Overgrading Blue Fluorescent Diamonds, the problem, the proof and the solutions

Michael D. Cowing, FGA

Abstract: *Long after worldwide acceptance of the GIA-established standard of UV-free, daylight-colour-balanced illumination for the correct colour grading of a diamond's "true body colour", an examination of diamond trade and laboratory grading practices finds nearly everyone, including GIA, employing some type of fluorescent tube lighting. GIA taught that this lighting "causes fluorescent diamonds to be graded higher than is actually warranted due to the neutralizing, or masking, effect of the fluorescent color on the true body color". This work demonstrates the over grading of blue-fluorescent diamonds that often results, and which adds to the distrust of strongly fluorescent diamonds and their resulting discounting at the wholesale level. Three methods to resolve this problem are proposed which, by themselves or in combination, provide inexpensive and workable solutions. New lighting standards are proposed that would insure a return to color grading of a diamond's "true body color".*

Introduction

Diamonds are composed of carbon atoms, and owe their hardness and beauty to their crystallization in the cubic mineral system. Most naturally occurring diamonds contain a small percentage of nitrogen in the carbon crystal lattice in various cluster arrangements (termed aggregated nitrogen). Diamonds with aggregated nitrogen are called Cape Series or type Ia. They comprise over 98% of clear, sizable, natural diamonds. Depending upon the forms and amounts of nitrogen aggregation, this impurity often causes varying intensities of blue or bluish-white fluorescence when stimulated by UV energy. Nitrogen impurity in type Ia diamonds is also a cause of slight tints of yellow body color to which the GIA assigns the letter color grades from D to Z.

Being complementary colors, the presence of blue fluorescence whitens the yellowish-white body color. In some cases, the fluorescence produces a "blue-white" appearance in natural daylight or in artificial fluorescent lighting where there is sufficient UV energy. But the diamond's "true body color" returns when removed from these UV-emitting light sources, when it is seen in lighting that emits little UV energy. The more yellowish-white

"true body color" is seen at typical viewing distances from light with little UV energy, such as incandescent, overhead illumination.

The Problem

The light yellowish tints in a Type Ia diamond combine with the various amounts of blue fluorescence, stimulated by daylight and other illumination containing Ultra Violet energy, to give the diamond its “perceived color“, which varies from its “true body color” seen in lighting where fluorescence is not stimulated.

Going back over 100 years, there was concern in the diamond trade for this fluorescence-improved, “perceived color”, which was viewed as a “false color”. Evidence is found of concern for this fluorescence-improved, “false colour”, in Frank B. Wade’s book **“*Diamonds A study of the factors that govern their value*”**, published in 1916. Wade warned dealers to be “on their guard against them”. He said that few bluish appearing diamonds are really blue in body colour. “Most of them owe their blueness to a bluish fluorescence which becomes more marked the stronger the light.” “Some of these stones are inferior in beauty to pure white stones when viewed under a light which does not cause them to fluoresce.”

The problem is how to color grade blue fluorescing diamonds, when they often appear a higher, whiter color grade in daylight than their “true colour” as seen at night and indoors under typical artificial lighting. In the time prior to the 1930’s and the advent of fluorescent lighting, typical home and store lighting was flame lighting from gas or other sources, carbon arc lighting, and incandescent filament lighting. Today, ceiling mounted fluorescent lighting, with its lower power consumption, has become the typical lighting in offices and homes along with the different forms of incandescent lighting. The diamond’s “true colour” is seen at normal wearing and viewing distances from these forms of artificial illumination where the diamond’s blue fluorescence is not stimulated. So, we observe that more than 30 years before the founding of the GIA by Robert Shipley, and more than 40 years before GIA proposed the first lighting standard for diamond colour grading, the trade valued a diamond based upon its “true color” and not its “false color” improved by blue fluorescence.

From those early times and today, gemologists and the trade define and refer to the diamond's "true body color" as that color that a diamond exhibits when viewed under typical illumination that does not stimulate fluorescence.

Important information that has recently come to light is that blue fluorescence is stimulated, not only by UV, but also by the narrow band of visible-violet wavelengths from 400nm up to 420nm, including the strong absorption band from the N3 aggregate centered at 415nm. More about this later.

