pressure-treated wood.

We request, therefore, that the Association rescind the mandatory Assessments regarding the bulkhead construction, as outlined in the recent Memorandum.

Property Owner	Seadrift Rd. Lot#	Dipsea Rd. Lot#	Signature
ALICE P. THOMAS		# 202	Alice P. Thomas

TO: Sarah Borchelt and the Ladies and Gentlemen of the California Coastal Commission
FROM: Sharon Call, Resident Owner of 103 Dipsea Road, Stinson Beach, Ca. 94970
DATE: September 24, 2002
RE: Polyvinyl Chloride (PVC) aka Vinyl – Proposed bulkhead material - Applicant Metz, Permit Number 2-02-1

I respectfully ask you to consider the following information regarding PVC as a bulkhead in our salt water, man-made lagoon:

Recycled: The subject product, ShoreGuard, is 95% recycled PVC encased by 5% virgin PVC, according to their literature and representatives. "The entire source of the recycled materials is very rarely known," according to Andy Vare, Tap Plastics. Materials International (MI) state their recycled material is from siding, pipe and window frames.

Resins from the original use will remain in the recycled product as " it can never be 100% clean." [1] Heavy metal stabilizers such as lead, cadmium and organotins are used in the above mentioned applications. The recycled product is really "down-cycled"; only 2% in the U.S. is recycled. [2] The result is a low quality PVC [3] that must then be encased in 5% virgin PVC, stabilized by organotins in the case of ShoreGuard.

Organotins: are endocrine disruptors and found to interfere with immune system cell activity. The specific organotins identified in the ShoreGuard product are dimethyltin and monomethyltin, "used in rigid PVC drinking water pipe (similar compound to ShoreGuard)." [4] Renal and urinary bladder changes occurred in a dietary study in rats using monomethyltin and dimethyltin.[5] And in another study with rats using methyltin (monomethyltin trichloride); "Acquisition and extinction learning ability were impaired in the pups compared to controls. [6] EPA considered additional toxicology studies necessary for methyl- and dimethyltin. [7]

In six workers exposed to dimethyltin for 90 minutes over 3 days, one died, one remained hospitalized and only 3 were able to return to work. [8] The EPA Office of Water has also expressed interest in potential reproductive and developmental effects. ...the methyltins appear to have a great potential to cause neurotoxicity....[9]

UV Degrade: All plastic will UV degrade. [10] [11] [12] PVC does not age well and is brittle in nature. I could find no tests that this product will not flake, break down or fracture upon pounding impact of install or a boat ramming it; nor how sand abrasion, salt and tidal motion will affect it. Loss of material upon install is a great concern.

Leaching: " Stabilizers are not chemically bound to the PVC polymer chains....tend to clump and migrate when the polymer is heated, or in surface areas subject to weathering and stress. For this reason, we expect the stabilizer to accumulate on the surface in normal use, especially if the product is exposed to heat, stress, or light, particularly direct sunlight." Smith (1996) cites leaching from new PVC pipe."

Thank you for your time and considered effort in this matter. I respectfully urge you to decide on the precautionary side of safety. The ramifications of using PVC are enormous.

Sharon Call

References

Environmental Impacts of Polyvinyl Chloride (PVC) Building Materials, Joe Thornton, Ph.D
http://www.healthybuilding.net/PVC/ThorntonPVCComplete.html

Endocrine Disruptors, Goettlich rev. 17 Mar 2002 Endocrine disruptors are man-made synthetic chemicals...(addresses **bioaccumulation**, measure EDs in **Parts Per Trillion,** Health Effects, etc.) http://www.mindfully.org/Pesticide/EDs-PWG-16jun01.htm.

Our Stolen Future, Colborn, Theo, Dumanoski, Dianne, Myers, John P. Myers 1996

[1]"**We would never recommend a vinyl building product of any kind**. From our perspective, vinyl is the worst plastic for the environment, and virtually any plastic alternative would be a superior choice." Walsh, Bill. National Coordinator, Healthy Building Network, Washington, D.C., (202)232-4108, bill@healthybuilding.net

"We have never encountered a so-called recycled PVC product that contains 100% post-consumer PVC, which is itself recyclable. **Most so-called recycled PVC products still contain virgin resin, still require toxic additives unique** to **PVC** and not other plastics, and typically cannot be recycled again." Walsh, Bill. National Coordinator, Healthy Building Network, Washington, D.C., (202)232-4108, bill@healthybuilding.net

"Coatings, films and construction parts with adherent PVC glues can never be cleanly separated from PVC." Eggink 1997 **Recycled** material **may contain toxic materials** that would not be present in the virgin product, van der Naald & Thorpe 1998

[2] [3] SRI International 1993, Pohle 1997, Rogner 1995

[1] [2] [3] **"Recycling vinyl still leaves the material susceptible to leaching of additives in use** .....Because of the problems throughout the life cycle of vinyl products, the Healthy Building Network **cannot endorse a vinyl product** regardless of its claimed recycled content." Lent, Tom – Healthy Building Network, Berkeley, Ca. 94702 tom@healthybuilding.netwww.healthybuilding.net.

[4] Memo from Kantola, Polyone to Sarah Borchelt, California Coastal Commission, dated September 17, 2002, regarding stabilizers used in Shoreguard .

Organotin Toxicity, New article, July 2000: Organotin compounds found to interfere with immune system cell activity. (five other cites relating to toxic effects of organotins). http://www.turnertoys.com/organotin_toxicity.htm.

[5] [6] [7] [8] [9] Noda, Tsutomu, *Maternal and Fetal Toxicity of Dimethyltin in Rats.* The maternal and fetal toxicity of dimethyltin chloride . Journal of Health Science, 47(6)544-551 (2001

Sadiki, A.-I., and D. T. Williams. A study on organotin levels in Canadian waters distributed through PVC Pipes. Chemosphere 38, 1541-1548 (1999)

Rey, C. H., H. J. Reinecke, and R. Besser. Methyltin intoxication in six men: Toxicologic and clinical aspects. Vet. Hum. Toxicol. 26, 121-122(1984)

Norland, E. A., D. H. Taylor, and R. J. Bull. Monomethyltin and trimethyltin compounds induce learning deficiencies in young rats. *Neurobehav. Toxicol. Teratol.* 4, 539-544 (1992)

[10] [11] [12] Andrady 1995, Summers 1997, Wolf & Kaul 1992, Matthews, 1996, Scott, 1999 *

[13] **Metals would be expected to leach**, Reith 1996, Carroll et. al. 1992 ....and out of water pipes, Koh et.al., 1991, Moller et. al. 1996.*

*These cites taken from Chlorine and the Environment Stinger, Ruth and Johnston, Paul, Kluwer Academic Publishers: Dordrecht/Boston/London

"Despite industry claims to the contrary, **metal stabilizers do leach out**, since they do not bind to the polymer until the polymer chain undergoes local dehydrochlorination degradation." Ed Loewenton, www.turnertoys.com

"Organotins are toxicologically problematic and it is quite possible that these could be released over time; they are, after all, not bonded to the polymer." Joe Thornton, Ph.D.

