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**A Study of Matching the Color of EPSON Stylus COLOR 3000  
to ANSI CGATS TR 001-1995 – Type 1 Printing**

by

Joel C. Chan

A thesis submitted in partial fulfillment of the  
requirements for the degree of Master of Science in the  
School of Printing Management and Sciences in the  
College of Imaging Arts and Sciences of the  
Rochester Institute of Technology

May, 1999

Thesis Advisor: Professor Robert Chung



School of Printing Management and Sciences  
Rochester Institute of Technology  
Rochester, New York

**Certificate of Approval**

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**Master's Thesis**

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This is to certify that the Master's Thesis of

Joel C. Chan

With a major in Printing Technology  
has been approved by the Thesis Committee as satisfactory  
for the thesis requirement for the Master of Science degree  
at the convocation of

May 1999

Thesis Committee:

**Robert Chung**

---

Thesis Advisor

**Joseph L. Noga**

---

Graduate Program Coordinator

**C. Harold Gaffin**

---

Director or Designate

A Study of Matching the Color of EPSON Stylus COLOR 3000  
to ANSI CGATS TR 001-1995 – Type 1 Printing

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## Abstract

ICC color management system (CMS) has become a major tool for color image rendering and color matching in the printing and publishing industry. It attempts to automate color management functions, e.g., from scan to print, and from press sheet to proof, with the use of device profiles, a CMM, and an application programming interface. Earlier studies, conducted at RIT, showed that ICC-based digital proofing did not perform better than a well calibrated film-based proofing system. Specifically, the average  $\Delta E$  between ICC color managed proofs and a reference press sheet was found to be 6-9 while the average  $\Delta E$  between a film based proof and its correspondence press sheet was 5.

Realizing that sources of  $\Delta E$  errors exist in many places, e.g., printing consistency, proofer's color gamut, proofing consistency, measurement conditions, this paper discussed an improved methodology for testing the performance of color matching in a digital proofing workflow. The source profile was a SWOP press profile, supplied by Kodak, which characterizes the ANSI CGATS TR 001-1995 – Type 1 Printing condition. The destination profile was built from an Epson SC3000 ink jet printer using the Kodak Colorflow ProfileEditor at the printer's default color gamut. The IT8.7/3 basic (CMYK) target was transformed with the use of the Mac OS, ColorSync 2.5, Kodak CMM, and Adobe Photoshop 5.0.2, and output to the Epson SC3000 ink jet printer.

The IT8.7/3 basic target, containing 182 patches, was measured colorimetrically (D50, 2°) and compared to ANSI CGATS TR 001-1995 – Type 1 Printing (SWOP) data. The average  $\Delta E$  between an ICC color managed Epson proof and the CGATS TR 001 data set was 3.7  $\Delta E$ . This represents a significant improvement over previous research findings.

The improved color matching performance was due to the following: (1) an accurate press profile, (2) no printing inconsistency in the experiment since no press run was conducted, (3) EPSON SC3000 being a very stable device after the first two hours of the print out, and (4) improved profiling software.

Like most color proofing systems, the Epson SC3000 proofer has a larger color gamut than that of SWOP. This researcher was curious if the color matching can be improved if the Epson profile was built under the condition where its color gamut is only slightly larger than SWOP as indicated by solid ink densities. Reducing color gamut of the Epson printer was implemented by means of transfer curves in software. The results showed that there is no improvement whatsoever in color matching. Two reasons shed light on the subject: (1) only hardware adjustments can change the behavior of the proofer; software adjustments only clip its color gamut, and the overall color gamut of the proofer stays unchanged; (2) While solid ink density of the adjusted CMY showed larger  $a^*b^*$  plot in the proofer, it does not assure that the  $C^*$  of these inks remains to be larger as  $L^*$  decreases. In other words, a proofer with a wider  $a^*b^*$  plot than a printer does not necessarily have a larger gamut slice in the  $L^*C^*$  dimension. These are the reasons why reducing color gamut as a part of the proofer calibration did not improve its color matching performance.

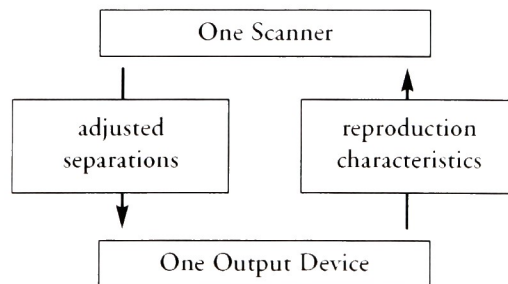
## Chapter 1

### Introduction

Breakthroughs in digital imaging technology have dramatically changed the infrastructure of the graphic arts industry in recent years. Increasing use of desktop scanners, on-demand printing and computer-to-plate, use of digital proofing, and the adopting wider printing specifications enforced printing industry form closed-loop color to become open-system color, or from device-dependent to become device-independent. The color management system (CMS) was therefore developed to meet the needs.

#### Closed-loop Color and Open-system Color

The technology used in printing and publishing attempts to closely duplicate the original colors to the final reproduction. There are two approaches: closed-loop color and open-system color. In closed-loop color, the color reproduction characteristics of the output device are used to make scanner settings (see **Figure 1**). In order to achieve a general agreement

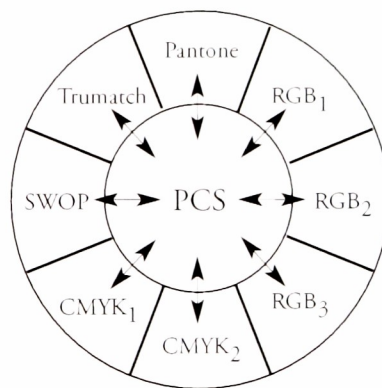


**Figure 1** Closed-loop color



between shop and client, standards and specifications were set by industry committees. Specifically, standardized inks and substrate, and other specifications were set to achieve consistent color among color reproduction. A scanned image is used for a specific printing process, however, this image needs to be scanned again under another set of scanner settings for the other output device. For instance, images scanned for offset printing cannot be used for gravure printing.

In open-system color, a device-independent color space, or profile connection space (PCS), is used as an intermediate step. Any individual peripheral device is only responsible to this device-independent color space, but not to other devices. A scanned image with its input profile can be printed by different output devices as long as there is an output profile for the device (see **Figure 2**). Specifically, a system of color reproduction in which input and output devices are characterized using device-independent color space, allows color matching among multiple devices.

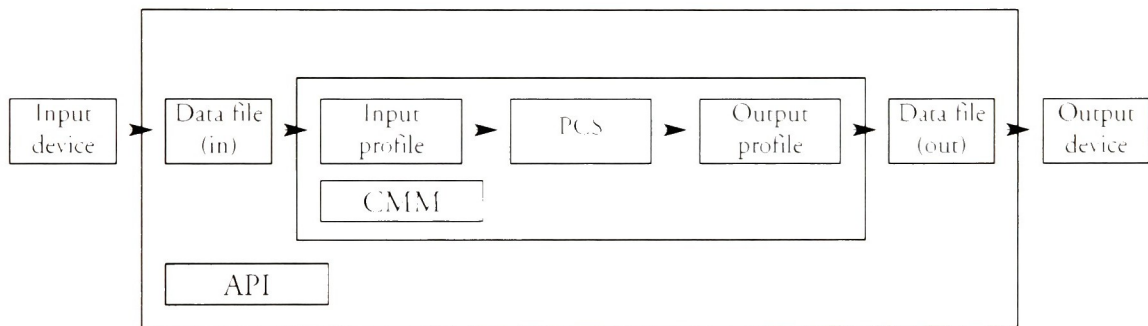


**Figure 2** Open-system color<sup>1</sup>

### Color Management System

The purpose of CMS is to individually calibrate all input and output devices. This has become the solution to compensate for the differences occurring between input and

output in an open infrastructure. CMS translates color between devices by means of the profile connection space (PCS), and two profiles. A profile characterizes a device's color reproduction capabilities. Color transformation is performed by a color management module (CMM). By using a profile for each device respectively and with a CMM, application programming interface (API; such as Photoshop and QuarkXpress) can therefore convert an image from source to output. Images already scanned may be used for any output device by applying the input and an output profiles under API environment (see **Figure 3**).



**Figure 3** Workflow of color management system

In Pre-ColorSync 2.0 era (1992-1995), color management system has difficulties in adopting the new paradigm. It did not fit into the traditional prepress procedures without disturbing the workflow. Its performance was unknown, and software and hardware were conflict between brands. Moreover, DTP users could not master CMS. Any of these inconveniences did not make color matching easier but led it into another complicated situation. However, this situation has improved since International Color Consortium (ICC) was formed in 1993.

The goal of ICC is to promote consistent colors across all platforms by using a standard color format to handle colors in color management system. Conflict does not exist

between brands since device profiles are accessible by different compliant platforms and operating systems. From there, color management has also benefited from other recent technologies, especially new automated color measurement instruments; the IT8.7 color scanner target standard, and new color profiling software. These improvements usher the graphic arts industry into an open system, a truly device-independent infrastructure. Color management system, therefore, became the leading trends in the printing industry. In fact, ICC-based CMS has become a major tool for color rendering and color matching between devices in digital workflow.

### **IT8.7/3 and ANSI CGATS TR 001-1995 Type 1 Printing**

The ANSI IT8.7/3-1993 - Graphic technology - Input data for characterization of 4-color process printing, has been adopted as a portion of the SCID (Standard Color Image Data). It contains a series of 928 color patches and is used to characterize any four-color printing process. The output data (characterization) file should be transferred with any of the four-color (cyan, magenta, yellow, and black) halftone image files to enable a color transformation to be undertaken as required. The data is available on a CD-ROM as TIFF/IT file from the draft version of ISO 12640 -1995.<sup>3</sup>

ANSI CGATS TR 001-1995 provides public access to, and serves as a reference source for, colorimetric characterization data describing offset lithographic printing meeting the requirements of ANSI/CGATS .6-1995, Graphic Technology - Specifications for graphic arts printing – Type 1. It is actually a function of ANSI/IT8.7/3, CGATS .5, and the SWOP. It is an important reference; however, it is the first document which provides the best estimate of the characterization of this class of printing.<sup>4,5</sup> Since the colorimetric data are expressed as a data set, and this data set is derived from an average of six actual printed sheets. Unfortunately, there is no single example directly related to this data set.

## DDCP along with CMS vs. Analog Proofer

Proofing is a key element of the reproduction process. Since a color proof represents a color reproduction of the process, a contract proof is used as an agreement between the shop and client. In addition, the contract proof is also used as a visual guideline during a press run, and a visual verification in prepress. Both closed-loop color and open-system color attempt to accurately match color between the proof and the finished product. Following those changes in printing technologies, direct digital color proofer (DDCP) and on-screen soft proof have become new features in the digital workflow. A DDCP and a monitor screen through CMS can be accepted as a proof as well. Although a calibrated analog proofer (closed-loop color) is designed to conform to a standard (such as SWOP), it is limited to one printing condition or one rigid set of specifications. However, a color managed digital proofer with a sufficiently large color gamut has multiple applications. It offers an inexpensive, fast, and easy way for making a color proof. Images can be simulated for comparison of accuracy to many output devices if there is a source profile and an output profile. If DDCP along with CMS is capable of rendering color which closely matches a high speed printing process, open-system color is therefore achieved instead of closed-loop color.

## Statement of the Problems

A “qualified proofer” is capable of making a color proof which closely matches the final reproduction. Based on Scott Stamm’s research in 1981, a color difference of 6  $\Delta E$ , in CIELAB term ( $D50, 2^\circ$ ), is the dilemma of tolerance for color matching.<sup>6</sup> A recent publication in the 1998 TAGA proceedings, “ICC-based Digital Proofing,” by Professor Robert Y. Chung and Yoshinori Komori, indicated an average  $\Delta E$  of 2 to 4 between two press runs, and there was an average  $\Delta E$  of 6.4 to 9.1 between the proofs and the reference press sheet. In other words, the ICC-based digital proof did not perform better than a well calibrated film-based proofing system.



In order to successfully match a proof to the final reproduction, the proofer used needs a larger gamut than the printer. Since amplitude responses of a proofer and the printer are different, and noise occurred in CMS process influences the performance of the proofer, a refined proofer calibration may impact the result. In other words, amount of noise occurred in the process may be impacted from aligning the amplitude responses of the proofer to the SWOP reference prior running through CMS. Specifically, a slightly larger gamut than the SWOP reference, instead of the original sufficiently large gamut (default proofer) of the proofer, was tested in the study.

There has been advancement in ICC-based color management technologies. For example, ColorSync 2.5, Kodak CMM, Kodak *Colorflow* ProfileEditor, and Adobe Photoshop 5.0.2, have provided more features (e.g., profile editing under Kodak *Colorflow* ProfileEditor environment) and there have been many options for managing color transform under CMS software environment. There was a need to investigate whether recent ICC-based CMS technology could fulfill CMS's promise. Such was the case between the DDCP and SWOP.

The purpose of this study was to answer whether an ICC-based CMS through a refined proofer calibration (amplitude alignment ) with currently available CMS software would help EPSON SC3000 ink jet printer simulate the SWOP reference (ANSI CGATS TR 001-1995 Type 1 Printing). In other words, the objective of this research was to investigate if there was a significant difference in color performance with and without ICC-based CMS through a calibrated proofer.

## Definition of Terms

*calibration* Adjustment of a device to known values.

*close-loop color* A system of color reproduction in which scanner (input) image settings are based on printer (output) characteristics, enabling color matching between those two devices.

*color management* The integration of imaging devices in color matching and color image rendering.

*color management system (CMS)* A system in which all imaging devices are color-managed by a color management software package to maintain color consistency from one device to another.

*ColorSync* A system level color management software system from Apple Computers. It is used to interpret color data between peripheral devices, such as a scanner, a monitor, and a color printer.

*delta E ( $\Delta E$ )* The geometric distance between two colors in the CIE Lab space.

*digital press* An output device which used offset technology to reproduce colors directly on a press controlled by a host computer.

*direct digital color proofer (DDCP)* An off-press proofer that makes a color proof directly from digital data without any film.

*gamut* The subset of humanly perceivable colors that a given device or system can reproduce.

*gamut mapping* A transformation of color coordinates which is usually performed in order to accommodate differences in the color gamut of two devices.

*ICC (International Color Consortium)* ICC was founded in 1993 to create standards for rendering color on the desktop. The result was a broad cross-platform implementation for color management profiles.

*ICC profile* A cross platform standard used to represent the color capabilities of a device.

*offset* Offset describes image transfer from the image carrier to an intermediate surface, then to the paper or other substrate. It refers to lithography in printing industry.

*soft proof* Horsing a color proof on a color monitor.

*IT8* Information Technology, an ANSI-accredited committee that developed three standard targets for input and output profiling, collectively covered by Standard IT8.7; IT8.7/1, scanner transparency target; IT8.7/2, scanner reflection target; and IT8.7/3, CMYK output target.

*open-system color* A system of color reproduction in which input and output devices are characterized using device-independent color space, allowing color matching among multiple devices.

*SWOP* Acronym for Specifications on Web Offset Publications; It has been guidelines for web printing since 1986. Today SWOP clearly defines the requirements for processes such as color separations, proofing, web printing, and so forth

## Endnotes for Chapter 1

- <sup>1</sup> Chung, Robert. "Managing Color for Consistent Results from Scan to Print," *Rochester Institute of Technology*.
- <sup>2</sup> Adams, M. Richard and Weisberg, Joshua B. "The GATF Practical Guide to Color Management," *GATF*, 1998.
- <sup>3</sup> *ANSI - IT8.7/3 -1993 - Graphic technology - Input data for characterization of 4-color process printing*.
- <sup>4</sup> *ANSI CGATS .6-1995 - Graphic technology - Specifications for graphic arts printing - Type 1*.
- <sup>5</sup> *ANSI CGATS TR 001-1995 - Graphic Technology - Color Characterization Data for Type 1 Printing*, an ANSI Technical report.
- <sup>6</sup> Stamm, Scott. "An Investigation of Color Tolerance," *TAGA Proceedings*.1981, pp 156-173.



## Chapter 2

### Theoretical Basis

The theoretical basis for this study encompasses the following areas: CIE system and CIELAB color space, Jones type diagram and curve transfer, color management system, and PostScript Level 2.

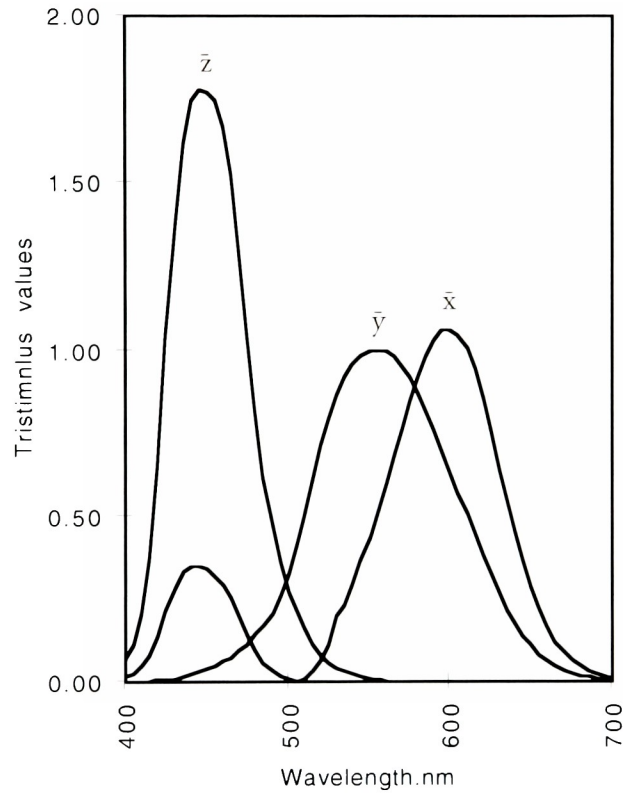
#### **The CIE System and CIELAB Color Space**

The CIE system (Commission Internationale de l'Éclairage) is the color system which has been used most in connection with instruments for color measurement, thus it is the most crucial one. It defines the element of standardization of source and observer, and the methodology to derive numbers that provide a measure of a color seen under a standard source of illumination by a standard observer. There are two standard observers in the CIE system: the 1931 2° standard observer, and the 1964 standard 10° observer, however, the CIE illuminant D50 and the 2° standard observer have been selected as partial standards for graphic technology (CGATS .5 – 1993).<sup>1</sup>

#### The CIE X, Y, Z System

The CIE X, Y, Z system chose a set of X, Y, and Z primaries, which could not be reproduced by any real lamps, instead of the prior set of primaries – red, green, and blue, in 1931. The mathematical transformation of the standard observer data from red, green, and blue primaries to the X, Y, and Z primaries was made to eliminate negative numbers among the tristimulus values (**Figure 4**). These CIE tristimulus values X,

$Y$ , and  $Z$  of a color were obtained by multiplying together the relative power  $P$  of a CIE standard illuminant, the reflectance of the object, and the standard observer functions  $\bar{x}$ ,  $\bar{y}$ , and  $\bar{z}$ , which  $P$ ,  $R$ ,  $\bar{x}$ ,  $\bar{y}$ , and  $\bar{z}$  all are functions of the wavelength  $\lambda$ .



**Figure 4** The tristimulus values of the equal-energy spectrum colors in the  $X, Y, Z$  system define the 2° 1931 CIE standard observer as it is usually used.

Equations for CIE 1931 Tristimulus Values  $X$ ,  $Y$ , and  $Z$ :

$$X = k \sum P R \bar{x}$$

$$Y = k \sum P R \bar{y}$$

$$Z = k \sum P R \bar{z}$$

where  $k = 100 / \sum P \bar{y}$

In the 1931 CIE system,  $\bar{y}$  was selected to be exactly the same as the response curve of human eyes to total amount of power, and is expected to correlate well with the perceived lightness of the sample. However, Y has been known as the luminance factor, or the luminance reflectance or the luminous transmittance factor.

### The CIELAB System

The uniformity of a color space, in which an equal distance presents that an equal visual difference of a color will be perceived, is one of the major concerns of choosing a preferred color space. The CIELAB (CIE 1978) is almost an uniform color space, however, the ideal uniform color space has not been achieved. The CIELAB is based on opponent-type coordinates, and is a three-dimensional color space. There are three coordinates which represents measures of color:  $L^*$  for darkness or lightness,  $a^*$  for redness or greenness,  $b^*$  for blueness or yellowness (Figure 5).

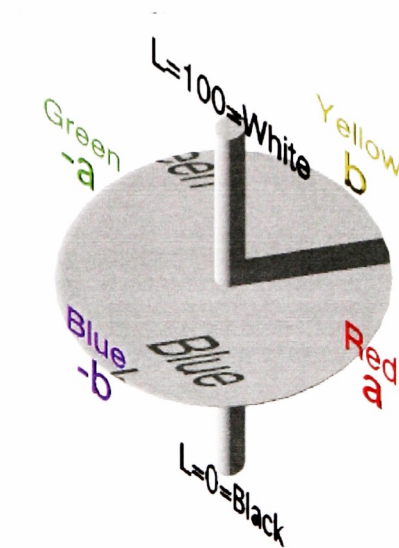


Figure 5 CIE  $L^*a^*b^*$  Color Space

Equations for CIE 1976  $L^* a^* b^*$  (CIELAB) Color Space:<sup>2</sup>

$$\begin{aligned} L^* &= 116 [f(Y/Y_n)] - 16 \\ a^* &= 500 [f(X/X_n) - f(Y/Y_n)] \\ b^* &= 200 [f(Y/Y_n) - f(Z/Z_n)] \end{aligned}$$

$$\begin{aligned} \text{where } f(X/X_n) &= (X/X_n)^{1/3} & \text{for } X/X_n > 0.008856 \\ f(Y/Y_n) &= (Y/Y_n)^{1/3} & \text{for } Y/Y_n > 0.008856 \\ f(Z/Z_n) &= (Z/Z_n)^{1/3} & \text{for } Z/Z_n > 0.008856 \end{aligned}$$

$$\begin{aligned} \text{and } f(X/X_n) &= 7.7867(X/X_n) + 16/116 & \text{for } X/X_n \leq 0.008856 \\ f(Y/Y_n) &= 7.7867(Y/Y_n) + 16/116 & \text{for } Y/Y_n \leq 0.008856 \\ f(Z/Z_n) &= 7.7867(Z/Z_n) + 16/116 & \text{for } Z/Z_n \leq 0.008856 \end{aligned}$$

and  $X_n$ ,  $Y_n$ , and  $Z_n$ , are the tristimulus values of the reference white. Usually these correspond to the tristimulus values of the standard illuminant with  $Y_n$  equal to 100.

The CIE 1976  $L^* a^* b^*$  (CIELAB) Color-Difference Equation:

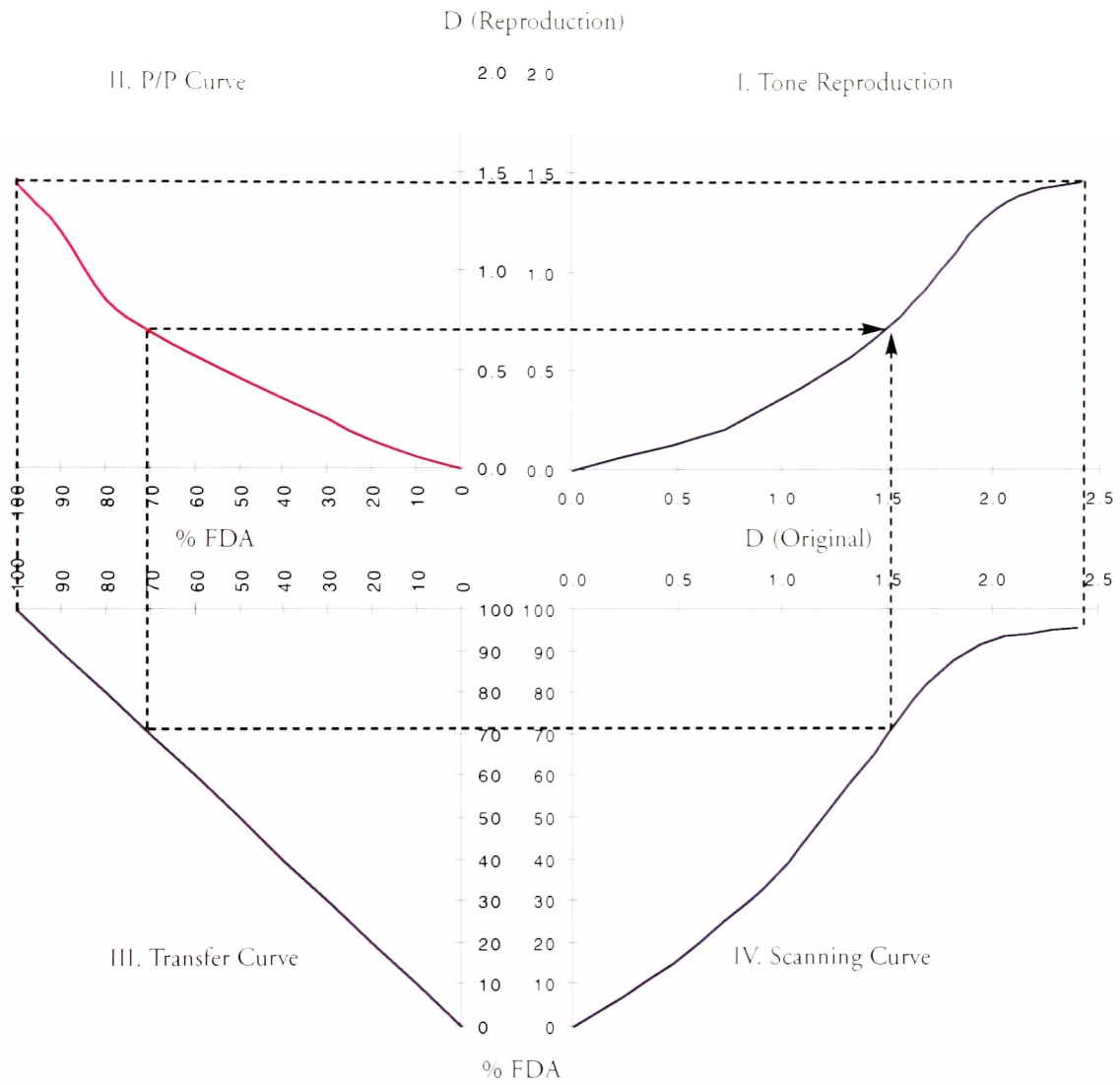
$$\Delta E = [(\Delta L^*)^2 + (\Delta a^*)^2 + (\Delta b^*)^2]^{1/2}$$

where  $\Delta L^*$ ,  $\Delta a^*$ , and  $\Delta b^*$  are the difference of the three coordinates between the sample and the reference.

### Jones Diagram and Transfer Curve<sup>3,4</sup>

The Jones type of tone reproduction diagram (Jones, 1931), generally called a 4-quadrant diagram, is a way of showing the contribution of the individual steps through the whole reproduction process. The printing reproduction process is complicated and involves many components. Varying types of inks, substrates, or printing processes, among others, will influence the over-all tone reproduction. The ideas behind a Jones diagram is to determine a tone reproduction analysis, and therefore to derive a pre-



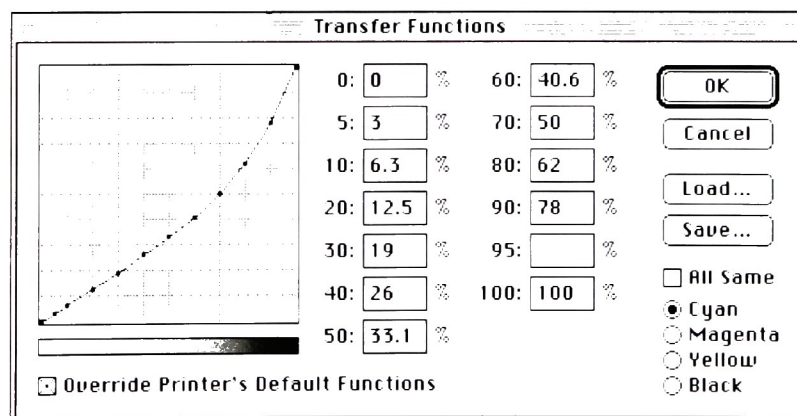


**Figure 6** A black-and-white tone reproduction Jones Diagram

ferred tone reproduction. However, a careful analysis of the Jones diagram can provide the over-all tone reproduction correlation required for the run and the aiming target.

The Jones diagram technique is useful in the determination of midtone placement to achieve preferred tone reproduction for different keyness or scenes in the original. Its innovative use has been in the derivation of transfer curves between prepress and press operations for keyness compensation and dot gain compensation. **Figure 6** is a sample of a black-and-white tone reproduction Jones diagram, where Quadrant I shows the over-all tone reproduction curve, Quadrant II shows characteristic press curves of different printing conditions, Quadrant III shows the transfer curve, and Quadrant IV shows the characteristic curve of the screening.

Adobe Photoshop provides several transfer functions. To implement the curve transfer in Photoshop, simply go to File / Page Setup / Transfer Curve. There will be a dialog box shown as illustrated in **Figure 7**. Once the transfer curve has been constructed, it can be saved for similar usage in the future. The Image / Adjust / Curves command in Photoshop has a similar result for the image modification.



**Figure 7** Dialog box of Transfer function in Adobe Photoshop

## Color Management System<sup>5, 6</sup>

The nature of the open system is to individually calibrate all input and output devices with respect to a device-dependent standard. This has become the only solution to compensate the differences occurring between input and output. Therefore, color management system (CMS) is created to perform the task.

A CMS creates color profiles, and then links them to all calibrated peripheral devices. Specifically, it is a software package that is able to automatically compensate for the different color characteristics of the input and output devices. **Figure 8** (in the following page) illustrates a workflow of reproduction process with color management systems.

### The “Three Cs” of Color Management

One objective of color management is to make it easier to get accurate, repeatable color reproduction. Throughout a color-managed workflow, calibration, characterization, and conversion are the three steps to follow in setting up and maintaining a color management system. To achieve the goals of color management, calibration, characterization, and conversion must be done in this sequence. The following will introduce each term:<sup>7</sup>

***Calibration*** ensures that all devices (scanner, monitor, and printer) conform to an established state or condition, often specified by manufacturer, be it RGB illuminant, CMYK density, or CMYK dot area.

***Characterization*** is a way of determining the output of a system in response to a known input, where input and output are defined colors and system signals. Characterization provides a way of deriving the color gamut and reproduction characteristics of a particular device in a specified (calibrated) state. It is a way of determining how an input device captures color or an output device records color when it is calibrated. Characterization data provides the input to profile creation.

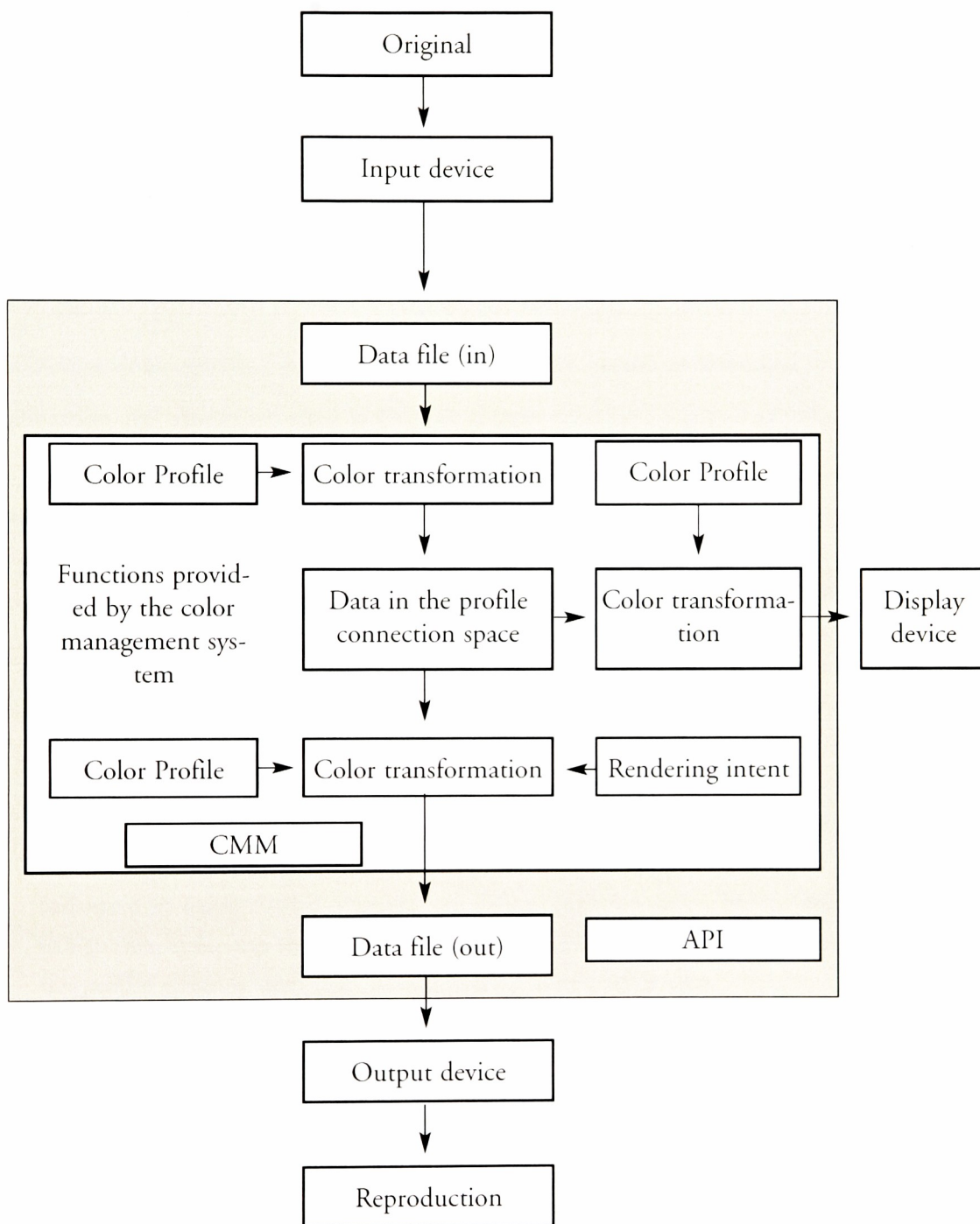


Figure 8 Workflow of the reproduction process with color management



*Conversion* (also known as color transformation or, in close-loop color, color correction) refers to translating a color image from the color space of one device to that of another under known conditions. Color conversion can be done by manually correcting the image or automatically by using color management software.

### Calibration and Characterization of Imaging Devices Used

Calibration means to normalize or make a device linear.<sup>8</sup> Calibration takes place before color management specifically. It involves development of transformations in and out of a device's color coordinate system. The transformation usually is stored or embodied in a profile. The calibration and characterization of imaging devices used are explained as follows:

#### *Scanner*

##### (1) Calibration

To calibrate a scanner, a default setting with which all advanced operations such as sharpness, unsharp masking, or descreening are turned off is used while an IT8/7 target is scanned. Therefore, next time an image is scanned, the setting of the scanner must be the same as the calibration setting.

##### (2) Characterization

Characterization requires scanning a test target such as the IT8.7/1 target for transmissive or IT8.7/2 target for reflective at the default setting. The target is opened following by using a color management characterization utility for the scanner. The utility then compares the scanned target with the reference target to create the scanner profile which is then used to evaluate a scanned RGB data.