Not long after Robert Shipley founded the GIA in 1931, he recruited academic members to a GIA advisory board to help advance the gemology movement. Chief among these members, especially in the field of diamond science, evaluation and valuation, was Frank Wade, MS from Wesleyan University, and author of the afore mentioned book, **"*Diamonds A study of the factors that govern their value*"**. Wade was a pioneer in America of "the first series of scientific articles (from 1915 to 1948) on diamonds and gems written especially for the jeweler." With input from diamond experts and educators like Wade, it is no surprise to find Shipley concerned about fluorescence in the color grading of diamonds. He addressed this fluorescent diamond grading problem in Gems and Gemology (G&G) Vol III Fall, 1941 Number 11, ***A solution to diamond color grading problems*** page 162-180. There he says: "One of the most important causes of the anomalies that so often trouble a diamond grader is the change of color shown by many fluorescent stones when viewed under different light conditions. Often a fluorescent diamond, which appears slightly yellowish under artificial light, appears distinctly bluish in daylight. Many fluorescent diamonds even vary in interior daylight, depending upon the amount of ultra-violet light which has been filtered out by the glass of the windows and doors. Such diamonds are more bluish near an open window."

With the perceived color of fluorescent diamonds varying with the illumination, what lighting should be used in laboratory color grading? Historically, the standard lighting for color grading was "northern daylight", such as that through the North facing windows of the Antwerp Diamond Bourse pictured in Fig. 1. At the same time, it was known that daylight's long and short wave UV energy was causing blue fluorescent diamonds to

look whiter than they did when compared under incandescent illumination. Additionally, the perceived whiteness, and ultimately the color grade, was impacted by the time of day grading occurred, the geographic location, and whether or not the day was sunny or cloudy. Since the color of a fluorescent diamond changes as a function of the illumination under which it is observed, what should be the standard illumination to grade this color?

GIA's Solution to colour grading the "true body colour"

Early on the GIA and others decided to separate the whitening effect of a blue fluorescing diamond from its "true body color" by designing an artificial lighting environment to approximate northern daylight, but absent the amount of UV in northern daylight. The GIA Diamond Course from 1969, (Assign. # 35, p. 3), stated "A large percentage of diamonds fluoresce, usually blue; and the fluorescence, if sufficiently intense will alter the color of such a stone when observed under a light source emitting ultraviolet rays. Since this occurs under daylight examination, the most desirable conditions are to be encountered under a balanced artificial light with a minimum of ultra violet content."

The GIA produced their first diamond color grading instrument, called the DiamondLite, using an incandescent filament type of light source and a "daylight filter" which produced "the equivalent of north light ***without*** the UV radiation", (Assign. # 35, p. 4). At the same time the GIA Diamond Course stated that "a reasonably good substitute for the DiamondLite can be made by adapting a simple desk lamp fixture containing cool white fluorescent tubes", (Assign. # 35, p. 6). However, they caution "the disadvantage of this kind of illumination is that fluorescent tubes emit a significant percentage of ultra violet radiation. Although this does not affect the grading of non-fluorescent stones, it causes fluorescent diamonds to be graded higher then is actually warranted due to the neutralizing, or masking, effect of the fluorescent color on the true body color", (Assign. # 35, p. 6). **Graduate gemologists from this 1969 time frame and since have been educated to believe that diamonds should be graded for color under a daylight balanced artificial illumination *absent* the UV radiation energy contained in natural northern daylight and also contained in fluorescent lighting. They learned that grading in daylight or fluorescent light with the attendant UV radiation will result in over grading a blue fluorescing diamond.**

Eric Bruton's book, ***Diamonds***, published in the 70's, indicated that gemologists worldwide shared these views on illumination for diamond color grading. In a section of his book under conditions for color grading, (pp. 264-265), he said a "very important consideration is that any fluorescence in the stone must be suppressed…It is therefore important to grade stones in white light that is relatively free of ultra-violet".

The shift from a UV free illumination to use of fluorescent lights in colour grading

What has happened since that time? By the 70's we find gemologists and the diamond trade worldwide are universally using some form of fluorescent light to color grade diamonds. The later versions of the GIA DiamondLite have substituted unfiltered fluorescent tubes for the daylight corrected incandescent light source in the early model. This is the very same source of grading illumination that was said to result in the over grading of fluorescent diamonds. **The implication ─ based on GIA's own position and rationale for their original color grading standards ─ is that gemologists using the DiamondLite or other fluorescent illumination are over grading some blue fluorescent diamonds.**

At this juncture, it is important to note that it was not GIA's intent to change the standard grading illumination from northern-daylight balanced, but absent the amount of UV in northern daylight, to "fluorescent tubes that emit a significant percentage of ultra violet radiation". GIA believed that the Verilux fluorescent lighting that they substituted for the incandescent lighting in the original Diamond Lites had a minimum of UV. This is clear from the statements by Eunice Robertson Miles in her winter 1962 article in Gems and Gemology where she comments, "The GIA Diamondlite is especially valuable for color grading, since it eliminates surface reflections and is free from ultraviolet radiation". In the Diamond Course, copyright 1969, Assignment 19, GIA notes that the Diamondlite was designed to give "the same balance of wavelengths as north light but with the ultraviolet subtracted". It was decades later that they found "a similar intensity of long wave UV content" in each source of fluorescent lighting including the Verilux tubes in the Diamondlite.