"Sweden is phasing out the use of organotins, including in PVC. The Swedes have been especially **concerned with the organotins in the food chain**, where I think it **bioaccumulates**." Mark Rossi, Plastics Specialist, markrossi@attbi.com.

California Coastal Commission
45 Fremont Street, Suite 2000
San Francisco,CA 94105-2219

May 22,2002

The Seadrift Association (P.O. Box 128,Stinson Beach, CA 94970-0128) proposes replacement of the existing wood bulkhead around the Seadrift Lagoon with rigid polyvinal (P.V.C.) plastic. The proposal is now in the permit process.

The removal of the existing creosote-laden wooden timbers may require disposal in a hazardous waste disposal site. Removal may also contaminate the water of the lagoon. We have been advised that rigid polyvinal (P.V.C.) plastic will collect algae which must be pressure cleaned with detergent. This may polute the lagoon. In addition, the sedimentation in the lagoon may contain residue of copper sulfate. This contaminated water in turn flows into the Bolinas Lagoon. We must maintain an ecologicaly safe environment for the birds and harbor seals who use Bolinas Lagoon as their home.

We are opposed to this ecological disaster. We recommend that no permits be issued to proceed with this project. We would like to be informed of any public hearing scheduled regarding permit applications.

Yours truly,

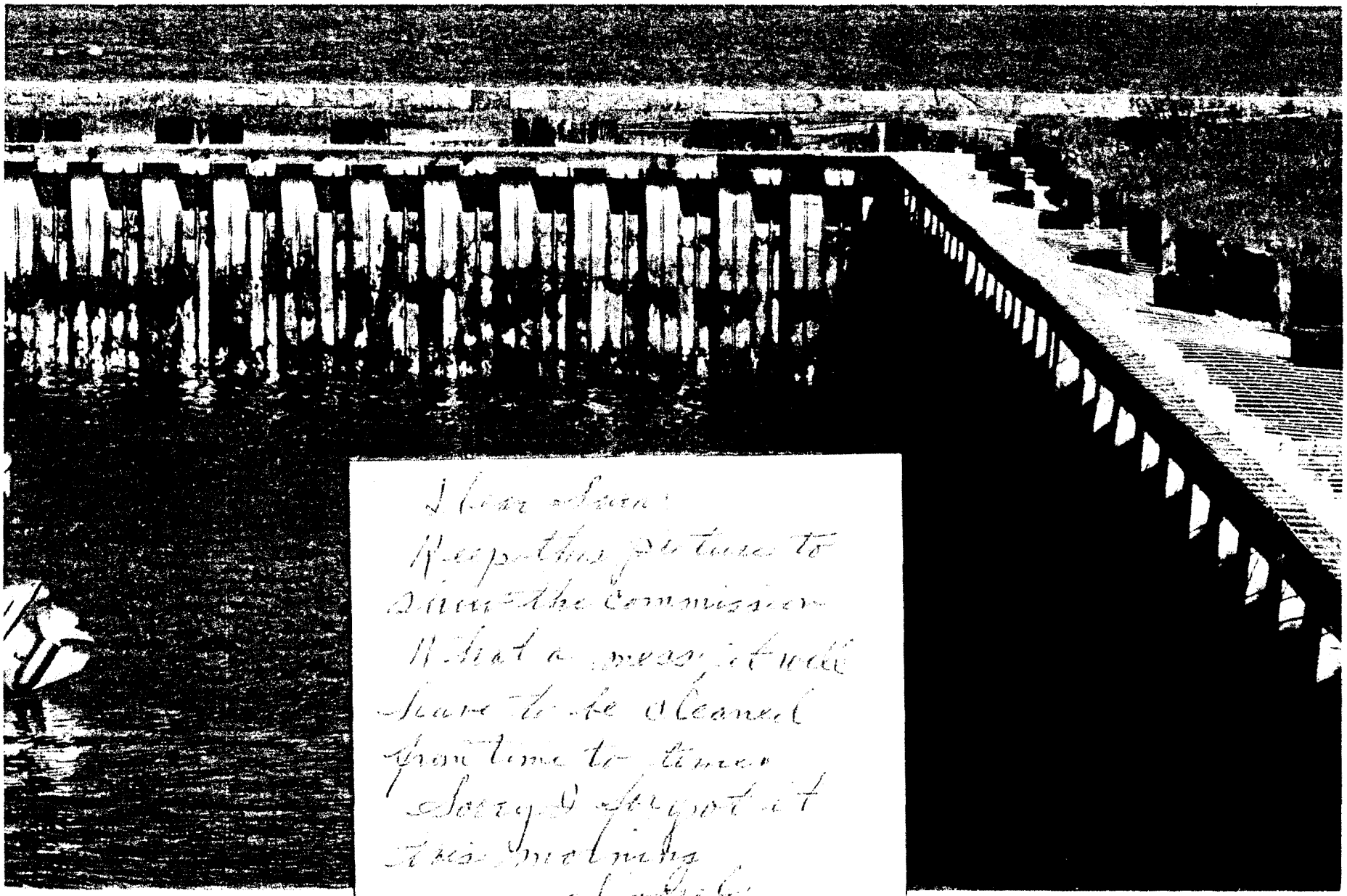
Henry Raab

Henry Raab

54 San Jacinto Way

San Francisco,CA 94127-2033

(415) 664-3366



Dear Mom:
Keep this picture to
show the Commission
that a person should
have to be cleaned
from time to time.
Sorry I forgot it
Love you lots
Sincerely
Catherine

MARIN HILLS MEDICAL GROUP, INC.
711 D Street, Suite 102
San Rafael, CA 94901-3703

(415) 457-7414
Fax (415) 460-2750

PETER A. BARRY, M.D.
Orthopaedic Surgery
Diplomate American
Board of Orthopaedic Surgeons

JANICE D. BARRY, M.D.
General Practice
American Academy of
Family Physicians

7/26/02

Architecture Committee
Seadrift Association
P.O. Box 128
Stinson Beach, California

Dear Committee members:

Dick Kamieniecki suggested I write you concerning my views on the proposal to replace bulkheads with polyvinyl chloride as I have a strong interest in the subject. I often swim in the lagoon as do many others.