#### *Printer/Proofer/Press*

##### (1) Calibration

To calibrate a digital color proofer, a calibration software is used. For example, the 3M Rainbow has a calibration tool called 3M Rainbow Controller Ver. 4.<sup>9</sup> Targets such as SWOP, new paper, and commercial targets can be selected to calibrate the conditions of the proofer to one of the targets. However, it is not true that every output device has a calibration software. Low-end printers do not have the capability of being calibrated by themselves.

An analog proofer is calibrated by a test target<sup>3</sup> such as the UGRA scale to obtain an optimum exposure for the proofing materials. For calibration of a press machine, solid ink density (SID) on a test target is controlled. If a press machine has a console system, the console system has a target value of SID for some target products such as a commercial product or a previous product printed on the press.

## (2) Characterization

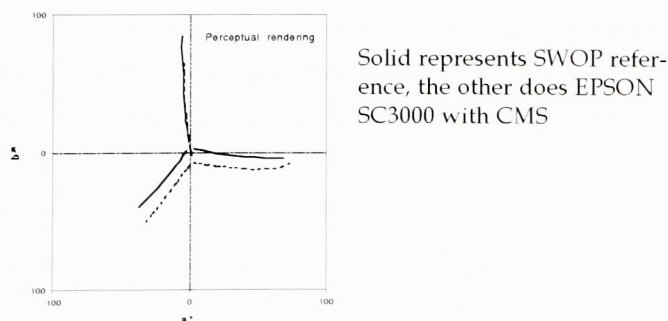
First, the output device is calibrated, then a profiling target is output from the output device through a color management characterization utility. Next, a colorimeter such as Colortron II, X-Rite's DTP 51, or Gretag SpectroScan is used to measure the printed profiling target. Last, the color management characterization utility generates a device profile for the output device.

## Color Rendering Methods

There are three types of color rendering methods: perceptual, relative and absolute colorimetric, and saturation. These color rendering methods are explained:

### *Perceptual*

Perceptual rendering is used to render a photographic image. This rendering method keeps the hue and the contrast of the original. The gamut is compressed in a more or less linear way. It keeps the relative range of colors visually constant. The colors of a reproduction, through the rendering method, appear to the eye to be the same as the original (see **Figure 9**). Therefore, this method is called perceptual, or pictorial, color rendering. For instance, when an RGB image captured by an RGB input device is converted into a CMYK image for an output device, the perceptual rendering method is chosen.

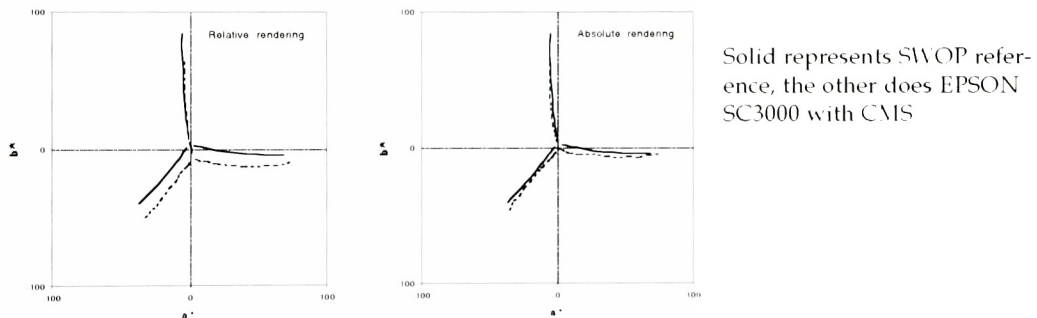


**Figure 9**  $a^*b^*$  diagram for perceptual rendering method

### *Relative and Absolute Colorimetric (Colorimetric)*

Colorimetric rendering is used to render colors without gamut compression so that all colors are matched as accurately as possible. To reproduce a company's logo, either relative or absolute colorimetric rendering should be selected. This method tries to match the reproduction color to the original as much as possible, however, the result of the color appearance is different from the original because some of the colors are out of gamut. Therefore, the colors which are out of gamut are represented as the closest colors achievable by the devices. For instance, when a CMYK image for an output device is simulated by another CMYK imaging device, the colorimetric rendering is used for the CMYK to another CMYK color conversion.

The colorimetric method is divided into two methods: relative colorimetric and absolute colorimetric. The relative and absolute colorimetric differ in the decision of the white point. Relative colorimetric is relative to the white point of the paper or scanner used, while absolute colorimetric is relative to the CIE white value, D50 and 2° (see **Figure 10**).



**Figure 10**  $a^*b^*$  diagrams for relative and absolute colorimetric rendering methods

### *Saturation*

Saturation rendering is used for a presentation graphic. Colors are pushed towards the gamut boundary, giving them the maximum saturation available in the output system. If maximized saturation is desired, this method is suited to render a bright, vivid, and punchy image.

**PostScript Level 2** <sup>10, 11</sup>

The first generation of PostScript language, developed by Adobe Systems in 1985, was spread into desktop publishing for the these reasons: typographic flexibility, typographic quality, and device independence.<sup>12</sup> Due to the weakness of the original PostScript language in controlling color and halftone screening became a barrier to further adoption, Adobe Systems introduced PostScript Level 2 in 1990. The main features of PostScript Level 2 are: better memory management, better color handling, the introduction of forms caches and patterns, increased use of dictionaries, the ability to handle file decompression during output, and Improved control of the output device from the front end. Therefore, it helps handling color management between a host computer and a color printer with a device independent color model such as CIE XYZ and CIELAB.



## Endnotes for Chapter 2

- <sup>1</sup> *ANSI CGATS .5-1993 - Graphic technology - Spectral measurement and colorimetric computation for graphic arts images.*
- <sup>2</sup> Billmeyer and Saltzman. *Principles of Color Technology*, A Wiley-Interscience Publication.
- <sup>3</sup> Yule, J.A.C., *Principles of Color Reproduction*, NY, John Wiley & son, 1967, Chapter 5.
- <sup>4</sup> *Adobe Photoshop User Guide Version 3.0 for Macintosh*, Adobe, pp 33-34, 245
- <sup>5</sup> "ColorSync 2.0 Photoshop Plug-In Modules 1.3 Read Me," Apple Inc. 1996.
- <sup>6</sup> "Color management: focus on ICC standard," *The Seybold Report on Publishing Systems*, Seybold Publications Inc. Oct. 26, 1994, vol. 24, no. 3, pp 18-26
- <sup>7</sup> Adams, M. Richard and Weisberg, Joshua B. "The GATF Practical Guide to Color Management," *GATF*, 1998.
- <sup>8</sup> Kieran, Michael. "Color Management," *Understanding Desktop Color 2nd*, Michael Kieran. 1994, Ch. 4, pp146-156.
- <sup>9</sup> "3M Rainbow Color Proofing System," *3M Co.*, 1995.
- <sup>10</sup> "Color Drive 1.5 User's Manual," *Paton Inc.*, 1996, Ch. 4.
- <sup>11</sup> Green, Phil. "Understanding Digital Color," *GATF*, 1995.
- <sup>12</sup> Kieran, Michael. "Color Management," *Understanding Desktop Color 2nd*, Michael Kieran. 1994, Ch. 4, pp 172-174.

## Chapter 3

### Review of Literature

#### Specifications and Standards

We are at a turning point in graphic arts history and most people have not yet realized how greatly computerization and standardization will impact the printing industry. SWOP and the standards committees play an important role in this event. It is the first time that the industry will have a physical reference and numerical data to use in establishing aims. The following details will introduce some national specifications and international standards.

The Specifications for Web Offset Publications, commonly known as SWOP, has been used as a guideline to ensure maximum quality reproduction in magazines and advertising for several years. It is a proofing specification that defines the requirement for sheetfed on-press lithographic proofing to be used for publication material to be printed by web offset or gravure. Although it is only a recommendation and not a standard, to conform to SWOP is to achieve a predictable quality with the pages of a publication.

As web offset printing of publications became popular, and then predominant, in the late 1960s and early 1970s, the printing industry was facing a major problem caused by the materials (proof and film) being supplied to web offset publications. The idea of forming a committee to write specifications first emerged in late 1974, thereafter the initial set of specifications was first published in 1975, and then SWOP was

first used in 1976. There were updates published in 1977, 1978, 1981, 1986, 1988, and last in 1993. These SWOP specifications applied only to the separator in their early stages, however, the first guidelines for web printing had been addressed in 1986.<sup>1</sup>

According to David Q. McDowell, SWOP marked the beginning of a trend: a shift away from the industry notion of printing as art or craft and toward a view of printing as a scientific process that is controllable and measurable.<sup>2</sup>

Today SWOP clearly defines the requirements for color separations, proofing, web printing, and so forth. The SWOP booklet also includes the Gravure Association of America (GAA) approved specifications for halftone gravure that calls for adherence to SWOP proofing specifications. These additional GAA specifications provides a better understanding of the differences between the two printing process.

There are three printing and publishing groups within the United States reporting to ANSI (American National Standards Institute), and one international printing and publishing standards group.<sup>3</sup> The US national Bodies are the US Technical advisory Group (TAG) to ISO/TC 130 (USTAG/ISO/TC130), the Committee for Graphic Arts Technologies Standards (CGATS), and B65 Safety Standards. The international committee is ISO Technical Committee 130, Graphic Technology (ISO/TC130). CGATS and ANSI IT8 are presently working together with SWOP Committee to develop color calibration and printing definition standards. Some of standards developed from these committees will be briefly described in this chapter.

The SWOP committee has been developing color calibration and printing definition standards together with CGATS and IT8. The results are shown as follows:<sup>4</sup>



CGATS .4	Graphic Arts Reflection Densitometry Measurements - Terms, Equations, and procedures.
CGATS .5	Spectral Measurement and Colorimetric Computation for Graphic Arts Images.
CGATS .6	Specifications for Graphic Arts Printing - Type 1.
CGATS .9	Graphic Arts Transmission Densitometry Measurement - Terms, Equations, Image Elements and Procedures.
IT8.7/1	Color transmission target for input scanner calibration.
IT8.7/2	Color reflection target for input scanner calibration.
IT8.7/3	Input data for characterization of Four-color process printing.
IT8.7/4	Default three component (RGB) color data definition for use in the graphic arts industry.

The ISO/TC 130 Graphic Arts Standards Committees has developed a set of test images called SCID (Standard Color Image Data) which was under review as ISO/DIS 12640.<sup>5</sup> It was designed to evaluate the performance of the printing processes. However, the purpose of this standard was to specify an input data file, a measurement procedure and an output data format to characterize any four-color printing process. There were eight natural and ten synthetic images selected. In order to eliminate variations in input scanning, these SCID images were only available in an electronic form, therefore, they were merely a common set of reference data. This data was available on a CD-ROM as TIFF/IT file from the draft version of ISO 12640 -1995.

The ANSI IT8.7/3-1993 - Graphic technology - Input data for characterization of 4-color process printing, was also adopted as a portion of the SCID. It contained a

series of 928 color patches. As previously mentioned, this standard is used to specify an input data file, a measurement procedure and an output data format to characterize any four-color printing process. The output data (characterization) file should be transferred with any of the four-color (cyan, magenta, yellow, and black) halftone image files to enable a color transformation to be undertaken as required.<sup>6</sup>

The intent of CGATS .4 and .5 was to define terms and established methodologies for reflection densitometer instrumentation and measurement, and for reflection and transmission spectral measurements and colorimetric parameter computation for graphic arts images. The conditions defined are: 0/45 geometry, the CIE 2° standard observer, the CIE D50 illuminant, and black backing under samples. However, the weighting functions and computational procedures to minimize variations due to computational procedures are also provided in these documents.<sup>7,8</sup>

Table 1 - Press Test Density and Colorimetric Data

		Density (Status T)	L*	a*	b*	ΔE
<b>Cyan</b>	Aim	1.22-1.36	54.7	-36.9	-40.0	4
	Test	1.29	55.7	-37.8	-40.4	
<b>Magenta</b>	Aim	1.33-1.47	46.2	70.0	-1.5	5
	Test	1.40	46.3	70.1	-2.2	
<b>Yellow</b>	Aim	.94-1.08	84.6	-5.1	84.7	6
	Test	1.01	84.3	-5.8	84.5	
<b>Black</b>	Aim	1.52-1.66	18.3	0.4	0.7	3
	Test	1.58	18.5	0.4	0.9	
<b>Paper</b>			88.7	-0.3	3.7	

**Note:** The value shown for paper is for a representative sample of Champion Texweb paper, which meets the SWOP specification.



ANSI CGATS TR 001-1995 provides public access to, and serves as a reference source for, colorimetric characterization data describing offset lithographic printing meeting the requirements of ANSI/CGATS .6-1995, Graphic Technology - Specifications for graphic arts printing – Type 1. It actually is a function of ANSI/IT8.7/3, CGATS .5, and the SWOP, and so forth. Since the data contained in this document is based on the measurement of press sheets from practical printing, the data itself cannot be normative. However, it is an important reference because it is the first document which provides the best estimate of the characterization of this class of printing. **Table 1** (see page 26) shows the aim density range, colorimetric aim values, and colorimetric tolerances ( $\Delta E^*$ ) of the single color solids as defined in CGATS .6.<sup>9, 10</sup>

### Color Management System and ICC Profile

A color management system is a system in which all imaging devices are color-managed by a color management software package to maintain color consistency from one imaging device to another. There are two main tasks:<sup>11</sup>

1. Creating device profiles which contain data about the color characteristics of each device in the system.
2. Linking these device profiles together to compensate for the color capability (gamut) of each device.

In the past, input, display, and output devices were calibrated in a closed-loop fashion to ascertain the desired color match between original and reproduction. However, with the advent of open systems based on desktop components an automatic compensation of the differences occurring between input and output was no longer guaranteed. A theoretical way to overcome this problem was to individually calibrate

all input and output devices with respect to a device independent standard (calibration.) Consequently, color management systems were created to perform the task.

CMS is a software that is able to convert the color data recorded with an input device into device-dependent output data with the aim of achieving a user-defined match between original and production.<sup>12</sup> The first color management systems were created in a different architecture, thus, there was no compatibility between profiles and no consistency among the results. The International Color Consortium (ICC), which was a common platform comprising of a definition of the basic functions and a data format for color profiles, was developed soon after the idea of color management systems was born. It was established in 1993 by eight industry vendors for the purpose of creating, promoting and encouraging the standardization and evolution of an open, vendors-neutral, cross-platform color management system architecture and set of components. The founding members were Adobe Systems Incorporated, Agfa, Apple Computer, Eastman Kodak Company, Microsoft Corporation, Silicon Graphics Inc., Sun Microsystems, and TaligentInc.<sup>13</sup>

### **ColorSync**

ColorSync works as a system level color management system for Macintosh computers, Apple Computer. ColorSync 1.0, the first generation, was introduced in 1993 for providing a common architecture for color management. However, it was not sufficient for high-end users because of a lack of application programming interface (API). In fact, prepress people did not obtain good results for color transformation with ColorSync 1.0.<sup>14</sup>

In June 1995, Apple introduced the second generation color management system, ColorSync 2.0. The ColorSync 2.0 system software improves three elements: the ColorSync API, the Apple Default CMM (Color Matching Method), and ColorSync 2.0 (or ICC-compatible) profiles.

In the same year, Apple introduced ColorSync 2.0 Photoshop Plug-In Modules 1.3. They became available for Photoshop users to obtain high quality reproduced color images.<sup>15</sup> It uses Linotype-Hell's color matching methods, and links two or three peripheral devices for doing gamut mapping on a host computer. Therefore, it provides an accurate color from any device. There are three plug-in modules: acquire, export, and filter. (Note: only images saved in the TIFF format without any compression can be processed.)

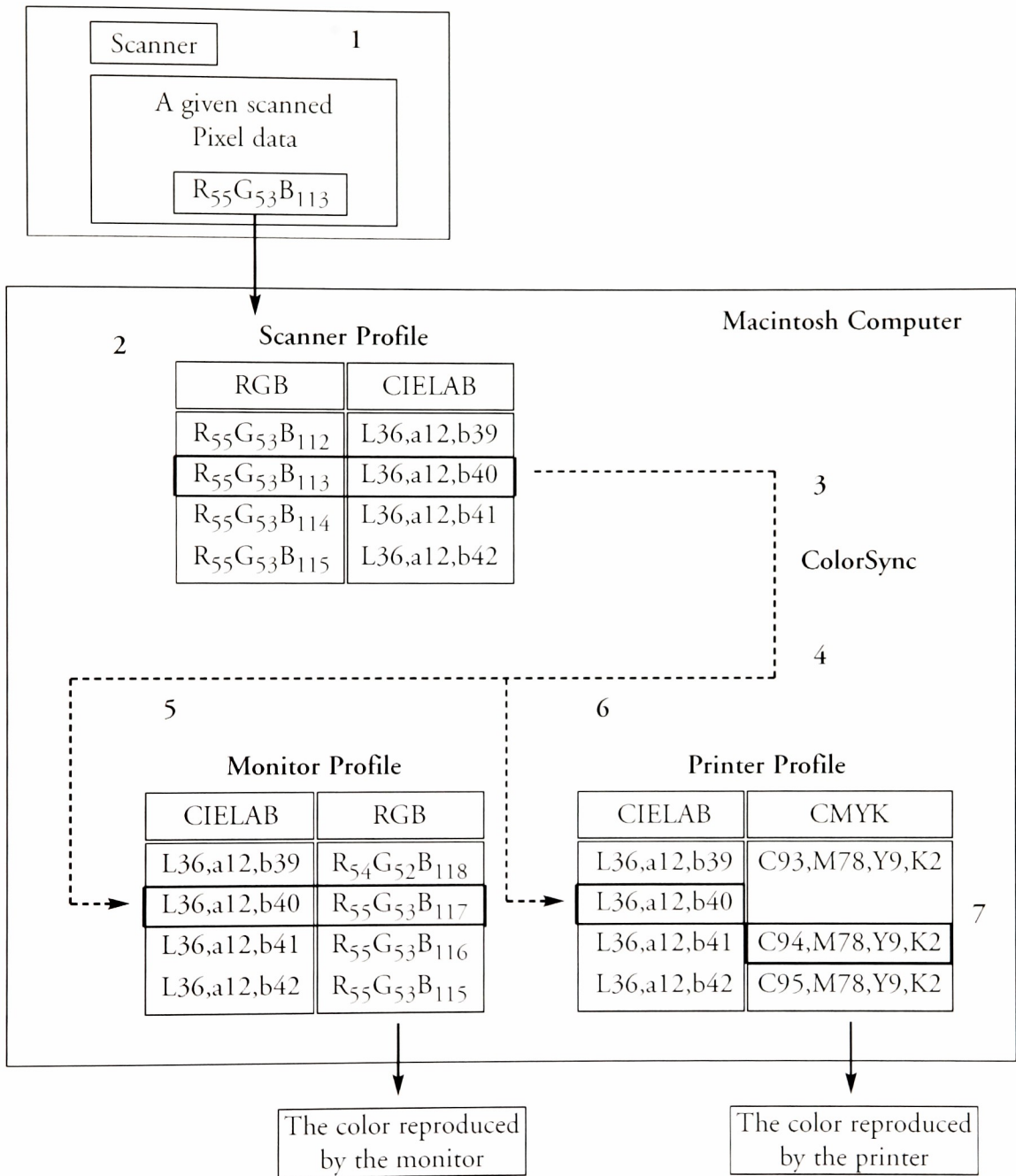
In early 1998, Apple brought ColorSync 2.5 with several improvements to the market.<sup>16</sup> These major changes are: improved ease of use through calibration framework, multi-processor support for improved performance, increased productivity resulting from AppleScript and profile management enhancements, and ColorSync 2.5 extras.

ColorSync manages color transformation from one device to another by referring to both device profiles. When a color transformation (gamut mapping) is conducted, ColorSync uses a color rendering method, also called color matching method (CMM), that decides how the colors in the different gamut spaces are compensated for. The color rendering method can vary the color result. Selecting one of the color rendering methods is important in color management. There are three color rendering methods: perceptual, colorimetric, and saturation.

As mentioned, ColorSync is not designed for full-function color management. ColorSync is a system software for color matching that converts one color space to another. The ColorSync function is explained as follows (refer to **Figure 11** in the following page).<sup>17</sup>

1. Scanned pixel color data are sent to the host computer along with the scanned image.
2. Each ICC device profile for a scanner, monitor, or color printer has to be created in advance. A scanner profile describes each color in terms of RGB (Red, Green, Blue) numbers and gives the best-fit equivalent in device-independent CIE Lab





**Figure 11** How ColorSync works with the color management system by way of look-up table

numbers for the given pixel color data, similar in concept to the way an English-Japanese dictionary gives the English equivalent of Japanese words.

3. ColorSync receives the profile and manages an algebraic conversion of the scanner's RGB values to the monitor's profile. The actual comparing can be done by ColorSync Application Programming Interface (API).

4. The first part of this conversion is to find the pixel color data listed in the profile as RGB values, and then to convert them to CIE Lab values.

5. ColorSync then uses the monitor profile to find the monitor's RGB values that best fit the CIE values.

6. When an original image is printed, ColorSync compares the scanner profile with the printer profile by utilizing a common language such as CIE Lab. Then the CIE values are converted to CMYK (Cyan, Magenta, Yellow, Black) values that color printers can understand.

7. If ColorSync finds a color the printer cannot reproduce, it picks another that is close depending on the color rendering style.

## Previous Study

Professor Robert Y. Chung and Yoshinori Komori of the Rochester Institute of Technology had a master thesis, *The Performance Analysis of Color Management System: Simulation of Colors from Sheetfed Offset Press by Analog and Digital Color Proofer*, published in May 1997, and as a TAGA paper in 1998.<sup>18</sup> Their research indicated that an ICC-based digital proof did not perform better than a well calibrated film-based proofing system. An average  $\Delta E$  of 6 to 9 between proofs and the reference press was found.

Their research data derived from were based on the IT8.7/3 basic target (182 patches) measured in CIELAB values. Two press runs were performed as a base refer-



ence. An average color difference of 3.76  $\Delta E$  was found to exist between the runs. However, this color difference of 3.76  $\Delta E$  was well within the tolerance of 6  $\Delta E$  as reported by Scott Stamm.<sup>19</sup> Thereafter, analog proofs (Imation MatchPrint III) and digital proofs (Imation Rainbow) were made to match the reference press sheet both managed and unmanaged by CMS. As a result, average color differences of 6.41, 7.22, 7.31, and 9.14  $\Delta E$  were found between the base reference and the proofs (see Table 2).

**Table 2** - Average  $\Delta E$  between each color proof and the reference press sheet

	MatchPrint III		Rainbow	
	w/o CMS	w CMS	w/o CMS	w CMS
Average $\Delta E$	7.34	9.14	6.41	7.22

These colorimetric findings show a noticeable color difference between the color proofs and the reference press sheet. All of them are outside of the tolerance of 6  $\Delta E$ . In other words, there are significant color differences between all four proofs and the base reference. Since the Rainbow proofer with CMS does not show a significant improvement in matching color, they state that ICC-based digital proofer does not perform better than a well calibrated film-based proofing system. However, this case does show that ICC-based digital proofer performs about the same as a well calibrated film-based proofing system.

### Endnotes for Chapter 3

- <sup>1</sup> *SWOP - Specifications Web Offset Publications 1993*, SWOP Inc.
- <sup>2</sup> Blessing, Rose. "The Numbers Game," *Publishing & Production Executive*, July 1995, p. 39-41.
- <sup>3</sup> "Who's Who in Printing and Publishing Industry Standards," NPES The Association for Suppliers of Printing and Publishing Technologies.
- <sup>4</sup> *SWOP - Specifications Web Offset Publications 1993*, SWOP Inc.
- <sup>5</sup> *ISO/DIS 12640 - Graphic technology - Prepress digital data exchange - Standard colour image data (SCID)*, ISO 1995.
- <sup>6</sup> *ANSI - IT8.7/3 -1993 - Graphic technology - Input data for characterization of 4-color process printing*.
- <sup>7</sup> *ANSI CGATS .4-1993 - Graphic technology - Graphic arts reflection densitometry measurements - Terminology, equations, image elements and procedures*.
- <sup>8</sup> *ANSI CGATS .5-1993 - Graphic technology - Spectral measurement and colorimetric computation for graphic arts images*.
- <sup>9</sup> *ANSI CGATS .6-1995 - Graphic technology - Specifications for graphic arts printing - Type 1*.
- <sup>10</sup> *ANSI CGATS TR 001-1995 - Graphic Technology - Color Characterization Data for Type 1 Printing*, an ANSI Technical report.
- <sup>11</sup> Kieran, Michael. "Color Management," *Understanding Desktop Color 2nd*, Michael Kieran. 1994, Ch. 4, pp 146-156.

## Chapter 4

### Hypothesis

Digital proofing systems have certain advantages over analog proofing systems, in that, they are inexpensive, fast, and an easy way for making a color proof with less maintenance. As a digital proofer is developed to work in open-system color, device's calibration and characterization, and conversion through CMS processes determine the quality of the performance. A well calibrated digital proofer managed by CMS is capable of matching color to any output device, theoretically. However, noise during the CMS processes can usually impact the result for the worse.

The objective of this study was to investigate whether a color management system enabled EPSON SC3000, which had sufficiently large gamut, to simulate the SWOP color. Only colorimetric consistency based on CIELAB terms was evaluated. Visual differences could not be accessed because the reference printing conditions were expressed as a data set, and this data set was derived from an average of six actual printed sheets. There was no single example directly related to the data set. As a result, color differences were displayed as  $\Delta E$  values in the study. By doing so, we also investigated if there was a significant difference amongst the following three testing methods:

**M1** EPSON SC3000 in default condition

**M2** EPSON SC3000 in default condition with CMS compensation

**M3** EPSON SC3000 with a refined calibration (to have the amplitude responses calibrated to SWOP) and with CMS compensation

## **Hypotheses**

The hypotheses have been tested are stated below:

**H1** There is no significant difference between **M1** and **M2** when comparing the SWOP reference in colorimetric CIELAB  $\Delta E$  values.

**H2** There is no significant difference between **M2** and **M3** when comparing the SWOP reference in colorimetric CIELAB  $\Delta E$  values.

## **Limitations**

Noise during the processes can usually directly impact the CMS's performance. In addition, the result can vary if a different color management profiling software or a different CMM is selected. This experiment was only tested under the following conditions:

1. Printer: EPSON Stylus COLOR 3000 ink jet printer
2. Printer driver: EPSON StylusRIP
3. Paper: DuPont/Epson Commercial Proofing paper (Super A3/B)
4. Target: IT8.7/3 basic color characterization target (182 patches)
5. System-based CMS: ColorSync 2.5
6. Profiling software: Kodak Colorflow ProfileEditor 2.0
7. Color matching module: Kodak CMM
8. API: Photoshop 5.0.2
9. Pagination software: QuarkXPress 3.32
10. Measuring instrument: Gretag SpectroScan system

**Delimitation**

The scope of this study was limited to a given proofer condition. An absolute rendering method was used for the color conversions from one CMYK to another CMYK space. Experimental errors and their impacts were not investigated separately.



## Chapter 5

### Methodology

The objective of this study was to investigate the color difference, which the  $\Delta E$  was derived from  $L^*$ ,  $a^*$ ,  $b^*$  (CIELAB), between the SWOP reference (ANSI CGATS TR 001-1995 – Type 1 Printing) and EPSON Stylus COLOR 3000 printed color proofs. Three testing methods were proposed for this research. The first method was to have a proof reproduced in the default device gamut without ICC profiles applied. The second method was to have a proof reproduced in the default device gamut with ICC profiles applied. The third method was to have the proofer's amplitude responses calibrated to SWOP conditions, and then to have a proof reproduced with ICC profiles applied under the condition that the proofer has been calibrated to SWOP.

### Equipment and Materials

1. Host computer and accessories:
  - Power Macintosh 7300/120 WITH SYSTEM 8.0
  - iomega zip 100MB drive and disks
2. DTP software:
  - QuarkXPress 3.32 software (Efi color extension off)
  - Photoshop 5.0.2
  - Microsoft Excel 98

### 3. CMS:

- ColorSync 2.5 Mac OS system-based extension software
- Kodak Colorflow 2.0 ProfileEditor profiling software
- SWOP ICC profile provided by Kodak

### 4. Target:

- SCID S7&S8 (as ANSI IT8.7/3 basic target with 182 color patches in total) from ISO/TC130 SCID (CD-ROM as TIFF/IT file from the draft version of ISO 12640 -1995)



Figure 12 ANSI IT8.7/3 basic target

### 5. Colorimetric reference data:

- Colorimetric Characterization Data for Type 1 Printing

### 6. Output device:

- Epson Stylus COLOR 3000 (1440x720 dpi) ink jet printer output onto DuPont/Epson Commercial Proofing Paper (Super A3/B)

### 7. Measurement devices:

- Gretag SpectroScan system which was composed of SpectroScan (an automation table), Spectrolino (spectrophotometer), Spectroserver software (to establish Spectrolino protocols), and SpectroChart software (to control the SpectroScan).

## Experimental Procedure and Data Collection

There were three testing methods performed for the study. **Figure 13** (refer to the following page) shows a workflow chart for experiment procedures and hypotheses testing. However, a device consistency and a material stability test were also performed.

### Pre-experiment Testing

Stability and repeatability is always a key element within an experiment. A device consistency test with thirty samples printed in a month was investigated. A material stability test with one selected sample for the issue of ink and paper fade was tested. Both testing were done prior to performing the main experiment. The same ink cartridges and settings were used through the entire study.

#### *0.1 To perform a device consistency test*

An 8.5" x 11" (letter size) page in QuarkXPress 3.32 was created (**Appendix A**). An IT8.7/3 basic target, an indication of the printing date, time, and a description with the proofer settings were placed within the page. This test page was saved, and then printed by EPSON SC3000 with its StylusRIP driver (**Appendix B**). All the settings were recorded (**Appendix C**). Thirty samples were printed in a month; one or two were performed from each day. The IT8.7/3 basic target from all thirty samples were measured and recorded in Excel workbook.

#### *0.2 To perform a material stability test*

The same test page (as step 0.1) was used to perform the material stability test. The IT8.7/3 basic target of the printed sample was measured and recorded in Excel workbook seven times: right after printed, 30 minutes, one, two, four, eight, and twenty-four hours after printed. Delta E of the four process colors (cyan, magenta, yellow, and

Legend:

SP Source profile

OP Output profile

RM Rendering Method

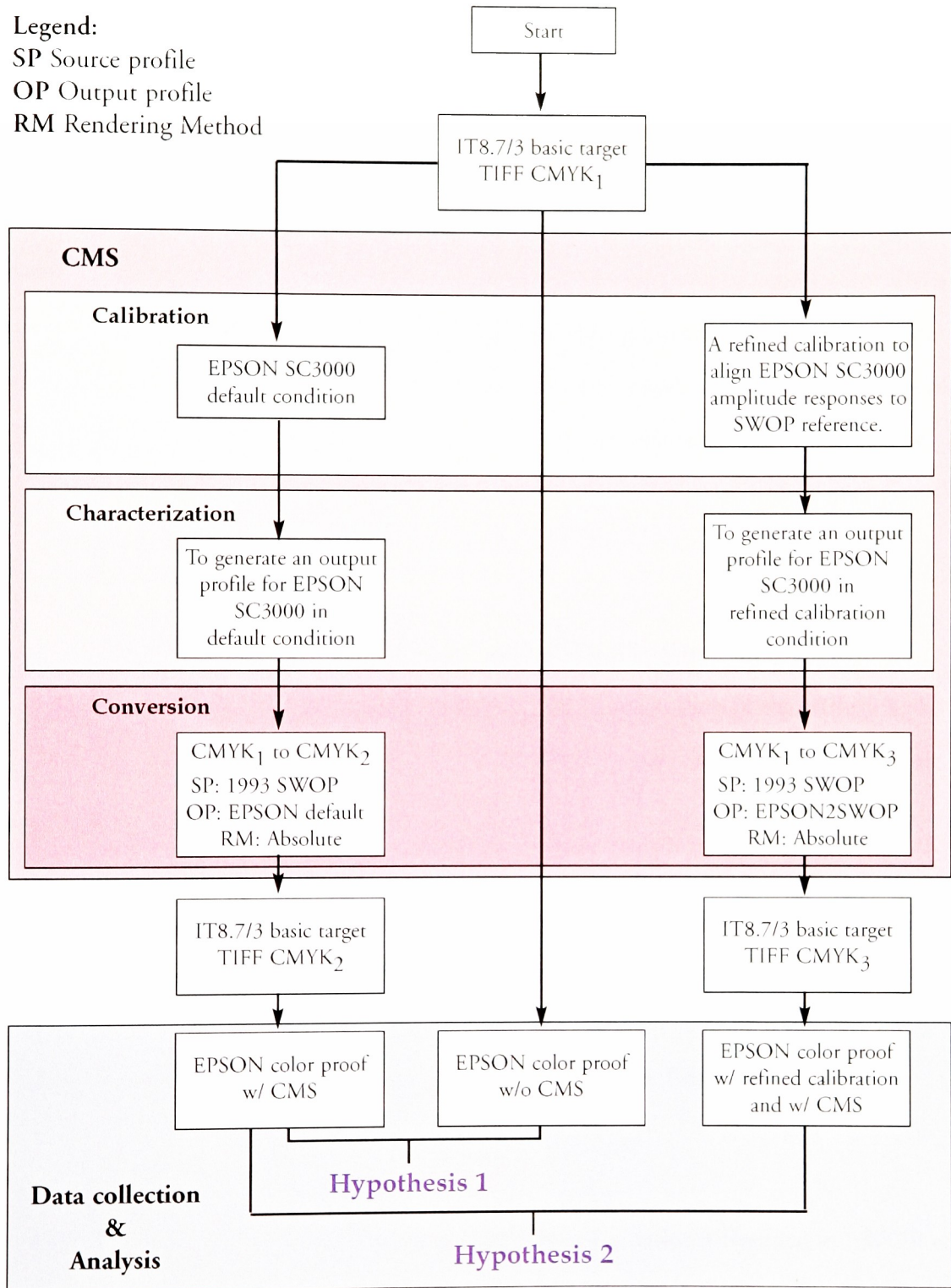


Figure 13 Workflow chart for experiment procedures and hypotheses testing.

black), paper, and an average (based on all 182 patches of IT8.7/3) were calculated based on the first measurement.

### Method One

The function of the first testing method was to calibrate the digital proofer, EPSON Stylus COLOR 3000 ink jet printer, in amplitude responses and to access color difference to SWOP before the CMS treatment. All the data generated from Method One will represent the proofer's default condition and the proofer's amplitude responses in this experiment. A large average  $\Delta E$  value is expected in this stage because of ink colorant, paper, and device characteristic differences.

#### *1.1 To create Test Form I*

The first part of this experiment was to create a 8.5" x 11" (letter size) page in QuarkXPress 3.32. IT8.7/3 basic target (CMYK<sub>1</sub>) and a description of the settings were included in the page as the Test Form I. This test form was saved as an electronic file for further usage.

#### *1.2 To make a proof*

Test Form I was printed via QuarkXPress 3.32 with EPSON StylusRIP driver (refer to the same condition as stated in step 0.1). The printed IT8.7/3 basic target was measured and compared to Colorimetric Characterization Data for Type 1 Printing.

### Method Two

The function of the second testing method was to access color difference to SWOP reference in proofer's default condition with a CMS treatment. A fair average  $\Delta E$  value was expected in this stage.



### 2.1 *ICC profiles preparation and image modification for Method Two*

This portion of Method Two was to generate an ICC output profile for the proofer, EPSON Stylus COLOR 3000 ink jet printer. A SWOP ICC profile was provided by Eastman Kodak to be used as a source profile. Kodak Colorflow output characterization target as TIFF format was printed with the same condition as step 1.2. The target was measured and computed through Kodak Colorflow ProfileEditor software to generate an ICC profile (**Appendix D**). Both ICC profiles were applied to the IT8.7/3 basic target (CMYK<sub>1</sub>) under Photoshop 5.0.2 environment (**Appendix E**). The modified target (CMYK<sub>2</sub>) was saved as a TIFF file.