The winter 1997 G&G article on "the Effect of Blue Fluorescence on the Appearance of Diamonds" indicates that a digital radiometer was used to measure the UV content of each of the light sources that were used in their

research study. They found a similar intensity of long wave UV content in each source of fluorescent lighting including the Verilux tubes used in their standard DiamondLite. They also found "indirect daylight through our windows has about as much UV radiation as the fluorescent light sources". (However, it is important to note at this point that they did not quantify the UV energy present at typical light-to-object distances. Because the UV energy falls off rapidly with distance from its source, this distance between the UV source -- the unfiltered fluorescent tube -- and the diamond is a critical factor in determining whether or not the UV energy is sufficient to excite the blue fluorescence reaction in a diamond.) With the GIA's finding that “fluorescent lighting” and “daylight through a window” have a similar amount of UV radiation, it would be expected that blue fluorescing diamonds would similarly be perceived to be whiter in daylight and under the DiamondLite than they would when viewed at typical distances from indoor, artificial lighting.

Fluorescent illumination containing significant UV energy does not reveal a diamond's "true color" as defined by early gemologists, and as understood by the trade. The amount of UV exciting the fluorescence in the diamond being graded varies with the tube’s manufacturer, with the tube’s size, wattage, age and with the distance the diamond is held from the tube during grading. This variability in UV makes the use of unfiltered fluorescent lighting especially problematic as an illumination grading standard.

The contradiction in requiring master diamonds to be non-fluorescing

The GIA instruction to use faint to non-fluorescing master stones in color-grading presents a clear contradiction. Consider what occurs in the application of the current practice of color-grading fluorescent diamonds against master diamonds without fluorescence. Today’s standard requires that the fluorescence strength of any master stone not exceed “faint.” This ensures that a master stone’s “true body color” is not effected by the UV emissions present in the lighting used for grading. What happens when a blue-fluorescing diamond is graded against a non-fluorescing master stone, beneath a UV-emitting light source such as the unfiltered fluorescent tubes of the DiamondLite? While the grade of the “master stone” represents its “true body color,” the grade being measured of the fluorescent diamond is a “perceived color”—the whiter color seen as a result of the excitation of

fluorescence.

This is a conflicting standard, because the grades do not represent the same thing. The master diamond is graded on its “true body color,”—a color that will remain constant regardless of the presence of UV emissions in any lighting environment in which it is viewed. Contrary to grading the “true body color,” the color-grade given to a blue-fluorescent diamond does NOT represent its “true color,” but rather, a “perceived color”. This is a whiter color than its “true color,” and one that will not remain constant, but is dependent upon the amount of UV emission present in the lighting in which it is viewed. **Only by removing UV energy from the illumination environment during color grading, as prescribed by gemological teaching, can the “true body color” of a fluorescent diamond be appropriately compared to the “true body color” of the master stone.**

The problem of how to grade blue-fluorescent diamonds boils down to only two choices: 1) grade the “true color” in lighting which does not stimulate fluorescence, or 2) change the historical standard to accept other lighting, such as unfiltered fluorescent tubes with their variable amounts of UV. The latter choice inevitably produces variable and inconsistent color grading results that are different from the “true body colour,” in direct contradiction to the historical intent of GIA and the diamond trade worldwide.

The Proof

The universal use today of unfiltered fluorescent lighting is an abandenment of the diamond grading standards originally established by GIA. Today the trade, and anyone grading with fluorescent lighting, is over-grading many diamonds with strong or very strong blue fluorescence, and to a lesser degree, those with medium blue as well. This varies little, except in degree, from the over grading that many felt was occurring when natural northern daylight was being used for color grading. The current use of unfiltered fluorescent lighting represents a revised standard for diamond color-grading. It has changed the standard that had previously mandated the use of UV-free daylight-balanced illumination to a new standard which mandates a lighting source with highly variable amounts of UV. This assures the over-grading of many blue fluorescing diamonds.