While I agree that the bulkheads should be replaced, I am worried about the safety of the proposal. Poly vinyl chloride is a polymer that it to say many exactly similar molecules linked to form in this case a plastic. The idea is similar to nylon. You can make a material using this chemistry which can be very useful.

Unfortunately the creation of polyvinyl chloride from vinyl chloride is very dangerous. It is extremely unecologic and the monomer vinyl chloride is the subject of many lawsuits. Its production is associated with dioxin. In this respect it is like asbestos, silicone used for implants, MTBE used as an oxidant in gasoline, lead in paints and other substances. Indeed the first site you see if you use Yahoo and type vinyl chloride is site by an attorney soliciting clients to sue over the effects of vinyl chloride.

Typically the pvc has other substances in it to stabilize it. One of these is the class of chemicals phthalates. These are derived from naphthalic acid (naphthalene mothballs). They are known carcinogens causing angiosarcomas and interfere at very low levels with reproduction and development especially in the young.

As the salt water in the lagoon causes degradation in the pvc, the phthalates, and other substances such as heavy metals may leach out and be concentrated in the lagoon water.

MARIN HILLS MEDICAL GROUP, INC.
711 D Street, Suite 102
San Rafael, CA 94901-3703

PETER A. BARRY, M.D.
Orthopaedic Surgery
Diplomate American
Board of Orthopaedic Surgeons

(415) 457-7414
Fax (415) 460-2750

JANICE D. BARRY, M.D.
General Practice
American Academy of
Family Physicians

Any money saved by putting in pvc instead of more traditional material such as wood or concrete might be lost defending lawsuits. The science need not be specific as the Erin Brockovich story demonstrates.
I hope the committee with allow me to present further information in the future before acting without due caution to recommend using this material.

Sincerely yours

Peter Barry M.D.

July 4, 2002

Coastal Commission
45 Fremont Street
San Francisco, Ca.
94105

Gentlemen and Ladies:

I am writing this as I leave for a 12 day vacation, so I cannot follow through or do more than this until July 16, 2002.

I wish to express my total opposition to using vinyl as the product for the bulkheads at Seadrift Subdivision, Stinson Beach, Ca. I will pursue this upon my return, but wanted this registered before action is taken.

I believe we should be fully informed as to why this kind of product is even being considered.

Thank you for your consideration in this matter.

Sincerely yours.

Sharon Call
103 Dipsea Road
Stinson Beach, Ca. 94970

415-868-0695

ALICE PALMER THOMAS
ATTORNEY AT LAW
BOX 365, KENTFIELD, CA 94904
Tel/Fax (415) 461-4344

July 5, 2002

Ms. Sara Borchelt
California Costal Commission
45 Fremont Street, Suite 320
San Francisco, California 94105

Re: Bulkhead Proposed at SeaDrift Lagoon, Stinson Beach, California

Dear Ms. Borchelt:

This letter is to express my concern about the SeaDrift Board proposed bulkhead to be replacing the existing wooden bulkhead.

I find the replacement using the proposed materials not only unsightly, expensive, but more seriously, ecologically detrimental to the environment If replacement is deemed necessary, there are far less damaging materials that are supportive of the numerous unique species that reside in this lagoon. This includes the salt water inhabitants as well as the dwindling bird life.

I welcome your inspection of the area surrounding my bulkhead, located at 209 Dipsea, at any time convenient for you, and your Commission. Please contact me at the above telephone number so that I can answer any questions that you, or your committee might have.

Thank you for your consideration of this request.

Very truly yours,

Alice Palmer Thomas

Alice Palmer Thomas

APT:os
file

8/2/02

RECEIVED
AUG 22 2002
CALIFORNIA COASTAL COMMISSION

To whom it may concern

Please actively investigate environmentally safer alternatives to Seadrift's proposed PVC bulkhead. offer those only - The PVC ~~c~~ dioxin should not be an option — Don't permit their monetary resources to prevail using The PVC

Very concerned Citizen of Stinson Beach - Millbourne Finlay

July 16 - 2002

California Coastal Commission
Attn. Ms. Sara Borchett.
45, Freemont Street # 320
San Francisco, CA. 94105

RECEIVED
JUL 17 2002
CALIFORNIA COASTAL COMMISSION

Dear Members,

Re: Bulkheads, Seadrift Lagoon, Stinson Beach.

I am a Home owner at the Seadrift subdivision, Stinson Beach, and I have reason to believe that the Board of Directors intend to file for a permit to replace the wooden Bulkheads with a PVC type Bulkhead around the whole Lagoon. The Bulkheads are on private property.

I am opposed to the PVC Bulkhead proposal, as it contains toxic material, which may contaminate the Lagoon. Furthermore, the Architectural Guidelines for the Seadrift, declares that all Bulkheads shall be made of wood. Therefore, I urge the Commission not to approve the PVC Bulkheads, as requested, with a blanked approval.

Sincerely yours,

Nils Ingemansson
P.O. Box 264
Stinson Beach, CA. 94970

22 Aug 02

To Whom It May Concern!

Please vote any contract allowing PVC as a bulkhead material for the Seadrift lagoon.. So much pollution in our area already.. i.e. radioactive waste off our coast.. Our Bolivar lagoon

Sincerely:

Thank you for your time!

Denise Carlson
P.O. Box 1107
Stinson Beach Ca
94970

August, 2002

Dear Sirs.

Would you please consider the "Environmentally Sound alternatives" for the Seadrift Lagoon bulkhead.

Thank you.

Martha M. Jones

DEAR SIRS—

It's come to my attention that th
SEDDRICT ASSOCIATION IN Stinson Beach
is planning to replace the bulkhead
in the inner lagoon with PVC a
dangerons, DIOXIN leaching plastic that
will be sure to be a mistake.
I have been swimming there for
24 years and would like to
continue — Please Help —

Thankyou,
Michael Knowlton

P.O. Box 981
STINSON BEACH, CA
94970
415.868.0362

Barbara Lee
POB 534
Stinson Beach, CA 94970

RECEIVED
AUG 2 3 2002
CALIFORNIA
COASTAL COMMISSION

California Coastal Commission
45 Fremont St., Suite 2000
San Francisco, CA 94105

Dear California Coastal Commission,

Please do not allow the use of PVC for the bulkhead in the Seadrift inner lagoon in Stinson Beach.

There are many other suitable alternatives.

PVC is a horrible product that creates poison in the production process and may even off gas poison as it begins to break down over time in use.

Sincerely,

Barbara Lee

Howard Schechter, Ph.D.
POB 454
Stinson Beach, CA 94970

California Coastal Commission
45 Fremont St., Suite 2000
San Francisco, CA 94105

Dear Seadrift Association,

Please do not allow the use of PVC for the bulkhead in the Seadrift inner lagoon in Stinson Beach.