### 2.2 *To create Test Form II*

Test Form II used the same form as Test Form I. The CMS managed IT8.7/3 basic target (CMYK<sub>2</sub>) from step 2.1 was used instead of the original one (CMYK<sub>1</sub>).

### 2.3 *To make a proof*

The Test Form II was printed under the same manner and settings in Method One (see step 1.2).

## Method Three

The function of the third method was to experiment with color matching by means of color management system and default-to-SWOP amplitude responses' matching. When comparing the  $\Delta E$  results to Method One and Method Two, a better color match was expected with Method Three.

### 3.1 *ICC profiles preparation and image modification for Method Three*

Based on Method One, the color proof was measured with the Gretag SpectroScan system. Densities and Lab values of all four process colors were recorded and compared to the SWOP reference (**Appendix F**). These data represented the printer's amplitude responses and led a refined calibration for Method Three, a default-to-SWOP proofer calibration. "Curves" were generated in Photoshop 5.0.2 environment after the data analysis.

The Kodak Colorflow output characterization target was saved as a TIFF format. Therefore, it was able to be modified to SWOP's amplitude responses with "Curves." The characterization target was then printed via QuarkXPress 3.32. Target was measured and computed through Kodak Colorflow ProfileEditor software to generate another ICC profile.

The same SWOP ICC profile provided by Eastman Kodak as a source profile and the new built ICC profile as an output profile were applied to IT8.7/3 basic target (CMYK<sub>1</sub>) before the amplitude adjustment for EPSON SC3000. The same "Curves" were then applied to the ICC managed IT8.7/3 basic target under Transfer Curve function in Photoshop 5.0.2 environment. The treated IT8.7/3 basic target (CMYK<sub>3</sub>) was saved as another TIFF file.

### 3.2 *To create Test Form III*

Test Form III used the same form as Test Form I and II. The treated IT8.7/3 basic target (CMYK<sub>3</sub>) from step 3.1 was used instead of the others.

### 3.3 *To make a proof*

The Test Form III was printed under the same manner and settings in Method One and method Two (see step 1.2 & 2.3).

### Data collection and analysis

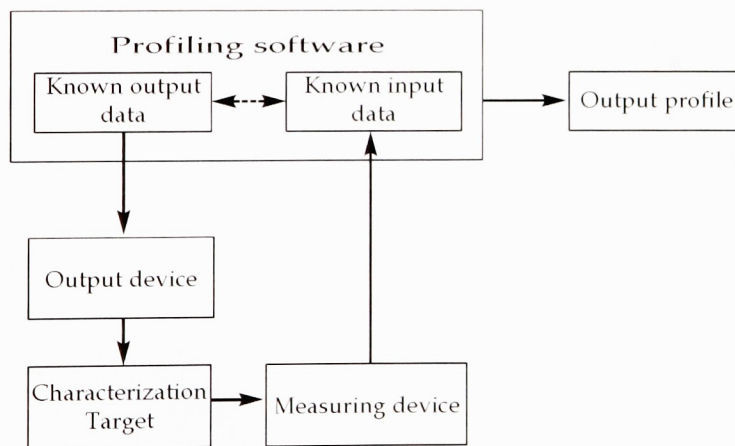
The IT8.7/3 basic target in the sheets printed from all three methods were measured by a Gretag SpectroScan system in CIELAB values. Colorimetric data were measured under the condition of the CIE illuminant D50 and the 2° standard observer (ANSI CGATS .5-1993) with a black backing. The SWOP reference, which the IT8.7/3 has been defined in ANSI CGATS TR 001-1995 in colorimetric terms, was taken as reference. IT8.7/3 basic target containing 182 color patches at all printed proofs were measured and recorded in Microsoft Excel 98. The final color differences were made from the comparison of the reference and the the measured data in  $\Delta E$  terms.

## Chapter 6

### Experiment Results

#### Assessment of Pre-experiment Testing

A profiling software sends a set of known output data (characterization data; CMYK or RGB) to an output device. This printed sample was measured and recorded as a set of known input data (CIELAB). These characterization data, therefore, provide the input to ICC profile creation (see **Figure 14**). Since a color management system builds an output profile mainly based upon one output, the output represents the characteristics of the process as the profile is being used. Therefore, the higher the process consistency is achieved, the better the color management system will perform.



**Figure 14** Workflow of an ICC profile creation

As already mentioned, a color management system builds an output profile based upon the one target output and the profile is built to represent the device characteristics. If the target fades before or while being measured, then the profile will not



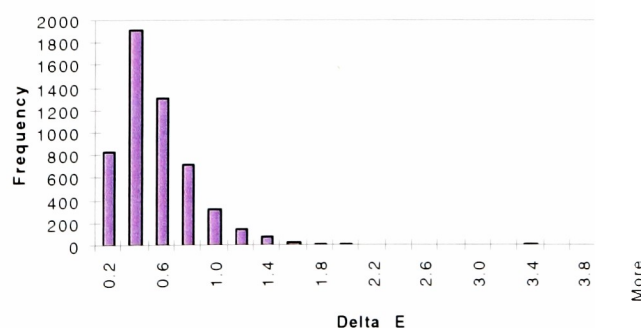
be accurate. In other words, the degree of color fade will directly influence the accuracy of the color management performance.

Therefore, a device consistency and a material stability test were performed to ensure the quality of this thesis study prior to testing the hypotheses. The same ink cartridges and settings were used through the entire study.

### Assessment of EPSON SC3000 Device Consistency

Thirty color samples contained IT8.7/3 basic color characteristic targets (182 patches) were printed by EPSON SC3000 in a month to perform the consistency test. One or two samples were generated from each day. The IT8.7/3 targets of all proofs were immediately measured with a Gretag SpectroScan system right after the proofs were printed. The result were thirty sets of colorimetric data in CIELAB values (D50, 2°) recorded in Microsoft Excel workbook. A reference data set was achieved by averaging the value of  $L^*$ ,  $a^*$ , and  $b^*$  of each color patch of the thirty samples.

From comparing all the thirty samples to the reference respectively, the results were thirty sets of 182  $\Delta E$ s, a total of 5460  $\Delta E$ s. A histogram is shown in **Figure 15**. By averaging the 182  $\Delta E$ s of each sample, there was a result of 30 average  $\Delta E$ s which represent-



**Figure 15** Histogram of Delta E values of 30 EPSON SC3000 printed samples

ed the performance of each sample (see **Table 3** & **Figure 16** on the following page). By doing so, there were 30 standard deviations also derived for each sample (refer to **Appendix G**).

**Table 3** Average Delta Es and standard deviation of 30 EPSON SC3000 printed samples

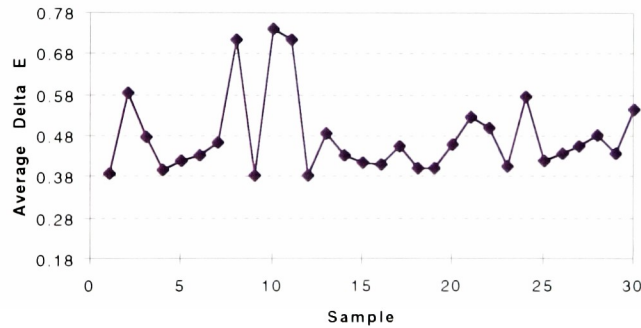
Sample #	1	2	3	4	5	6	7	8	9	10
Average Delta E	0.39	0.59	0.48	0.40	0.42	0.44	0.47	0.72	0.38	0.74
Standard Deviation	0.23	0.33	0.30	0.23	0.18	0.28	0.25	0.77	0.18	0.81

Sample #	11	12	13	14	15	16	17	18	19	20
Average Delta E	0.72	0.39	0.49	0.43	0.42	0.41	0.46	0.40	0.41	0.46
Standard Deviation	0.49	0.25	0.37	0.30	0.23	0.20	0.23	0.27	0.26	0.28

Sample #	21	22	23	24	25	26	27	28	29	30
Average Delta E	0.53	0.50	0.41	0.58	0.42	0.44	0.46	0.49	0.44	0.55
Standard Deviation	0.35	0.30	0.28	0.41	0.23	0.25	0.27	0.27	0.28	0.29



**Figure 16** Average Delta Es over 30 EPSON SC3000 printed samples

Of the 30 samples, there were three (#8, #10, and #11) with sufficiently larger average  $\Delta E$ s or larger standard deviations than the others. Within the three samples, there were 38 patches (6.96% out of 546 patches) which had a  $\Delta E$  of 2 or higher (Max  $\Delta E$  of 4.43). In the remaining twenty-seven samples, there were only five patches (or 0.10%) with a  $\Delta E$  of 2 or higher (Max  $\Delta E$  of 2.65) (refer to **Table 4**). From the general statistics, it actually did not show a significant difference in average  $\Delta E$ s with and without accepting the three samples,

Table 4 General statistics for EPSON SC3000 consistency test

	All 30 Samples	w/o #8, #10 & #11*
<b>Total Patches</b>	5460	4914
<b>Average Delta E</b>	0.48	0.45
<b>Standard Deviation</b>	0.36	0.28
<b>Maximum Delta E</b>	4.43	2.65
<b>Minimum Delta E</b>	0.02	0.01
<b>Patches with Delta E &gt; 1</b>	346	215
<b>Percentage</b>	6.34%	4.38%
<b>Patches with Delta E &gt; 2</b>	42	5
<b>Percentage</b>	0.77%	0.10%

\* The reference of this data analysis to be compared with and then generated delta Es from was by averaging the 27 samples but not the three error samples.

but did significantly in the standard deviations. An average  $\Delta E$  of 0.45 with a standard deviation of 0.28 without taking the three error samples (#8, #10, & #11) into account, and an average  $\Delta E$  of 0.48 with a standard deviation of 0.36 with all thirty samples were established. The average  $\Delta E$  of 0.45 is fairly small comparing any two press runs (which is about 2 to 4).<sup>1</sup> Therefore, the EPSON SC3000 is a very consistent device was concluded. The  $\Delta E$  0.45 was, therefore, taken as a testing criteria of the hypotheses testing.

In order to achieve better process control, it was imperative to verify what the possible causes of the errors could be. It was found that these three color proofs were the first or the second output of the day, and the EPSON SC3000 had a long rest for 24 hours or longer prior to making these proofs. Based on this finding, there was no other output accepted for the thesis study if it was the first or the second print-out of the day.

#### Assessment of EPSON SC3000 Material Stability

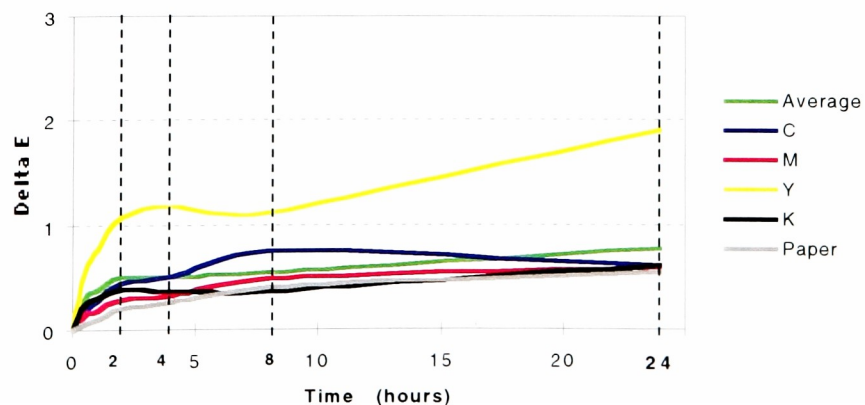
Since colors of an ink jet output rapidly fade as soon as the inks were drawn down to paper, it is imperative to find a period of time which offers a minimal change in color appearance in order to build an accurate profile for EPSON SC3000 (refer to a recom-

mendation by Mr. Wilson Cheung at Dupont). Therefore, there was an output stability test performed. A selected color proof with the IT8.7/3 target was measured seven times in 24 hours (see Table 5). Delta E of the four process colors, paper, and an average (based on all 182 patches of IT8.7/3) were calculated based on the first measurement (refer to Appendix H).

**Table 5** Color stability of EPSON SC3000 output over time (within 24 hours)

Time (hours)	0	0.5	1	2	4	8	24
<b>Average</b>	0	0.31	0.40	0.52	0.51	0.54	0.76
<b>C</b>	0	0.19	0.28	0.45	0.51	0.75	0.60
<b>M</b>	0	0.13	0.18	0.29	0.32	0.49	0.59
<b>Y</b>	0	0.58	0.77	1.08	1.17	1.11	1.90
<b>K</b>	0	0.24	0.30	0.40	0.37	0.36	0.60
<b>Paper</b>	0	0.05	0.10	0.20	0.26	0.40	0.55

From there, a chart with six curves was created and analyzed (see Figure 17 on the following page). There was a sufficient  $\Delta E$  difference found in the first two hours, and a minimal between two to eight hours. This suggested that there should not have any profile built in the first two hours; and any information derived from that period of time was not good for data analysis. However, two to eight hours has appeared to be the best time for taking measurements.



**Figure 17** Color stability of EPSON SC3000 output over time (within 24 hours)

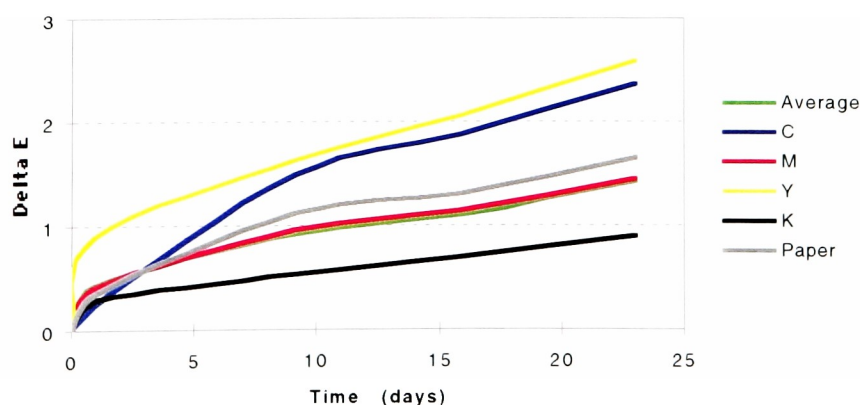


There were two fairly small  $\Delta E$  difference decrement (0.03 & 0.01  $\Delta E$ ) found in black color at four and eight hours after printing. It was small enough to be ignored. This phenomenon will not be discussed in this study.

As tested, an ink jet output fades through time changes. There was an extended stability test with a period of time up to three weeks (typically a proof's life is two to three weeks) performed, recommended by Prof. Joseph Noga at Rochester Institute of Technology, to answer how much the color of the EPSON SC3000 output may fade in its life. A reference was achieved by measuring the IT8.7/3 target of a selected color proof at two hours after printing. From there, this proof was measured at about a day, a week, two weeks, and three weeks. Another set of tables and charts, **Table 6** and **Figure 18**, were established. There was no  $\Delta E$  difference larger than two, within the two week period, but the  $\Delta E$  difference of cyan and yellow became slightly larger than two after the two weeks. However, a 2  $\Delta E$  is considered to be a “just noticeable” difference in the graphic arts industry.

**Table 6** Color stability of EPSON SC3000 output over time (within 23 days)

Time (days)	0	1	9	16	23
Average	0	0.43	0.91	1.10	1.42
C	0	0.24	1.49	1.87	2.38
M	0	0.40	0.97	1.14	1.45
Y	0	0.89	1.63	2.05	2.59
K	0	0.29	0.52	0.68	0.90
Paper	0	0.36	1.13	1.30	1.66



**Figure 18** Color stability of EPSON SC3000 output over time (within three weeks)

## Testing of Hypothesis H1

*Method One* EPSON SC3000 in default condition

*Method Two* EPSON SC3000 in default condition with CMS compensation

In the hypothesis **H1**, the color performance of EPSON SC3000 with and without CMS, under the default condition, were investigated. The null hypothesis was that there is no significant difference between **M1** and **M2** in colorimetric CIELAB  $\Delta E$  values. The  $\Delta E$ s were derived from  $L^*$ ,  $a^*$ , and  $b^*$  values (D50, 2°), between the SWOP reference (ANSI CGATS TR-001-1995 – Type 1 Printing) and EPSON SC3000 color proofs.

Two sets of data which represented the two methods were analyzed (refer to **Appendix I**). A t-Test of the hypothesis that the data from Method One and Method Two belonged to the same distribution was conducted (see **Table 7**). Spot checking of

**Table 7** t-Test: Paired Two Samples (Method One & Method Two) for Means

	<i>Method One</i>	<i>Method Two</i>
Mean	14.62340189	3.625360038
Variance	26.38557017	6.853639535
Observations	182	182
Pearson Correlation	0.273989972	
Hypothesized Mean Difference	0	
df	181	
t Stat	29.17098437	
P(T<=t) one-tail	1.24965E-70	
t Critical one-tail	1.286246061	
P(T<=t) two-tail	2.4993E-70	
t Critical two-tail	1.653315849	

the results showed that a large number of points were significantly different at the > 90% probability level. This showed that the data from the two color proofs actually represented two different populations. Looking at the data, since *t Stat* was positive,

that Method Two did provide smaller  $\Delta E$ s than Method One did. A histogram of the  $\Delta E$  distribution of the two methods is shown in Figure 19.

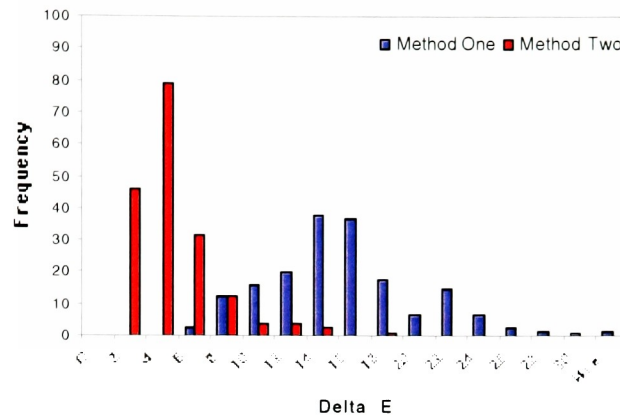


Figure 19 Histogram of Delta E values of Method One & Method Two

Of the two sets of 182  $\Delta E$ s, an average  $\Delta E$  of 14.62 without CMS and an average  $\Delta E$  of 3.63 with CMS were found (see Table 8). There were 179 patches (98.35%) which

Table 8 General statistics of Method One & Method Two

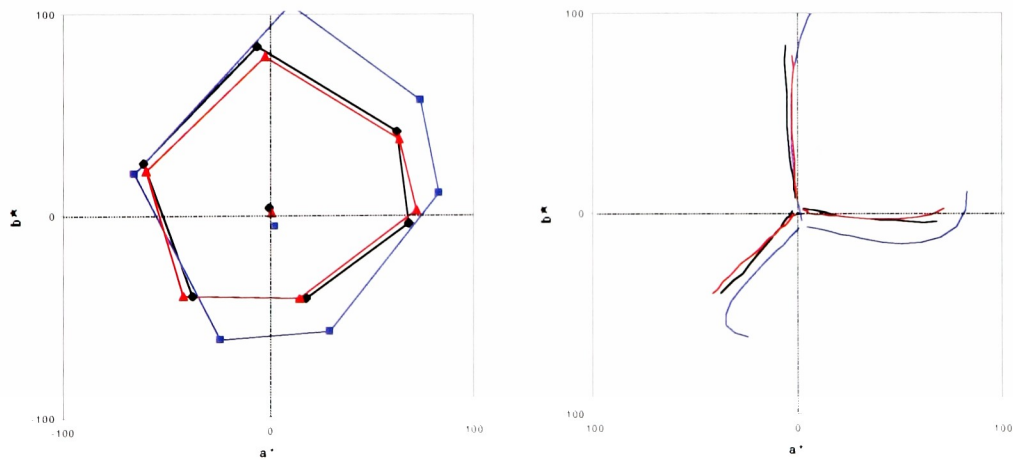
	Method One	Method Two
Total Patches	182	182
Average Delta E	14.62	3.63
Standard Deviation	5.14	2.62
Maximum Delta E	32.88	17.10
Minimum Delta E	4.78	0.49
Patches with Delta E > 6	179	25
Percentage	98.35%	13.74%
Patches with Delta E > 12	130	4
Percentage	71.43%	2.20%

had a 6  $\Delta E$  or higher and 130 patches (71.43%) with a 12  $\Delta E$  or higher (Max 32.88  $\Delta E$ ) from Method One. It was found that Method Two had a total of 25 patches (13.74%) which had a 6  $\Delta E$  or higher and a total of 4 patches (2.20%) with a 12  $\Delta E$  or higher (Max 17.10  $\Delta E$ ). Since the two color proofs actually represented two different populations and

the average  $\Delta E$  difference of 10.99 was greater than the testing criteria 0.45, that Method Two had better proof-to-SWOP agreement than Method One was concluded. Therefore, the null hypothesis **H1** was rejected.

Looking at the  $a^*b^*$  hexagon diagrams in **Figure 20**, the gamut of Method One (EPSON SC3000 in default condition without CMS) was sufficiently larger than the SWOP reference. In other words, the EPSON SC3000 was capable of reproducing SWOP colors within its limit (only 256x256x256 colors for 8-bit color). It was also found that there was significant color shift in the high density area of cyan, magenta, and yellow colors. This situation was improved as CMS was applied. A significant improvement shown in gamut mapping and in color corrections of the three colors was observed.

**Note:** Black represents SWOP reference, blue does of Method One, and red does of Method Two



**Figure 20**  $a^*b^*$  diagrams of SWOP reference, Method One, and Method Two



## Testing of Hypothesis H2

*Method Two* EPSON SC3000 in default condition with CMS compensation

*Method Three* EPSON SC3000 with a refined calibration (to have the amplitude responses calibrated to SWOP) and with CMS compensation

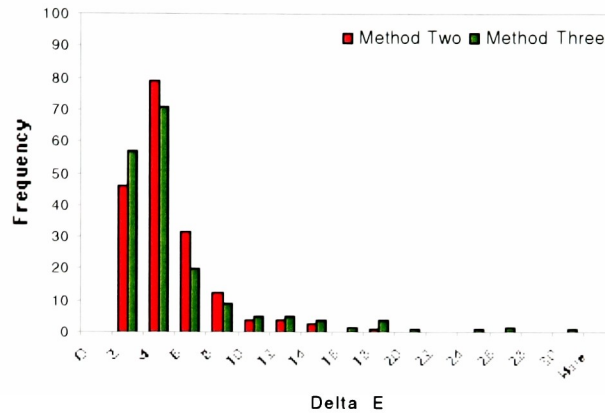
In the hypothesis **H2**, the color performance of EPSON SC3000 managed by CMS under the default condition and under the refined calibration (default-to-SWOP) were investigated. The null hypothesis was that there is no significant difference between **M2** and **M3** in colorimetric CIELAB  $\Delta E$  values. The  $\Delta E$ s were derived from CIELAB  $L^*$ ,  $a^*$ , and  $b^*$  values (D50, 2°), between the SWOP reference (ANSI CGATS TR-001-1995 – Type 1 Printing) and EPSON SC3000 color proofs.

The two sets of data which represented each method were analyzed (refer to **Appendix J**). A t-Test of the hypothesis that the data from using the default proofer calibration and from using a default-to-SWOP calibration, that both the method were ICC based, belonged to the same distribution was conducted (see **Table 9**). Spot checking of the results showed that a large number of points were significantly different at

**Table 9** t-Test: Paired Two Samples (Method Two & Method Three) for Means

	<i>Method Two</i>	<i>Method Three</i>
Mean	3.625360038	4.50660479
Variance	6.853639535	23.27857411
Observations	182	182
Pearson Correlation	0.702098329	
Hypothesized Mean Difference	0	
df	181	
t Stat	-3.376724524	
P(T<=t) one-tail	0.000448929	
t Critical one-tail	1.286246061	
P(T<=t) two-tail	0.000897858	
t Critical two-tail	1.653315849	

the  $> 90\%$  probability level. This showed that the data from the two color proofs actually represented two different populations. Looking at the data, since  $t\ Stat$  was negative, that Method Two did provide smaller  $\Delta E$ s than Method Three did. A histogram of the  $\Delta E$  distribution of the two methods is shown in **Figure 21**.



**Figure 21** Histogram of  $\Delta E$  values Method Two & Method Three

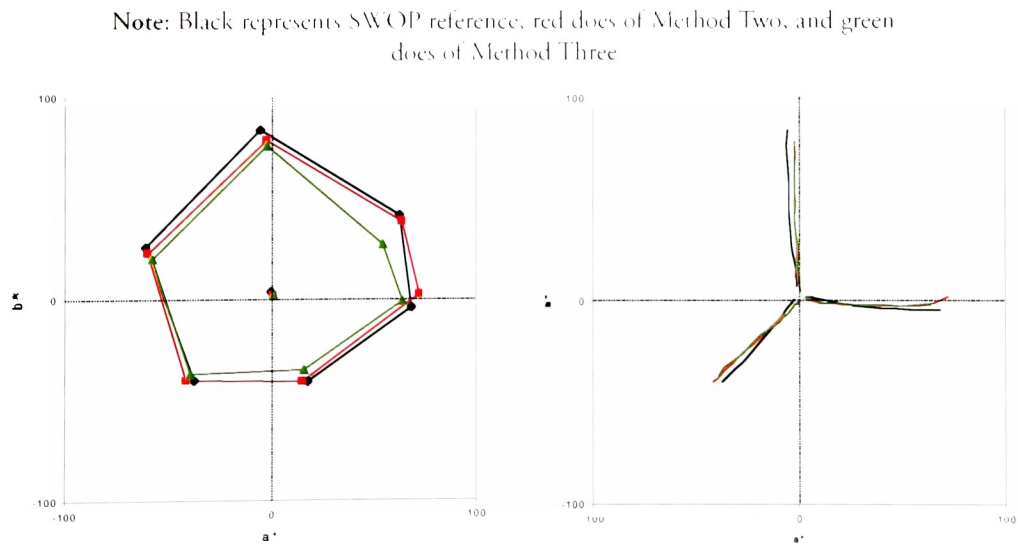
Of the two sets of 182  $\Delta E$ s, an average  $\Delta E$  of 3.63 using the default proof calibration and an average  $\Delta E$  of 4.51 using the default-to-SWOP calibration were found (see **Table 10**). There were 25 patches (13.74%) which had a 6  $\Delta E$  or higher and 4 patches (2.20%) with a 12  $\Delta E$  or higher (Max 17.10  $\Delta E$ ) from Method Two. In Method Three,

**Table 10** General Statistics of Method Two & Method Three

	Method Two	Method Three
<b>Total Patches</b>	182	182
<b>Average Delta E</b>	3.63	4.51
<b>Standard Deviation</b>	2.62	4.82
<b>Maximum Delta E</b>	17.10	28.25
<b>Minimum Delta E</b>	0.49	0.25
<b>Patches with Delta E &gt; 6</b>	25	34
<b>Percentage</b>	13.74%	18.68%
<b>Patches with Delta E &gt; 12</b>	4	15
<b>Percentage</b>	2.20%	8.24%

there were 34 (18.68%) patches with a 6  $\Delta E$  or greater, and 15 patches (8.24%) with a 12  $\Delta E$  or greater (Max 28.25  $\Delta E$ ). Since the average  $\Delta E$  difference 0.88 has been greater than the testing criteria 0.45 and the two color proofs actually represented two different populations, that Method Two had better proof-to-SWOP agreement than Method Three was concluded. Therefore, the null hypothesis **H2** was also rejected.

Looking at the  $a^*b^*$  hexagon diagrams in **Figure 22**, the gamut of both the methods had been closely brought to the SWOP reference via CMS. However, Method Three had shown a slightly smaller gamut than Method Two, and the red of Method Three had a significant reduction in saturation comparing to the other. It was evident that the refined calibration (default-to-SWOP) had made the proofer's gamut smaller prior to making the output, and the red became impossible to be reproduced as expected by magenta and yellow overprint. Besides these findings, the two methods had similar responses in gamut mapping and color correction.

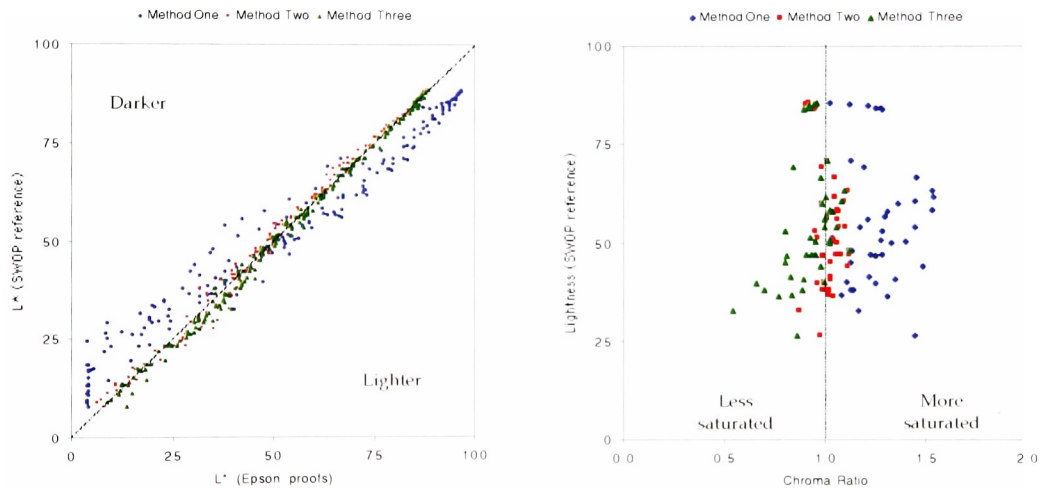


**Figure 22**  $a^*b^*$  diagrams of SWOP reference, Method Two, and Method Three

## Further Finding and Discussion

### Tone Reproduction and Chroma Ratio

The three methods were also analyzed for tone reproduction and chroma ratio against the SWOP reference (see **Figure 23**). All 182 color patches of the IT8.7/3 basic target were used to test for the tone reproduction, however, only C's of 40 or greater (based on the SWOP reference) were sampled for the chroma ratio analysis.<sup>2</sup> The results showed that Method One tended to print lighter in highlight areas and darker in shadow areas. By contrast, both Method Two and Method Three were very accurate throughout the entire section.



**Figure 23** Tone reproduction and chroma ratio chart of Method One, Method Two, and Method Three

From the chroma ratio analysis, it was found that the Epson SC3000 was offering much more saturated colors than the SWOP reference (Method One). Method Two was fairly precise in reproducing C's. By contrast, Method Three favored the less saturated side. This was evidence that the color management system was mapping the colors with L\* as first priority.

### L\*–C\* Diagram

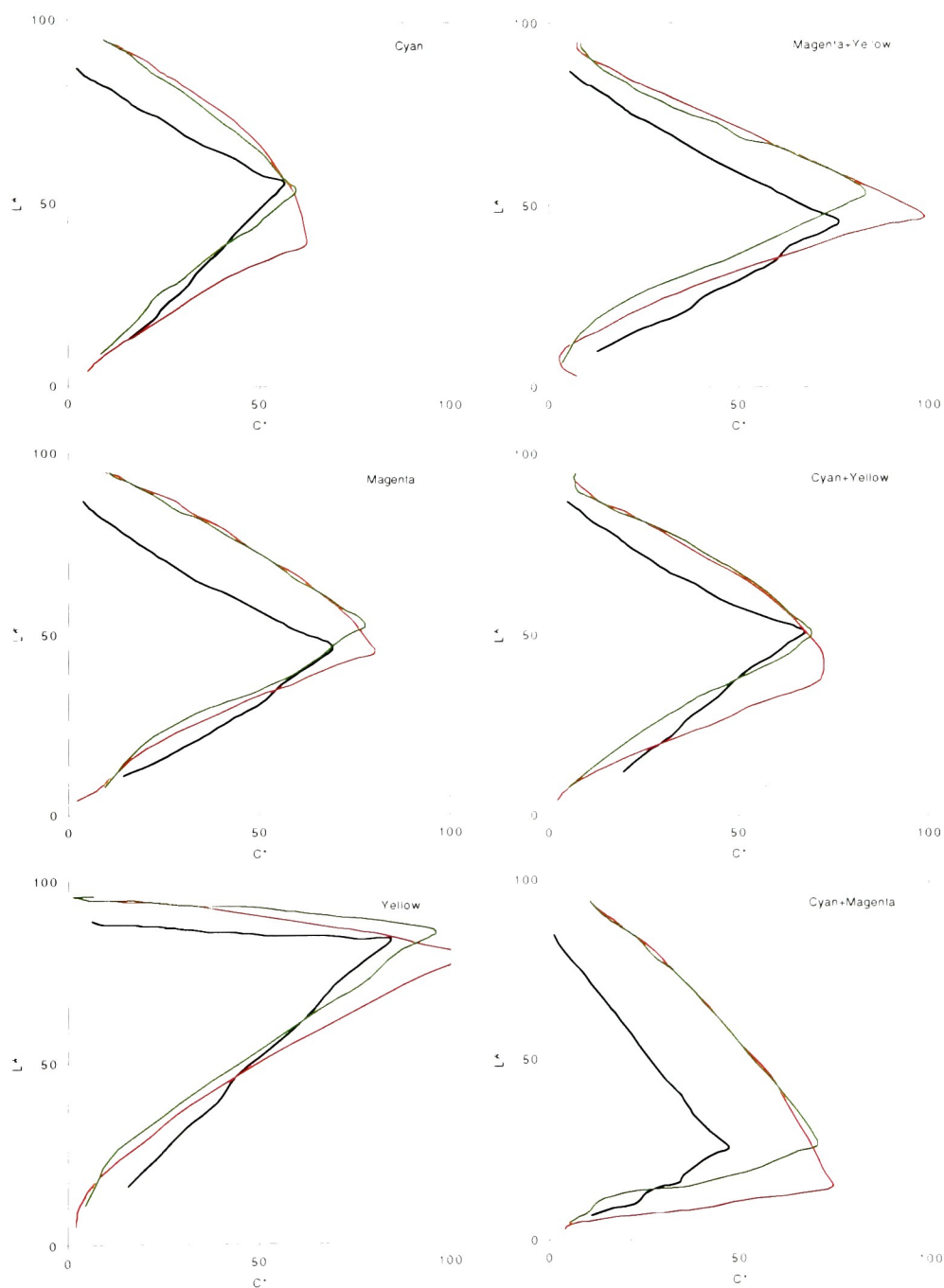
Although the  $a^*b^*$  hexagon diagram (shown in **Figure 20**) illustrates that the Epson SC3000 had larger gamut than the SWOP reference in a two dimensional color space, it does not mean that Epson was capable of reproducing all colors in a three dimensional color space. Therefore,  $L^*–C^*$  slices of RGB and CMY were investigated for another aspect (see **Figure 24**). Beware that the  $L^*–C^*$  diagrams were not generated from measuring actual printed samples, but were simulated with ICC profiles via Photoshop 5.0.2 (refer to **Appendix K**). This method has offered a best estimate of the printable color space of each condition based upon the ICC profiles.

In general, the Epson SC3000 in default condition covers the SWOP reference very well in  $L^*–C^*$  dimension from midtone to highlight. However, there are some problems in mapping the shadow area for magenta, yellow, red, and green. This phenomenon is due to the fact that the Epson SC3000 does not print black, but only cyan, magenta, and yellow for all color images. In other words, the Epson SC3000 rewrite CMYK information to CMY data with its own black-box. Problems arise as the conversion of CMYK to CMY is rendering from highly saturated color with large amount of black over-print. Fortunately, these colors are perceptually the least noticeable colors.

