BLOCK ISLAND SOUTHEAST LIGHT

MERCURY LENS ALTERNATIVES

DISCUSSIONS OF ALTERNATIVES

I. Alternatives to placing the lens back in operation include the following:

1. ENERGIZE AS IS OR INSTALL VENTILATION SYSTEM: Energizing as is would violate OSHA standards and impose a health hazard to maintenance personnel as well as other occupants of the lighthouse structure. The Coast Guard would be responsible and liable for any potential mercury spills or releases. Reliability and maintenance would be extremely difficult at best since no spare parts are available and technical training on these optics is no longer taught by the Coast Guard. A ventilation system would involve design and installation of an elaborate and costly ventilation system within the lighttower to remove any mercury vapors generated by operation of the First Class mercury lens. This may resolve some of the safety issues but does not solve the difficulties of servicing and maintenance. Also adds additional equipment for ANT responsibility and maintenance. As a non-compatible optic for automation systems, a rotation detection signal would need to be developed and installed. In addition, Coast Guard is still responsible and liable for presence of mercury. Use of lens as is would violate Coast Guard standard policy and reject recommendations from the Coast Guard's Health & Safety Office.

2. REPLACEMENT - INSTALL DCB-224: The DCB-224 is already on-hand from the skeletal tower and can be easily installed in the lantern house. Removal of the First Order Lens (after removal of the mercury) can be accomplished and placed on loan to BISELF for display in their museum. This will allow a reliable, serviceable and repairable optic that CG personnel are trained to maintain. Current automation monitoring equipment is compatible with this optic. The old Lens can be placed on display for the general public to see and touch providing a great benefit for the historical appreciation of these lens. (If operated in the lighttower as the navigational aid, CG regulations prohibit the general public from viewing due to safety precautions. This denies the public the real opportunity to view and appreciate our maritime heritage associated with historical lighthouse lens.) No cost involved with purchasing new optic since DCB-224 is on hand. COE can relocated First Order Lens to Dwelling; Coast Guard personnel can perform DCB-224 installation. Follow-on maintenance costs are minimal. Maintains operational optic of 24NM.

3. CONVERT EXISTING LENS - CONVERSION OF THE LENS TO ROLLER BEARING OPERATION: This would involve removing the mercury from the existing First Order lens and converting the support pedestal to a mechanical roller bearing operation. No known conversions of this type have ever been accomplished by the Coast Guard. The time required and expense is unknown; design time would be lengthy and conversion would be costly. In addition, continued annual service and maintenance would increase significantly, availability of spare parts, reliability of operation also an unknown. Approval of SHPO would also be required since classical lenses are considered historical artifacts and conversion of the lens would permanently destroy the historicity of the lens. Placing the converted lens back in operation would deprive the public of general viewing of the lens in it's original configuration.

4. ERECT TROLLY MAST AND OPTIC OUTSIDE TOWER: This would involve placing a trolly mast and small rotating optic above the catwalk on the lantern house deck in operation as the operational optic. The First Order Lens could be placed on loan to BISELF and left in the original lantern tower (after removal of the mercury). Purchase of a new optic is required (Rotating 300MM-$5300) however, the maximum nominal range obtainable is only 14NM. The present signal is advertised as 24NM. Purchase or fabrication of a trolley mast, winch and associated equipment is also required ($4000). . The First Order Lens would be accessible to the general public within the lighthouse since it would be a static display and not in operation. The trolley mast would detract from the overall view of the lighthouse and would require increased maintenance costs due to exposure of the equipment to weather. Increase outages and more frequent service visits can be expected.

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MERCURY LENS ALTERNATIVES

QUALITATIVE ALTERNATIVE COMPARISONS

ISSUES	ALTERNATIVES			
	AS IS	REPLACE	CONVERT	ALT. OPTIC
OPERATIONAL	-	+	-	+
Nom. Range	+	+	+	-
Reliability	-	+	-	+
Service	-	+	-	+-
MAINTENANCE	-	+	-	+
Training Req.	-	+	-	+
Spare Parts	-	+	-	-
Freq. Visits	-	+	-	+
Safety	-	+	+	+
HISTORICAL SIG.	+	+	-	+
Public View	-	+	-	+
In-Use	+	-	+	-
Remain Intact Preservation	+	+	-	+