There are many other suitable alternatives.

PVC is a horrible product that creates poison in the production process and may even off gas poison as it begins to break down over time in use.

Sincerely,

Howard Schechter

I am writing to ask for a bulkhead that is safe for the Seadrift Lagoon. Please consider an alternative that won't poison our water for good.

Many Thanks,

Sophia

TO: THE CALIFORNIA COASTAL COMMISSION

WE, THE UNDERSIGNED, SAY NO ON POLYVINYL CHLORIDE, PVC, IN THE SEADRIFT LAGOON.

AND YES ON USING AN ENVIRONMENTALLY SAFE ALTERNATIVE.

NAME	ADDRESS	SIGNATURE	DATE
Laura Kloeppel	906 Clovelly Way Oceanside, CA 92057		8/30/02
Heidi Hoeppel	17 Tall Oak Ct. Flagstaff, AZ 86001		8/30/02
EDITH BRYSON	768 9TH Ave. #18 S.F. CA. 94118		8/31/0
COACH DAVE LICH	131 Buena Vista Stinson Beach		8/31/0
Kimberly Scott	3 English Ct. Novato CA 94947		
	768 9th AVE SF CA 94118		
Jessica Rider	1980 Rose St. #1, Berkeley CA 94709		
[illegible] artist	2683 Shasta Rd, Berkeley 947[illegible]		
Alycia Montag	17[illegible] Nordahl Ave Richmond CA 948[illegible]		
[illegible]	#2 Alameda Point	Stinson Beach	

Samuel J. Roland 160 Nevada Ave Palo Alto, CA 94301 8/30/62

TO: THE CALIFORNIA COASTAL COMMISSION

WE, THE UNDERSIGNED, SAY NO ON POLYVINYL CHLORIDE, PVC, IN THE SEADRIFT LAGOON.

AND YES ON USING AN ENVIRONMENTALLY SAFE ALTERNATIVE.

NAME	ADDRESS	SIGNATURE	DATE
Lilah Toland	P.O. 725 STINSON BCH	Lilah Toland	8/30/02
Natalia Beperal	640 Brooklyn Ave #1 Oakland, CA 94606	NataliaBeperal	8/30/02
Mabel Morales	2632 N. Sycamore St. Arlington. VA 22207		8/30/02
Nikki Drummond	P.O Box 143 Stinson Beach, 94970		8/30/02
Norma Fogelberg	2980 Vallejo St SF CA 94123	Fogelberg	8/30/02
Bill Shay	3472 Shoreline		8-30-02
X Dan Compton	180 Altamira Sedona AZ	Dan Compton	8/30/0
Ben Scott	240 Grand #24 Oakland CA 94610		30-Aug-02
SOFIA NUNES	30 Buena Vista Stinson Beach		30/Aug/

over

TO: THE CALIFORNIA COASTAL COMMISSION

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AND YES ON USING AN ENVIRONMENTALLY SAFE ALTERNATIVE.

NAME	ADDRESS	SIGNATURE	DATE
SAM GILL		S. Gill	
SEAN MAHER	13 SUNVIEW AVE SAN ANSELMO		
Diane Wara	240 Seadrift	Diane Wara	
Sandy Briggs	3369 Clay St. San Francisco, CA 94118		8/31/02
Sharon Minken	Box 665 Bolinas		
Paul B. Pachtly Sr.	P.O. Box #1265 Pinole Ca. 94564		
Rob Regan	870 Sunnyview Dr. Pinole CA 94564		8/31/02
Dara Pratt	908 Bel Marin Keys Blvd, Novato CA. 94949		
Dave Menashe	2595 Washington St SF	94115	
Etta Tanenbaum	2595 Wash. St. SF		

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NAME	ADDRESS	SIGNATURE	DATE
Neil + Karyn Smith	60th St Oakland 94618 CA		8/31/02
GENE CLASON	831 COLCOCO DR. SAN JOSE 95128		8/31/02
[illegible]	3 Micon Tree. 94941 MV.		8/31/02
Erin dell	PO BOX 1083 BOLINAS		8/31/02
[illegible]	5 Meadow ct 94941 Millvalley		8/31/02
[illegible]	98 Mittletal Lane, Novato, CA		8/31/02
[illegible]	1018 Shattuck Ave Berkeley 94707 CA		8/31/02
[illegible]	1107 Fountain St Alameda		8/31/02
Robert Lundgaine	1107 Fountain St Alameda 94501		8/31/02
S. Soyfe	Woodside CA		8.31.02

TO: THE CALIFORNIA COASTAL COMMISSION

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NAME	ADDRESS	SIGNATURE	DATE
Julie Larose	385 CEDAR	Julie LaRose	9/2/2002
Randy Fallgren			
Jan Harding	25	Jan Harding	9/2/2002
Scott McCracken	465 Laughlin rd	Scott McCracken	9/2/2002
Tina Sarris	PO Box 594 (Inverness)		9/2/2002
Ellen Anne Bolinas	PO 464	Ellen Anne	9-2-02
Django Gurley	PO 375 San Geronimo	94963	789-8101
Diana Thurston	870 Las Trampas	Diane Thurston	9/2/2002
Brie Gettinger	1120 Shrader SF, CA 94117	Brie Gettinger	9/2/02
Kim Po	870 Las Trampas Rd. Lafayette CA. 94549		

TO: THE CALIFORNIA COASTAL COMMISSION

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AND YES ON USING AN ENVIRONMENTALLY SAFE ALTERNATIVE.

NAME	ADDRESS	SIGNATURE	DATE
MARIE DERN	PO 1025, Stinson Beach, CA 94970	Marie C. Dern	9/2
CARL DERN	" " " " "		9/2/02
Daisy Dern	1009 Stuart Ln. Brentwood, TN 37027	Daisy Dern	9/2/02
Krista Poston-Dern	131 Meernaa Frfx, CA 94957	Krista Poston-Dern	
Fritz Dern	131 Meernaa Ave. Fairfax CA. 94930		
Dave Gibson	1009 STUART LN, BREATWOOD, TN 37027		
Michelle Logan	POBox 597 Bolinas		9/2/02
BENJAMIN A. PFEIFFER	POBOX 1068 BOLINAS, CA 94924		9/2/02
Brenna Gubbins	P.O. BOX 472 Stinson Beach,	Brenna Gubbins	9/2/02
Susie Stuart	PO. 275 Bolinas, Ca	94924	9-3-02

TO: THE CALIFORNIA COASTAL COMMISSION

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NAME	ADDRESS	SIGNATURE	DATE
CLINT D. GRAVES	82 CALLE DEL REGEN		9/6/02
D. Ingemansson	~~STINSON BEACH~~ 253 P. Terrelles Circ. Sonoma, CA 95476		9-11-02
Tom Tiller	66 Miwok Way Mill Valley		7/13/02
	P.O. Box 481 BO		7/13/02
Steve Hodge	Po Box 558 Bo	94924	7/13/02
David J. Thiep	330 Grove Bolinas	94924	
Susan Vicketich	4520 Shoreline Hwy, SB,		Sept 13, 2002
DR Clough	51 MARIN WAY BOLINAS		"
SAM MYERS, MD	1611 BAKER ST SAN FRANCISCO	CA	9/13/02
Mike DiPalo	3215 Hwy 1	S.B. CA	94970

TO: THE CALIFORNIA COASTAL COMMISSION

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AND YES ON USING AN ENVIRONMENTALLY SAFE ALTERNATIVE.