The refined calibration (EPSON SC3000 default-to-SWOP) covers the SWOP reference fine in  $L^*–C^*$  dimension from midtone to highlight. However, it appears to have more problems in mapping shadow areas for all colors than when it is in default condition. Although all the cyan, magenta, and yellow are larger in  $C^*$  than the SWOP reference as they are 100% solid dots, it does not necessarily mean that the three dimensional color space is larger as well. This is also evidence that the  $a^*b^*$  hexagon diagram can only provide two dimensional, but not three dimensional information regarding the color gamut.



**Note:** Black represents  $L^*-C^*$  chart of SWOP reference, red does of Epson SC3000 in default condition, and green does of Epson SC3000 in default-to-SWOP condition



**Figure 24**  $L^*-C^*$  slices for the SWOP reference, Epson SC3000 in default condition, and Epson SC3000 in default-to-SWOP condition

Since the refined calibration reduces the capabilities of reproducing colors from the EPSON SC3000 in default condition, the refined calibration should not go beyond the default condition in  $L^*-C^*$  dimension. Ironically, it does occur as shown in the yellow slice. This is evidence that discrepancy does exist within profiles. As already mentioned, this investigation was mainly based upon the ICC profiles via photoshop 5.02. The results were achieved as a reference for this thesis study, however, the accuracy of each profile does directly influence the result.

## Endnotes for Chapter 6

- <sup>1</sup> Komori, Yoshinori. *The Performance Analysis of Color Management System: Simulation of Colors from Sheetfed Offset Press by Analog and Digital Color Proofer*, Rochester Institute of Technology, Master Thesis, May 1997.
- <sup>2</sup> Stamm, Scott. "An Investigation of Color Tolerance," *TAGA Proceedings*, 1981, pp 156-173.

## Chapter 7

### Summary

The goal of this study was to find an affordable digital color proofer which could provide a good color match to any device. The purpose of this study was to answer whether ICC-based CMS through a refined proofer calibration (amplitude alignment ) with currently available CMS software would help a sufficiently large gamut digital proofer to simulate the SWOP reference (ANSI CGATS TR 001-1995 Type 1 Printing). In other words, the objective of this research was to investigate if there was a significant difference in color performance with and without ICC-based CMS through a calibrated proofer. To test these questions, three methods were proposed:

**Method One**      EPSON SC3000 in default condition

**Method Two**      EPSON SC3000 in default condition with CMS compensation

**Method Three**    EPSON SC3000 with a refined calibration (to have the amplitude responses calibrated to SWOP) and with CMS compensation

The results of the testing methods are shown in **Table 11**.

**Table 11** Result of the three testing methods

Device: EPSON SC3000

Method	Description	Average Delta E
Method One	Default w/o CMS	14.62
Method Two	Default w/ CMS	3.63



The two hypotheses which have been tested were:

### **Hypothesis One**

There is no significant difference between Method One and Method Two when comparing the SWOP reference in colorimetric CIELAB  $\Delta E$  values (D50, 2°).

**REJECTED**

### **Hypothesis Two**

There is no significant difference between Method Two and Method Three when comparing the SWOP reference in colorimetric CIELAB  $\Delta E$  values (D50, 2°).

**REJECTED**

There were 182  $\Delta E$ s derived from each testing method. A total of three sets of 182  $\Delta E$ s were generated for the hypotheses testing. Each of the two sets of data (Method One & Method Two / Method Two & Method Three), which depicted the two methods for the hypothesis testing, were analyzed. The two t-Tests to determine if the two sets of data belong to the same distribution were conducted. Spot checking of the results showed that a large number of points were significantly different at the > 90% probability level for both Hypothesis One and Hypothesis Two. The results showed that the data from the two color proofs actually represented two different populations for both the hypotheses. In other words, there was a significant difference between Method One and Method Two, and between Method Two and Method Three comparing to the SWOP reference in colorimetric CIELAB  $\Delta E$  values (D50, 2°). Therefore, both Hypothesis One and Hypothesis Two were **rejected**.

This study has successfully brought the average delta E inside of 4 between the EPSON color proof and the SWOP reference. This result is attributed to the ANSI CGATS TR 001-1995 Type 1 Printing data set and to the consistent output of the EPSON SC3000. The researcher found that the refined calibration did not reduce the noise within the CMS process but only lessened the amount of colors from its gamut. It was also found

that the CIE  $a^*b^*$  plot was not able to represent the color gamut of any device itself since it could not provide a three-dimension aspect. Findings and conclusions of the thesis study are stated as follows:

1. The EPSON SC3000 is a very stable device (an average  $\Delta E$  of 0.45 with a standard deviation of 0.28) when comparing any two press runs (which has about 2 to 4  $\Delta E$ ).<sup>1</sup>
2. The EPSON SC3000 generates color proofs that fade over time. Color differences become apparent when comparing the first measurement (right after printed) to a period of 24 hours and three weeks, respectively, are 0.76  $\Delta E$  and 1.42  $\Delta E$ . However, these small color differences do not turn the proof into a bad one.<sup>2</sup>
3. Method Two does perform better than Method One. It is evident that CMS with the current available technologies does help a sufficiently large gamut digital proofer simulate the SWOP reference (ANSI CGATS TR 001-1995 Type 1 Printing).
4. Method Three does not perform any better than Method Two. Since only hardware adjustments can change the behavior of the proofer, software adjustments do not compress its gamut but only clip it. In other words, the number of colors is reduced as a digital device is being calibrated digitally.
5. CMS is very accurate in tone reproduction. In contrast, this may cause loss of saturation if one color (yellow for instance) to be reproduced is outside of the device gamut and is high in  $L^*$  value.
6. A two dimensional  $a^*b^*$  plot diagram can not represent the gamut of a device. While the solid ink density of the adjusted CMY showed larger  $a^*b^*$  plot in the proofer, it does not assure that the  $C^*$  of these inks remains to be larger as  $L^*$  decreases. In other words, a proofer with a wider  $a^*b^*$  plot than a printer does not necessarily have a larger gamut slice in the  $L^*C^*$  dimension.

## Recommendations for Further Study

(1)  *$\Delta E$  stemmed from device limitation*  $L^*C^*$  plots must be used to complement solid ink densities and  $a^* b^*$  in determining color gamut capabilities of a device. In this study, the EPSON SC3000 printer did provide a good colorimetric matching (Delta E of 3.6) to the SWOP reference (ANSI CGATS TR 001-1995 Type 1 Printing). Most off-target colors (which have Delta E of 6 and greater) were from those highly saturated colors (cyan, magenta, and yellow) over-printed with black, especially with 70% and 100% black. These off-target colors were not due to gamut mapping, but to the device limitations, which have been stated earlier in this chapter. A device with a larger color gamut, in all colorimetric dimensions, should be used to further reduce  $\Delta E$ s.

(2)  *$\Delta E$  stemmed from gamut mapping* Gamut mapping plays an important role within a color management system. Since a color management system converts a color from one color space to another, the performance of it depends on how well the gamut mapping is performed through the CMS process. During this thesis study three SWOP profiles were tested for the best result. It was found that most profiling software used lightness as the first priority for gamut mapping when a profile was built. This has led to some problems when attempting reproducing a color from outside of the color gamut. The result was a loss of chromaticity. To eliminate these problems and to emphasize profile accuracy, new methods should be developed for the next generation of CMS software to further reduce  $\Delta E$ s.

(3) *Extending the study to typical digital proofing practices* ICC-based color management system uses CIELAB values for profile generation and color conversion. Since the CIELAB system interprets a color into colorimetric readings based on a series of human visual tests, it does not ensure that the color transformation achieved by ICC-based CMS is correlated to perceptual judgments. An experiment to verify the correlation between colorimetric and perceptual matching should be conducted to provide additional data for analysis.

## Endnotes for Chapter 7

<sup>1</sup> Komori, Yoshinori. *The Performance Analysis of Color Management System: Simulation of Colors from Sheetfed Offset Press by Analog and Digital Color Proofer*, Rochester Institute of Technology, Master Thesis, May 1997.

Stamm, Scott. "An Investigation of Color Tolerance," *IAGI Proceedings*, 1981, pp 156-173.

## Bibliography

- <sup>1</sup> “3M Rainbow Color Proofing System,” *3M Co.*, 1995.
- <sup>2</sup> “All about ColorSync 2.0,” Apple Inc. 1995.
- <sup>3</sup> “Color Drive 1.5 User’s Manual,” *Paton Inc.*, 1996.
- <sup>4</sup> “Color management: focus on ICC standard,” *The Seybold Report on Publishing Systems*, Seybold Publications Inc. Oct. 26, 1994, vol. 24, no. 3, pp 18-26
- <sup>5</sup> “ColorSync 2.0 Photoshop Plug-In Modules 1.3 Read Me,” Apple Inc. 1996.
- <sup>6</sup> “International Color Consortium Profile Format,” Version 3.01, Boston, 1995.
- <sup>7</sup> “Who’s Who in Printing and Publishing Industry Standards,” NPES The Association for Suppliers of Printing and Publishing Technologies.
- <sup>8</sup> *ANSI - IT8.7/3 -1993 - Graphic technology - Input data for characterization of 4-color process printing.*
- <sup>9</sup> *ANSI - IT8.8, Graphic technology - Prepress Digital Data Exchange - Tag Image File Format for Image Technology (TIFF/IT.)*
- <sup>10</sup> *ANSI CGATS .4-1993 - Graphic technology - Graphic arts reflection densitometry measurements - Terminology, equations, image elements and procedures.*
- <sup>11</sup> *ANSI CGATS .5-1993 - Graphic technology - Spectral measurement and colorimetric computation for graphic arts images.*
- <sup>12</sup> *ANSI CGATS .6-1995 - Graphic technology - Specifications for graphic arts printing - Type 1.*



- <sup>15</sup> *ANSI CGATS TR 001-1995 - Graphic Technology - Color Characterization Data for Type 1 Printing*, an ANSI Technical report.
- <sup>16</sup> *ISO/DIS 12640 - Graphic technology - Prepress digital data exchange - Standard colour image data (SCID)*, ISO 1995.
- <sup>17</sup> *SWOP - Specifications Web Offset Publications 1993*, SWOP Inc.
- <sup>18</sup> Adams, M. Richard and Weisberg, Joshua B. "The GATF Practical Guide to Color Management," *GATF*, 1998.
- <sup>19</sup> *Adobe Photoshop User Guide Version 3.0 for Macintosh*, Adobe.
- <sup>20</sup> Billmeyer and Saltzman. *Principles of Color Technology*, A Wiley-Interscience Publication.
- <sup>21</sup> Blessing, Rose. "The Numbers Game," *Publishing & Production Executive*, July 1995.
- <sup>22</sup> Bruno, H. Michael. *Principles of Color Proofing*, pp 38-42, 106-109.
- <sup>23</sup> Prof. Chung, Robert and Compton, John, "A Colorimetric Method For Visualizing and Determining Color Tolerances of Printed Colors," *TAGA Proceedings*, 1991, pp 119-129.
- <sup>24</sup> Prof. Chung, Robert. "Calibrating a gravure Process for Quality," GAA Annual Convention, Norfolk, VA, April 30, 1995.
- <sup>25</sup> Prof. Chung, Robert and Kuo, Shih-Lung, "Color Matching with ICC Profiles—Take One," Rochester Institute of Technology, 1996.
- <sup>26</sup> Prof. Chung, Robert and Li-yi Ma, "Press Performance Comparison Between AM and FM Screening," *TAGA Proceedings*, 1996, pp 321-328.
- <sup>27</sup> Prof. Chung, Robert. "Managing Color for Consistent Results from Scan to Print," *Rochester Institute of Technology*.

- <sup>26</sup> Field, Gary. *Color and Its Reproduction*, Graphic Arts Technical Foundation, 1986.
- <sup>27</sup> Green, Phil. "Understanding Digital Color," *GATF*, 1995.
- <sup>28</sup> Kieran, Michael. "Color Management," *Understanding Desktop Color 2nd*, Michael Kieran. 1994.
- <sup>29</sup> Komori, Yoshinori. *The Performance Analysis of Color Management System: Simulation of Colors from Sheetfed Offset Press by Analog and Digital Color Proofer*, Rochester Institute of Technology, Master Thesis, May 1997.
- <sup>30</sup> Long, John W., "Specifications and Tolerances for Publication Press Proofing," *TAGA Proceedings*, 1995, pp 579-597.
- <sup>31</sup> *Manual for Standardization of the Offset Printing Process*, BVD/FORGRA, Wiesbaden, 1992.
- <sup>32</sup> McDowell, David Q. and Taggi, Arthur J., "Characterization of SWOP Printing," *TAGA Proceedings*, 1995, pp 598-606.
- <sup>33</sup> Rizzo, John and Clark, K. Daniel. "How Color Matching Works," *How Macs Work*, Ziff-Davis Press.1993, pp 208-209.
- <sup>34</sup> Schläpfer and Widmer, "How to Test a Color Management System," EMPA/UGRA St. Gallen, Switzerland.
- <sup>35</sup> Stamm, Scott. "An Investigation of Color Tolerance," *TAGA Proceedings*.1981, pp 156-173.
- <sup>36</sup> Yule, J.A.C., *Principles of Color Reproduction*, NY, John Wiley & son, 1967.

## Appendix A

Output date & time: \_\_\_\_\_

IT8.7/3 Basic Color  
Characterization Target

IT8.7/3 Basic Color Characterization Target (182 color patches)

Application: QuarkXPress 3.32

Printer: EPSON Stylus COLOR 3000

Printer Driver: EPSON StylusRIP

Paper: Dupont/Epson Commercial

Proofing Paper

Page Setup/Resolution: 1440 dpi

Print/Options: PQ Glossy paper 1440 dpi

Image: IT8.7/3

Source profile: \_\_\_\_\_

Output profile: \_\_\_\_\_

Rendering intent: \_\_\_\_\_

## Appendix B



## Printing from a Macintosh with EPSON Stylus COLOR 3000

(12/01/98)

Although the EPSON SC3000 uses 4-color CMYK ink cartridges, it is actually a CMY 3-color printer. Black is only to be used for monochrome printing. If a CMYK or a RGB image is sent to the printer, the data is interpreted by only 3-color CMY inks on substrate (See EPSON SC3000 User's Guide 2-9 and C-1.)

### Specifications:

**Serial Interface Connector** 8-pin mini-circular connector

**Printing Method** On-demand ink jet

**Nozzle configuration** Monochrome (black) 128 nozzles; Color (cyan, magenta, yellow) 192 nozzles, 64 nozzles of each color

**Resolution** Maximum 1440 dpi x 720 dpi (horizontally x vertically) with special coated ink jet paper

**Control code** ESC/P2 and expanded raster graphics code; IBM XL24E

**Input buffer** 64KB

**Paper size** Up to A2 (420x594 mm)

### Print Drivers:

There are two different print drivers included in the EPSON STYLUS 3000 package. One is a non-PostScript EPSON driver. The other is a Postscript-based EPSON StylusRIP driver. Basically, most print jobs can be done with either print drivers. However, EPSON recommends use of StylusRIP if printing placed or imported EPS files within a page layout program, printing from complex PostScript-based drawing and publishing application (such as CorelDRAW, Adobe Illustrator, and QuarkXpress), and matching PANTONE spot color. For all other printing applications, especially photography, use of the standard, non-PostScript EPSON driver is preferred.

Since many options can be chosen from print drivers, certain combinations will cause problems. Two situations have to be avoid: 1. Never print a RGB image as an EPS format within a page layout program, e.g. QuarkXPress, in combination with EPSON standard driver. 2. Never print a RGB image in Photoshop as "Print in CMY" is selected in Print window, if EPSON standard driver is in use.

### EPSON Media Type and Inks:

The EPSON SC3000 can print on just about any kind of paper, however, it provides best results on EPSON's specially coated ink jet paper. There is a number of choices from a variety of EPSON media, ranging from glossy paper and transparencies to iron-on transfer paper and canvas cloth. In addition, EPSON printer's versatile feeding options make almost any size or format of media possible to be printed, including single sheets (up to A2), continuous paper, and roll paper for banners and signs.

Media Name	Size	Cost
360 dpi Ink Jet Paper	Letter, A4, Super A3/B	
High Quality Ink Jet Paper	Letter, A4	
Photo Quality Ink Jet Paper	Letter, A4, Legal, B, Super A3/B, A2	\$13.99/100 sh. (Letter)
Photo Quality Glossy Paper	Letter, A4, Super A3/B, A2	\$12.99/20 sh. (Letter)
Photo Quality Glossy Film	Letter, A4, A6, B, Super A3/B	
Ink Jet Transparencies	Letter, A4	
Photo Quality Ink Jet Cards	A6, 8 x 10	
Iron-On Transfer Paper	Letter, Super A3/B	
Photo Quality Self Adhesive Sheets	A4	
Photo Quality Banner Paper	A2 x 15m roll (16.5 inches x 49.2 ft)	
Ink Jet Canvas Cloth	A2 x 3m roll (16.5 inches x 9.8 ft)	
Ink Jet Back Light Film		

EPSON SC3000 prints about 2100 color pages, or 3800 monochrome (black) pages in A4 (ISO/IEC 10561 Letter Pattern at 360 dpi.) The print capacity may vary, depending on how often you clean the print head. Only clean print heads when printed image is unexpectedly light or faint (See EPSON SC3000 User's Guide 6-1 for details), and when precise color matching is performed but printer hasn't been run for more than 12 hours. Replace ink cartridges as an ink out light flashes on printer's control panel.

- Important:**
1. Make sure paper is loaded printable side down.
  2. Once an ink cartridge is removed from printer, it becomes unusable and cannot be reinstalled.

### Printing with EPSON Non-Postscript Standard Driver:

0. Select **Remote Only** from Apple Talk.
1. Turn on the printer prior starting-up the computer.
2. Start the application, e.g. Photoshop, and create a document.
3. Open the **Chooser** in the Apple menu, click the EPSON Stylus icon and click the icon for the port to be used. *Click Inactive to turn off AppleTalk if printer port is selected (Figure 1.)*

Select SC 3000, then click the icon for the port to be used in the box on the right. *Click Inactive to turn off AppleTalk and printer port selected.*

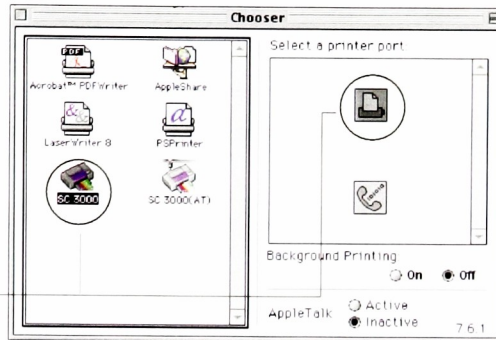


Figure 1. Chooser window

4. Choose **Page Setup** from File menu. Make sure that paper size and paper source are in correct setup. Also check if the other options, e.g. resolution, are in desired setup. Click OK to continue (Figure 2.)

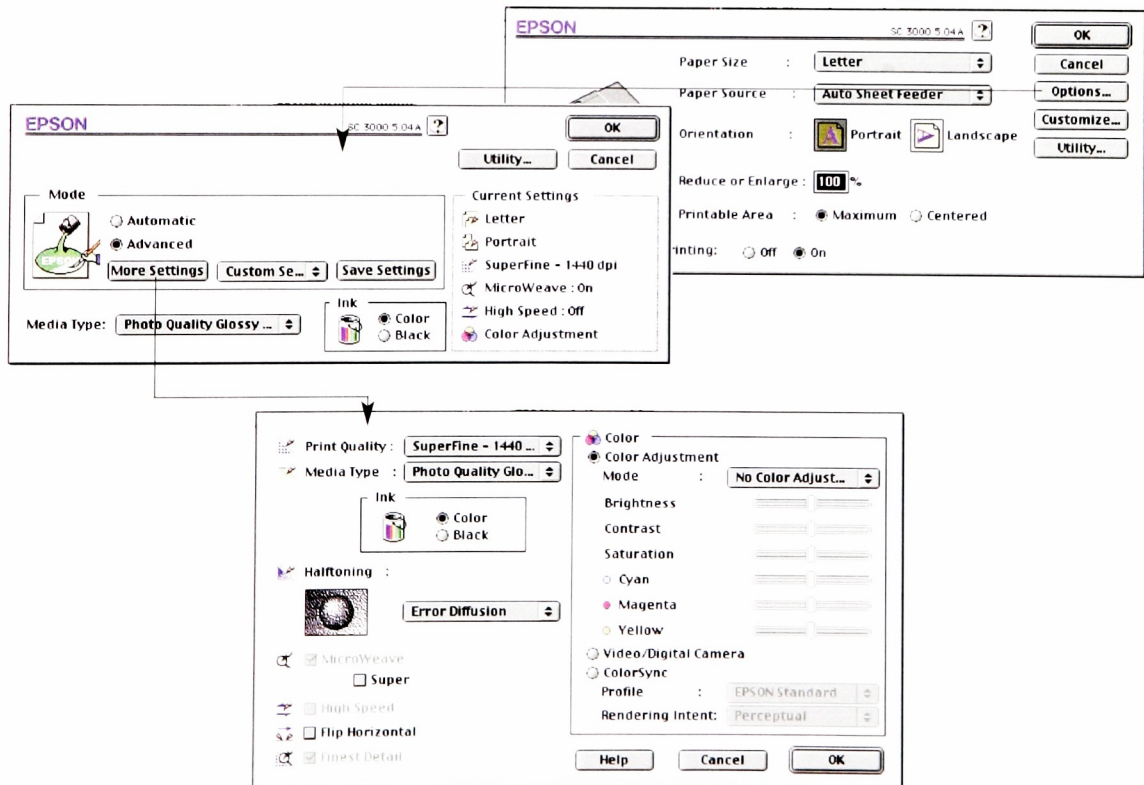
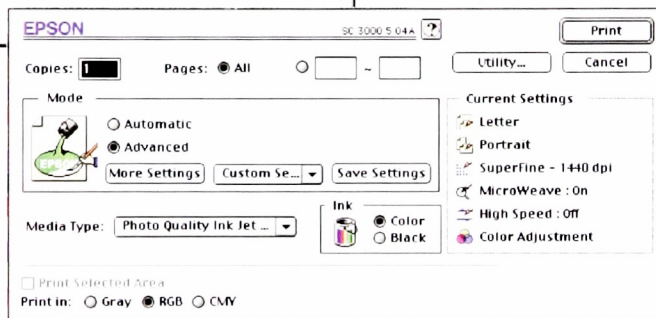
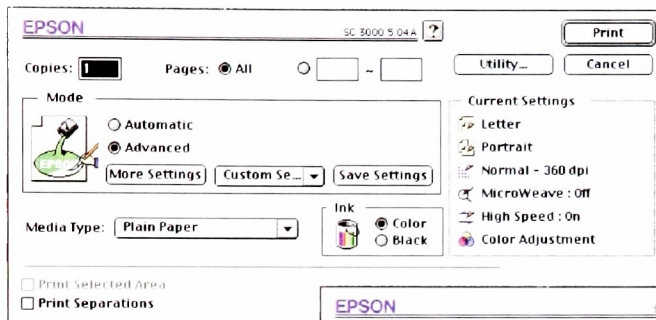


Figure 2. Page Setup and other options windows

5. Choose **Print** from the File menu. Notice that the appearance of “Print” windows are slightly different from each other as a CMYK or a RGB image is to be printed. There is an extra option “Print in: Gray, RGB, and CMY” if a RGB image is chosen to be printed. **Be aware, never print a RGB image in CMY (Figure 3.)**

Window shown below illustrates as a CMYK image is to be printed in Photoshop.



Window shown above illustrates as a RGB image is to be printed in Photoshop.

Figure 3. Print windows

6. Click **Print**.

**P.S.** There is another Non-PostScript print driver called **SC3000 (AT)** included in the package. It is for network printing, and requires an optional interface board: either the LocalTalk board or the Ethernet board. It functions about the same as the standard driver but for network printing. (See EPSON SC3000 User's Guide A-1.)



### Printing with EPSON StylusRIP (PostScript) Driver:

0. Select **Remote Only** from **Apple Talk**.
1. Turn on the printer prior starting-up the computer.
2. Start the StylusRIP software and leave it active until job is done.
3. Open the **Chooser** in the Apple menu, click the **PSPinter** icon and select the **StylusRIP** server listed in the box on the right. *Make sure AppleTalk is active* (Figure 4.)

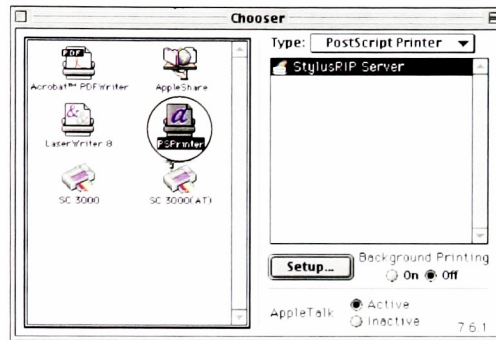


Figure 4. Chooser window

4. Open an application, QuarkXPress as instance in this article, and open a document to be printed.
5. Set the **Page Setup** options and click **OK** (refer to Figure 5. which illustrated in the following page.)
6. Select **Print** and set the **Print Options** (See Figure 5.) Click **Print**.



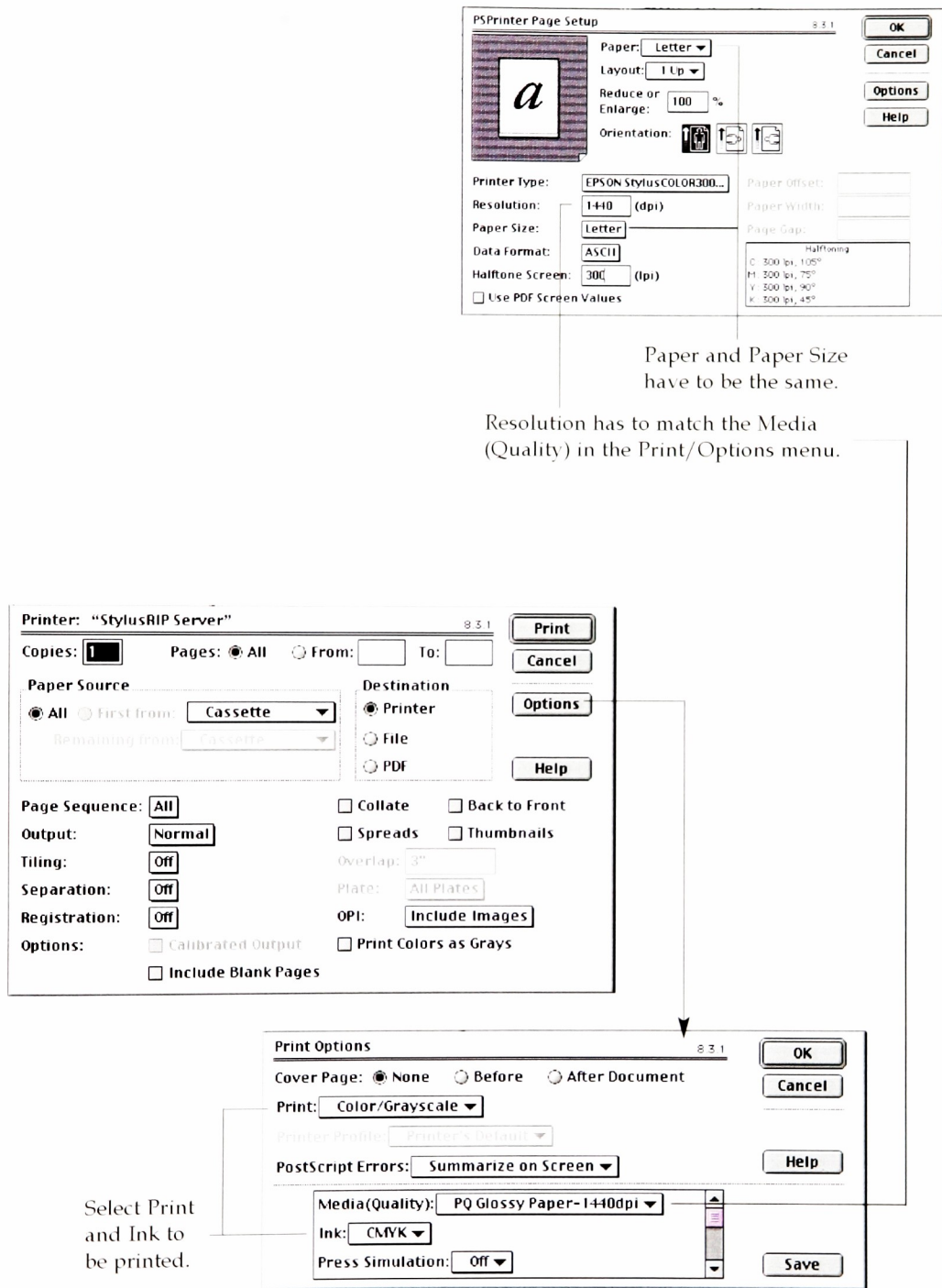


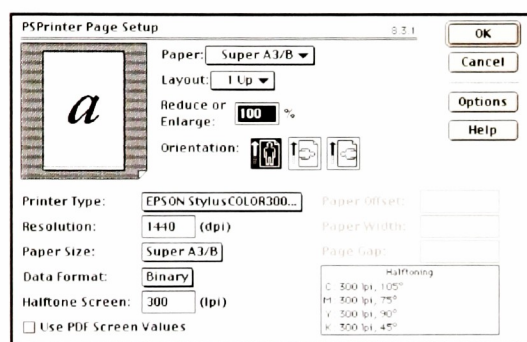
Figure 5. Page Setup, Print and Options windows.

## Appendix C

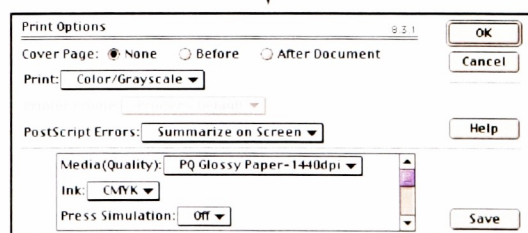
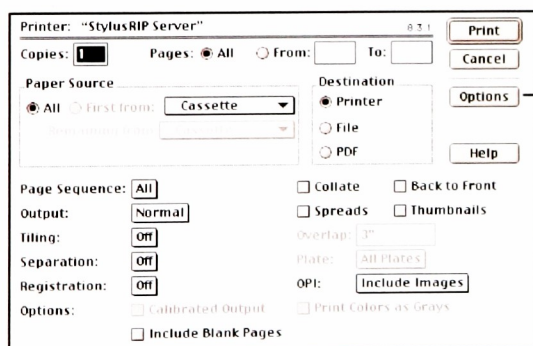
## EPSON Stylus COLOR 3000 Printer Settings

The printer settings of Epson SC3000 for the thesis study is illustrated as below:

### File/Page Setup...



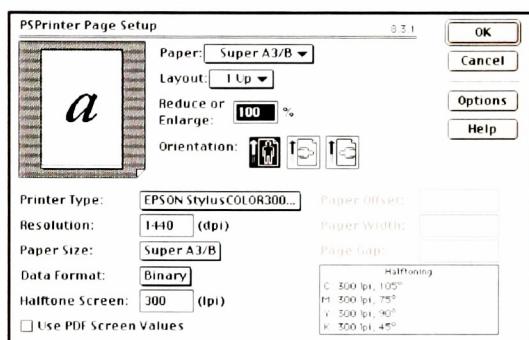
### File/Print...



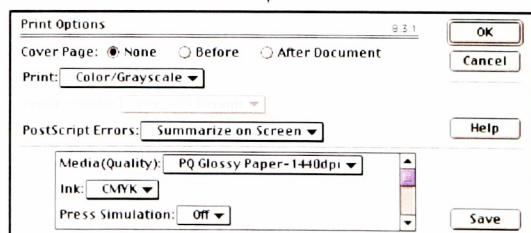
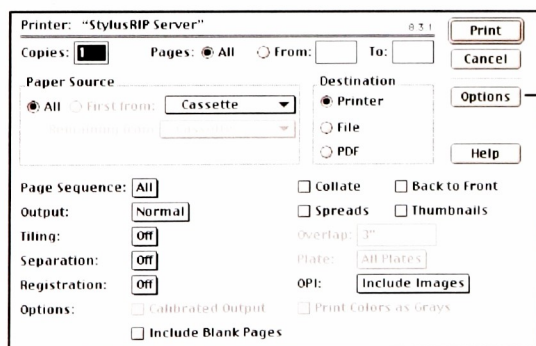
## EPSON Stylus COLOR 3000 Printer Settings

The printer settings of Epson SC3000 for the thesis study is illustrated as below:

### File/Page Setup...



### File/Print...



## Appendix D



## **To Build ICC Profiles with Kodak Colorflow ProfileEditor** (1/13/99)

Kodak Colorflow Profile Editor creates and tunes monitor, input, and output profiles, and saves profiles as ICC profiles or POSTSCRIPT level 2 language CRDs. It evaluates color profiles using wizard-based profile analysis and KODAK Color Evaluation targets.

### **System Requirements**

- Color monitor with a minimum 16-bit (Thousands Color) display board; or 24-bit (Million Color) color display recommended for visual tuning
- 90MB hard disk space required for full installation with all options
- CD ROM drive
- Power PC with minimum 64 MB RAM, 128MB RAM is recommended for Macintosh; Computer compatible with IBM computer with Pentium processor or higher for PC
- Mac OS 7.5.3 or higher; Microsoft Windows 95 or higher for PC

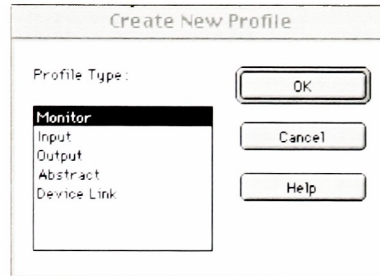
### **Preparation Prior to Getting Started**

- To install profile Editor software.
- To have a colorimeter, KODAK Q-60 and evaluation targets ready for profiling and profile tuning.
- Make sure there is a controlled, consistent viewing environment.

## 0. To Launch Kodak Profile Editor and Ready for Building a Profile

0.1 Start Profile Editor.

0.2 Select **File/New**. The Create New Profile dialog box appears.

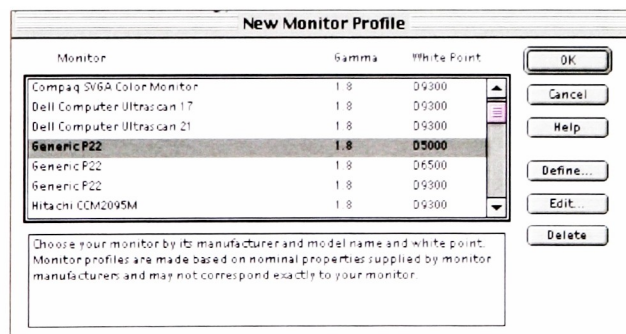


0.3 Select **Monitor**, **Input** or **Output** and click **OK**.

## 1. To Build a Monitor Profile

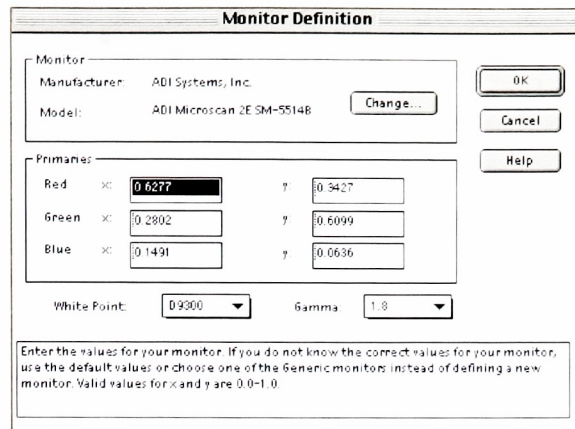
Before building a monitor profile, make sure that monitor is calibrated, is warmed up as recommended, and the white point is set to the standard (typically D50).

