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Upgraded Rig Lighting Improves Night Time Visibility While Reducing Stray Light and the Threat to Dark Skies in West Texas

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Abstract:

McDonald Observatory, part of the University of Texas at Austin, is a world-class astronomical-research facility representing hundreds of millions of dollars of public and private investment that is increasingly threatened by nighttime lighting from oil-and-gas-related activities in and around the Permian Basin. Established in the remote Davis Mountains of West Texas in 1932, the observatory is home to some of the world's largest telescopes and it has continued as a world-renowned research center. Dark night skies are crucial to its mission. Since 2010, however, the sky along the observatory's northern horizon, in the direction of the Permian Basin, has been steadily and rapidly brightening, due to new exploration for oil and gas. The pace has been accelerating: More than 2,000 applications were filed over the past year to drill

in the region. In 2011, the State of Texas enacted a law that instructs the seven counties surrounding McDonald Observatory, an area covering some 28,000 square miles, to adopt outdoor lighting ordinances designed to preserve the dark night skies for ongoing astronomical research at the observatory. Most had already done so voluntarily, but additional effort is needed throughout the area to address fast-moving energy-exploration activities.

A joint project between McDonald Observatory and Pioneer Energy Services (PES) has demonstrated that many of the adverse effects of oilfield lighting can be mitigated, without jeopardizing safety, through proper shielding and aiming of light fixtures. Beginning July, 2013, PES granted the observatory access to a working rig, Pioneer Rig #29. Every time the rig moved to a new location, there was an opportunity to install shields, re-aim floodlights, and evaluate effectiveness.

This joint project demonstrated that, in many cases, nighttime visibility on the rig can be significantly improved. Many light fixtures, which had been sources of blinding glare due to lack of shielding, poor placement, or poor aiming, were made better and safer, using optional glare shields that are offered by manufacturers for a variety of fixture models. Proper shielding and aiming of existing fixtures improves visibility and reduces wasted uplight. New lighting systems that take advantage of light-emitting-diode technology also promise better directionality, reduced fuel consumption, and darker skies overhead.

The oil-and-gas industry has been lighting its exploration and production activities in much same way for more than 100 years, with little to no consideration of environmental impacts. The opportunity exists to adopt new lighting practices and technologies that improve safety, reduce costs, and help preserve our vanishing night skies so that important ongoing scientific exploration can continue.