



**ULTRA-VIOLET PRODUCTS**

Corporate Headquarters: UVP, Inc.  
2066 W. 11<sup>th</sup> Street, Upland, CA 91786  
Telephone: (800)452-6788 or (909)946-3197  
E-Mail: [uvp@uvp.com](mailto:uvp@uvp.com)

Internet: <http://www.uvp.com>

## Application Bulletin UVP-AB-211

European Operations: Ultra-Violet Products Ltd.  
Unit 1, Trinity Hall Farm Estate, Nuffield Rd.  
Cambridge CB4 1TG UK \* Tel: +44(0)1223-420022  
E-Mail: [uvpuk@uvp.com](mailto:uvpuk@uvp.com)

### DETECTION OF OIL AND GREASE CONTAMINATION AND/OR LEAKAGE

#### INTRODUCTION:

Oil contamination of critical parts and oil leakage is a very common problem in industry and numerous tests have been developed in response because of its importance. Most tests are, at best, convenient rather than being definitive, sensitive or reliable and are not available in all situations.

Lack of contamination is critical in surface treatment operations such as in electroplating, spot welding of electronic circuitry, etc., where residual contamination can lead to poor adhesion, coating failure, discoloration and other major problems.

Because petroleum-derived oils, lubricants and greases are mostly aliphatic hydrocarbons with varying amounts of polynuclear aromatic hydrocarbons, they are all potentially capable of determination by ultraviolet-excited fluorescence techniques. Transformer oils additionally contain naphthols which are also fluorescent.

#### WHAT IS THE SPECTRAL DISTRIBUTION OF THE FLUORESCENCE EMISSION?

Owing to the complex nature of the mixtures constituting "oils" and "greases" it is difficult to be exact in the specification of the fluorescence emissions. They are very much dependent upon refining parameters of the original crude oil and the addition, if any, of foreign substances, e.g., anti-oxidants in certain lubricating oils. Generally, however, the shorter wavelength emissions characteristic of the simpler aromatics are absent because of quenching phenomena associated with their concentration and partly because of energy transfer processes to more highly conjugated molecules.

The spectra are shifted to longer wavelengths than those characteristic of the simpler molecules, peaking in the 350-500nm range and appearing blue to bluish-white. Diesel and lubricating oils fall into this category. Because of the various quenching processes, the fluorescence efficiency is, unfortunately, frequently low, making the leak or contamination difficult to see except under the most favorable conditions of a high intensity, well filtered ultraviolet lamp and low ambient lighting.

#### HOW CAN THE TECHNIQUE BE IMPROVED?

It is possible to improve the procedure by using highly efficient fluorescent dyes. The principal is based on the absorption of the dyes by the contaminating oil or grease followed by examination under ultraviolet radiation. Both dipping and dusting techniques are practiced in industry and require a minimum of skill, training and judgement in the interpretation of the results.