1.1 Select **Monitor** and click **OK**. An New Monitor Profile dialog box appears.



When building a monitor profile with Profile Editor, it is based on manufacturer, white point, and gamma of the monitor. These technical specifications are available from the monitor's manufacturer.

The Profile Editor software provides a list of descriptions. From the list, select one that matches - or is closest to - the monitor description. Then change the values for gamma, primaries, and white point if needed. Click **OK** to continue.



**Monitor Definition**

Monitor

Manufacturer: ADI Systems, Inc. Change...

Model: ADI Microscan 2E SM-55148 Change...

OK Cancel Help

Primaries

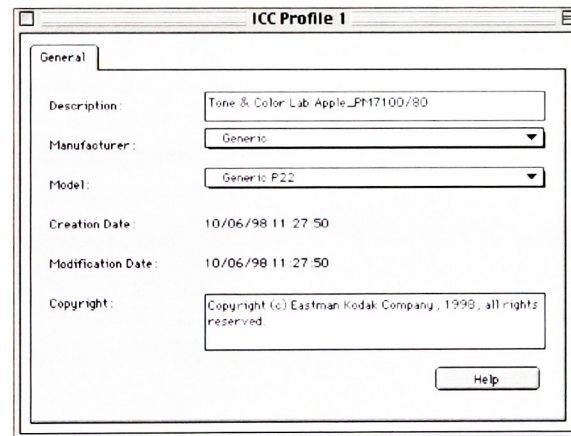
Red	x:	0.6277	y:	0.3427
Green	x:	0.2802	y:	0.6099
Blue	x:	0.1491	y:	0.0636

White Point: D5000 Gamma: 1.8

Enter the values for your monitor. If you do not know the correct values for your monitor, use the default values or choose one of the Generic monitors instead of defining a new monitor. Valid values for x and y are 0.0-1.0.

Select the monitor if it is listed, then click **OK**. If there is no preferred monitor description available from the list, select the **Generic P22** entry with the correct white point and click **OK**.

1.2 A profile window appears with the default name ICC Profile1. The manufacturer and model fields are filled in.



**ICC Profile 1**

General

Description: Tone & Color Lab Apple\_P17100/80

Manufacturer: Generic

Model: Generic P22

Creation Date: 10/06/98 11:27:50

Modification Date: 10/06/98 11:27:50

Copyright: Copyright (c) Eastman Kodak Company, 1998, all rights reserved.

Help

1.3 Type a description for the profile.

1.4 Select **File/Save** and save the profile in **System Folder/ColorSync Profiles** (Macintosh computer with ColorSync 2.5).

## 2. To Build an Input Profile

Before building an Input profile, make sure that:

- the monitor has been characterized, and there is a monitor profile created.
- the scanner is powered on, warmed up, and calibrated according to manufacturer's specifications.
- the scanner is capable of producing consistent scan; contact vendor if the results are not as expected.

2.1 There are two Q-60 IT8 Targets included in the Profile Editor software package (one is a 35mm slide on EKTACHROME film and the other is a 5x7 print on EKTACOLOR paper). Select a Q-60 target which matches the typical work.

2.2 Mount the target so it produces a squared, right-reading, right-side-up image.

2.3 Start the scanner application.

2.4. **Important:** Turn **off** any automatic exposure settings.

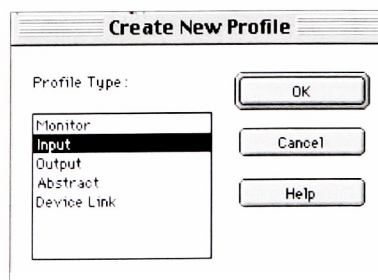
2.5 set the image size to **1** to **2** MB.

2.6 Set the film-type options.

2.7 Scan the Q-60 target, and then save the scanned target file as TIFF format.

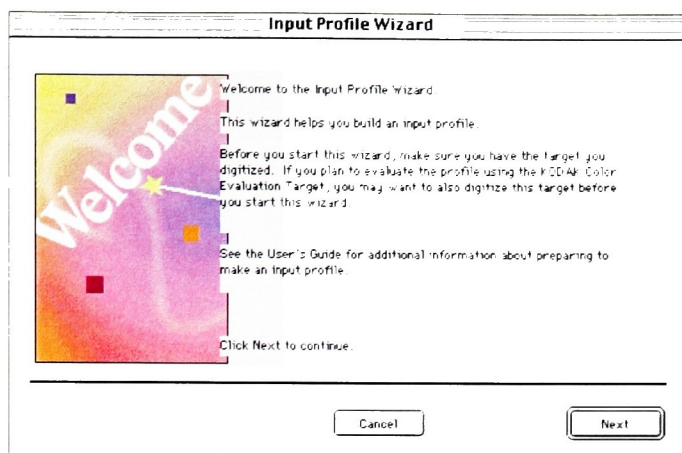
2.8 Make a note of the scanner settings and description (for example, the setup's gray balance and emulsion type).

2.9 Start Profile Editor.



2.10 Select **File/New**. The Create New Profile dialog box appears.

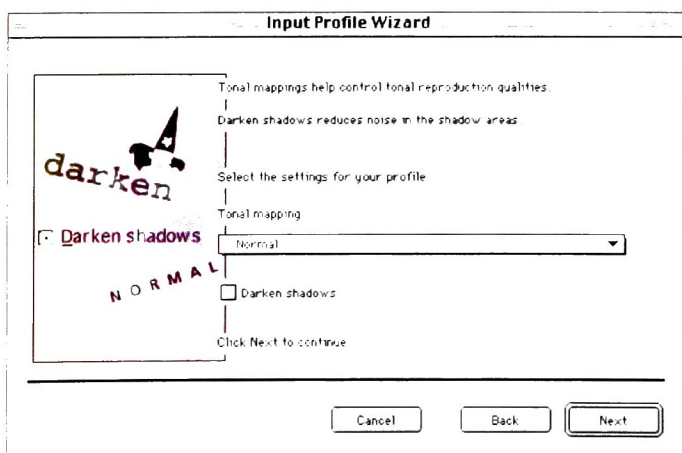
2.11 Select **Input** and click **OK**. The Input Wizard appears.



2.12 Follow the wizard's prompts and respond appropriately, an advanced Tonal Mapping pull-down bar appears with four options as shown below:

- **Normal** – Brighten with contrast
- **Lighten** – Reproduce under-exposed transparencies and low-key reflective prints.
- **Darken** – Reproduce over-exposed transparencies and high-key reflective prints.
- **Reduce Contrast** – Capture as much of the original as possible.

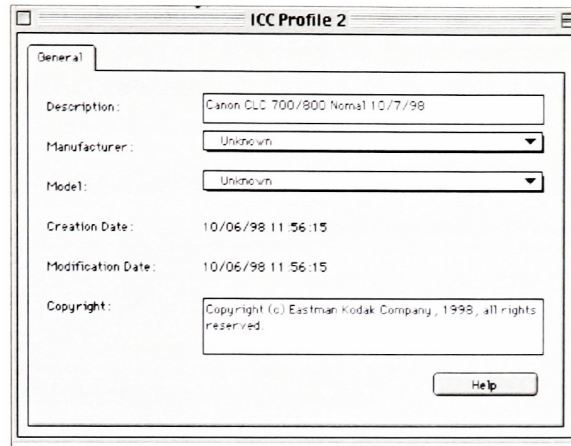
There is also a **Darken Shadows** check box to compensate for artifacts introduced by scanners that have problems with shadows.



Click **Next** to continue.



2.13 Click **Finish** when it is done, a profile window appears with the default name ICC profilen. Edit the default Description. Choose a manufacturer and Model or select **Other** and type as preferred.



2.14 Select **File/Save** and save the profile in **System Folder/ColorSync Profiles** (Macintosh computer with ColorSync 2.5.)

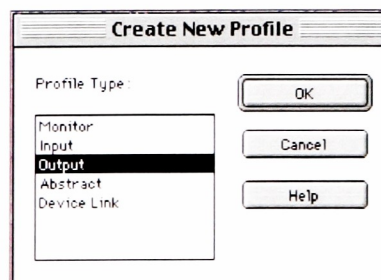
### 3. To Build an Output Profile

Before building an output profile, make sure that:

- the monitor and input device are characterized, and there is a monitor profile and a input profile created.
- the output device is powered on, warmed up, and calibrated according to manufacturer's specifications.
- the output device is capable of producing consistent output; contact vendor if the results are not as expected.

3.1 Start Profile Editor.

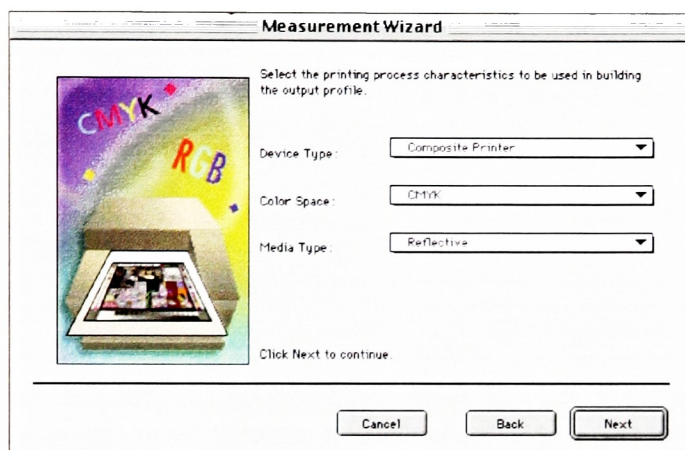
3.2 Choose **File/New**. The Create New Profile dialog box appears.



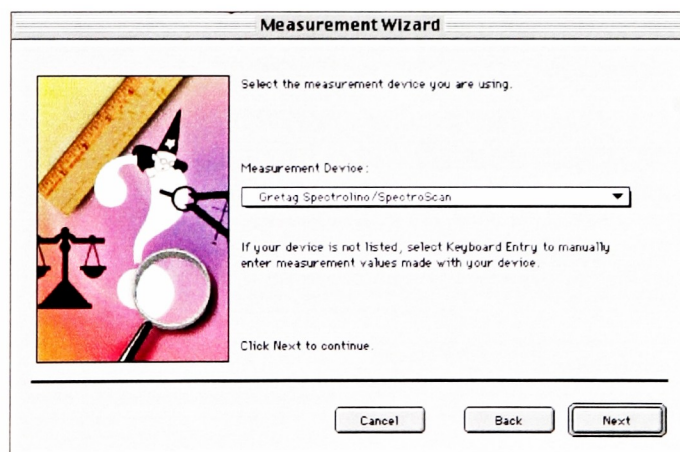
3.3 Select **Output** and click **OK**. The Measurement Wizard appears.

3.4 From this point, follow the wizard's prompts and respond appropriately.

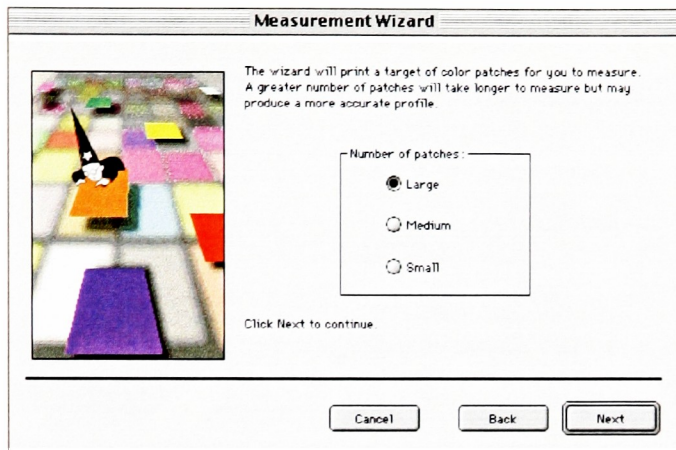
3.4.1 There are three options in Device Type: Composite Printer, Separation Printer, and Film Recorder; and CMYK or RGB options in Color Spaces depending on the Device Type selected. Based on the other two options, either Reflective Coated, Reflective Uncoated and Transparent also has to be selected in Media Type.



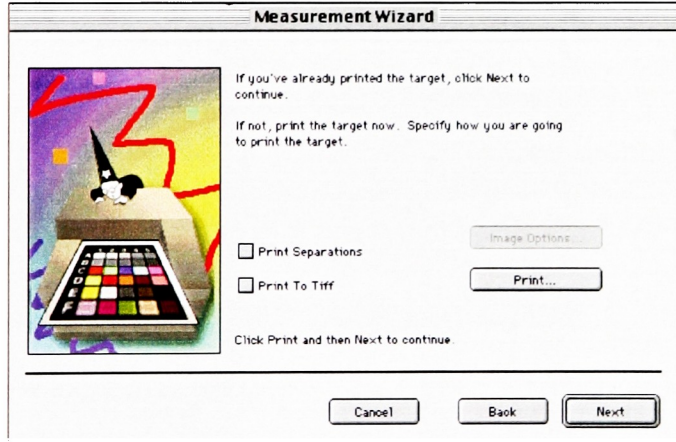
3.4.2 Select the measurement device being using.



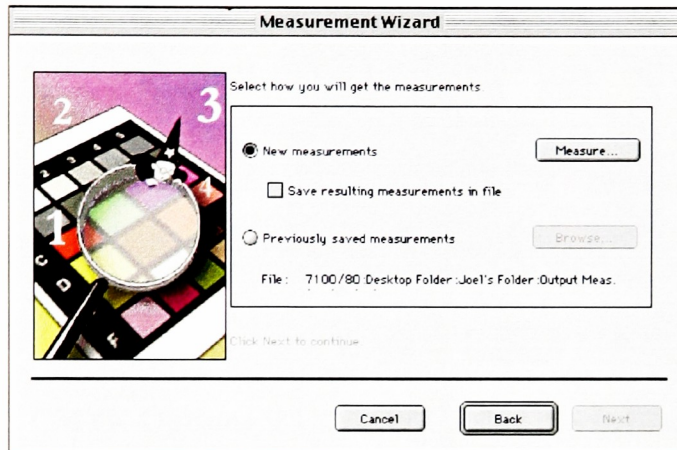
3.4.3 Three options, Large, Medium, and Small, can be chosen from the check boxes. The wizard will print a target of color patches to measure. The greater the number of patches, the more accurate the profile will be. However, a greater number of patches will take longer to measure.



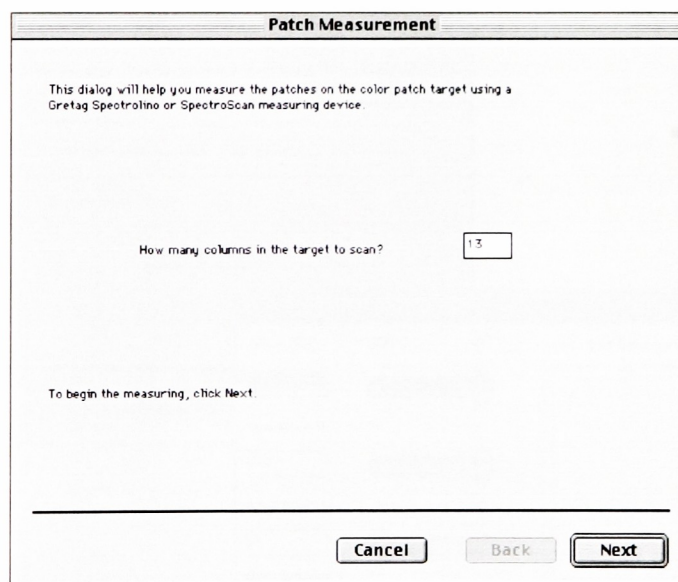
3.4.4 If there is a target that has been printed, click **Next** to continue. If not, print a target now. Specify a desired setting; Print Separation and Print To Tiff can also be selected from check boxes as options.



3.4.5 Click **New measurements** check circle, and click **Measure** to continue. However, there is also a “**Save resulting measurements in file**” check box for saving the result in a file. If a previously save measurements is being used to create an new profile, click “**Previously saved measurements**” check circle and click **Browse...** Then select a previous saved measurements.

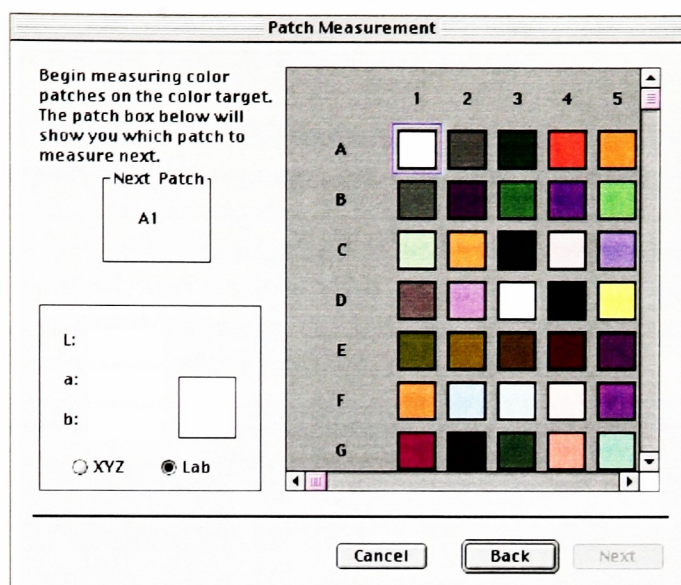


3.4.6 Type number of columns in the target to measure.

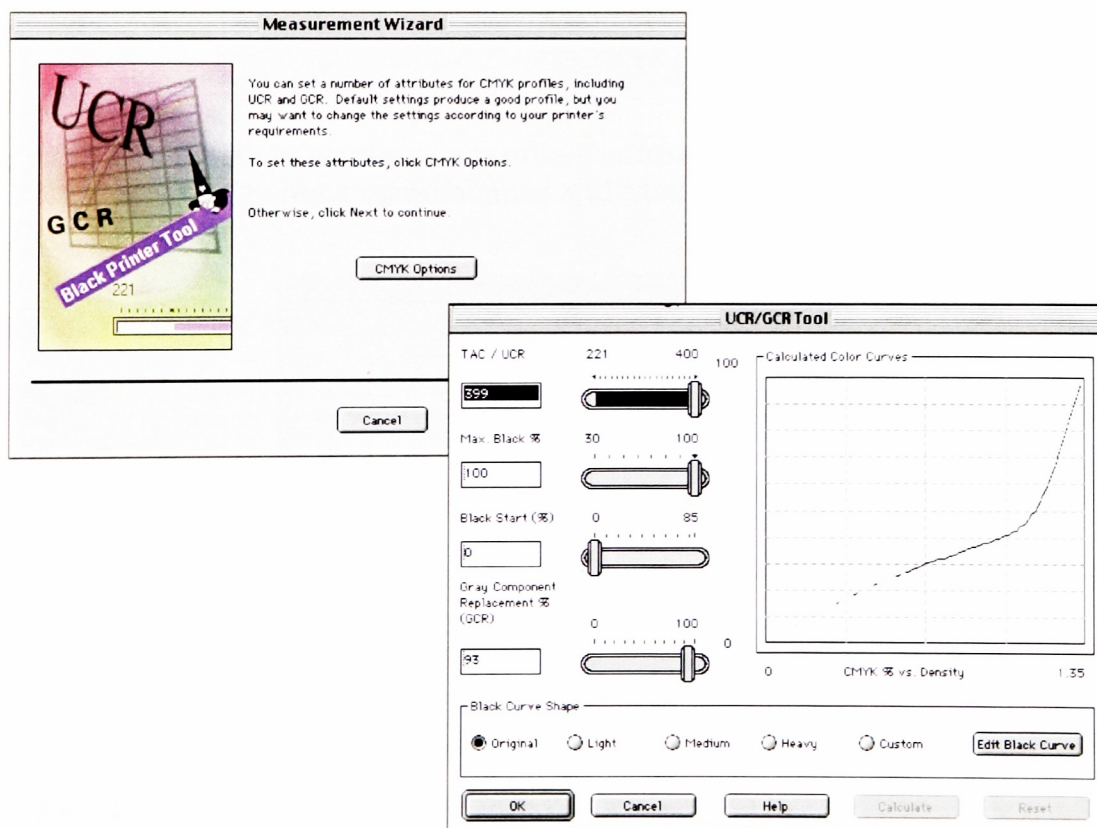




3.4.7 Follow the instruction carefully, and complete the measurements.



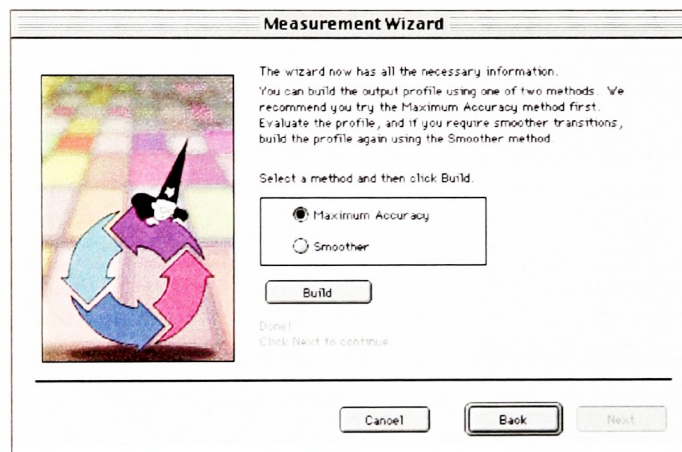
3.4.8 Click **CMYK Options** if UCR/TAC, Max Black, Black Start, and GCR setting need to be defined or modified. Otherwise, click **Next** to continue.



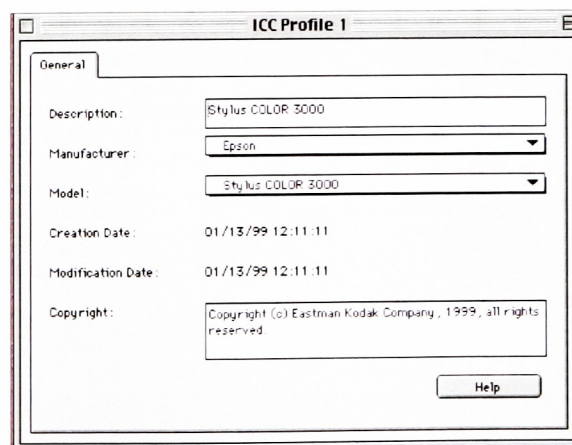


3.4.9 There are two methods of building a profile, Maximum Accuracy and Smoother Transitions. Select one of them and click **Build** to create a new output profile; then click **Next** to continue.

The rule of thumb is this: the maximum Accuracy method creates a profile that preserves color accuracy, but may not have the smooth and tonal transitions that images require. However, a target with a large or medium number of patches is required in order to use the Maximum Accuracy method, and a target with a small number of patches will not be allowed to use the smooth Transitions method. Do some experiments to determine what method fits best in the situation.



3.5 Click **Finish** to continue, a profile window appears. Edit the default Description. Choose a manufacturer and Model or select **Other** and type as preferred.



3.6 Select **File/Save** and save the profile in **System Folder/ColorSync Profiles** (Macintosh computer with ColorSync 2.5.)

## Appendix E

## Color Management Settings in Photoshop 5.0.2

Photoshop 5.0.2 offers many new features for color management, however, to apply ICC profiles to an image is very different from using the version 5.0.2 and 4.0. The IT8.7/3 basic target has been modified, with ICC profiles, twice via Photoshop 5.0.2 in this thesis study. The ICC profiles, CMM, and rendering intent used were :

<b>Input Profile:</b>	SWOP CMYK Output; ANSI/CGATS TR001-1993
<b>Output Profile:</b>	DuPont/Epson.CMYK.icc DuPont/Epson.CMYK4SWOP.icc
<b>CMM:</b>	Kodak CMM
<b>Rendering Intent:</b>	Absolute Colorimetric

Since there were many options in the process for modifying an image with ICC profiles in Photoshop 5.0.2, a proper way of dealing with CMS conversion was achieved through a series of tests prior to the experiment. The procedures and settings for CMYK-to-CMYK conversion, as using Photoshop 5.0.2, are stated as below:

1. Launch Photoshop 5.0.2.

- 2.1 Select **File/Color Settings/CMYK Setup** (see **Figure 1** on the following page).

- 2.2 In the **CMYK Setup** window, check **CMYK Mode/ICC**. ICC Options window appears; select desired output profile from **Profile** pull-down bar, desired CMM from **Engine** pull-down bar, and desired rendering method from **Intent** pull-down bar. Uncheck **Black Point Compensation** if colorimetric matching is selected. Click **OK**.

- 2.3 In the **Profile Setup** window, select desired input profile under **Assumed Profiles/CMYK** pull-down bar. Make sure that all **Ask When Opening** options are selected under **Profile Mismatch Handling**. Click **OK**.

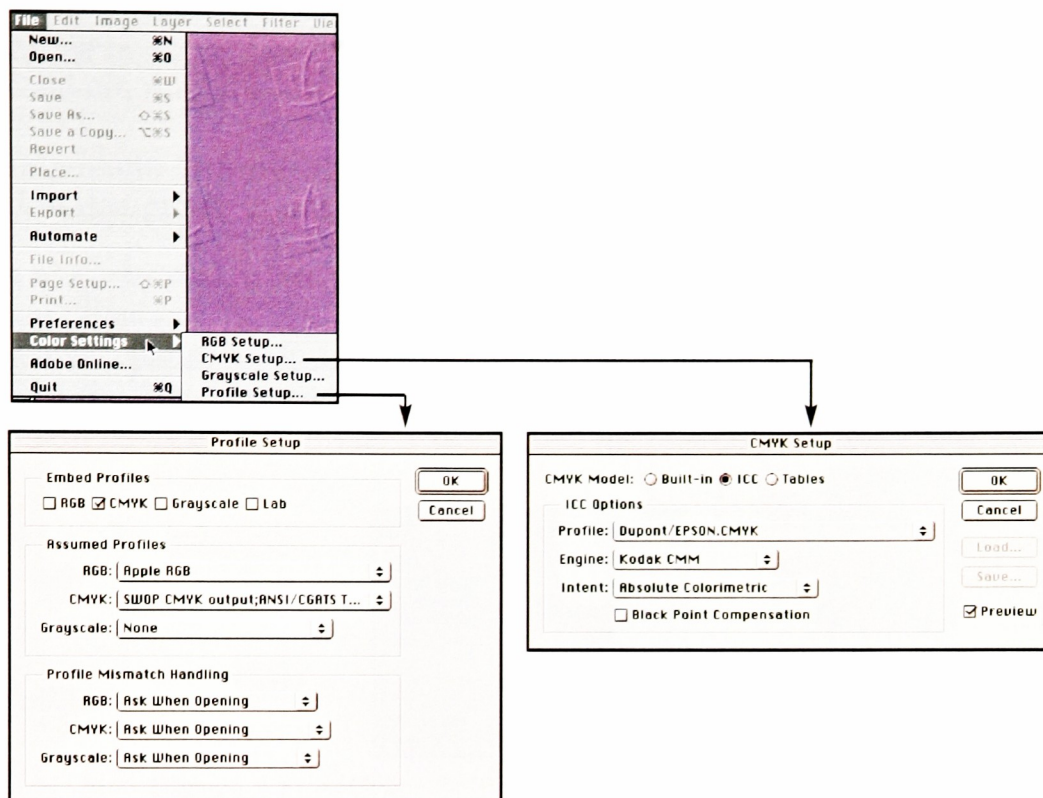


Figure 1 File/Color Settings/CMYK Setup windows

2.4 Open the image that is being modified with ICC profiles. If this image is not embedded with the same profile selected in the **Profile Setup** and/or **CMYK Setup** window, a **Profile Mismatch** window appears:

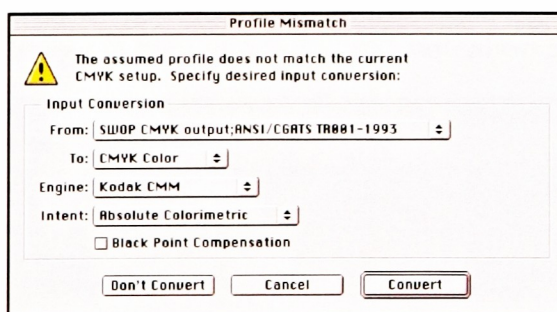


Figure 2 Profile Mismatch window

2.5 If the desired input and output profiles have been selected as described earlier in step 2.2 and 2.3, double check the desired **Engine** and **Intent**. Click **Convert**. A modified CMYK image is then opened in Photoshop 5.0.2.

**Important:** As embedded profile has been checked in the **Profile Setup** window, the profile is tagged when the image is saved.

3.0 As the **Profile Mismatch** window appears if the desired ICC profiles are not selected in the **Color Settings** windows, click **Don't Convert**. The image will be opened without any conversion, and stay the same as the original data file. Follow the steps stated below to achieve CMS conversion in a different method.



Figure 3 File/Color Settings/CMYK Setup windows

3.1 Go to **Image/Mode/Profile to Profile**.

3.2 As **Profile to Profile** window appears, select desired profiles in **From** and **To** pull-down bars. Select **Engine** and **Intent** as desired. Uncheck **Black Point Compensation** if colorimetric matching is selected (as step 2.2). Click **OK**. A modified image is then generated in Photoshop 5.0.2.

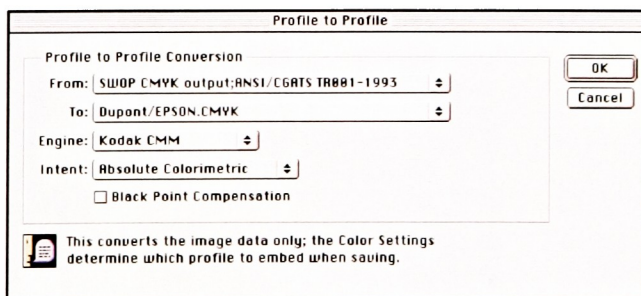


Figure 4 Profile to Profile window



**Important:** The **Profile to Profile** dialog box does not default to the currently embedded profile in the **From** pop-up menu. This can cause a problem if used incorrectly. The conversion only changes the image data, but does not determine which profile will be embedded when the profile is saved. Embedded profile has to be set in the **Profile Setup** window. And, therefore, a conversion to a color space that is not the working color space, will not display the colors accurately and any further conversions will be inaccurate.

**Note:** Both the methods described above will give the same result as the Photoshop 4.0 does if all the procedures are followed the same. The **File/Color Settings/ CMYK Setup** provides soft proofing function as a proper output device ICC profile is selected; the image shown on the monitor should fairly match the final reproduction as expected if the monitor is well calibrated.

## Appendix F

## Default-to-SWOP Calibration

### 1. Re-calibrate EPSON SC3000 to the SWOP Condition

To align the amplitude responses of EPSON SC3000 to SWOP, the IT8.7/3 basic target of a SWOP certified sheet and of a EPSON SC3000 printed sample (printed in default condition) were measured. These density readings of the CMYK four colors were then recorded in Excel workbook. From there, two curves of each color that represented the two printing processes were plotted and analyzed (see **Figure 1** and **Table 1**). The default-to SWOP calibration was therefore achieved via Photoshop 5.0.2 following the analysis. Beware that this refined calibration was intentionally aimed to the HSL of the SWOP specifications (absolute densities: C-1.37, M-1.47, Y-1.08, and K-1.66).

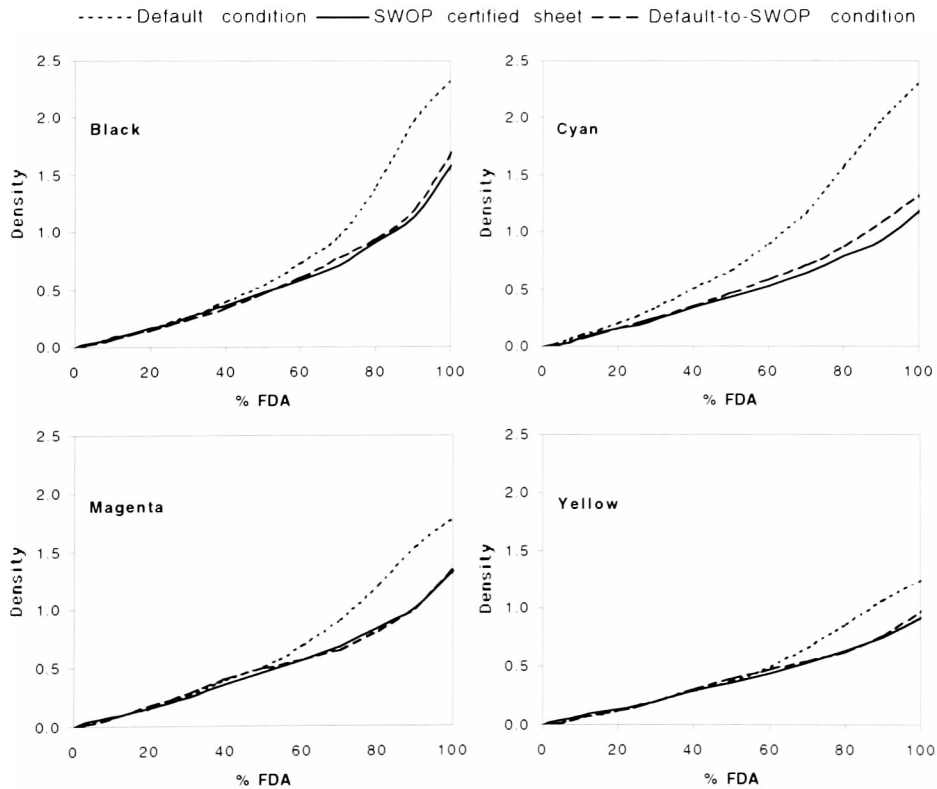


Figure 1 Amplitude responses of SWOP reference, EPSON SC3000 in default condition , and EPSON SC3000 in default-to-SWOP condition

Patch ID	% Dot Area	Epson in default				SWOP reference				Epson w/ curves			
		K	C	M	Y	K	C	M	Y	K	C	M	Y
B13	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
F13	3	0.02	0.02	0.02	0.01	0.03	0.02	0.04	0.03	0.02	0.01	0.02	0.01
F12	7	0.05	0.07	0.05	0.04	0.06	0.03	0.07	0.06	0.05	0.05	0.05	0.03
F11	10	0.08	0.10	0.08	0.07	0.09	0.08	0.09	0.08	0.07	0.07	0.08	0.07
F10	15	0.12	0.16	0.13	0.10	0.13	0.13	0.13	0.11	0.12	0.12	0.13	0.09
F9	20	0.17	0.21	0.17	0.12	0.17	0.16	0.16	0.14	0.15	0.16	0.18	0.12
F8	25	0.22	0.27	0.22	0.16	0.21	0.19	0.20	0.17	0.20	0.21	0.23	0.16
F7	30	0.27	0.34	0.27	0.20	0.26	0.24	0.25	0.21	0.24	0.25	0.29	0.21
F6	40	0.40	0.50	0.40	0.29	0.37	0.34	0.36	0.30	0.35	0.36	0.41	0.31
F5	50	0.54	0.67	0.52	0.38	0.48	0.44	0.47	0.37	0.47	0.47	0.50	0.40
F4	60	0.74	0.89	0.69	0.50	0.59	0.53	0.57	0.45	0.61	0.59	0.57	0.48
F3	70	0.97	1.17	0.91	0.67	0.72	0.64	0.69	0.54	0.78	0.72	0.65	0.55
F2	80	1.41	1.58	1.21	0.87	0.92	0.79	0.85	0.64	0.95	0.88	0.81	0.63
F1	90	1.98	1.99	1.54	1.07	1.14	0.93	1.02	0.75	1.20	1.09	1.01	0.76
B12	100	2.34	2.32	1.79	1.25	1.59	1.19	1.34	0.92	1.71	1.33	1.36	0.98

Table 1 Densities readings of CMYK four colors (minus paper)

The result was a set of **Curves** (see **Figure 2**) saved in Photoshop format for further application.

