

KSC Exterior Lighting Guidelines May 28, 2002

Sea turtle nesting season is the period of time from May 1 through October 31 of each year. Research has documented significant reduction in sea turtle nesting activity on beaches illuminated with artificial lights. Sea turtle hatchlings almost always emerge from the nest at night. Bright artificial lights disorient them, causing them to spend extended periods of time wandering landward or along the beach. Such disorientation usually results in mortality or weakening of those hatchlings that eventually do reach the sea, thereby greatly reducing their chances for survival. Adult females can also be distracted by artificial lights, discouraging them from nesting. In addition, adult females trying to return to the surf after a nesting event may become disoriented and have difficulty making it back to the ocean.

In order to minimize the effect of artificial light at KSC on threatened and endangered sea turtles, the following exterior lighting guidelines have been developed. The guidelines should be followed when planning new exterior lighting projects or modifications/relamping of existing light fixtures. Variation from these guidelines will require the approval of the NASA Environmental Program Office and will be evaluated on a case-by-case basis. Physical locations of light sources include, in order of potential impact (with A being the greatest impact):

- **AREA A** - Launch Pads 39A and 39B, KSC Conference Center (KCC), North Guard Shack (Eagle Four Tower), and miscellaneous structures and areas east of Beach Road.
- **AREA B** - LC-39 Area, VAB/LCC/OSB area, Shuttle Landing Facility (SLF) area, and Contractors' Road area.
- **AREA C** - Industrial Area, KARS Parks, Visitors Complex, and westernmost areas of KSC.

These guidelines will be updated as required to meet changing conditions or regulations.

GENERAL GUIDELINES APPLICABLE TO AREAS A AND B:

1. Lights with wavelengths from 585 - 590 nm and lowest wattage possible should be used for all exterior lighting applications. Lights with wavelengths between 320 and 560 nm, such as metal halide and mercury vapor lights, should not be used in any exterior lighting applications unless there are specific requirements that call for the ability to discern colors. Low-pressure sodium (LPS) lights are preferred if LPS can meet safety requirements and produce enough illumination.
2. Energy conservation standards will be incorporated into all lighting designs.
3. All exterior light fixtures should be positioned so that:

A. The point source of light or any reflective surface of the light fixture is not directly visible from the beach.

B. Areas seaward of the frontal dune are not illuminated. (Frontal dune is defined as the first natural or manmade mound of sand which is located landward of the beach and which has sufficient vegetation, height, continuity, and configuration to offer protective value.)

C. Light is directed downward and away from the beach at beachfront facilities, and downward and in the direction of the task being performed at non-beachfront facilities.

D. All lights should be shielded and/or recessed.

E. Photocells should only be used to support security or other mission specific requirements that occur on a regular schedule each night; e.g., parking lots will not

routinely utilize photocells unless mission operations occur 24 hours a day, 7 days a week. Automatic timers can be used instead of or in addition to photocells to control lighting during actual hours of operation. Timers can also be used in locations where personnel are not readily available to manually extinguish lights. Where random security monitoring is required, motion detector switches that keep lights off except when approached can be used. Such switches should turn lights on for the minimum duration possible.

4. Task lighting should be used for temporary operational activities rather than permanent light fixtures. Task lighting must conform to the same restrictions as permanent lighting. Switches should be used rather than timers or photocells.
5. Any new exterior lighting projects or projects involving modification to existing lighting must be submitted to the Environmental Program Office with a KSC Environmental Checklist for evaluation.

Exceptions to the guidelines will be evaluated on a case-by-case basis.

GUIDELINES SPECIFIC TO STRUCTURES ON THE BEACH (AREA - A):

1. Dark background surfaces should be used on beach structures to absorb light and help eliminate excess reflected light from illuminating the landward horizon.
2. All windows and glass doors of structures within line-of-sight of the beach must be tinted, filmed, shaded, or screened. (Tinted or filmed glass is defined as glass that has been treated to achieve an industry-approved, inside-to-outside light transmittance value of 45 percent or less.) Window curtains, blinds, or shades should be used in addition to tinting. Lamps and other movable light sources should be arranged away from windows and glass doors.
3. A breaker switch to turn exterior lights off from the outside should be installed at beachfront facilities so that lights may be extinguished when necessary without affecting other electrical appliances.
4. Sea turtle/lighting awareness signs should be posted at beachfront facilities citing the requirement to extinguish all exterior lights during nighttime hours of the nesting season. (Nighttime for the purposes of this document is defined as the hours between sunset and sunrise daily.)
5. Natural barriers, such as thick vegetation, can be used where possible to shield vehicular lighting, parking area lighting, and roadway lighting from the beach. Such barriers must not interfere with the marine turtle nesting or hatchling emergence, or cause short- or long-term damage to the beach/dune system.

GUIDELINES SPECIFIC TO LAUNCH COMPLEXES 39A AND 39B:

1. Alternatives to the reflective surfaces of the fuel and oxidizer spheres at the launch pads will be pursued.
2. A [Temporary Light Management Plan](#) (TLMP) has been generated specifically for the Launch Pads. This document was prepared jointly with NASA and USA. This document is incorporated into this guideline as reference. This document should be followed for all lighting plans at either LC-39A or LC-39B.

GENERAL GUIDELINES APPLICABLE TO AREA - C:

1. Lights with wavelengths from 585 - 590 nm and lowest wattage possible to meet all facility requirements should be used. LPS must be used if the illumination requirements can be met.

2. All exterior light fixtures should be positioned so that the point source of light or any reflective surface of the light fixture is not directly visible from the beach.
3. New lights should be shielded and/or recessed.
4. Energy use reduction policy will be implemented to reduce lighting use.
5. Task lighting should be used for temporary operational activities rather than permanent light fixtures.
6. Any new exterior lighting projects or projects involving modification to existing lighting must be submitted to the Environmental Program Office with a KSC Environmental Checklist for evaluation.

Exceptions to the guidelines will be evaluated on a case-by-case basis.