Where is the proof that this results in the over grading of some blue fluorescing diamonds?

The first hard evidence of the amount that blue fluorescence can improve the measured color in daylight over the “true color” was related by Shipely Jr. in a report in G&G Vol IX Spring 1958 No 5 p. 136. This article is a report about Shipley Jr.'s diamond grading colorimeter. He comments that “Since no source of ultraviolet radiation is provided, the Colorimeter reads only the body color of a fluorescent diamond.” The GIA and many other organizations and manufacturers sell modern versions of colorimeters to assist the human eye in color grading diamonds.

Colorimeters today, like Shipley Jr.'s, use incandescent light sources to make their measurements of color. Because of the much smaller amount of UV in incandescent compared to fluorescent lighting, the colorimeter will better measure the “true color” of a fluorescent diamond. Shipley goes on to say: “For years there has been speculation as to the possible maximum effect of fluorescence on grading, and the Colorimeter appears to give the answer: Diamonds have been observed that read two full color grades poorer on the Colorimeter than their visual appearance in unimpeded north daylight (with its ultra-violet). These stones in ultraviolet-deficient artificial light visually match the Colorimeter grade!”

These early colorimeters, however, did not reveal the full impact of blue fluorescence on body color; at that time, researchers lacked the fuller knowledge now available concerning the cause of blue fluorescence in diamond. Current data reveals that blue fluorescence is not only stimulated by UV, but also by the narrow band of ***visible*-violet** wavelengths (from 400nm up to 420nm) present in incandescent light. This means that the impact on stones with strong and very-strong blue fluorescence can actually be affected by more than 2 grades, as later testing has shown.

In the mid 1990's, former GIA Assistant Laboratory Director and Co-Founder of Professional Gem Sciences Inc., Thomas Tashey tested two diamonds with "very strong" blue fluorescence. He found that by placing a transparent UV filter below the Verilux tubes in the GIA DiamondLite, the color of one of these diamonds shifted 2.5 grades and the other shifted 3 grades. He found diamonds with "medium" to "strong" blue fluorescence generally shifted 0.5 to 1.5 grades when the filter was used. (The Professional Gemologist, 2000)

In the September 1998 issue of "Jewelers' Circular Keystone," Gary Roskin, Senior Editor and former GIA Assistant Laboratory Director, addressed "What GIA's Fluorescence Study Ignored" wherein he states: "To fully understand color grading, you need to appreciate the often overlooked matter of the light under which grading is done." He asks "Does strong blue fluorescence, whether perceived by a consumer or not, enhance the color grade of a diamond?" He then answers this question in the affirmative saying that he has compared diamonds with "strong" and "very strong" blue fluorescence in UV free light compared to "normal", "traditional" light and "the difference can be quite dramatic, possibly by two or three color grades".

Later investigations confirm Tashey's and Roskin's findings. The most recent, undertaken in 2008, involves a detailed study of a set of 25 diamonds with fluorescence intensities graded from "none" to "very strong." Detailed grading of these 25 diamonds was first done in a lighting environment where the "true colour" was seen, without improvement from blue fluorescence. This "true colour" grade was compared to grading in the GIA's Diamondlite and other lighting with various amounts of UV. One of the goals of this investigation was to determine the range of "perceived colour" improvement from "true colour." This diamond test set contained examples of various cut types in each of the five fluorescence-strength categories. Figure 2 is a chart of those 25 diamonds showing the color grades obtained in each of the light environments.

Summary findings support the observations described by Shipley Jr., Tashey and Roskin. Additionally, they support observations of fluorescence stimulation from the relatively intense incandescent illumination that exists at close distances in gemological microscopes and other high intensity incandescent lighting. After filtering out UV from intense lighting, the stimulation from the remaining narrow band of visible-violet from 400 to 420 nm was found to cause fluorescence improvement of up to a grade in some "strong" and "very strong" blue fluorescent diamonds. The blue fluorescence improvement in "very strong" blue fluorescing diamonds was up to four grades, one grade of which was determined -- by filtering out the UV -- to be due to stimulation by the remaining energy in the visible-violet 400 to 420nm band. In "strong" blue fluorescing diamonds, the "perceived color" improvement over the "true color" was found to be up to two grades. "Medium" blue was generally a half grade or less, with one exception of a full grade improvement. No differences were found in the faint and none test set diamonds.