NAME	ADDRESS	SIGNATURE	DATE
Ross Himburch	1120 Shrader St #4, SF, CA 94117		
Chris Clarke	Kentfield		
Peter Blaikie			9/10/02
Christian Leffert			9/11/02
Brian Smith	3755 Shoreline Hwy		9/10/02
Jeff Lerner	435 San Felipe Way Mountain View CA 94043		
Erik Ingemanson	250 Smith Ranch Rd. San Rafael Ca. 94903		9/12/02
Nils Ingemanson	253 S. Temelec Circle, Sonoma, CA 95476		
Geoffrey Ben	40 Crescent Ave Bo. 94924		
Peter Gumbbins	Box 472 S.B. 94970		9/13/02

P O Box 133
Stinson Beach, Ca 94970
29 August 2002

California Coastal Commission
North Central District Office
45 Fremont Street Suite 2000
San Francisco Ca, 94105

Re The Bolinas Lagoon

Dear Coastal Commission Members;

We are residents of the village of Stinson Beach therefore we have the constant opportunity to appreciate the unique and rare haven of extreme beauty: the Bolinas Lagoon.

We see the seals sunning themselves belly up on the sandbars. We *hear* and *then see* the wild ducks swoop down on this body of water during their seasonal migrations and we then enjoy them until they take flight again. We treasure the egrets and herons, which depend upon the lagoon for their nourishment. We wait for foggy August when the Brown Pelicans return and dive with great drama into the waters and then float about in great number until they too migrate. And it is unlikely that we could name all of the other birds, which we enjoy as they use the Lagoon.

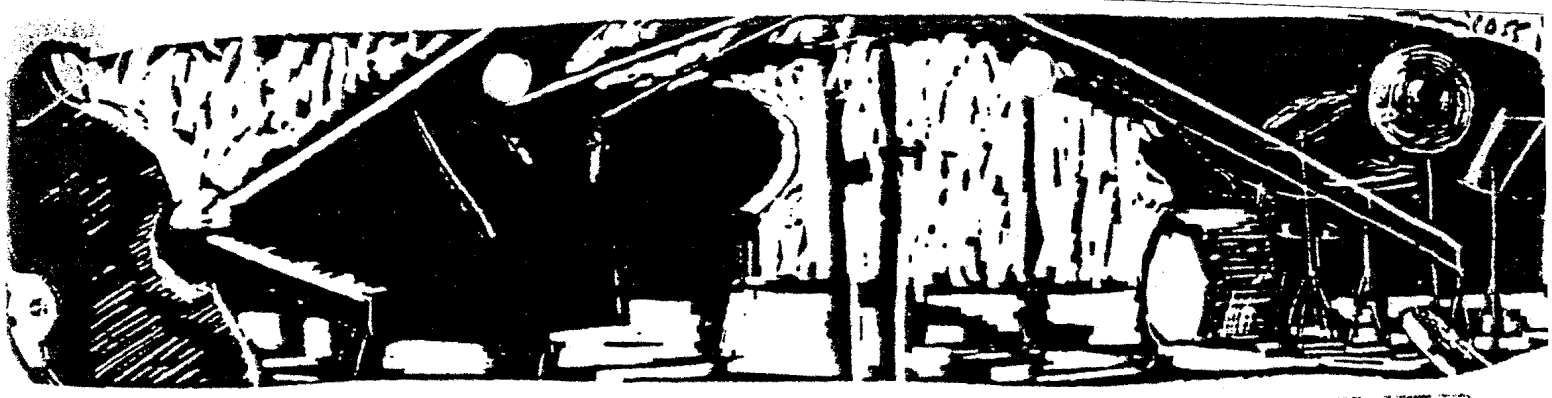
We have *just* been made aware of the fact that before your body there are permits/requests to use PVC for as a material in the inner and private Seadrift Lagoon. *This would be extremely detrimental to all of the wildlife.*

We are appalled that there is even a consideration re the use of this material as it is well known to be toxic! We can not understand why the idea would even be explored.

As responsible Members for the Coast of California, we are hoping that your allegiance will always be for the greater good and that your determination will always be in accordance. We will look forward to knowing of your vote.

Thanking you for your attention,

Sally Veauta and Garreth D. Shaw



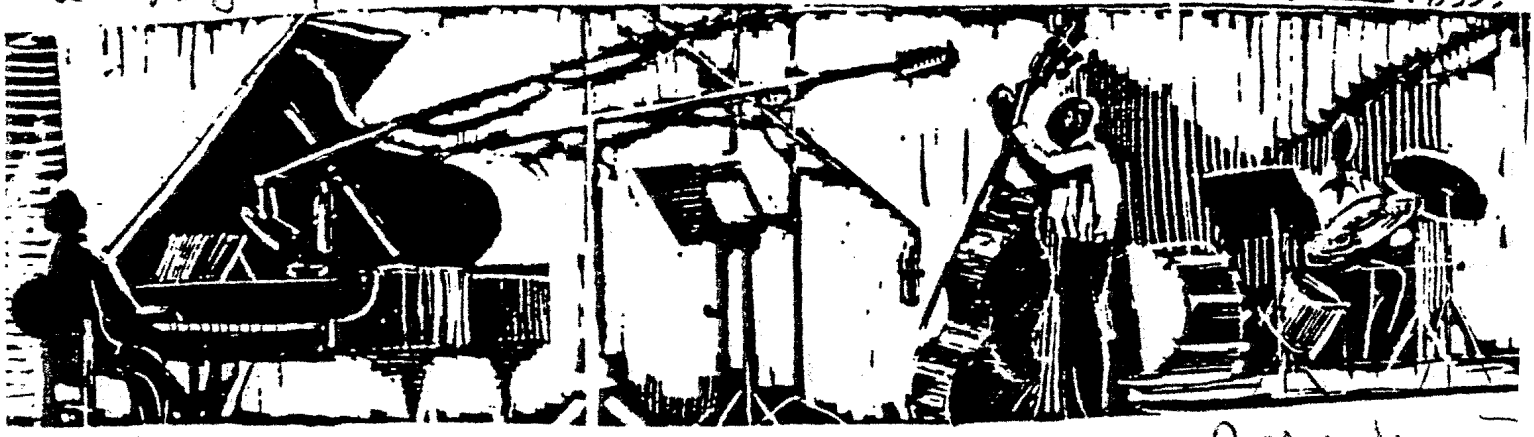
RECEIVED
SEP 0 5 2002
CALIFORNIA
COASTAL COMMISSION

CURTIS S. WOODMAN

Aug 30. 2002

Dear Coastal Commission Members:

As a long time resident of Stinson Beach and a concerned citizen, I strongly urge Jan Commission to REJECT any use of PVC for the planned bulkhead in the Stinson/Belvedere lagoon - the manufacture of PVC produces a highly toxic substance known as DIOXIN.