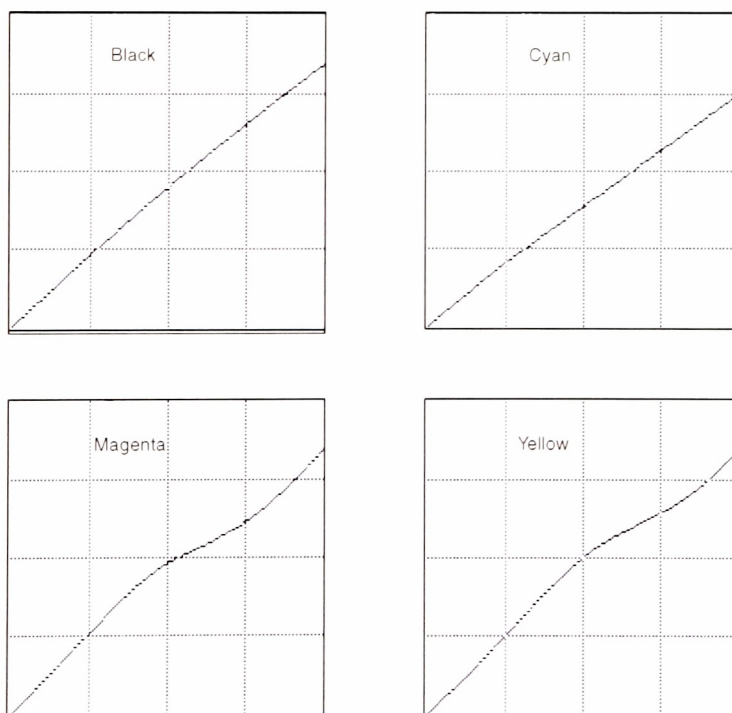


Figure 2 Curves of CMYK four colors in Photoshop 5.0.2 (Image/Adjust/Curves...)

## **2. To Generate an ICC Profile for the Default-to-SWOP Condition**

The Kodak ProfileEditor characterization target was printed to a TIFF image. This target was modified with the **Curves** via Photoshop 5.0.2 (Image/ Adjust /Curves.../Load), and saved. This modified target was then placed into a QuarkXPress 3.3.2 test page, and printed. This target was measured with Gretag SpectroScan system which was driven by Kodak ProfileEditor two hours after it was out of EPSON SC3000. All other settings and procedures for building the ICC profile were the same as building the other profile for this thesis study (see **Appendix C** and **D** for more details).

## **3. To Make a Color Proof under the Default-to-SWOP Condition**

IT8.7/3 basic target (original) was open in Photoshop 5.0.2 and modified with the two ICC profiles (see **Appendix E**). This modified IT8.7/3 basic target was modified again with the saved **Curves** after the first treatment, and saved. This saved IT8.7/3 basic target was then printed via QuarkXPress 3.3.2.



## Appendix G

				Sample #1							
ID#	L*	a*	b*	ID#	L*	a*	b*	ID#	L*	a*	b*
1	41.19	-24.43	-60.96	62	93.69	-0.44	7.77	123	3.71	0.47	-2.51
2	48.22	80.94	9.70	63	93.95	0.22	3.84	124	4.14	0.19	-3.12
3	85.49	8.69	104.69	64	94.01	1.06	-0.74	125	3.52	0.57	-2.48
4	16.31	29.09	-57.34	65	94.29	1.76	-4.26	126	4.69	0.32	-3.14
5	39.80	65.47	22.57	66	6.81	-0.30	-3.91	127	9.00	-2.82	-5.28
6	52.35	71.67	57.18	67	21.10	-2.65	-3.15	128	16.20	-6.89	-5.92
7	3.33	0.57	-2.17	68	35.74	-3.23	-2.10	129	3.61	0.59	2.27
8	34.76	20.55	-54.16	69	46.30	-2.42	-2.73	130	6.85	-1.01	-4.33
9	56.27	-58.36	20.15	70	56.57	-0.08	-3.47	131	20.11	-6.54	-5.59
10	61.45	56.16	43.75	71	65.25	1.21	-4.19	132	33.56	-10.88	-7.38
11	63.68	10.36	-34.02	72	74.09	2.58	-5.25	133	42.29	-12.50	-10.62
12	76.81	28.53	17.43	73	77.88	2.99	-5.99	134	3.37	0.63	2.47
13	65.13	1.51	-3.73	74	81.64	2.89	-6.13	135	10.57	-2.40	-4.05
14	75.75	-28.68	6.41	75	84.80	2.94	-6.04	136	31.42	-6.92	-5.72
15	80.49	6.37	-19.50	76	87.79	2.87	-6.68	137	44.75	-8.42	-7.58
16	86.14	-10.82	-1.74	77	89.93	2.73	-6.54	138	57.28	-7.57	-9.02
17	86.27	13.54	3.91	78	92.46	2.34	-6.20	139	63.66	-6.63	-9.79
18	3.43	0.60	-2.25	79	26.96	50.94	-26.11	140	3.44	0.56	2.28
19	3.37	0.56	-2.23	80	28.54	45.71	-5.45	141	14.51	-2.41	3.76
20	3.30	0.58	-2.09	81	48.36	78.11	31.36	142	39.27	-5.24	-4.71
21	3.39	0.50	-2.07	82	39.43	46.38	33.23	143	56.09	-3.84	-6.30
22	3.42	0.53	-2.16	83	67.56	44.56	81.78	144	70.83	-1.83	8.20
23	3.43	0.55	-2.30	84	49.22	-1.69	49.56	145	77.76	-1.09	9.68
24	3.36	0.57	-2.20	85	36.25	-1.88	-1.66	146	3.48	0.54	2.33
25	3.33	0.62	-2.27	86	61.89	-32.65	66.78	147	18.10	-2.89	3.50
26	94.38	2.16	-6.59	87	35.13	-51.50	14.93	148	43.26	-4.10	3.84
27	46.47	-30.70	-59.13	88	37.00	-55.83	-23.08	149	61.02	-1.03	-5.10
28	52.45	-34.65	-55.25	89	28.51	-31.11	-30.48	150	76.73	1.03	-7.34
29	58.93	-35.44	-50.02	90	29.71	0.12	62.36	151	82.68	0.99	-7.81
30	65.00	32.32	43.85	91	13.91	8.64	-32.12	152	7.91	-4.31	-6.45
31	70.40	27.69	-37.78	92	18.51	32.35	-36.64	153	32.52	-16.27	-11.05
32	75.14	22.13	-31.98	93	52.42	49.99	-11.38	154	51.34	-12.30	-12.62
33	80.27	-15.79	25.56	94	53.23	46.60	4.44	155	69.03	6.41	-12.65
34	82.83	-12.51	-22.13	95	40.24	60.04	26.87	156	83.14	-1.40	9.46
35	85.30	-9.30	-18.90	96	54.40	41.64	29.87	157	89.09	0.11	8.42
36	87.65	6.60	-15.99	97	50.10	42.09	53.26	158	91.66	1.24	-7.32
37	90.07	3.55	-12.65	98	72.14	-2.33	49.63	159	34.02	29.70	43.60
38	91.61	-1.61	-10.69	99	45.20	43.30	38.39	160	37.05	62.26	1.37
39	93.47	0.67	-8.07	100	52.24	-45.34	13.18	161	65.22	4.13	74.25
40	50.99	80.21	1.15	101	33.60	57.34	4.79	162	16.27	19.17	-46.94
41	55.15	76.44	-7.06	102	51.80	-32.72	33.59	163	38.09	-60.01	18.58
42	60.12	68.86	-12.54	103	21.95	3.19	-49.75	164	46.32	60.02	45.01
43	65.42	59.72	-14.89	104	35.07	12.87	-42.39	165	54.24	7.41	-29.36
44	70.67	49.72	-15.29	105	18.86	18.70	-9.02	166	64.67	26.53	5.11
45	75.34	40.13	-14.61	106	45.68	29.58	-9.62	167	65.29	25.47	15.09
46	80.39	30.00	-13.07	107	70.57	19.69	-10.08	168	14.32	8.48	-32.20
47	82.89	25.03	-12.06	108	22.88	15.33	7.56	169	35.05	-51.92	14.41
48	85.61	19.89	-10.87	109	71.46	15.60	6.15	170	39.38	46.00	32.38
49	87.36	15.80	-10.14	110	30.98	-6.44	19.38	171	41.85	4.16	-23.45
50	90.24	10.88	8.77	111	57.76	-3.82	27.24	172	50.63	-24.88	5.68
51	91.48	8.01	-8.15	112	77.67	-0.47	12.27	173	51.24	19.94	12.81
52	93.32	4.33	-7.18	113	81.49	3.13	-6.18	174	19.23	-19.83	-14.69
53	86.74	4.61	98.41	114	23.27	-25.53	2.75	175	19.18	18.46	-9.39
54	88.10	0.73	87.93	115	47.07	-31.82	8.52	176	31.09	-5.98	19.21
55	89.51	-2.22	74.27	116	71.32	-14.29	0.68	177	7.65	0.06	-11.24
56	90.75	3.46	59.14	117	19.05	-19.68	-14.52	178	23.38	25.07	2.87
57	91.37	-3.90	46.28	118	64.97	5.58	-20.39	179	23.16	15.67	7.41
58	92.06	3.54	35.14	119	7.75	0.17	-11.54	180	21.82	-1.69	-10.33
59	92.65	-2.44	23.19	120	70.48	-10.54	-16.89	181	30.72	-14.51	0.95
60	92.99	-1.74	16.83	121	45.97	-23.98	-20.71	182	30.66	6.89	4.03
61	93.51	-1.07	12.02	122	3.46	0.57	-2.29				

Sample #2											
ID#	L*	a*	b*	ID#	L*	a*	b*	ID#	L*	a*	b*
1	41.34	-24.73	-60.68	62	93.41	-0.38	7.49	123	3.78	0.55	-2.49
2	48.10	81.03	9.13	63	93.50	0.38	2.92	124	4.23	0.35	-3.01
3	85.33	9.29	103.86	64	94.10	1.18	-1.44	125	3.60	0.69	-2.21
4	17.00	28.40	-56.92	65	94.52	1.84	-4.83	126	4.80	0.39	-3.07
5	40.00	-64.80	22.22	66	7.32	-0.30	-3.55	127	8.69	-2.78	-4.91
6	52.35	72.21	56.42	67	20.84	-2.73	-2.90	128	16.82	-6.52	-5.82
7	3.62	0.73	-2.18	68	36.38	-2.02	-2.34	129	3.46	0.71	-2.25
8	35.32	20.45	-53.94	69	46.54	-1.58	-3.03	130	7.01	-1.04	-4.08
9	56.61	-56.67	19.48	70	56.74	0.14	-4.61	131	20.04	-6.41	-5.73
10	61.31	56.65	42.85	71	65.15	1.29	5.04	132	33.29	-10.89	-7.63
11	63.78	10.38	-34.57	72	74.03	2.57	-5.98	133	42.36	-12.37	-11.22
12	76.74	28.78	16.03	73	77.38	2.86	-6.67	134	3.43	0.64	-2.25
13	65.51	1.36	-4.45	74	81.25	3.02	-6.71	135	10.57	-2.11	-4.29
14	75.70	-28.40	5.41	75	84.70	2.93	-6.38	136	31.82	-7.19	-5.56
15	80.06	6.48	-20.47	76	88.15	2.92	-6.85	137	44.77	-8.40	-8.23
16	86.14	-10.74	-2.27	77	89.92	2.77	-7.14	138	57.27	-6.99	-9.78
17	86.10	13.82	3.36	78	92.63	2.31	-6.60	139	63.39	-6.81	-10.75
18	3.61	0.69	-2.21	79	26.64	50.24	-26.64	140	3.55	0.68	-2.26
19	3.65	0.71	-2.26	80	28.37	45.24	-5.98	141	15.38	2.62	-3.78
20	3.67	0.67	-2.21	81	48.16	78.08	30.17	142	39.74	-5.22	-4.81
21	3.80	0.79	-2.27	82	39.36	46.44	32.53	143	55.83	-3.85	-7.20
22	3.71	0.72	-2.20	83	67.28	44.55	80.92	144	70.35	-1.37	-8.93
23	3.58	0.70	-2.32	84	48.98	-1.82	48.86	145	77.38	-0.97	-10.31
24	3.63	0.69	-2.28	85	35.85	-2.53	-2.20	146	3.46	0.66	-2.18
25	3.69	0.77	-2.18	86	61.57	-32.14	66.11	147	18.59	2.38	-3.49
26	94.49	2.21	-7.03	87	35.04	-50.73	14.50	148	43.75	3.22	4.21
27	46.55	30.72	-58.57	88	36.95	-55.09	23.10	149	61.06	-0.55	-5.79
28	52.67	-34.81	-55.25	89	28.89	-30.42	-30.95	150	76.70	0.95	-7.88
29	59.26	-34.82	-49.80	90	29.86	-0.01	62.07	151	82.74	1.04	-8.33
30	65.39	-31.91	-43.92	91	14.27	8.50	31.72	152	7.94	-4.30	-6.26
31	70.50	27.80	-38.13	92	18.70	32.40	-36.66	153	32.35	-16.19	-11.04
32	74.99	-22.58	-32.68	93	51.69	49.96	-12.62	154	51.54	-11.68	-13.28
33	80.25	-16.30	-26.17	94	53.24	46.34	3.04	155	69.00	-6.41	-13.12
34	82.74	-12.88	-22.71	95	40.11	60.10	26.37	156	82.83	-1.33	-10.25
35	85.22	-9.55	-19.46	96	54.54	41.82	29.22	157	88.77	0.20	-9.27
36	87.46	6.81	-16.59	97	49.78	41.81	52.87	158	91.75	1.31	-7.90
37	89.63	-3.43	-13.24	98	71.97	2.32	49.40	159	34.29	-28.98	-44.00
38	91.04	-1.51	-11.26	99	45.21	42.63	38.49	160	36.93	62.22	0.59
39	93.37	0.74	-8.63	100	52.26	-44.62	13.28	161	65.02	4.32	73.98
40	50.79	80.12	0.26	101	33.59	-56.39	-4.55	162	16.43	19.47	-46.96
41	54.77	76.44	-8.17	102	51.92	-31.95	-33.65	163	38.13	-59.17	18.66
42	60.17	68.61	-13.41	103	22.37	3.56	-50.02	164	46.04	59.65	44.27
43	65.53	59.23	-15.60	104	35.60	13.05	-42.51	165	54.03	7.60	-30.02
44	70.65	49.71	-16.19	105	18.92	18.59	-9.20	166	64.35	-26.77	4.65
45	75.06	40.67	-15.52	106	45.61	29.71	-10.23	167	65.19	25.15	13.82
46	80.38	30.54	-13.82	107	70.52	19.93	-10.81	168	14.67	8.65	-32.07
47	82.94	25.75	-12.70	108	23.19	15.89	8.08	169	35.00	-50.93	14.47
48	85.36	20.49	-11.70	109	71.53	15.76	5.63	170	39.24	46.20	32.40
49	87.33	16.20	-10.75	110	30.66	-6.20	19.16	171	41.94	4.61	-23.97
50	89.87	11.09	-9.48	111	57.47	-3.58	26.58	172	50.70	-24.09	5.17
51	91.31	8.28	-8.72	112	77.65	-0.54	11.80	173	51.00	20.28	12.03
52	93.49	4.47	-7.58	113	81.56	3.24	-6.83	174	19.36	-19.60	-14.41
53	86.81	5.18	98.33	114	23.36	-25.06	3.41	175	18.79	18.28	-9.29
54	87.84	1.08	87.44	115	47.33	-30.65	7.50	176	31.08	-5.58	19.48
55	89.60	-1.70	72.97	116	71.09	-13.97	-0.02	177	7.96	0.13	-10.78
56	90.45	3.21	58.41	117	19.13	-19.08	-14.62	178	23.19	-24.79	3.33
57	91.20	-3.64	45.41	118	64.80	5.64	-21.00	179	23.09	15.55	7.73
58	91.83	-3.33	34.99	119	7.83	-0.19	-10.74	180	22.29	-0.98	-10.72
59	92.51	2.35	22.44	120	70.30	-10.41	-17.65	181	30.97	-14.19	0.70
60	93.02	-1.59	16.50	121	46.18	-23.09	-21.06	182	30.58	6.63	3.74
61	93.42	-0.97	11.50	122	3.51	0.73	-2.28				

Sample #3											
ID#	L*	a*	b*	ID#	L*	a*	b*	ID#	L*	a*	b*
1	41.08	-23.22	61.77	62	93.36	-0.41	7.57	123	3.74	0.64	-2.60
2	48.63	81.04	10.69	63	93.77	0.37	3.14	124	4.32	0.27	-3.05
3	85.66	8.37	104.56	64	93.88	1.18	-1.37	125	3.59	0.65	-2.19
4	16.28	29.66	-57.36	65	94.39	1.83	-4.70	126	4.97	0.46	-3.11
5	39.82	-65.74	21.90	66	7.27	-0.17	-3.56	127	8.86	-2.55	-4.86
6	52.71	72.03	57.51	67	21.08	-1.78	-2.31	128	16.24	-6.49	-5.85
7	3.54	0.73	-2.31	68	35.87	-2.67	-2.25	129	3.66	0.76	2.26
8	35.31	21.12	-53.84	69	46.06	-1.76	-2.69	130	7.20	-0.64	3.96
9	56.54	-56.00	18.96	70	56.77	0.29	-4.25	131	20.12	-6.57	-5.57
10	61.61	56.53	44.31	71	65.44	1.55	-4.32	132	33.71	-10.77	-7.59
11	63.73	10.65	-34.59	72	74.13	2.21	5.44	133	42.10	12.53	-11.15
12	77.05	29.08	17.19	73	77.47	2.90	-6.60	134	3.46	0.64	2.34
13	65.59	1.43	-4.34	74	81.67	2.81	-6.27	135	10.54	-2.22	-4.48
14	75.75	-28.44	5.43	75	84.90	2.87	-6.21	136	31.62	-7.40	5.25
15	80.22	6.50	-20.28	76	88.26	2.85	-6.77	137	44.63	-8.48	8.05
16	85.90	-10.66	-2.45	77	90.05	2.74	-6.82	138	57.27	-6.99	-9.50
17	86.26	13.78	3.64	78	92.67	2.47	-6.43	139	63.71	-6.50	-10.48
18	3.66	0.75	-2.12	79	26.78	50.42	-25.97	140	3.58	0.63	2.35
19	3.69	0.68	-2.13	80	28.52	45.49	-5.25	141	15.00	2.53	-3.59
20	3.76	0.75	-2.27	81	48.44	78.04	31.65	142	39.59	-5.14	-4.51
21	3.53	0.67	-2.06	82	39.41	46.39	33.42	143	55.97	-4.04	-6.58
22	3.57	0.74	-2.19	83	67.77	44.25	81.87	144	70.49	-1.51	8.76
23	3.65	0.75	-2.19	84	49.22	-1.55	49.52	145	77.27	-0.87	-10.27
24	3.67	0.72	-2.16	85	36.13	-2.80	-1.97	146	3.61	0.64	-2.30
25	4.22	0.82	-2.11	86	61.87	-32.81	66.34	147	17.95	-2.82	3.25
26	94.37	2.28	-6.98	87	35.01	-51.15	14.66	148	43.63	-3.63	-3.55
27	46.29	-29.61	59.45	88	36.75	-54.73	23.25	149	60.84	-0.83	-5.64
28	52.46	-33.98	55.87	89	28.45	-30.23	-30.90	150	76.80	1.12	7.62
29	58.84	34.59	50.66	90	29.56	1.18	62.78	151	82.86	0.99	8.10
30	64.84	-31.57	44.46	91	14.09	8.67	-31.41	152	8.12	4.46	-6.37
31	70.17	-26.98	-38.32	92	18.65	32.57	36.27	153	32.13	-16.01	-11.10
32	74.99	-22.33	32.90	93	52.22	49.89	-11.62	154	51.25	-12.00	-13.34
33	80.19	-16.01	26.22	94	53.25	46.56	4.11	155	68.95	6.35	-12.95
34	82.69	12.41	-22.74	95	40.47	60.25	27.64	156	82.63	-1.13	-10.33
35	85.18	-9.27	-19.41	96	54.75	41.62	30.39	157	88.88	0.27	8.93
36	87.50	6.75	16.50	97	50.05	42.05	53.77	158	91.33	1.42	-7.82
37	89.88	-3.35	-13.07	98	72.15	-2.42	49.84	159	34.03	-28.54	-44.21
38	91.37	-1.58	-11.13	99	45.19	-42.81	38.03	160	37.36	62.62	1.97
39	93.10	0.88	-8.61	100	52.23	-44.83	13.20	161	65.06	3.98	73.99
40	51.25	80.36	1.73	101	33.32	-56.37	-4.55	162	16.31	19.88	-46.83
41	55.40	76.50	-6.87	102	51.60	-32.12	33.94	163	38.10	-59.17	18.27
42	60.30	68.84	-12.67	103	22.02	4.32	-50.17	164	46.23	59.77	44.88
43	65.99	59.86	-14.79	104	35.36	13.13	-42.31	165	54.31	8.00	-29.58
44	71.11	49.35	-15.38	105	18.75	18.71	-8.39	166	64.28	26.42	4.71
45	75.31	40.71	-14.90	106	45.66	29.81	-9.46	167	65.42	25.26	14.60
46	80.42	30.63	-13.32	107	70.69	20.07	-10.39	168	14.32	9.28	-32.12
47	82.93	25.58	-12.37	108	22.91	15.70	8.36	169	35.10	-50.81	14.67
48	85.43	20.56	-11.34	109	71.38	15.74	5.73	170	39.47	46.46	33.30
49	87.63	16.33	-10.37	110	30.91	-5.47	19.34	171	42.11	4.04	-23.65
50	89.88	11.19	9.35	111	57.50	-3.59	27.23	172	50.58	-24.47	5.51
51	91.16	8.33	-8.68	112	77.56	-0.56	12.07	173	51.08	20.20	12.66
52	93.26	4.56	-7.57	113	81.27	3.27	-6.61	174	18.98	-18.88	-14.44
53	86.88	4.42	98.36	114	23.11	-25.04	3.22	175	19.20	18.90	-8.55
54	88.32	0.54	88.36	115	47.10	-30.85	8.28	176	31.15	-5.57	19.48
55	89.40	-2.32	74.00	116	71.11	-14.01	-0.06	177	8.08	0.52	-10.72
56	90.80	-3.61	60.03	117	18.82	-18.80	-14.63	178	23.50	24.64	3.53
57	91.68	-3.85	46.03	118	64.92	5.66	-20.77	179	22.75	15.78	7.64
58	92.09	-3.52	35.41	119	8.14	0.01	-10.65	180	22.29	-0.58	-9.79
59	92.71	-2.50	23.01	120	70.42	-10.69	-17.63	181	30.73	-13.78	0.88
60	93.19	-1.79	16.83	121	45.94	-23.59	-20.99	182	30.66	6.79	4.41
61	93.56	-1.07	11.89	122	3.51	0.72	-2.22				

Sample #4							
ID#	L*	a*	b*	ID#	L*	a*	b*
1	41.32	-24.52	-60.65	62	93.34	-0.44	7.75
2	48.23	80.82	9.69	63	93.80	0.25	3.59
3	85.59	9.23	105.18	64	94.46	1.08	-0.85
4	16.99	27.77	-56.01	65	94.34	1.82	-4.69
5	39.94	63.93	22.96	66	7.62	-0.46	-3.54
6	52.13	71.78	57.00	67	21.63	-3.01	-2.32
7	3.63	0.60	-2.22	68	36.05	-2.81	-2.05
8	35.62	20.41	-53.28	69	46.20	-2.00	-2.67
9	56.41	-56.82	20.54	70	56.68	0.22	-3.88
10	61.46	56.31	43.67	71	65.10	1.30	-4.33
11	63.97	10.30	-34.40	72	74.00	2.34	-5.59
12	76.75	28.93	17.82	73	77.45	2.88	-6.45
13	64.82	0.97	-3.81	74	81.51	2.82	-6.33
14	75.64	-28.44	6.17	75	84.63	2.72	-6.20
15	80.27	6.53	-20.38	76	88.05	2.74	-6.87
16	85.85	-11.05	-2.01	77	89.94	2.63	-6.88
17	86.30	13.84	4.29	78	92.45	2.40	-6.43
18	3.85	0.69	-2.18	79	27.06	50.47	26.02
19	3.79	0.67	-2.27	80	28.59	45.19	-5.21
20	3.68	0.61	-2.22	81	48.18	77.81	30.80
21	3.73	0.69	-2.23	82	39.38	46.38	33.23
22	3.60	0.65	-2.29	83	67.64	44.14	81.80
23	3.74	0.68	-2.11	84	49.23	-0.97	50.21
24	3.67	0.69	-2.31	85	36.28	-2.51	-1.89
25	3.72	0.61	-2.03	86	61.73	-31.96	66.92
26	94.55	2.21	-6.94	87	35.09	-50.21	15.46
27	46.62	-30.66	-58.81	88	36.96	54.85	22.40
28	52.71	-34.42	-55.16	89	28.58	30.61	-30.09
29	58.92	34.95	-50.02	90	29.56	0.23	-61.82
30	64.82	-32.06	-44.15	91	13.88	7.85	-30.85
31	70.50	27.42	-38.08	92	19.02	32.41	35.96
32	74.99	22.72	32.84	93	52.00	49.96	-12.17
33	80.25	-16.26	26.21	94	53.03	46.54	3.46
34	82.68	-12.75	22.78	95	40.06	59.64	26.60
35	85.46	-9.75	-19.41	96	54.62	41.72	29.97
36	87.37	-6.83	-16.64	97	49.94	42.22	53.32
37	90.01	-3.55	-13.21	98	71.85	2.39	49.97
38	91.11	-1.68	-11.34	99	45.09	-41.94	38.61
39	93.16	0.70	-8.68	100	52.17	-44.60	13.74
40	51.01	80.26	0.94	101	33.52	-56.19	-4.30
41	55.03	76.34	-7.59	102	51.81	-31.89	33.33
42	60.05	68.64	-12.97	103	22.16	3.26	-49.51
43	65.18	59.52	-15.51	104	35.04	12.51	-42.46
44	70.62	49.66	-16.02	105	19.00	18.31	-8.96
45	74.87	40.70	-15.49	106	45.55	29.37	-9.71
46	80.38	30.67	-13.74	107	70.59	19.71	-10.50
47	82.68	25.40	-12.77	108	23.08	15.63	7.96
48	85.11	20.39	-11.73	109	71.23	15.56	5.62
49	87.31	16.15	-10.71	110	30.95	-5.78	19.67
50	89.72	11.12	-9.55	111	57.39	-3.65	27.38
51	91.68	8.28	-8.52	112	77.54	-0.66	12.19
52	93.45	4.47	-7.57	113	81.24	3.06	-6.52
53	86.97	5.03	99.20	114	23.33	-24.70	3.52
54	88.01	0.95	88.32	115	47.02	-31.33	8.84
55	89.38	-1.93	74.67	116	70.94	-14.15	0.42
56	90.37	-3.40	60.02	117	18.50	-19.40	-13.98
57	91.30	-3.71	46.26	118	64.70	5.72	-20.81
58	91.91	-3.54	36.08	119	8.21	-0.11	-10.93
59	92.67	-2.48	23.42	120	70.63	-10.49	17.18
60	92.93	-1.84	17.51	121	46.00	-23.30	-20.67
61	93.32	-1.08	12.10	122	3.76	0.65	2.14
123	3.96	0.61	-2.26				
124	4.69	0.38	2.88				
125	3.68	0.66	-2.20				
126	4.95	0.44	-2.88				
127	8.80	-2.70	-4.69				
128	16.59	-6.80	5.29				
129	3.70	0.74	-2.16				
130	7.23	-0.98	-3.71				
131	20.14	-6.35	5.54				
132	33.63	-9.70	-7.06				
133	42.52	-12.14	-10.49				
134	3.64	0.67	2.37				
135	10.97	-2.40	-4.02				
136	31.69	-7.26	-5.22				
137	44.83	8.12	-7.63				
138	57.14	-7.28	9.16				
139	63.42	-6.55	-10.34				
140	3.62	0.79	-2.14				
141	15.19	-2.99	-3.42				
142	39.68	-5.21	-4.25				
143	55.35	-4.85	-6.41				
144	70.45	-1.50	-8.94				
145	77.45	0.99	-10.08				
146	3.58	0.62	2.28				
147	18.64	-2.39	3.65				
148	43.58	-4.03	-3.95				
149	60.80	-1.18	-5.53				
150	76.58	0.67	-7.61				
151	82.64	0.91	8.31				
152	8.05	-4.46	-6.46				
153	32.37	-15.74	-10.95				
154	51.36	-11.90	-12.68				
155	68.80	-6.57	-12.51				
156	82.48	-1.59	-10.39				
157	89.00	0.04	-9.01				
158	91.70	1.25	-7.81				
159	34.11	-28.97	-43.92				
160	37.06	62.22	1.19				
161	65.04	4.08	74.26				
162	16.47	19.23	-46.38				
163	38.10	-58.64	19.25				
164	46.19	59.75	44.99				
165	54.12	7.52	-29.91				
166	64.29	-26.50	5.20				
167	65.23	25.18	15.00				
168	14.58	8.43	-31.43				
169	34.12	-50.64	14.91				
170	39.47	46.44	32.87				
171	41.81	4.11	-23.80				
172	50.96	-24.52	5.30				
173	51.12	19.91	12.64				
174	19.20	-19.32	-13.82				
175	19.03	18.40	8.62				
176	31.11	-5.67	19.65				
177	8.07	0.19	-10.71				
178	23.37	-24.75	3.62				
179	23.53	15.85	8.08				
180	22.28	-1.66	-9.73				
181	30.70	-14.03	0.87				
182	30.44	6.14	4.67				



				Sample #5							
ID#	L*	a*	b*	ID#	L*	a*	b*	ID#	L*	a*	b*
1	41.31	-24.53	-60.64	62	93.55	-0.50	7.79	123	3.88	0.71	-2.09
2	48.15	81.14	9.43	63	93.55	0.27	3.32	124	4.30	0.39	-2.65
3	85.24	9.02	104.55	64	94.13	1.13	-1.30	125	3.66	0.75	-1.98
4	16.75	28.24	-56.56	65	94.43	1.79	-4.69	126	4.71	0.45	-2.65
5	39.84	-64.58	22.91	66	7.27	-0.24	-3.15	127	8.64	-2.80	-4.49
6	52.09	71.59	56.84	67	21.38	-2.80	-2.13	128	16.23	-6.95	-5.55
7	3.49	0.72	-2.11	68	36.18	-2.64	-2.01	129	3.44	0.82	-1.95
8	35.02	20.47	-54.10	69	45.90	2.33	-2.43	130	6.95	-0.88	-3.63
9	56.22	-57.66	20.80	70	56.50	-0.09	-3.94	131	19.79	-6.65	-5.27
10	61.15	56.42	43.21	71	65.05	1.34	-4.49	132	33.35	-10.99	-7.06
11	63.43	10.47	34.84	72	74.00	2.21	-5.45	133	42.35	-12.20	-10.77
12	76.54	29.17	17.13	73	77.45	2.77	-6.48	134	3.57	0.78	-2.11
13	64.88	1.20	-3.69	74	81.43	2.71	-6.26	135	10.60	2.40	-3.69
14	75.26	-28.76	5.94	75	84.62	2.81	-6.22	136	31.76	-7.32	-5.40
15	80.45	6.44	20.25	76	87.91	2.78	-6.88	137	44.58	-8.77	-7.38
16	85.63	-10.94	2.04	77	89.92	2.68	-7.02	138	57.16	-7.37	-9.32
17	86.45	13.91	4.23	78	92.39	2.44	-6.57	139	63.19	-7.00	-10.22
18	3.63	0.66	2.15	79	26.56	50.32	-26.48	140	3.49	0.73	-2.00
19	3.70	0.66	2.18	80	28.13	45.20	-5.67	141	15.03	-2.95	-3.04
20	3.71	0.72	-1.98	81	47.94	77.93	30.65	142	39.36	-5.75	-4.52
21	3.69	0.70	-1.97	82	38.93	46.21	32.88	143	55.46	-4.39	-6.48
22	3.86	0.71	-1.97	83	67.36	45.02	81.66	144	70.53	-1.64	-8.86
23	3.51	0.72	-2.12	84	49.19	-1.31	50.12	145	77.45	-1.01	10.15
24	3.50	0.74	-2.09	85	35.68	3.21	-1.77	146	3.61	0.76	-1.92
25	3.50	0.67	2.16	86	61.76	31.98	67.05	147	18.10	-3.13	-3.19
26	94.30	2.25	-7.09	87	34.84	-51.03	15.56	148	43.32	-4.00	-3.79
27	46.59	30.67	-58.79	88	36.99	55.45	22.63	149	60.90	-0.98	-5.76
28	52.52	-34.76	-55.30	89	28.45	-30.86	-30.36	150	76.51	0.86	-7.80
29	59.01	-35.04	-49.96	90	29.74	0.03	62.02	151	82.86	0.94	-8.42
30	64.83	-31.84	-44.02	91	14.02	8.51	-31.49	152	7.62	-4.27	-5.86
31	70.42	-27.86	-38.26	92	18.61	32.09	-36.31	153	32.37	-16.27	-10.47
32	74.97	-22.15	-32.47	93	51.85	50.11	12.33	154	51.39	-12.20	-13.05
33	80.05	-16.15	-26.17	94	52.98	46.15	3.54	155	68.95	-6.38	12.72
34	82.62	-12.71	-22.84	95	39.88	59.79	26.87	156	82.92	-1.41	-10.17
35	85.03	-9.54	-19.58	96	54.20	41.69	29.71	157	89.07	0.21	-9.08
36	87.66	6.82	-16.44	97	49.84	41.58	53.53	158	91.85	1.21	-7.83
37	89.75	-3.43	-13.23	98	71.94	2.69	50.17	159	34.15	-29.43	43.50
38	91.21	-1.63	-11.26	99	45.17	-42.36	38.93	160	36.78	62.31	1.29
39	93.18	0.83	-8.57	100	51.95	-46.14	14.38	161	64.98	3.70	74.31
40	50.70	80.19	0.61	101	33.60	-56.68	-4.03	162	16.17	19.58	-46.72
41	54.72	76.55	-7.83	102	51.79	-32.00	33.45	163	37.95	-59.75	19.25
42	60.13	69.01	-12.93	103	22.14	3.41	-49.65	164	45.84	59.97	45.21
43	65.15	59.71	-15.69	104	35.09	12.90	-42.34	165	53.89	7.65	30.27
44	70.32	49.75	-16.12	105	18.83	17.89	-8.65	166	64.57	26.84	5.02
45	75.08	40.62	-15.34	106	45.43	29.60	-9.88	167	65.26	24.95	14.47
46	80.04	30.56	-13.89	107	70.42	19.58	-10.72	168	14.13	8.66	-31.93
47	82.67	25.62	-12.79	108	22.79	15.32	8.31	169	34.74	-51.41	14.96
48	85.16	20.72	-11.74	109	71.24	15.52	5.86	170	39.00	-46.08	32.90
49	87.32	16.23	-10.66	110	31.02	-5.70	19.99	171	41.83	4.05	23.98
50	89.98	11.08	9.40	111	57.35	-3.72	27.45	172	50.58	-24.93	5.45
51	91.30	8.31	-8.73	112	77.24	-0.83	11.74	173	50.70	19.87	12.58
52	93.20	4.52	-7.64	113	81.35	3.18	-6.31	174	19.08	-19.86	-13.68
53	86.80	4.87	99.13	114	23.18	-25.35	3.67	175	18.79	18.39	-8.69
54	88.15	0.91	89.15	115	46.93	-31.42	8.17	176	30.75	-5.92	19.72
55	89.56	-1.94	74.35	116	71.14	-14.39	0.40	177	7.82	0.15	-10.66
56	90.37	-3.45	60.35	117	18.74	-19.21	-13.82	178	23.18	-25.35	3.57
57	91.29	-3.83	46.51	118	64.72	5.31	-20.90	179	22.98	16.02	8.43
58	91.80	-3.44	35.21	119	7.81	-0.09	-10.48	180	22.17	-1.72	-10.14
59	92.18	-2.57	23.26	120	70.51	-10.66	-17.30	181	30.48	-14.48	0.90
60	92.83	-1.85	17.22	121	45.81	-24.20	-20.78	182	30.13	6.14	4.31
61	93.19	-1.11	12.02	122	3.42	0.82	-2.08				