The Need for New Solutions to the Overgrading of Blue Fluorescent Diamonds

The need to address new solutions to the color grading of fluorescent diamonds arises from a number of considerations. GIA's Fluorescence Study (G&G Winter 1997) mainly addressed what they said was the perception in the trade that “fluorescence has a negative effect on the overall appearance of a (fluorescent) diamond” Their study findings challenge that perception.

A consideration that Tom Tashey suggested was that the GIA Study “did not address the other possible reason that top color diamonds with blue fluorescence might be being discounted in the market – which was that the grading labs, such as GTL, might be greatly over-grading them.” If this is the case, then the discounts may not be adequate to account for the difference in the grade shown on reports (which is the "perceived color") and the "true body color." He goes on to say that Martin Rapaport “still believed what the market “told us” by its discounting policy and suggested that a reason for it was the possible over-grading of high color stones with blue fluorescence”

In the April 1998 issue of the "Rapaport Diamond Report" Martin Rapaport responded to the conclusions of the GIA study. He explained the trade’s historical handling of blue fluorescence in diamonds from a pricing and marketing perspective. He pointed out why diamonds with fluorescence were discounted by the trade in the higher gem quality diamonds, and how it came about that comments on reports that pertained to fluorescence became undesirable. Rapaport stated: “Unfortunately, the probability of a lab over-grading a fluorescent stone is much greater than a non-fluorescent stone and a large percentage of high color mistakes turn out to be fluorescent”. (RDR Vol. 21, No.13 page 12) He concluded: "Obviously from the market perspective there appears to be a reasonable basis for price discrimination against fluorescence". Finally, he admonishes that "changing buyers’ perception about the negative impact fluorescence has on higher color diamonds will have to backed up by solid results. In other words, the labs are going to have to be very serious about not over-grading the color of fluorescent stones even though these stones tend to appear whiter than they are."

Another consideration already mentioned that calls for correction is the universal use of some form of fluorescent light to color-grade diamonds at

major grading laboratories and within the trade—despite the teaching of Shipley and subsequent GIA researchers and educators. Models of the GIA DiamondLite currently in use are fitted with fluorescent tubes rather than the daylight corrected incandescent light source in the earlier model. This ignores the fact that fluorescent lighting is the very same source of grading illumination that was said by GIA to result in the over grading of fluorescent diamonds.

Examing GIA's Recent Research Findings and Current Diamond Color-Grading Methodology

GIA Solution

According to the article on "the Effect of Blue Fluorescence on the Appearance of Diamonds" in the Winter 1997 issue of ***Gems & Gemology***, GIA's investigation found no appreciable intensity differences in long wave UV content from one source of fluorescent lighting to the next including the Verilux tubes used in their standard DiamondLite. They also stated that they found "indirect daylight through our windows has about as much UV radiation as the fluorescent light sources." What is striking is the omission of critical data that would put a different light on their findings. For instance, they did not quantify the intensity of the UV-energy at "typical light-to-diamond distances." This is a critical factor in fully understanding the issue. **It is the distance from the light source that is a critical determiner of whether or not the intensity of UV emitted from an unfiltered fluorescent tube is sufficient to trigger a fluorescent reaction in a diamond.**

For example, a fluorescent diamond held immediately beneath a UV-emitting fluorescent light will exhibit a much stronger fluorescent reaction than it will if examined 6 inches away from the light, and less yet at a foot. Within "people distance" (3-4 feet), from typical overhead light sources, there is no noticable fluorescent reaction because the UV emissions are too week to stimulate fluorescence at that distance from the source.

GIA's findings are best summed up in the words of Tom Moses, who in response to Tashey's article stated the GIA belief "that the best man-made light sources reproduce all the characteristics of traditional north daylight, including a "good deal" of UV." "Not only do members of the trade typically buy and sell diamonds under lighting conditions that have a UV component, but they also color grade them with a lamp that has some UV content. Grading in a UV-free environment is contrary to this accepted practice and

will cause confusion. **From Moses' words, the GIA solution was to avoid confusion by maintaining the status quo of grading in variable-UV fluorescent lighting, with its variable and inconsistent grading results, against all historical GIA gemological teaching.**

Trade response to GIA's Solution

How is GIA's solution working for the diamond trade?

Eleven years later we find the same discounting and distrust of the grading of fluorescent diamonds to which Rapaport referred. GIA's efforts to dispel negative trade perception of fluorescent diamonds has not reversed the discounting of fluorescent diamonds, nor the distrust of their grading.