There are other, safer alternatives.

Regards
Curtis Woodman

RECEIVED
SEP 0 5 2002
CALIFORNIA
COASTAL COMMISSION

August 25, 2002

To Whom It May Concern:

I am writing to urge you to insist that only products that are safe for the environment be used for the bulkhead in the Seadrift Lagoon in Stinson Beach. Please consider the enormity of damage that will be caused by using a bulkhead made of polyvinyl chloride. Please do not dismiss the fact that there are safer alternatives available.

Concerned Citizen,

Angelique Samantha Weller

PLEASE DO NOT ALLOW SEADRIFT DEVELOPMENT IN STINSON ~~BEACH~~ TO USE PVC for A BULKHEAD IN THE LAGOON. A BULKHEAD THAT DOES NOT CAUSE ENVIRONMENTAL DAMAGE CAN BE USED.

Mary Turnbull
CHRIS BECKMAN
SHANTA KUMARI
10 SONOMA PATIO
STINSON BEACH
94970

August 25, 2002

To Whom It May Concern:

I am writing to urge you to insist that only products that are safe for the environment be used for the bulkhead in the Seadrift Lagoon in Stinson Beach. Please consider the enormity of damage that will be caused by using a bulkhead made of polyvinyl chloride. Please do not dismiss the fact that there are safer alternatives available.

Concerned Citizen,

ADRIAN - PETER. WELLER

A-P-W

August 21-2002

Dear Ca. Coastal Commission
Please do not approve the 5 permits before you to allow a polyvinyl chloride (PVC) bulkhead in the Seadrift-Stinson Beach inner lagoon. Dioxin is so toxic that the Bush administration has signed a treaty calling for its elimination. There are safer alternatives. You must not allow this dangerous chemical to pollute our fragile environment.
Yours truly, Lois Lancaster
resident of Stinson Beach

Suzanne Duerden
P. O. Box 434
Stinson Beach, CA 94970
September 2, 2002

California Coastal Commission
45 Fremont, Ste. 2000, SF, CA 94105

Re: PVC Lining for Seadrift Lagoon

Dear Sir/Madam:

For all of the many environmental reasons set forth in the Stinson Beach Community Alert by numerous public interest groups, including American Nurses Assn., Greenpeace, Center for Environmental Action, Kaiser Permanente, Health Care Without Harm and others, I and my family strongly OPPOSE the proposal to line the Seadrift Lagoon with a PVC vinyl wall. We encourage you to insist on a safer alternative which will not result in the creation of more dioxin (generated by PVC manufacture) and which would be distinctly less likely to threaten animal and plant life in the Bolinas Lagoon.

Please note that the Community Alert mentioned that the US Government is a signatory to the Stockholm Convention on Persistent Organic Pollutants, which calls for a global phaseout of 12 heavily toxic chemicals, one of which is dioxin.

Thank you for your important action on this issue.

Suzanne Duerden

cc: Seadrift Assn.
Box 128
Stinson Beach, CA 94970

TO: THE CALIFORNIA COASTAL COMMISSION

WE, THE UNDERSIGNED, SAY NO ON POLYVINYL CHLORIDE, PVC, IN THE SEADRIFT LAGOON.

AND YES ON USING AN ENVIRONMENTALLY SAFE ALTERNATIVE.

NAME	ADDRESS	SIGNATURE	DATE
Rob Van Bracy	POB 541 Stinson Beach	R. Van Bracy	8/30/02
	30 Buena Vista PO Box 113 Stinson Beach		8/30/02
Niki Damas	21 Calle del Embarcadero 6 stinson 94970	Niki Damas	8.30.02
JON FRANCIS	135 DIPSEA		8/30/02
	P.O. 101		8.30.02
Mary Turnbull	PO235	Mary Turnbull	8.30.02
Margie Hyde	PO 605	Margie Hyde	8-30-02
	PO Box B SBCA		8.30.02
Terry Crusy	PO Box 523		8/30/02
Kimberly Yancy	Box 983 Stinson		8/30/02

TO: THE CALIFORNIA COASTAL COMMISSION

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NAME	ADDRESS	SIGNATURE	DATE
Morton	7733 Panoramic	Morton Cliffman	8/30
Heidi Gross	175 Buena Vista. Stinson Beach CA. 94970.		8/30/02.
Betty Goodman	21 Embarkadero #3, Stinson Beach Ca 94970		8/30/02
Liz Cros	PO 311 SB CA 94970		8/30/02
Lisa Hebert	1256 Rover Rd Bolinas P.O Box 25 94970		8/30/02
Tom White	PO Box 1055 SB CA 94970		
Charlotte Irvine	268 Sunlight Rd SM 94970 N Puente del Mar	Charlotte Irvine	8/30
Collin Mullen	POBlecks	Stinson Bch CA 94970	8/30/02
Roger Hurt	PO Box 98	Stinson Beach CA 94970	8/30/0
Persis Norton	111 Dipsea Rd Stinson Beach 94970	Persis Norton	

TO: THE CALIFORNIA COASTAL COMMISSION

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AND YES ON USING AN ENVIRONMENTALLY SAFE ALTERNATIVE.