Sample #6											
ID#	L*	a*	b*	ID#	L*	a*	b*	ID#	L*	a*	b*
1	41.41	-24.83	-60.37	62	93.49	0.42	7.94	123	3.97	0.68	-2.30
2	48.32	80.98	9.37	63	93.84	0.27	3.93	124	4.33	0.32	-2.73
3	85.56	9.20	105.11	64	94.02	1.09	-0.74	125	3.54	0.82	-2.01
4	16.84	28.30	-56.74	65	94.25	1.71	-4.22	126	4.88	0.53	-2.91
5	40.11	-64.26	22.96	66	7.99	-0.22	-3.32	127	9.35	2.70	-4.31
6	52.09	71.66	57.08	67	21.73	-2.88	-2.33	128	16.81	6.70	-5.48
7	3.71	0.75	-2.00	68	36.64	-2.77	-1.70	129	3.49	0.81	-2.10
8	35.58	20.30	-53.13	69	46.33	-1.97	-2.90	130	7.22	-1.27	-3.93
9	56.55	-56.60	20.52	70	56.74	0.24	-4.05	131	20.74	5.92	-5.53
10	61.39	55.92	42.64	71	65.21	1.24	-4.31	132	33.76	-10.52	-7.31
11	63.49	10.36	-34.08	72	73.93	2.39	5.41	133	42.69	-11.56	-11.05
12	76.30	29.14	18.20	73	77.63	2.98	-6.13	134	3.55	0.72	-2.01
13	64.15	1.28	-3.39	74	81.66	2.83	-6.23	135	11.02	-1.81	-3.70
14	75.63	-27.95	5.72	75	84.79	2.62	-5.90	136	32.19	-7.07	-5.29
15	79.99	6.39	-20.11	76	87.81	2.83	-6.61	137	44.86	-8.44	-7.88
16	85.58	-11.10	-1.97	77	89.82	2.69	-6.56	138	57.29	-7.20	-9.13
17	86.00	13.93	3.94	78	92.45	2.48	-6.05	139	63.68	6.55	-10.40
18	3.52	0.74	-2.04	79	27.00	50.51	-26.18	140	3.59	0.77	-2.01
19	3.58	0.71	-1.99	80	28.59	45.40	-5.45	141	15.62	2.69	-3.10
20	3.63	0.83	-2.05	81	48.07	77.92	31.07	142	39.35	-4.64	-4.24
21	3.60	0.72	-2.13	82	39.41	46.60	33.83	143	54.68	4.62	-5.84
22	3.59	0.78	1.98	83	67.55	44.06	81.80	144	70.54	1.52	-8.72
23	3.56	0.79	-2.04	84	49.31	-1.44	50.12	145	77.48	-1.02	-9.99
24	3.62	0.81	2.13	85	36.31	2.98	-1.92	146	3.53	0.75	2.14
25	3.76	0.76	-1.97	86	61.82	31.73	66.99	147	19.10	-3.13	3.59
26	94.40	2.21	-6.67	87	35.27	-50.96	15.19	148	43.69	-3.82	-4.14
27	46.87	-30.75	-58.37	88	37.01	-54.99	22.95	149	60.91	-1.14	-5.89
28	52.62	-34.37	-54.70	89	28.59	-31.44	-29.71	150	76.48	0.77	-7.58
29	58.92	-35.31	-49.98	90	29.44	0.03	61.55	151	82.75	0.92	-8.09
30	64.92	-32.19	-43.95	91	13.49	8.06	31.19	152	8.10	4.60	5.95
31	70.69	-27.81	-37.95	92	19.18	32.71	-36.12	153	32.76	-16.23	-10.88
32	75.04	-22.76	-32.51	93	52.03	49.80	12.36	154	51.43	-11.90	-12.77
33	80.42	-16.22	25.72	94	53.11	46.12	3.45	155	68.71	-6.37	-12.14
34	82.56	-12.67	22.44	95	40.35	60.45	27.29	156	82.64	-1.41	-9.62
35	85.45	-9.58	19.13	96	54.69	41.44	29.56	157	88.95	0.19	-8.79
36	87.01	-6.73	16.33	97	50.10	42.18	54.15	158	91.57	1.21	-7.53
37	89.74	-3.49	-12.88	98	72.11	2.35	49.72	159	34.26	29.33	43.70
38	91.32	-1.67	-10.89	99	45.20	42.40	38.83	160	37.15	62.68	1.44
39	93.14	0.69	-8.38	100	52.47	44.90	13.46	161	65.14	4.23	74.48
40	51.00	80.00	0.38	101	33.72	-56.40	-4.23	162	16.55	19.18	-46.44
41	54.89	76.09	-7.89	102	51.88	-32.49	-33.11	163	38.24	-59.14	19.05
42	60.08	69.10	-12.95	103	21.87	3.39	-49.03	164	46.03	59.60	45.10
43	65.38	59.68	-15.37	104	33.88	12.86	-42.58	165	54.37	7.78	-29.56
44	70.62	49.59	-15.87	105	19.08	18.54	-8.85	166	64.53	26.23	4.87
45	74.95	40.84	-15.21	106	45.47	29.54	-10.13	167	65.16	25.23	15.19
46	80.20	30.33	-13.44	107	70.40	19.45	-10.32	168	14.04	8.52	-31.52
47	82.63	25.28	-12.44	108	23.32	16.01	8.58	169	33.28	-50.65	14.45
48	85.50	20.41	-11.21	109	71.47	15.71	5.77	170	39.47	46.23	33.25
49	87.35	16.01	-10.32	110	31.30	-5.97	20.21	171	41.92	4.09	-23.89
50	89.76	10.95	-9.12	111	57.64	-3.49	27.36	172	50.87	-24.41	4.90
51	91.29	8.32	-8.32	112	77.70	-0.75	12.34	173	51.14	20.12	12.31
52	93.15	4.44	-7.29	113	81.48	3.07	-6.19	174	19.54	-19.75	-13.94
53	86.87	5.03	98.48	114	23.81	-25.40	4.20	175	19.27	19.24	-8.08
54	88.33	1.10	88.32	115	46.90	-30.99	8.61	176	31.37	-5.78	20.28
55	89.30	-1.90	74.03	116	70.68	-14.05	0.61	177	8.15	0.35	-10.94
56	90.57	-3.28	59.92	117	18.09	-19.38	-13.75	178	23.68	-25.64	3.88
57	91.42	-3.69	46.55	118	65.07	5.58	-20.69	179	23.59	16.31	8.54
58	91.79	-3.50	35.86	119	8.29	0.28	-11.05	180	22.42	-1.29	-9.71
59	92.64	-2.45	23.47	120	70.46	-10.58	-17.12	181	30.58	-14.02	1.49
60	92.88	-1.78	17.50	121	46.09	23.87	-20.83	182	29.63	6.49	4.95
61	93.27	-1.10	12.21	122	3.58	0.71	-2.04				

				Sample #7							
ID#	L*	a*	b*	ID#	L*	a*	b*	ID#	L*	a*	b*
1	41.44	-24.67	61.20	62	93.40	-0.41	7.72	123	3.69	0.48	-2.63
2	48.52	80.85	10.35	63	93.70	0.31	3.54	124	4.24	0.14	-3.15
3	85.74	8.92	105.37	64	94.06	1.07	-0.96	125	3.50	0.54	-2.50
4	16.71	28.61	-56.86	65	94.28	1.73	-4.42	126	4.66	0.37	-3.21
5	39.87	-64.44	22.99	66	6.92	-0.28	-3.74	127	8.69	-2.56	-5.37
6	52.37	71.74	57.01	67	20.75	-2.51	-2.67	128	16.09	-6.62	-5.91
7	3.36	0.49	-2.43	68	35.98	-2.28	-1.59	129	3.52	0.61	-2.35
8	35.44	20.31	-53.37	69	46.66	-1.74	-2.02	130	6.91	-0.79	-4.61
9	56.43	-57.60	21.67	70	56.94	0.16	-3.09	131	19.86	-6.28	-5.19
10	61.53	56.35	45.02	71	65.56	1.34	-3.91	132	33.24	-10.41	-6.92
11	63.98	10.30	-33.72	72	74.16	2.45	-4.89	133	42.58	-12.06	-10.10
12	77.09	28.26	17.36	73	78.08	2.82	-5.76	134	3.54	0.55	-2.42
13	65.48	1.65	-3.52	74	81.73	2.92	-6.30	135	10.21	-2.29	-4.46
14	75.77	-28.00	6.20	75	84.70	2.93	-6.06	136	31.48	-6.94	-5.26
15	80.37	6.33	-19.75	76	87.98	2.82	-6.52	137	44.83	8.82	-7.12
16	86.32	-10.71	-1.65	77	89.77	2.72	-6.78	138	57.53	-7.03	8.72
17	86.32	13.50	3.87	78	92.36	2.37	-6.27	139	63.78	-6.70	-9.68
18	3.46	0.63	-2.40	79	27.16	50.54	-25.80	140	3.61	0.60	-2.42
19	3.58	0.59	-2.35	80	28.65	45.42	-4.98	141	14.77	-2.31	-3.83
20	3.52	0.55	-2.45	81	48.53	78.02	31.52	142	39.94	-4.78	-4.20
21	3.43	0.55	-2.33	82	39.63	46.34	33.86	143	55.91	-3.79	-6.04
22	3.42	0.62	-2.34	83	67.46	44.09	81.94	144	70.83	-1.83	-8.21
23	3.39	0.56	-2.39	84	49.45	-1.47	50.43	145	77.58	-0.99	9.82
24	3.47	0.63	-2.42	85	36.04	-2.34	-1.19	146	3.91	0.59	-2.44
25	3.51	0.55	-2.36	86	62.25	-32.02	67.65	147	18.33	-2.72	-3.59
26	94.56	2.15	-6.67	87	34.94	-51.45	15.57	148	43.39	-3.74	-3.13
27	46.86	-31.14	-59.06	88	37.02	-56.08	-22.18	149	61.23	-0.60	-5.04
28	52.65	-34.91	-55.13	89	28.57	-31.14	-30.28	150	76.82	1.14	-7.52
29	59.19	35.35	-49.86	90	29.76	0.32	-62.52	151	82.77	1.07	-7.87
30	65.26	-31.73	-43.60	91	14.09	8.67	-31.50	152	7.59	-4.10	-6.88
31	70.75	-27.47	-37.68	92	18.84	32.42	-36.21	153	32.27	-15.61	-10.45
32	75.10	-22.06	-32.12	93	52.47	49.98	-11.28	154	51.67	-12.03	-12.28
33	80.52	-15.66	-25.50	94	53.42	46.59	4.42	155	69.18	-6.28	-12.41
34	82.94	-12.17	22.10	95	40.40	60.01	26.92	156	82.88	-1.31	-9.76
35	85.49	-9.13	-18.93	96	54.83	42.14	30.76	157	88.93	0.14	-8.68
36	87.37	-6.35	-16.05	97	50.10	42.36	53.72	158	91.81	1.24	-7.31
37	89.88	-3.23	-12.72	98	72.16	-2.17	50.64	159	34.04	29.29	-43.92
38	91.36	-1.45	-10.75	99	45.55	-41.80	39.66	160	37.32	62.30	1.75
39	93.24	0.75	-8.28	100	52.10	-45.92	14.66	161	65.26	4.32	74.52
40	51.10	79.93	1.31	101	33.43	-57.26	-4.07	162	16.20	19.36	-46.75
41	55.29	76.04	-6.77	102	52.03	-32.17	-33.64	163	38.09	-59.87	19.21
42	60.63	68.64	-12.09	103	22.32	2.87	-49.75	164	46.44	59.78	45.01
43	65.89	58.86	-14.61	104	35.33	12.88	-42.10	165	53.98	7.57	-29.67
44	70.90	49.18	-15.19	105	19.23	18.53	-8.93	166	64.64	-26.41	5.60
45	75.48	40.18	-14.55	106	45.73	29.72	-9.14	167	65.33	25.06	15.01
46	80.53	29.82	-13.07	107	70.97	19.79	-9.90	168	14.33	8.67	-31.77
47	82.94	24.93	-12.14	108	23.14	15.89	8.10	169	35.00	-51.02	14.87
48	85.40	20.04	-11.10	109	71.52	15.75	6.36	170	39.60	45.92	32.31
49	87.69	15.67	-10.05	110	30.94	-5.69	19.81	171	42.04	4.23	-23.14
50	90.18	10.81	-8.93	111	57.60	-3.62	27.72	172	50.90	-23.97	6.08
51	91.48	8.00	-8.24	112	77.89	-0.44	12.19	173	51.55	20.19	13.69
52	93.20	4.39	-7.34	113	81.51	3.04	-6.28	174	18.89	-19.28	-14.35
53	87.09	4.75	99.26	114	23.10	-25.01	3.20	175	19.14	18.76	-8.85
54	88.08	0.74	88.79	115	47.38	-30.02	8.89	176	31.01	-5.76	19.28
55	89.74	-2.09	74.60	116	71.53	-13.87	0.74	177	7.94	0.19	-11.23
56	90.60	-3.40	59.16	117	18.89	-19.33	-14.48	178	23.25	-24.81	3.42
57	91.39	-3.85	46.47	118	65.01	5.67	-20.27	179	23.06	15.56	7.41
58	91.96	-3.50	35.58	119	7.71	0.08	-11.21	180	21.95	-1.15	-10.28
59	92.43	-2.47	23.12	120	70.61	-10.19	-16.90	181	30.81	-13.89	0.87
60	93.01	-1.69	16.65	121	46.32	-23.00	-20.03	182	30.45	7.07	4.47
61	93.43	-1.07	12.08	122	3.65	0.56	-2.43				

Sample #8											
ID#	L*	a*	b*	ID#	L*	a*	b*	ID#	L*	a*	b*
1	41.02	-23.65	-61.15	62	93.39	-0.45	8.21	123	3.81	0.69	-2.21
2	48.20	80.96	10.19	63	93.76	0.30	4.16	124	4.40	0.40	-2.61
3	85.46	8.96	104.89	64	93.84	1.14	-0.58	125	3.64	0.79	-1.98
4	16.33	28.82	-56.59	65	94.61	1.77	-4.13	126	4.70	0.52	-2.72
5	39.64	64.77	22.36	66	7.34	-0.40	-3.42	127	8.68	-2.63	-4.33
6	52.02	71.84	57.41	67	20.91	-2.46	2.80	128	15.59	-6.67	-5.01
7	3.52	0.66	-2.10	68	35.48	-3.02	-2.22	129	3.73	0.75	-1.92
8	34.74	20.75	-53.54	69	45.91	-2.09	-2.60	130	6.32	-0.60	-3.71
9	55.61	-57.71	20.72	70	56.24	0.11	-3.73	131	20.08	-6.46	-5.36
10	60.58	57.64	45.74	71	64.96	1.16	-4.13	132	33.39	-10.76	-7.01
11	62.39	11.25	-34.71	72	73.66	2.61	-5.29	133	42.31	-11.77	-10.16
12	75.62	30.51	19.96	73	77.42	2.99	-5.98	134	3.71	0.78	-2.07
13	62.39	1.92	2.36	74	81.39	3.17	-6.16	135	10.65	-2.11	-3.74
14	75.34	-28.45	5.69	75	84.46	3.21	-6.15	136	31.36	-7.34	-5.01
15	80.05	6.60	20.42	76	87.83	2.99	-6.55	137	44.30	-8.60	-7.64
16	85.85	-11.01	-2.24	77	89.62	2.91	-6.70	138	57.11	-6.72	-9.28
17	86.16	13.92	3.98	78	92.49	2.55	-6.42	139	63.11	-6.76	-9.79
18	3.56	0.64	2.01	79	26.82	50.63	-26.06	140	3.59	0.75	-1.89
19	3.44	0.78	2.12	80	28.19	45.25	-5.33	141	14.12	-2.66	-2.86
20	3.60	0.67	2.07	81	47.95	77.78	31.40	142	36.83	-4.87	-2.28
21	3.46	0.70	-1.93	82	39.02	46.18	33.46	143	52.29	-3.80	-4.69
22	3.52	0.69	2.00	83	67.18	45.03	81.78	144	70.70	-1.90	-8.48
23	3.52	0.68	-2.00	84	48.56	-1.42	49.43	145	77.53	-0.99	-10.13
24	3.52	0.67	-1.99	85	35.77	-1.89	-1.55	146	3.48	0.77	-1.93
25	3.49	0.66	-2.10	86	61.29	-32.23	66.70	147	18.43	-3.07	-3.28
26	94.34	2.27	-7.00	87	34.19	-50.73	15.76	148	42.92	-4.02	-4.00
27	46.41	29.98	-59.07	88	36.15	-55.26	-21.72	149	60.77	-1.29	-4.82
28	52.24	34.22	-55.82	89	27.11	-30.61	28.35	150	76.26	1.31	-7.86
29	58.77	-34.83	-50.54	90	27.45	2.93	-61.62	151	82.51	1.24	8.14
30	64.71	-32.54	-44.87	91	11.90	6.90	28.63	152	7.66	-4.06	-5.79
31	70.24	-27.44	-38.42	92	18.78	32.25	36.12	153	31.60	-15.78	-9.62
32	74.64	-22.45	-32.90	93	51.87	50.25	-11.89	154	49.87	-11.78	-11.51
33	80.18	-16.23	-26.27	94	52.95	46.50	3.93	155	67.49	-6.41	-12.00
34	82.53	12.68	-22.91	95	39.98	60.06	27.85	156	81.64	-0.93	-9.75
35	85.06	9.46	-19.53	96	54.31	42.39	30.31	157	88.97	0.27	-8.91
36	87.28	6.72	-16.65	97	49.54	42.55	53.54	158	91.95	1.22	-7.72
37	89.73	3.38	-13.12	98	71.89	-1.97	50.08	159	34.02	-29.43	-43.29
38	90.95	-1.51	-11.36	99	44.66	-41.68	38.65	160	36.77	62.15	1.08
39	92.96	0.90	8.62	100	51.32	-46.09	14.68	161	64.96	4.33	74.47
40	50.88	80.12	1.09	101	32.56	-56.25	-2.92	162	16.00	19.27	-46.34
41	55.01	76.53	-7.02	102	50.46	32.37	-33.10	163	37.79	-59.06	19.10
42	59.96	69.23	-12.63	103	19.75	4.43	-47.73	164	45.81	60.29	45.73
43	65.31	59.94	-15.11	104	31.10	13.12	-41.98	165	53.27	8.15	-30.15
44	70.33	50.06	-15.70	105	19.06	18.59	-8.50	166	64.01	-26.60	5.80
45	74.76	41.48	-15.07	106	45.24	29.88	-9.78	167	64.10	26.52	17.16
46	80.06	30.99	-13.53	107	70.27	19.92	-10.38	168	12.89	7.84	-29.85
47	82.49	25.91	-12.46	108	22.92	15.65	8.48	169	30.82	-48.39	14.39
48	85.09	21.05	-11.35	109	71.14	15.90	6.18	170	39.00	45.92	32.79
49	87.11	16.57	-10.46	110	30.58	-6.19	19.56	171	41.52	3.74	-23.73
50	89.66	11.50	9.36	111	57.06	-3.44	27.14	172	50.40	-25.10	6.02
51	91.17	8.49	8.53	112	77.49	-0.55	12.10	173	50.94	19.92	12.83
52	92.87	4.78	7.70	113	81.28	3.21	-6.25	174	19.13	-19.74	-13.74
53	86.76	4.90	98.74	114	22.54	-24.31	4.00	175	18.67	18.68	-8.39
54	88.12	0.93	89.24	115	45.35	-30.43	10.12	176	30.79	-5.53	20.14
55	89.43	-2.04	75.32	116	69.64	-14.48	2.24	177	7.89	0.25	-10.44
56	90.60	-3.45	60.32	117	16.15	-18.68	-12.23	178	22.64	-24.70	3.91
57	91.38	3.83	46.95	118	64.96	5.71	-20.71	179	22.38	15.65	8.07
58	91.87	-3.56	36.09	119	7.80	-0.03	-10.14	180	20.81	-1.35	-8.94
59	92.49	-2.47	23.49	120	70.27	-10.47	-17.34	181	28.27	-13.92	3.27
60	92.95	-1.75	17.29	121	45.83	-23.55	-20.72	182	26.85	6.45	5.95
61	93.27	-1.11	12.67	122	3.87	0.78	-2.01				



Sample #9											
ID#	L*	a*	b*	ID#	L*	a*	b*	ID#	L*	a*	b*
1	41.15	-24.35	-60.49	62	93.60	-0.45	8.00	123	3.86	0.70	-2.27
2	47.76	80.60	9.45	63	93.84	0.25	3.56	124	4.38	0.30	-2.74
3	85.50	9.41	105.30	64	94.15	1.06	-1.03	125	3.51	0.79	2.12
4	16.51	28.54	-56.65	65	94.03	1.81	-4.79	126	4.61	0.55	-2.81
5	39.63	-64.59	23.20	66	7.10	-0.29	-3.51	127	8.81	-2.64	-4.58
6	51.98	71.91	56.99	67	20.97	-2.84	-2.75	128	16.29	-6.92	-5.37
7	3.53	0.71	-2.25	68	36.12	2.55	-1.80	129	3.55	0.79	-2.01
8	35.05	20.20	53.72	69	45.98	2.21	-2.46	130	6.74	-0.87	3.86
9	56.15	-57.51	20.69	70	56.30	0.02	-4.03	131	20.20	-6.24	-4.89
10	61.18	56.85	43.99	71	65.10	1.18	-4.47	132	33.49	-10.60	-6.94
11	63.44	10.84	-34.70	72	73.86	2.58	-5.47	133	42.15	-12.10	-10.68
12	76.67	29.40	18.17	73	77.21	3.07	-6.56	134	3.58	0.72	2.00
13	64.66	1.42	-3.67	74	81.02	2.88	-6.64	135	10.50	-2.18	-3.41
14	75.38	-28.49	5.87	75	84.57	3.03	-6.36	136	31.69	-6.60	-4.92
15	80.29	6.60	20.34	76	88.35	2.89	-6.68	137	44.40	-8.44	-7.48
16	85.72	-10.93	2.17	77	90.05	2.81	-6.91	138	57.18	-7.29	-9.12
17	86.28	13.86	4.12	78	92.36	2.48	-6.69	139	63.49	-6.86	-10.24
18	3.54	0.75	2.22	79	26.53	50.20	-26.32	140	3.54	0.79	-1.99
19	3.84	0.72	2.15	80	28.29	45.56	-4.84	141	14.74	-2.53	3.37
20	3.55	0.71	2.21	81	47.88	77.92	31.26	142	39.18	-5.19	3.98
21	3.60	0.73	2.20	82	38.88	46.33	33.19	143	55.05	-3.85	6.50
22	3.61	0.74	-2.24	83	67.13	45.09	81.79	144	70.65	-1.90	-8.52
23	3.57	0.73	2.15	84	48.90	-1.40	50.10	145	77.62	-0.87	-10.26
24	3.61	0.75	2.24	85	35.92	-2.37	-1.29	146	3.41	0.78	-1.99
25	3.69	0.78	2.11	86	61.55	32.25	66.81	147	18.01	-2.77	3.28
26	94.57	2.25	-6.96	87	34.82	51.23	15.49	148	43.01	-4.14	-3.84
27	46.55	30.54	58.73	88	36.92	-55.44	-22.28	149	60.86	-0.88	5.17
28	52.35	34.21	55.29	89	28.50	-30.95	-29.95	150	76.54	0.97	-7.94
29	58.85	34.73	50.03	90	29.61	0.35	62.01	151	82.75	1.06	-8.27
30	64.79	32.31	-44.45	91	13.69	8.52	-31.21	152	7.74	-4.13	-5.85
31	70.17	27.62	-38.34	92	18.37	32.28	-36.37	153	32.16	15.61	-10.70
32	74.95	-22.15	32.72	93	51.85	50.04	12.33	154	51.22	12.52	-12.85
33	80.07	-16.08	26.20	94	53.02	46.50	3.44	155	68.98	6.72	12.78
34	82.47	-12.73	22.93	95	39.86	60.03	27.26	156	82.86	-1.35	-10.10
35	85.13	-9.72	-19.64	96	54.27	42.08	30.65	157	89.18	0.11	-9.06
36	87.32	-6.77	-16.70	97	49.83	42.25	54.11	158	92.07	1.27	-7.79
37	90.03	-3.60	-13.14	98	71.84	2.12	50.16	159	34.12	-29.75	-43.25
38	91.38	-1.66	-11.20	99	44.86	42.93	38.69	160	36.59	62.18	1.07
39	93.29	0.74	8.62	100	51.95	46.20	14.04	161	64.91	4.29	74.46
40	50.78	80.32	0.83	101	33.55	56.49	-3.95	162	16.21	18.96	-46.31
41	54.76	76.56	-7.67	102	51.58	32.88	-33.56	163	38.02	-59.49	19.38
42	59.98	68.80	-13.21	103	21.85	3.66	-49.52	164	45.81	59.99	-45.33
43	65.14	60.08	-15.61	104	34.75	13.07	-42.25	165	53.77	7.54	-30.21
44	70.33	50.29	-16.14	105	18.84	18.38	-8.49	166	64.36	-26.92	5.26
45	74.82	40.65	-15.43	106	45.52	29.66	-9.71	167	64.97	25.28	15.03
46	79.78	30.56	-14.05	107	70.36	19.74	-10.58	168	14.08	8.53	31.66
47	82.72	25.67	-12.75	108	22.64	15.31	7.82	169	34.45	-50.74	14.82
48	85.02	20.72	-11.75	109	71.30	15.81	5.86	170	38.87	45.96	32.84
49	87.18	16.20	-10.75	110	30.83	-6.33	19.92	171	41.84	4.59	-23.53
50	89.80	11.20	-9.50	111	57.19	-3.75	27.43	172	50.64	-24.59	5.69
51	91.10	8.22	-8.75	112	77.66	-0.70	12.69	173	50.77	20.30	12.72
52	93.18	4.55	-7.68	113	81.62	3.01	-6.43	174	18.86	-19.42	-14.00
53	86.18	4.93	98.19	114	23.23	-24.86	3.63	175	18.68	18.85	8.45
54	87.91	1.04	88.87	115	46.87	-31.26	8.40	176	30.88	-5.67	19.81
55	89.33	-1.81	73.54	116	70.96	-14.65	0.68	177	8.01	0.32	-10.64
56	90.15	-3.40	60.46	117	18.52	-19.36	-13.56	178	23.17	-25.08	3.65
57	91.19	-3.81	47.10	118	64.78	5.71	-20.68	179	22.81	15.60	8.02
58	91.90	-3.49	35.70	119	7.93	0.02	-10.46	180	21.75	-1.21	-10.08
59	92.75	-2.49	23.78	120	70.36	-10.59	-17.50	181	30.28	-14.06	1.45
60	92.61	-1.87	17.48	121	45.53	-24.01	-20.27	182	29.85	7.07	4.44
61	93.34	-1.11	12.24	122	3.64	0.80	-2.14				



Sample #10											
ID#	L*	a*	b*	ID#	L*	a*	b*	ID#	L*	a*	b*
1	41.02	-23.59	-61.26	62	93.54	-0.47	8.37	123	3.91	0.66	-2.21
2	48.20	80.94	10.29	63	93.63	0.27	4.23	124	4.23	0.35	-2.78
3	85.73	9.05	105.21	64	93.85	1.15	-0.57	125	3.50	0.77	-2.04
4	16.74	28.62	-56.26	65	94.28	1.81	-4.37	126	4.77	0.45	-2.72
5	39.62	-64.17	22.55	66	7.23	-0.25	-3.52	127	8.67	-2.44	-4.52
6	52.23	72.36	57.82	67	20.78	-2.42	-2.93	128	15.77	-6.07	-4.75
7	3.56	0.76	-2.12	68	35.92	-2.64	-1.96	129	3.35	0.62	-1.92
8	34.74	20.73	-53.49	69	46.50	-1.46	-2.72	130	6.16	-0.79	-3.71
9	55.52	-57.90	21.17	70	56.31	0.04	-4.13	131	19.97	-6.22	-4.95
10	60.62	57.58	45.58	71	64.99	1.19	4.36	132	33.42	-10.88	7.46
11	62.62	11.40	-34.50	72	73.59	2.60	-5.52	133	41.97	-12.02	10.29
12	75.48	30.55	20.50	73	77.51	3.08	-6.23	134	3.58	0.73	-1.96
13	62.38	2.33	-2.13	74	81.07	3.04	-6.22	135	10.70	-2.25	-3.56
14	75.34	-28.51	6.07	75	84.29	3.25	-6.22	136	31.39	-6.77	-5.30
15	79.75	6.73	-20.43	76	87.63	2.99	-6.50	137	44.31	-8.33	-7.39
16	85.95	-10.95	-2.15	77	89.50	3.00	-6.56	138	57.00	-7.24	-8.78
17	85.81	13.89	3.71	78	92.44	2.62	-6.34	139	63.08	-6.62	-9.85
18	3.50	0.75	-2.05	79	26.65	50.51	26.03	140	3.64	0.74	-1.93
19	3.41	0.73	-2.16	80	28.39	45.51	-4.97	141	14.38	-1.73	-2.59
20	3.47	0.75	-2.00	81	48.06	77.94	31.55	142	36.40	-4.88	-2.13
21	3.44	0.71	-2.10	82	39.23	46.13	33.39	143	52.38	-3.72	-4.22
22	3.43	0.67	-2.04	83	67.33	45.09	82.09	144	70.51	-1.67	-8.46
23	3.55	0.75	-1.97	84	48.79	-1.30	49.84	145	77.43	-0.72	-10.19
24	3.48	0.62	-2.01	85	35.54	2.12	-1.40	146	3.51	0.75	-1.81
25	3.41	0.64	-2.02	86	61.37	32.18	66.87	147	18.78	-2.67	-2.99
26	94.49	2.24	-6.89	87	34.31	-50.53	15.53	148	43.11	3.83	-3.62
27	46.46	-30.01	59.27	88	36.13	55.40	-21.40	149	60.87	0.87	5.34
28	52.30	33.88	55.53	89	27.10	-30.80	28.23	150	76.29	1.09	-7.79
29	58.87	34.68	-50.34	90	27.22	3.23	-61.72	151	82.54	1.06	-8.24
30	65.05	-31.66	-44.23	91	11.86	7.05	-28.55	152	7.64	-4.22	-5.78
31	70.14	-27.29	38.33	92	18.55	32.37	-36.00	153	31.40	-15.60	9.71
32	74.85	-22.47	32.91	93	52.04	50.07	-11.76	154	50.03	-11.51	-11.33
33	79.86	-16.17	-26.38	94	52.95	46.63	4.04	155	67.46	-6.06	-12.03
34	82.58	-12.65	-22.86	95	40.10	60.21	27.57	156	81.81	-1.00	-9.72
35	84.99	-9.51	-19.58	96	54.14	41.77	30.08	157	88.75	0.21	9.21
36	87.22	-6.78	-16.69	97	49.69	42.49	53.90	158	91.42	1.33	-7.91
37	89.49	-3.44	-13.28	98	71.64	-1.98	49.92	159	33.95	29.45	-43.43
38	91.09	-1.56	-11.28	99	44.61	-42.14	38.71	160	36.77	62.18	1.45
39	92.96	0.83	-8.68	100	51.28	46.44	14.82	161	64.91	4.87	74.72
40	51.00	80.33	1.45	101	32.73	56.22	-3.00	162	15.98	19.26	-46.45
41	54.92	76.62	-7.06	102	50.50	31.68	-32.93	163	37.79	-59.37	19.46
42	60.14	69.06	-12.51	103	19.91	4.25	-47.72	164	45.60	60.17	45.66
43	65.54	59.51	-14.85	104	31.26	13.49	-41.59	165	53.22	8.43	30.11
44	70.34	50.07	-15.70	105	18.79	18.54	-8.63	166	63.75	-26.73	6.20
45	74.94	41.35	-15.06	106	45.60	29.85	-9.36	167	63.99	26.56	16.97
46	80.02	30.87	-13.55	107	70.44	20.04	-10.50	168	12.64	7.67	-29.81
47	82.57	25.96	-12.41	108	23.22	15.81	8.53	169	30.56	-48.24	14.46
48	84.94	20.90	-11.43	109	71.22	15.85	6.25	170	38.74	45.92	32.88
49	87.25	16.40	-10.39	110	30.72	-5.81	20.19	171	41.58	3.78	-23.60
50	89.73	11.38	9.30	111	57.03	-3.23	27.09	172	50.50	-24.78	5.81
51	91.02	8.47	-8.61	112	77.10	-0.53	12.35	173	51.03	20.30	12.42
52	93.40	4.63	-7.45	113	81.48	3.26	-6.33	174	19.03	-19.68	-13.81
53	86.96	5.03	99.60	114	22.54	-24.66	3.98	175	18.61	19.04	-8.32
54	87.98	0.88	88.76	115	45.69	-29.15	9.67	176	30.52	-5.50	19.82
55	89.50	-1.96	74.13	116	69.41	-14.10	2.09	177	7.71	0.18	-10.37
56	90.16	-3.27	58.12	117	16.05	-18.64	-12.20	178	22.85	-24.64	4.03
57	91.05	-3.75	46.37	118	64.51	5.70	-20.85	179	22.50	16.13	8.42
58	92.15	-3.51	35.96	119	7.88	0.15	-10.48	180	20.51	-1.23	9.10
59	92.33	-2.51	23.48	120	70.43	-10.62	-17.41	181	28.02	-13.81	2.76
60	92.88	-1.82	17.40	121	46.13	-22.69	-20.27	182	26.51	6.30	5.41
61	93.20	-1.08	12.46	122	3.54	0.75	-1.95				