The belief that diamonds should be graded for their "true body color" remains thoroughly ingrained in the diamond industry in general and the gemological and appraisal community in particular. The only solution that can satisfy the industry would be a return to grading the "true color" as observed in typical indoor lighting environments, whether it be incandescent, fluorescent home or office lighting, or today's new "green" lighting technology -- light emitting diodes (LED's), where there is insufficient UV to excite fluorescence.

Is today's home or office lighting sufficiently free of UV as Shipley observed in 1941? The absence of sufficient UV energy to stimulate fluorescence in most indoor artificial lighting has been challenged by the GIA. Gem Trade Lab's director of special projects, John King, when asked why GIA doesn't use UV-free lights, responded: "It's not relevant because it doesn't really exist anywhere." He and Tom Moses, Senior Vice President, GIA Laboratory and Research, insist that UV energy is everywhere, including indoors in our home and office lighting. The GIA states in their G&G article that their findings show there is "no appreciable difference in long wave UV content from one source of fluorescent lighting to the next including the Verilux tubes used in their standard DiamondLite"…and "indirect daylight through [our] windows has about as much UV radiation as the fluorescent light sources" The implication made—by stating that the UV present in their grading lights is no different from what they found coming in their windows— is that the same amount of UV is present indoors and thus, the color seen under their grading lights is representative of the color one will see indoors. The 2008 investigation by the AGA Lighting Task Force provides evidence that challenges this thinking. Today's home and office lighting has been found to be sufficiently free of UV to not stimulate

fluorescence, and thus artificial indoor lighting does reveal the diamond's "true colour" as Shipley stated in the 1940's.

The Color Seen in Most Indoor Lighting Is the "True Body Color"

As explained earlier, the strength of UV-emissions diminishes rapidly as distance from the source point increased, **and by "distance" we mean within a matter of inches and feet.** Whether the source point is entry through a window or skylight, or emission from a fluorescent light, within inches of the source, the strength of UV-emission is significantly weakened, and within a couple of feet, it is usually undetectable. Because of this rapid reduction in UV intensity with distance, typical ceiling mounted indoor home and office illumination in any environment in which a diamond might be worn is relatively UV- free. And although GIA is correct that indoor lighting has a UV component, they are incorrect that UV-free lighting doesn't really exist anywhere. At the distances from typical lighting in which diamond jewelry is worn and observed, the UV energy is generally too small to stimulate fluorescence. Indoor illumination is essentially UV free at the point where diamonds are worn and seen, and the color seen for any blue-fluorescent diamond will not be the whiter color seen when graded under a lamp with strong UV emissions, but rather, the color seen will be the diamond's true body color.

To measure "true body color" the lighting used in grading must not stimulate fluorescence in the diamond. If all color-grading measurements employed such illumination, there would be consistency in color grading among grading labs and between colorimeter and human grading. This would correct the charge that blue fluorescing diamonds are being over-graded. If the "true color" was graded, a medium or strong blue fluorescing diamond would have a perceived color in daylight environments whiter than a corresponding color with no fluorescence. As long as there is no loss in transparency this should give fluorescent diamonds a real selling advantage, something these diamonds and their sellers used to enjoy.

Concern for "hazy", "oily" or "milky" appearance in strongly fluorescent diamonds

There is concern, when it is present, for the loss in transparency in some highly fluorescent diamonds. Addressing this concern, Rapaport stated "the labs must clearly indicate on their grading reports instances where milky

fluorescence detracts from the quality of the diamond". At what point along the scale of fluorescent strength from faint to very strong blue can this milky appearance be noticed? There are differences of opinion. However, everyone acknowledges that this effect of a loss in transparency, when present, has a significant negative impact on value and saleability. This was a quality factor that the GIA study asked its participants to evaluate in order to make a contribution to answering this question. They did not include in the study "diamonds with extremely strong blue fluorescence and a distinctive oily or hazy appearance". In the range of fluorescent strengths, including very strong, the study found that "most observers did not detect any differences in transparency among diamonds in a given color set. Of those who did see a difference under fluorescent lighting, it was only apparent in the table-down position. These results challenge the notion that strongly fluorescent diamonds typically have a hazy appearance". The GIA believes that the study shows, up to and including strong blue fluorescent diamonds, there is no noticeable decrease in transparency in the normal face up viewing position. The study's findings indicate that this may be one negative perception of blue fluorescent diamonds, harbored by the trade that may not be warranted except in the case of extremely strong blue fluorescence.