NAME	ADDRESS	SIGNATURE	DATE
Michael Baeza	375 Levy Bolinas CA		8.30.02
Gustavo Cayetano.	P.O Box 552, Bolinas Stinson Beach.		8/30/02.
Carmen Jones	23 Walden Ave. T.O. Canada	Carmen Jones	Aug 30/02.
Andrew West	23 Walden Ave, Toronto, Canada		Aug 30/02
WINIFRED APPLEBY	83 Lincoln Ave, S.B.	Winifred H. Appleby	8/30/02
ROBERT DUNDAS	1101 ADAMS ST 211 HOBOKEN NJ 07030		8/30/02.
Toni Aylette	1101 Adams St 211 as above. Hoboken NJ 07030		8/30/02
Bonnie Herman	6081 Wood Dr Oakland 94611	Bonnie Herman	8/30/02
Cristina di Grazia	P.O. 191 Bolinas, Ca 94924		8/30/02.
Christine N. Cunha	22 Avenida Cerra PO Box 161 Stinson Beach CA 94970	Christine N. Cunha	8/30/02

TO: THE CALIFORNIA COASTAL COMMISSION

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NAME	ADDRESS (Street)	SIGNATURE	DATE
MIKE GRIFFIN	POB 222 STINSON BEACH		8/30/02
ALEX BOBROFF	P.O BOX 11 116 CALLE DEL ARROYA S.B.		8/30/02
WEB OTIS	BOX 713 50 LAUREL AV. STINSON BCH		8/30/02
DAWN DIMAS	P.O. BOX 23) STINSON BEACH		8/30/02
SANDRA GROSS	P.O. BOX (8) STINSON BEACH	SLG	8/30/02
Gale Tobins Buerger	General Delivery Stinson Beach CA		8/30/02
Kurt Poellt	P.O. Box 321 Stinson Beach CA 94970		8/30/02
Larry Wall Snedden	P.O 131	SB	8/30/02
Donna Simmons	P.O. #83 80 Arnold Dr	S.B.	8/30/02
Karen Horton	PO 916 14 Dipsea	SB	8/30/02

TO: THE CALIFORNIA COASTAL COMMISSION

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NAME	ADDRESS	SIGNATURE	DATE
DALE ROUSH	BOX 584		8/30/02
SJ FORD	100 HARNISS		8/30/02
	380		8/30/02
	11 Calle del Sierra		8/30/2002
	17 Calle De Los Banderas		8/30/02
	177 Seadrift		8/30/02
Ralph Jacobson	90 Buena Vista		30 Aug '02
	PO Box 873 SB		8/30/02
Virginia Bewley	21 Calle del Prado		8/30/02
Billy Geiger	11 Ave. Olema		8/30/02

TO: THE CALIFORNIA COASTAL COMMISSION

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NAME	ADDRESS	SIGNATURE	DATE
Pam DeWeerd	365 Belvedere	P. DeWeerd	8-30-02
Bonnie Whyte	9208 San Antonio Ave Sta 94960		8/30/02
Glenda Queen	Box 322 Stinson Beach CA 94970		
Nancy McCarthy	460 Calle del Mar S.B. CA. 94970		
Sharon R. Clayton	1095 W. Calif. St-Mill Valley 94931		
Margaret Clayton	#1 Belvedere P.O. Box 404 Stinson Beach		94970
Christine V Cassell	(P.O. Box 491) 104 Buena Vista	Stinson,	94970
Barbara Bowen	6 Willow Ave.	Stinson	94970
Jan A Smith	Box 888	Stinson	
Lauri McDaniel	190 Horseshoe Hill Rd	Bolinas	

TO: THE CALIFORNIA COASTAL COMMISSION

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NAME	ADDRESS	SIGNATURE	DATE
Bettina Foster	207 Seadrift BOX 714	Bettina Foster	8-30-02
K Cookson	20 Seadrift Rd	K Cookson	8-30-02
Myra Brayman	P.O. Box 135 Myra Pt. Reyes St. 94956	Brayman	8-30-02
Marian Corbin	P.O 2113 Stinson Beach Ca. 94970		8-30-02
Greg Becker	Po.102 Stinson Beach 94970		8/30/02
Carol Hutton	3327 Shoreline Hwy. S.B	94970	8/30/02
Sally Ueltta	#11 Calle del Sierra Stinson		94970 Beach
Andrew De Marco	512 OHIO STREET	Vallejo	94590
Tara Kinton	BOX 1095 41 LINCOLN Ave	Stinson Beach CA	94970
Roslyn Terry	BOX 304 12 calle del Occidente	Stinson	94970

TO: THE CALIFORNIA COASTAL COMMISSION

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NAME	ADDRESS	SIGNATURE	DATE
James O. Foster	41 Seaview Dr. Stinson Beach, CA.	JAMES FOSTER	8-30-02
Greg Shepherd	18 Arenal Dr.		8/30/02
Bruce Gillmore	PO Box 465, Mead, CO 80542		8/30/02
Natalia Colliers	4990 Shoreline Hwy Stinson Bch, CA 94970		8/30/02
TAUNI MEADE	PO BOX 513 2 Joaquin Patch		8/30/02
Barb Freeman	12 Calle del Pinos Stinson Bch CA 94970		8/30/02
Wendy Hunt	7000 Panoramic Stinson Bch 94970		8/30/02
Clodagh Orton	55 CALLE DEL RIBERA STINSON		8/30/02
Sandy Rabusch	3488 Shoreline Stinson Beach		94970
David Rabusch	BOX 545 Stinson Beach		

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NAME	ADDRESS	SIGNATURE	DATE
MRS Charles Abercrombie	145 Calle del mar	Mrs C. G. Abercrombie	8-30-02
JEFFREY GRAHAM	190 MAPLE RD. #2E, BOLINAS, CA 94924		8/30/02
PATRICIA D. WILKERSON	#16 Calle del Rosaca	Stinson Beach	94970
Mike Lemont	#15 Calle del Onda	S.B	94972
Steven Trufre	#15 Calle del onda	SB.	94970
KATIE FOX	139 DIPSEA		30/8/02
CAROL Bennett	114 Calle del Arroyo	Carol Bennett	8/30/02
Colleen Cavin	195 Elm	Bolinas	8/30/02
Richard C. Fischer	320 ASPEN	BOLINAS	8/30/02
George Gorrell	41 Lincoln,	SB	94970 8/30/02

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NAME	ADDRESS	SIGNATURE	DATE
[illegible]	Box 711		8-30-02
[illegible]	P.O. Box 312 Stinson Beach CA 94970		8/30/02
Anne deBeers Rand	PO 428 Stinson Beach, CA 94970		8/30/02
[illegible]	120 Buena Vista PO 543 Stinson Beach CA 94970		8/
Susan Scarlopo	7745 Pancremic Hy. Box 641 Stinson Beach		8/30/02
Jamie Amyan	335 Overlook Dr, Bolinas		8/30/02
Jennifer Jarvis	P.O. Box 1009	8/30/02	8/30/02
Susan Hewitt	2682 16th Ave SF CA 94116		8/30/02
Jan deBeers	240 Buena Vista SB	94970	8/30/02
Zeke Sutton	186 Seadrift SB	94970	8/30/02