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MERCURY LENS ALTERNATIVES

QUANTITATIVE ALTERNATIVE COMPARISONS

COST DESCRIP.	ALTERNATIVES			
	AS IS	REPLACE	CONVERT	ALT. OPTIC
Design	$15K*	-	$25K	$2K
Installation Cost	$50K*	$5K	$100K	$20K
Total Init.	$65K	$5K	$125K	$25K
*ventilation system				
RECURRING COSTS				
Maint.	$10K	$.1K	$7K	$1K
x Disc Fac. @ 25yrs	11.6532	11.6532	11.6532	11.6532
Total Rec.	$116K	$1.2K	$82K	$11.6K
TOTALS	**$181K**	**$6.2K**	**$207K**	**$36.6K**

USCG USE OF MERCURY OPTIC LENS

FACT SHEET

1. Federal Regulations Concerning Mercury Equipment:

- The US Government Occupational Safety and Health Administration (OSHA) publishes guidelines for operation of equipment involving hazardous substances when servicing or maintenance by human personnel is required. The published limits for exposure to mercury under 29CFR1910.1000 are .05mg/m3 This is the maximum acceptable level that shall not be exceeded at any given time during the work day.

- Surveys by Coast Guard occupational & health inspectors and independent commercial testing laboratories have recorded mercury vapor readings at lighthouses with operational Coast Guard mercury lens in excess of the federal tolerance levels. In some instances the levels recorded were as much as five times (.25mg/m3) the allowable limit. Data supports that the actual levels fluctuate depending upon ambient temperature and humidity but that it can be anticipated that all CG mercury type lens will exceed the federal tolerance level at some point of operation.

2. Coast Guard Policy in use of Mercury Lenses:

- USCG Headquarters in Washington DC guidance is contained in COMDT M16500.8 Automation Technical Guidelines: "Classical lenses rotating in roller bearing or mercury floats should be replaced because of the maintenance problems anticipated with rotation systems having special maintenance and safety requirements."

- Health and Safety personnel from USCG Maintenance & Logistics Command recommend all mercury float lenses be removed from operation based upon the field data that has been collected over the past several years on the use of mercury lenses.

Based upon the above, all mercury float lenses have been taken out of service or are scheduled for removal. See 3 below.

3. Discontinued Coast Guard Use of Mercury Lenses:

- There are only three operational mercury float lenses left in operation Coast Guard wide. The three sites are Cape Elizabeth, Maine, Cape Flattery, Washington and Hillsboro Inlet, Florida. All lenses at these sites are scheduled for replacement within the next 9-12 months.

- Mercury lenses that were removed from lighthouses are being researched, inventoried and accounted for. Where any remaining

operationally.

5. Incidents Involving Mercury Float Lenses:

- The Coast Guard has experienced several incidents involving accidental spill/release of mercury vapors as a result of operation of mercury lenses. Three known cases are listed below. It is estimated that numerous other incidents may have occurred but were not readily available in the CEU Providence files.

1. Dry Tortugas, Fla - In January of 1987, a mercury bath lens was disturbed by a civilian contractor performing work at the lighthouse causing a spillage of mercury. The spill required intervention by the Coast Guard Atlantic Strike Team for cleanup, removal and disposal. Subsequently, the Coast Guard hired a contractor to remove the remaining mercury and converted the lens to a modern optic. Cleanup and subsequent removal of the spilled mercury cost $20K+. In addition, several liability claims were filed against the Coast Guard by the civilian contractor.

2. Hillsboro Inlet, Fla - In 1991, the Coast Guard completed a survey of Hillsboro Light in anticipation of removing the mercury float lens. Testing by Coast Guard personnel as well as independent testing services discovered that mercury had previously been spilled at the site, more than likely during maintenance or serving of the lens. According to old guidelines on the use of mercury lenses, the mercury is to be replaced or at least strained, every two years. Civil Engineering Unit Miami is currently involved in a remediation project that will clean and remove all of the old residue from the mercury spill. Anticipated costs are $50K+. Upon completion of the remediation, the mercury lens will be removed and replaced.

3. Bakers Island, Mass - In 1972, on a hot and humid day, three industrial workers performing work in the lantern tower of Bakers Island were overcome with vapor fumes and had to be evacuated from the island for medical treatment. The source of the mercury was the mercury bath lens which operated in the tower. The lens has since been removed and replaced with a modern optic.