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NAME	ADDRESS	SIGNATURE	DATE
Marjory S. Craft	P.O. Box 8 119 Buena Vista	Marjory S Craft	8-30-02
Michael Jeneid	P.O. 128 calle del 1060 Arroyo	Michael Jeneid	8.30.02
Diane Drewry	195 Pioneer St. Athens, Ga. 30605		8.30.02
Gary Bisior	PO Box 385 40 Arenal	CA 94970	8/30/02
Doreen Stock	PO Box 442 Stinson Beach	CA 94970	8/30/02
Robin Ahlgren	PO BOX 612 STINSON Beach	CA 94970	8/30/02
Jan Barrington	PO BOX 696 Stinson Beach	CA 94970	8/30/02
[illegible]	Po box	Stinson Beach	94970
[illegible]	Po Box	"	"
T. Clifton	3 Marine Way PO BOX 317	SB	94970

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NAME	ADDRESS	SIGNATURE	DATE
Lone Fay	7 Olema Bolinas Rd Bolinas	Lone Fay	8/30/02
Kathryn Lughead	PO Box 683	Kathryn Lughead	8/30/02
Elmer Collett	PO Box 452	Elmer Collett	8/30/02
Hal Casteel	125 Buena Vista		8/30/02
Kerry Livingston	Box 278 Stinson Beach		8/30/02
J & M Tuttle	P.O Box 593 Stinson Beach CA		8/30/02.
Wendy DiPuccio	PO Box 482		
Lou Chapman	P.O. Box 268 S.B.		
Edward M Walsh	PO 445, SB		
Greg Shades	33296 1 Box 35		8/30/02

TO: THE CALIFORNIA COASTAL COMMISSION

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NAME	ADDRESS	SIGNATURE	DATE
Tracey Quintero	1322 46th AVE SF CA 94122		8/30
Peggy Brashear	31 EL PASEO M.V.		8/31/02
Mary Ann Cobb	100 Seadrift Rd Stinson Beach CA		8/30/02
Michael Hurley	3327 Hwy 1 SB.		8/30/02
[illegible]	409 CALLE DEL MAR S.B.		8/30/02
[illegible]	821 322 Seadrift Rd. S.B		8/30/02
Denise Mills	PO Box 224 Stinson Beach		
Ed Leslie	105 LINCOLN AVE S.B.		
Margo Gasperino	#1 Joaquin Patio		
Belinda Zell	6 Calle del Onda SB 9497		

TO: THE CALIFORNIA COASTAL COMMISSION

WE, THE UNDERSIGNED, SAY NO ON POLYVINYL CHLORIDE, PVC, IN THE SEADRIFT LAGOON.

AND YES ON USING AN ENVIRONMENTALLY SAFE ALTERNATIVE.

NAME	ADDRESS	SIGNATURE	DATE
JANE KELLER	666 GREENWICH ST. NY, NY 10014	Jane Keller	8/30/02
Andy Hess	497 12th St #4L Brooklyn, N.Y. 11215		8/31/02
John R. Washington	P.O. 554 70 Mesa Rd, Bolinas	John R. Washington	8/30/02
TIM DiPaolo	Box 492 S.B	Tim DiPaolo	8/30/02
D. Towle	230 Buena Vista	D. Towle	8/30/02
SABIN PHELPS	1 Sonoma Patio	Sabin Phelps	8/30/02
Gabriel Lory	23 Avenida Olema		8/30/02
Hongjie Sun	425 Anchor Rd #104	San Mateo 94404	8/30/02
Michael Hanley	255 Calle Del Mar	Stinson Beach	8/30/02
Scott Tyr	P.O. Box 885 149 Seadrift	Stinson Beach	8/30/02

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NAME	ADDRESS	SIGNATURE	DATE
SHARON CALL	103 DIPSEA Rd. STINSON BEACH	Sharon Call	8/30/02
Judy Stemen	210 Calle del Mar STINSON BEACH	Judy Stemen	8/30/02
Andy Thornley	1322 46th Ave 94122 San Francisco CA	AT	8/30/02
Madi London	2 Calle Del Resaca Stinson Beach	Madi London	8/30/02
HILARY C. Smith	Stinson Beach Ca.	Hilary C. Smith	8/30/02
J E Madrigal		JE MADRIGAL Stinson Beach CA.	8/30/02
Maggie Barry	111 Dipsea Rd	M Barry	8/30/02
	215 Buena Vista S.B.		8/30/02
MARTIN HERNANDEZ	& JOAQUIN PATTO		8/30/02
Wendy Crowell	35 Laurel Ave. Stinson Beach CA.	Wendy Crowell	8/30/02

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NAME	ADDRESS	SIGNATURE	DATE
John Bryant	164 Poplar Bolinas		8/30/02
Edris Cole	6 Arenal	EDRIS COLE	8/30/02
Jean Sublett	43 Ridge Rd M.V. Olema CA	Jean Sublett	8/30/02
	175 [illegible]		8-30-02
Melinda Seeman	340 Seadrift Rd.	Melinda Seeman	8/30/02
Adrian Wenner	Box 204 Stinson Beach	94970	8/30/02.
Owen Lampo	Box 475 Stinson Beach	94970	8/30/02
Michele Stanfield	Box 720 Bolinas	94924	8-31-02
Arthur Person	7220 Panoramic Hwy Box 1086 S.B. Ca.	94970	
Zoë Gardiner	#35 Purple Gate Rd Bolinas	94924	

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NAME	ADDRESS	SIGNATURE	DATE
Heidi Byer	66 Laurel	Heidi Byer	8/30/02
Luisa Garau	21 Embarcadero #7		8/30/02
	3419 State Rte 1		
	Bx 976 Stinson		8/30/02
	Box 133 Stinson		8/30/02
	P.O 272, S.B. Ca 94970		
	131 Seadrift		
	Bx 252, SB 94970		
Michael ROCK	22 Arnold Ave Stinson Beach 94970		
Michael Heckman	Box 1516 TJ San Rafael 94915		
	60 Willow STINSON Beach		
	16 Manne ways Stinson 94970		

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AND YES ON USING AN ENVIRONMENTALLY SAFE ALTERNATIVE.

NAME	ADDRESS	SIGNATURE	DATE
NORMAN D. CLAYTON	21 CALLE DEL SIERRA	Norman D Clayton	8-30-02
DO NOT USE CLAY FOR LIGHTHOUSE COVERAGE			
Robert FRIEDMAN	17 CALLE DEL ONDA	Robert Friedman	8/30/02
Jeane Powell	131 Seadrift	Jeane H. Powell	8/30/02
Kathy Zamudio	6 Joaquin Patio	Kathy Zamudio	8/30/02
Henry Raab	245 Seadrift Rd	Henry Raab	9/3/02