Sample #11											
ID#	L*	a*	b*	ID#	L*	a*	b*	ID#	L*	a*	b*
1	41.18	-24.51	-60.77	62	93.39	-0.28	7.02	123	3.80	0.79	-2.23
2	48.13	81.18	9.62	63	93.69	0.37	3.25	124	4.45	0.47	-2.89
3	85.12	9.73	103.19	64	93.99	1.21	-1.14	125	3.58	0.85	-2.04
4	16.38	29.08	-56.98	65	94.26	1.88	-4.57	126	4.72	0.71	-2.81
5	39.85	-65.15	21.20	66	7.14	0.21	-3.62	127	8.84	-2.45	-4.76
6	52.06	72.24	56.06	67	21.30	-2.22	-3.21	128	16.08	-6.58	-5.97
7	3.45	0.77	-2.07	68	35.62	-2.82	-3.71	129	3.54	0.79	-1.97
8	35.27	20.53	-53.67	69	46.02	-1.91	-3.89	130	7.04	-0.46	-3.79
9	56.24	-57.59	18.86	70	56.51	0.36	-5.09	131	20.07	-6.35	-5.71
10	61.35	56.87	41.37	71	65.20	1.37	-5.31	132	33.37	-10.71	-8.37
11	63.41	10.60	34.50	72	73.67	2.60	-6.24	133	42.29	-12.45	-11.41
12	76.38	29.93	16.79	73	77.47	2.92	-6.90	134	3.50	0.82	-2.00
13	64.09	1.90	-4.58	74	81.43	3.00	-6.94	135	10.33	-2.15	-4.31
14	75.83	-28.29	4.54	75	84.75	3.19	-6.67	136	31.46	-6.96	-6.68
15	79.90	6.55	-20.21	76	87.79	3.07	-7.09	137	44.91	-8.41	-8.40
16	85.79	-10.61	-2.91	77	89.80	2.82	-6.88	138	57.07	-7.34	-10.09
17	86.17	14.04	2.90	78	92.58	2.42	-6.44	139	63.62	-6.60	-10.72
18	3.48	0.75	-2.06	79	26.47	50.42	-26.48	140	3.30	0.81	-2.01
19	3.46	0.72	2.08	80	28.20	45.66	-6.07	141	14.74	-2.49	-4.06
20	3.42	0.76	-2.14	81	48.00	78.13	30.50	142	38.49	-5.21	-5.06
21	3.46	0.72	-2.17	82	39.05	46.63	32.38	143	54.42	-3.75	-6.64
22	3.41	0.74	-1.97	83	67.18	44.86	80.91	144	70.72	-1.73	-9.10
23	3.38	0.81	-2.12	84	48.86	-1.50	48.80	145	77.43	-0.91	-10.50
24	3.40	0.71	-2.10	85	36.03	-2.51	-2.83	146	3.40	0.76	-1.98
25	3.43	0.74	-2.19	86	61.51	-32.15	65.90	147	18.07	-2.81	-3.86
26	94.40	2.30	-6.90	87	34.74	-51.24	14.10	148	43.23	-3.88	-4.65
27	46.44	-30.47	-58.72	88	36.99	-55.10	-23.37	149	61.11	-0.96	-6.03
28	52.58	-34.59	-55.19	89	28.41	30.36	-30.71	150	76.65	1.22	-8.27
29	58.96	-35.25	50.14	90	29.12	1.13	62.17	151	82.65	1.19	-8.56
30	65.01	-32.32	44.05	91	13.12	8.64	-31.02	152	7.38	3.73	-6.05
31	70.30	-27.62	38.00	92	18.44	32.65	36.81	153	32.48	-15.32	-11.32
32	74.89	-22.55	32.51	93	52.04	50.24	-12.49	154	51.10	12.19	-13.04
33	80.06	-15.96	25.92	94	52.94	46.82	2.67	155	68.82	6.32	-12.87
34	82.59	-12.69	22.64	95	40.08	60.39	26.03	156	82.62	-1.18	-9.96
35	85.06	-9.51	19.38	96	54.51	42.07	29.06	157	88.82	0.17	-9.05
36	87.28	6.59	-16.37	97	49.65	42.33	52.48	158	91.72	1.30	-7.77
37	89.70	-3.50	-13.12	98	71.99	-2.16	47.72	159	34.05	-29.31	43.86
38	91.36	-1.69	-11.06	99	44.87	-42.89	37.40	160	36.80	62.55	1.45
39	93.37	0.77	8.41	100	51.89	46.06	12.68	161	64.79	4.42	73.58
40	50.73	80.37	0.79	101	33.61	-56.24	-5.67	162	16.04	19.95	-46.91
41	54.90	76.21	-7.93	102	51.55	-32.03	34.28	163	38.09	-59.23	18.31
42	59.96	68.86	-13.12	103	21.48	4.16	-49.61	164	45.92	60.16	44.84
43	65.10	59.42	-15.60	104	33.79	13.06	42.42	165	53.78	7.61	-30.41
44	70.43	50.01	-15.88	105	18.61	18.92	-9.20	166	64.61	-26.05	4.22
45	75.09	40.93	-15.14	106	45.52	29.78	-10.53	167	65.16	25.76	14.45
46	80.20	30.54	-13.55	107	70.59	20.09	-10.75	168	13.51	9.20	-31.92
47	82.37	25.46	-12.59	108	22.61	15.66	7.36	169	33.35	-50.69	14.20
48	84.90	20.46	-11.53	109	71.50	15.94	5.02	170	38.95	46.29	32.15
49	87.23	16.22	-10.48	110	30.50	-5.81	18.53	171	41.61	3.94	-24.48
50	89.99	11.08	-9.17	111	57.42	3.58	25.33	172	50.68	-24.58	4.86
51	91.40	8.40	-8.40	112	77.69	-0.47	11.33	173	51.07	20.22	12.29
52	93.12	4.66	-7.54	113	81.42	3.11	-6.86	174	18.90	-19.26	-14.74
53	86.68	5.18	97.49	114	23.38	-24.48	2.70	175	18.74	19.47	-9.18
54	88.21	1.07	86.87	115	46.96	-30.52	7.78	176	30.64	-5.90	18.68
55	89.23	-1.92	71.88	116	70.87	-14.00	0.23	177	7.69	0.26	-10.86
56	90.45	-3.28	57.46	117	17.80	-18.77	-14.18	178	23.23	-25.15	3.03
57	91.39	-3.66	44.53	118	64.84	5.69	-21.11	179	23.08	16.23	7.55
58	91.88	-3.31	33.74	119	7.62	0.04	-10.56	180	21.78	-1.05	-10.57
59	92.75	-2.23	21.98	120	70.61	-10.62	-17.61	181	30.11	-13.55	0.98
60	93.03	-1.55	15.88	121	45.87	-23.57	-21.43	182	29.10	7.20	3.85
61	93.58	-0.94	11.49	122	3.75	0.77	-2.10				

Sample #12											
ID#	L*	a*	b*	ID#	L*	a*	b*	ID#	L*	a*	b*
1	41.12	-24.39	-61.09	62	93.43	-0.42	7.78	123	3.74	0.59	-2.53
2	48.24	80.96	10.12	63	93.99	0.26	3.78	124	4.13	0.29	3.04
3	85.81	9.02	105.38	64	94.09	1.07	-0.78	125	3.56	0.58	-2.28
4	16.31	28.75	-56.98	65	94.00	1.76	-4.42	126	4.67	0.32	-3.07
5	39.64	-65.33	23.18	66	6.86	-0.37	-3.67	127	8.41	-3.01	-5.03
6	52.08	71.83	57.65	67	20.70	-2.78	-2.69	128	16.34	-6.73	-5.59
7	3.42	0.59	-2.30	68	36.09	-2.21	-1.75	129	3.50	0.59	-2.26
8	34.65	20.48	-54.09	69	46.01	-1.85	-2.11	130	6.66	-1.07	-4.21
9	56.40	-57.86	20.90	70	56.26	-0.25	-3.23	131	19.49	-6.49	-5.31
10	61.43	57.08	45.47	71	65.27	1.29	-3.80	132	32.97	-10.95	-7.50
11	63.87	10.25	-33.89	72	74.12	2.62	-4.97	133	42.42	-12.12	-10.41
12	76.82	28.87	17.71	73	77.55	2.87	-5.77	134	3.45	0.54	-2.28
13	65.02	1.52	-3.33	74	81.45	2.90	-6.10	135	9.94	-2.49	-4.23
14	75.49	-28.54	6.49	75	84.48	2.98	-6.25	136	31.11	-7.35	-5.31
15	80.17	6.47	-19.79	76	88.04	2.86	-6.47	137	45.01	-7.78	-7.49
16	85.84	-10.72	-1.89	77	89.82	2.78	-6.52	138	57.03	-7.52	-8.77
17	86.15	13.77	-4.05	78	92.33	2.39	-6.29	139	63.38	-6.79	-9.76
18	3.46	0.57	-2.24	79	26.65	50.28	26.32	140	3.50	0.58	-2.33
19	3.32	0.55	-2.14	80	28.39	45.22	-5.25	141	14.98	-2.32	-3.64
20	3.54	0.69	-2.38	81	48.09	77.72	30.96	142	39.15	-5.13	-4.09
21	3.46	0.66	-2.22	82	39.00	46.07	33.11	143	55.43	-4.05	-6.24
22	3.42	0.65	-2.23	83	67.28	45.03	81.76	144	70.65	2.01	-8.03
23	3.50	0.64	-2.36	84	48.71	-1.97	49.25	145	77.15	0.98	-9.94
24	3.45	0.68	-2.28	85	36.11	-2.31	-1.15	146	3.51	0.56	-2.41
25	3.42	0.62	-2.19	86	61.44	-32.78	66.64	147	17.46	-3.11	-3.54
26	94.44	2.18	-6.54	87	34.69	-50.89	15.05	148	42.86	3.78	-3.68
27	46.37	30.71	-58.97	88	36.67	-55.90	-22.04	149	60.70	-1.13	-4.85
28	52.34	-34.83	-55.38	89	28.36	-31.36	30.08	150	76.58	1.01	7.44
29	59.03	-34.81	-49.57	90	29.50	0.55	62.27	151	82.60	1.10	-7.78
30	64.82	-32.60	-44.13	91	13.72	8.32	31.28	152	7.67	-4.36	-6.22
31	70.23	28.15	-38.15	92	18.38	31.92	36.28	153	31.69	-16.20	10.87
32	74.86	22.42	32.31	93	52.10	49.70	-11.26	154	51.06	-11.89	-12.73
33	80.45	15.83	-25.48	94	52.99	46.06	4.00	155	68.86	6.58	12.52
34	82.68	-12.56	22.30	95	40.14	60.12	27.74	156	83.00	-1.34	-9.58
35	85.26	-9.34	-18.93	96	54.25	42.12	30.97	157	89.00	0.21	-8.48
36	87.39	-6.66	-16.09	97	49.76	42.09	53.59	158	91.69	1.16	-7.28
37	89.99	-3.37	12.56	98	72.08	-2.02	49.23	159	33.94	29.69	-43.35
38	91.22	-1.63	-10.84	99	44.70	-42.98	38.58	160	36.77	61.99	1.28
39	92.88	0.77	-8.23	100	51.71	-46.61	14.52	161	64.72	-4.05	73.45
40	50.92	80.32	1.48	101	33.16	-57.36	-3.93	162	16.00	19.06	-46.52
41	55.13	76.53	-6.86	102	51.82	-32.20	-33.19	163	37.95	-59.42	18.94
42	60.31	68.12	-12.34	103	21.85	3.25	-49.61	164	45.98	59.77	45.24
43	65.24	59.73	-14.94	104	34.79	12.75	-42.25	165	53.55	-7.66	-29.86
44	70.49	50.33	-15.35	105	18.61	18.38	-8.54	166	64.27	-26.96	-5.49
45	75.22	40.66	-14.64	106	45.44	29.73	-9.10	167	65.11	25.25	15.03
46	80.36	30.12	-13.05	107	70.45	19.59	-10.05	168	13.96	-8.44	-31.89
47	82.86	25.28	-12.04	108	22.45	15.35	7.82	169	34.68	-52.08	14.88
48	85.10	20.20	-11.13	109	71.26	15.79	6.47	170	39.07	45.88	32.74
49	87.17	15.91	-10.16	110	30.68	-6.06	19.59	171	41.45	3.78	23.35
50	90.08	10.83	-8.84	111	57.54	-3.20	26.47	172	50.48	-24.18	-5.73
51	91.30	8.08	-8.21	112	77.52	-0.71	12.98	173	51.01	20.09	13.63
52	93.00	4.45	-7.29	113	81.32	2.97	-6.23	174	18.96	-19.57	-14.14
53	86.79	4.84	99.38	114	22.63	-25.14	2.83	175	18.66	18.10	8.61
54	88.15	0.87	88.79	115	47.22	-29.91	8.14	176	31.08	-5.72	19.88
55	89.43	-1.89	72.42	116	71.04	-14.52	0.82	177	7.78	-0.14	-10.75
56	90.52	-3.51	60.30	117	18.60	-19.81	-13.82	178	22.94	-25.17	3.31
57	91.31	-3.89	47.53	118	64.76	5.46	-20.34	179	22.62	15.11	7.35
58	92.06	-3.52	36.00	119	7.80	-0.21	-10.90	180	21.44	-2.03	-10.02
59	92.81	-2.45	23.29	120	70.34	-10.71	-17.01	181	30.02	-14.33	0.82
60	92.86	-1.78	17.28	121	45.56	-24.07	-20.45	182	30.07	-6.91	-4.54
61	93.27	-1.08	12.17	122	3.56	0.61	-2.18				

Sample #13											
ID#	L*	a*	b*	ID#	L*	a*	b*	ID#	L*	a*	b*
1	41.13	-24.31	-60.62	62	93.61	-0.46	8.19	123	3.94	0.54	-2.29
2	48.29	80.83	10.39	63	93.78	0.30	3.90	124	4.45	0.25	-2.64
3	85.33	8.92	104.69	64	94.16	1.17	0.88	125	3.50	0.57	-1.92
4	16.61	28.40	-56.15	65	94.36	1.75	-4.40	126	4.79	0.36	-2.75
5	39.87	-63.55	22.37	66	7.18	-0.07	-3.37	127	8.68	-2.58	-4.92
6	52.16	71.97	57.32	67	20.90	-2.43	-2.41	128	16.40	-6.43	-5.41
7	3.65	0.47	-1.96	68	35.91	-3.08	-1.47	129	3.38	0.55	-1.97
8	35.38	20.98	-52.94	69	46.25	-1.80	-2.57	130	6.73	0.78	-3.89
9	56.02	-57.28	20.60	70	56.86	0.31	-3.75	131	20.25	-5.90	-5.36
10	61.18	56.98	45.08	71	65.33	1.47	-4.21	132	33.50	-10.31	-7.40
11	63.40	11.07	-34.24	72	73.84	2.82	-5.51	133	42.44	-11.54	-10.59
12	76.13	29.80	18.71	73	77.52	3.14	-6.05	134	3.40	0.55	-2.08
13	63.59	1.90	-2.84	74	81.19	2.98	-6.33	135	10.92	-1.88	-3.91
14	75.55	-28.42	6.10	75	84.59	3.12	6.34	136	31.36	-6.52	-5.38
15	80.02	6.49	-20.23	76	87.82	2.96	-6.64	137	44.85	-7.75	-7.47
16	85.96	-11.03	-1.93	77	90.03	3.01	-6.53	138	56.94	-6.88	-9.35
17	86.45	13.78	4.11	78	92.40	2.48	6.31	139	63.38	-6.75	-9.91
18	3.48	0.48	-1.87	79	27.00	50.54	25.10	140	3.48	0.59	-2.26
19	3.50	0.50	-1.98	80	28.74	45.86	-4.34	141	15.06	-2.05	-3.45
20	3.53	0.57	-1.94	81	48.16	77.89	31.54	142	38.20	-4.30	-3.14
21	3.47	0.50	-2.05	82	39.42	46.58	33.89	143	53.87	-3.24	-5.62
22	3.46	0.47	-1.97	83	67.48	44.29	81.82	144	70.55	-1.66	-8.53
23	3.50	0.54	-1.99	84	49.30	-1.06	50.28	145	77.26	-0.85	-10.16
24	3.49	0.62	-2.08	85	36.10	-1.96	-1.32	146	3.43	0.60	-1.91
25	3.58	0.55	-1.94	86	61.68	-31.39	66.94	147	18.71	-2.38	-3.29
26	94.49	2.25	-6.83	87	34.64	-50.21	15.19	148	43.72	2.81	-3.73
27	46.49	-30.35	-58.74	88	36.50	-54.80	22.50	149	60.90	-0.65	-5.56
28	52.35	34.15	-55.10	89	28.01	-30.55	29.47	150	76.44	1.13	-7.96
29	58.68	34.97	-50.28	90	28.83	1.23	61.51	151	82.34	1.23	-8.20
30	64.82	-32.00	-44.31	91	12.98	7.54	29.67	152	7.88	-4.19	6.22
31	70.36	-26.75	-37.88	92	18.91	32.37	35.53	153	32.12	-15.05	-10.28
32	74.80	-22.35	-32.68	93	52.12	49.79	11.78	154	51.07	-11.32	-12.12
33	79.95	-15.88	-26.13	94	53.07	46.33	3.80	155	68.26	-6.15	12.34
34	82.61	-12.60	-22.75	95	40.28	60.27	27.38	156	82.31	-1.20	-9.76
35	85.32	9.55	-19.39	96	54.66	41.58	29.44	157	88.83	0.21	-8.92
36	87.11	6.57	-16.57	97	50.08	42.73	54.07	158	91.80	1.40	-7.62
37	89.88	-3.41	-13.08	98	71.95	-1.93	49.51	159	33.96	-28.93	-43.77
38	91.27	1.56	-11.15	99	44.97	-41.82	38.65	160	37.13	62.44	2.20
39	93.38	0.79	-8.41	100	51.71	-45.68	13.99	161	65.07	4.60	74.39
40	50.94	80.25	1.64	101	33.07	-56.24	-4.14	162	16.20	19.49	-46.25
41	55.07	76.25	6.97	102	51.52	-31.59	-33.47	163	37.82	58.85	18.90
42	59.81	68.66	-12.70	103	21.02	4.10	-48.84	164	46.15	60.24	45.64
43	65.61	59.55	-14.90	104	33.00	13.38	-41.81	165	53.52	7.62	-29.94
44	70.75	49.13	-15.42	105	19.25	18.71	-8.31	166	64.13	26.37	-5.25
45	75.20	40.91	-14.91	106	45.67	29.61	-9.50	167	64.81	25.70	15.68
46	79.98	30.43	-13.54	107	70.39	19.94	-10.38	168	13.54	8.60	-30.73
47	82.81	25.68	-12.43	108	23.10	16.13	8.25	169	32.33	-49.44	14.50
48	85.15	20.55	-11.42	109	71.46	15.82	6.18	170	39.37	46.44	33.01
49	87.44	16.23	-10.38	110	30.91	-5.55	20.08	171	41.89	4.11	-23.51
50	89.54	11.23	-9.40	111	57.60	-3.23	26.93	172	50.57	24.22	-5.57
51	91.65	8.38	-8.37	112	77.63	-0.35	12.61	173	51.19	20.15	12.83
52	93.28	4.60	-7.47	113	81.15	3.20	-6.38	174	19.27	-18.91	-14.27
53	86.85	4.99	98.71	114	22.93	-24.34	3.27	175	18.79	18.78	8.77
54	88.10	1.03	87.99	115	46.70	-29.94	8.87	176	31.06	-5.35	19.59
55	89.44	-1.90	74.21	116	70.46	-14.09	1.10	177	8.13	0.31	-10.70
56	90.53	-3.31	59.47	117	17.36	-18.56	-13.02	178	23.11	-24.79	3.50
57	91.31	-3.60	45.87	118	64.64	5.78	-20.65	179	22.99	16.12	7.97
58	92.01	-3.47	35.87	119	7.86	0.30	-10.87	180	21.84	-1.29	-9.58
59	92.88	-2.43	23.80	120	70.23	-10.38	-17.47	181	29.60	-13.47	1.94
60	92.94	1.74	17.30	121	45.76	-23.27	-20.84	182	28.47	7.46	5.12
61	93.03	-1.12	12.32	122	3.47	0.58	-2.09				



Sample #14											
ID#	L*	a*	b*	ID#	L*	a*	b*	ID#	L*	a*	b*
1	41.21	-24.06	-61.06	62	93.55	-0.46	8.11	123	3.86	0.57	-2.29
2	48.19	80.75	10.03	63	93.78	0.26	3.81	124	4.41	0.24	-2.76
3	85.49	9.01	104.81	64	94.03	1.08	-0.88	125	3.50	0.60	-2.22
4	16.83	28.42	-56.30	65	94.23	1.84	-4.69	126	5.00	0.40	-2.62
5	39.74	64.67	22.91	66	7.39	-0.28	-3.30	127	9.19	-3.01	-4.38
6	52.30	71.84	57.26	67	21.62	-2.74	-2.62	128	17.43	-6.51	-5.47
7	3.57	0.50	-1.89	68	36.33	-2.75	-1.74	129	3.60	0.58	-2.12
8	35.40	20.23	-53.29	69	46.64	-1.49	-2.35	130	7.47	-1.07	-3.77
9	56.26	-56.97	20.57	70	56.60	0.06	-3.55	131	20.21	-5.76	-5.18
10	61.52	56.43	44.07	71	65.11	1.52	-4.28	132	33.81	-10.29	-7.16
11	63.60	10.57	-34.39	72	73.98	2.64	-5.30	133	42.42	-12.10	-10.62
12	76.68	28.97	17.48	73	77.65	3.06	-6.22	134	3.54	0.58	-2.08
13	64.90	1.49	-3.87	74	81.26	3.08	-6.65	135	10.73	-2.17	-3.67
14	75.33	28.59	-5.89	75	84.68	2.94	-6.15	136	31.78	-6.17	-5.19
15	80.02	-6.56	-20.18	76	88.15	2.92	-6.64	137	44.53	-8.44	-7.70
16	85.88	-10.85	-1.89	77	89.97	2.89	-6.80	138	57.31	-6.80	-9.37
17	86.43	13.83	-4.19	78	92.64	2.39	-6.44	139	63.46	-6.40	-10.23
18	3.43	0.49	-1.90	79	26.94	50.15	-25.79	140	3.41	0.55	-2.07
19	3.51	0.47	-1.85	80	28.70	45.53	-4.90	141	16.11	-1.47	-3.31
20	3.63	0.47	1.82	81	48.20	77.90	31.23	142	39.90	-4.80	-4.47
21	3.50	0.53	-1.82	82	39.53	46.45	33.75	143	55.55	-3.62	-6.78
22	3.46	0.48	-1.93	83	67.39	44.99	81.82	144	70.45	-1.83	-8.30
23	3.43	0.52	-1.81	84	49.14	-1.52	50.12	145	77.36	-0.81	-9.98
24	3.53	0.50	-1.81	85	36.33	-1.97	-1.19	146	3.48	0.61	-2.03
25	3.56	0.58	-1.91	86	61.78	-31.63	66.99	147	19.16	2.85	-3.03
26	94.36	2.26	-6.89	87	34.99	-50.82	15.52	148	43.32	-3.75	-3.78
27	46.52	30.10	-58.83	88	36.80	55.22	-22.74	149	60.89	0.80	-5.53
28	52.22	-34.08	55.46	89	28.59	-30.77	-30.22	150	76.53	1.04	-7.60
29	58.91	34.60	50.05	90	29.61	0.45	62.14	151	82.46	1.16	-8.36
30	64.97	31.32	43.97	91	14.38	8.59	-31.43	152	7.94	4.35	-5.88
31	70.26	-27.41	-38.27	92	18.85	32.20	35.93	153	32.52	-15.81	-10.51
32	74.91	-22.30	32.67	93	52.19	49.84	-11.56	154	51.80	-11.30	-12.68
33	79.97	16.07	-26.18	94	53.24	46.16	3.64	155	68.98	-6.34	-13.04
34	82.46	-12.47	-22.65	95	40.33	60.14	27.22	156	82.90	-1.34	-10.01
35	85.34	-9.45	-19.33	96	54.53	41.80	30.36	157	89.07	0.16	-8.86
36	87.45	-6.58	-16.42	97	50.01	42.35	53.95	158	91.60	1.39	-7.59
37	89.87	3.31	-12.98	98	71.93	-2.12	50.03	159	34.12	28.85	13.95
38	91.19	-1.56	-11.10	99	45.16	42.02	38.73	160	37.20	62.58	1.90
39	93.14	0.85	-8.44	100	52.10	-45.23	13.49	161	65.12	4.55	74.36
40	51.04	80.22	1.22	101	33.51	-56.33	-4.13	162	16.47	19.17	-46.28
41	55.07	76.15	-7.21	102	51.89	-30.89	-33.32	163	38.06	-59.15	19.21
42	60.12	68.77	-12.55	103	22.09	3.64	-49.66	164	46.23	59.89	45.46
43	65.57	59.69	15.02	104	35.47	13.04	-41.89	165	54.02	7.79	-29.73
44	70.52	50.24	-15.70	105	18.98	18.33	-8.51	166	64.30	-26.30	-5.00
45	74.97	40.76	-15.05	106	45.76	29.70	-9.23	167	65.18	24.99	14.23
46	80.15	30.57	-13.54	107	70.53	20.13	-10.21	168	14.94	8.86	-32.00
47	82.61	25.69	-12.55	108	23.51	16.15	8.60	169	35.06	-51.20	14.76
48	85.07	20.52	-11.55	109	71.45	15.77	6.14	170	39.18	-45.81	32.69
49	87.05	16.24	-10.58	110	31.09	-5.87	20.03	171	42.13	4.49	23.30
50	89.87	11.16	-9.36	111	57.17	-3.88	27.28	172	51.02	-23.95	-5.78
51	91.35	8.22	-8.53	112	77.51	-0.42	11.97	173	51.34	19.84	12.76
52	93.11	4.50	-7.55	113	81.24	3.10	-6.46	174	19.29	-19.26	13.72
53	86.82	4.95	98.80	114	23.29	-24.82	3.56	175	19.18	18.68	-8.37
54	88.40	0.99	88.80	115	47.49	-29.68	7.54	176	31.36	-5.57	19.94
55	89.37	-1.98	74.33	116	70.89	-14.04	0.06	177	9.13	-0.07	-11.02
56	90.65	-3.22	59.00	117	19.34	-19.25	-13.65	178	23.70	-24.81	3.58
57	91.08	3.83	46.84	118	64.66	5.46	-20.78	179	23.22	15.96	8.14
58	91.60	-3.52	35.90	119	8.27	-0.02	-10.83	180	22.81	-0.90	-9.93
59	92.74	-2.49	23.71	120	70.33	-10.54	-17.46	181	31.43	-13.61	1.51
60	92.90	-1.80	17.16	121	46.14	-23.08	-20.58	182	31.05	7.18	-4.40
61	93.60	-1.16	12.54	122	3.61	0.61	-2.00				



Sample #15											
ID#	L*	a*	b*	ID#	L*	a*	b*	ID#	L*	a*	b*
1	40.98	-23.96	60.97	62	93.69	-0.45	8.04	123	3.96	0.75	-2.20
2	47.94	80.72	9.87	63	93.46	0.28	3.56	124	4.56	0.40	-2.49
3	85.32	9.04	104.57	64	94.20	1.03	-0.60	125	3.78	0.81	-2.02
4	16.42	28.67	-56.30	65	94.14	1.79	-4.45	126	4.98	0.65	-2.62
5	39.65	64.42	22.46	66	7.15	-0.19	-3.47	127	8.58	-2.80	4.57
6	52.03	71.81	57.27	67	21.50	-2.57	-2.59	128	16.35	-6.30	-5.49
7	3.54	0.65	-2.15	68	35.58	-2.77	-2.07	129	3.71	0.85	-2.03
8	34.86	20.66	53.57	69	45.99	-1.61	-2.65	130	7.02	-0.64	-3.74
9	55.98	57.29	20.16	70	56.44	0.21	-4.06	131	19.93	-6.05	-5.39
10	60.96	56.83	44.23	71	64.93	1.39	-4.23	132	33.42	-10.56	-7.54
11	63.28	10.91	34.49	72	73.60	2.34	-5.52	133	42.15	-12.45	-10.53
12	76.11	29.78	18.45	73	77.48	3.01	-6.10	134	3.58	0.81	-2.08
13	63.73	1.72	3.07	74	80.90	3.17	-6.76	135	10.54	-2.09	-3.61
14	75.47	28.76	6.05	75	84.69	2.99	-6.37	136	31.17	-6.91	-5.17
15	80.27	6.48	20.12	76	87.74	3.06	-6.85	137	44.54	8.65	-7.64
16	86.05	10.92	1.96	77	89.46	2.91	-6.84	138	56.90	-7.40	-9.37
17	86.38	13.93	4.29	78	92.38	2.42	-6.40	139	63.47	-6.78	-10.10
18	3.49	0.70	2.06	79	26.52	50.44	-25.98	140	3.74	0.81	-1.86
19	3.70	0.74	1.94	80	28.24	45.36	-5.34	141	15.14	-2.02	2.88
20	3.48	0.62	2.02	81	47.95	77.90	31.54	142	38.66	5.25	-3.55
21	3.52	0.70	2.07	82	38.95	45.96	32.86	143	53.98	-3.72	5.84
22	3.62	0.69	2.01	83	67.40	44.88	81.77	144	70.40	-1.81	8.60
23	3.59	0.68	-2.02	84	48.74	-1.74	49.43	145	77.16	-0.82	-10.26
24	3.59	0.65	2.03	85	35.50	-2.75	-1.92	146	3.38	0.77	-2.01
25	3.63	0.71	-2.04	86	61.52	32.05	66.49	147	18.34	3.11	-3.38
26	94.34	2.26	6.93	87	34.71	50.72	15.16	148	43.08	-3.96	-4.20
27	46.15	-29.99	-58.99	88	36.53	55.50	22.52	149	60.60	-1.22	-5.28
28	52.34	33.91	55.30	89	28.23	30.88	29.88	150	76.51	1.01	-7.73
29	58.77	34.95	-50.37	90	28.90	1.34	62.02	151	82.33	1.11	8.38
30	64.63	31.91	41.29	91	12.97	8.32	30.48	152	7.52	3.98	-5.93
31	70.30	27.26	-38.12	92	18.42	32.43	36.09	153	31.77	-16.18	-11.05
32	74.82	22.52	-32.82	93	51.82	49.54	11.85	154	50.84	-12.20	-12.85
33	79.82	16.16	26.38	94	52.73	46.44	3.66	155	68.39	-6.53	-12.71
34	82.63	12.73	22.76	95	40.04	59.93	27.41	156	82.23	1.38	-9.84
35	84.79	9.43	-19.52	96	54.46	41.98	29.73	157	88.80	0.12	9.10
36	87.17	-6.76	-16.62	97	49.55	42.52	53.53	158	91.27	1.32	-7.81
37	89.97	-3.50	-13.03	98	71.46	2.19	49.19	159	33.85	-29.11	-43.50
38	90.92	-1.60	-11.25	99	44.65	42.44	37.93	160	36.67	62.26	1.49
39	93.04	0.74	8.63	100	51.74	-46.14	13.53	161	64.76	4.31	73.94
40	50.59	79.95	0.96	101	33.16	56.53	4.15	162	15.95	19.58	-46.62
41	54.85	76.31	-7.15	102	51.38	31.79	-33.30	163	37.78	-59.69	18.93
42	59.92	68.84	-12.62	103	21.21	4.08	-49.02	164	45.98	60.04	45.76
43	65.11	59.70	15.13	104	33.13	13.49	42.32	165	53.47	7.96	-30.19
44	70.39	49.78	-15.63	105	18.68	18.29	-8.19	166	64.12	-26.57	4.79
45	74.83	41.02	-15.07	106	45.61	29.70	-9.52	167	64.76	25.65	15.14
46	80.14	30.77	-13.50	107	70.34	19.93	-10.54	168	13.68	8.42	-31.06
47	82.67	25.74	-12.46	108	22.86	15.80	8.32	169	32.87	49.91	14.71
48	84.93	20.37	-11.54	109	71.23	15.82	5.98	170	38.82	45.86	32.59
49	87.04	16.35	-10.58	110	30.60	-6.09	19.78	171	41.60	3.95	-23.74
50	89.64	11.22	-9.33	111	57.06	-3.50	26.91	172	50.20	-24.74	5.48
51	91.30	8.34	-8.46	112	77.50	-0.60	12.41	173	51.09	20.25	12.75
52	93.34	4.59	7.47	113	81.15	3.12	-6.57	174	19.11	-19.35	-13.92
53	86.72	4.93	98.83	114	23.00	-24.86	3.19	175	18.56	18.61	-8.55
54	88.09	0.99	87.35	115	46.79	-29.92	8.15	176	30.59	-6.02	19.59
55	89.41	-2.00	74.79	116	70.75	-14.36	0.99	177	8.03	0.12	-10.29
56	90.69	-3.35	59.88	117	17.73	-19.00	-13.42	178	23.07	24.93	3.47
57	91.29	3.74	46.29	118	64.50	5.71	-20.86	179	22.76	15.79	8.03
58	91.75	3.51	35.56	119	7.73	0.14	10.86	180	21.52	-1.52	-9.66
59	92.82	2.49	23.65	120	70.18	-10.74	-17.38	181	29.87	-13.88	1.75
60	92.99	-1.81	17.19	121	45.67	23.30	-20.71	182	28.88	7.08	4.48
61	93.21	-1.16	12.34	122	3.56	0.79	-1.89				

Sample #16											
ID#	L*	a*	b*	ID#	L*	a*	b*	ID#	L*	a*	b*
1	41.01	23.88	60.74	62	93.21	-0.46	7.85	123	4.09	0.69	-2.16
2	48.03	80.75	10.19	63	93.81	0.23	3.88	124	4.76	0.30	-2.67
3	85.51	9.14	104.95	64	93.58	1.10	-0.90	125	3.73	0.68	-1.99
4	16.34	28.64	-56.48	65	94.39	1.75	-4.38	126	5.01	0.51	-2.81
5	39.52	-64.39	22.39	66	7.36	-0.05	-3.20	127	9.06	-2.64	-4.68
6	52.09	72.00	57.26	67	20.96	-2.38	-2.53	128	16.41	-6.91	-5.46
7	3.53	0.61	2.20	68	35.86	-2.65	-2.18	129	3.59	0.67	-2.04
8	34.96	20.28	53.50	69	45.82	-2.06	-2.71	130	7.24	-0.70	-3.92
9	55.97	57.79	20.27	70	56.05	0.01	-4.16	131	20.42	-6.33	-5.19
10	61.19	56.79	44.21	71	64.87	1.45	-4.57	132	33.24	-10.66	-7.44
11	63.49	10.54	34.39	72	73.75	2.76	-5.40	133	42.22	-11.68	-11.09
12	76.53	29.44	17.75	73	77.41	3.19	-6.18	134	3.44	0.71	-2.14
13	64.01	1.55	3.78	74	81.32	2.90	-6.46	135	10.54	-2.26	-3.92
14	75.27	28.94	6.04	75	84.13	3.02	-6.40	136	31.52	-6.90	-5.43
15	79.93	6.59	20.37	76	87.77	2.99	-6.81	137	44.57	-8.23	-7.90
16	85.84	-11.03	2.21	77	89.40	2.86	-6.91	138	56.54	-7.36	-9.62
17	86.42	14.11	4.30	78	92.15	2.41	-6.58	139	63.21	-6.61	10.32
18	3.49	0.59	-1.92	79	26.63	50.16	-25.86	140	3.62	0.70	-1.99
19	3.63	0.63	2.02	80	28.44	45.20	-4.79	141	15.14	-2.04	-3.45
20	3.54	0.60	-2.01	81	48.03	77.82	31.33	142	39.03	4.87	-4.52
21	3.45	0.62	2.13	82	38.98	46.15	33.18	143	54.64	-3.84	-6.40
22	3.55	0.66	-2.07	83	67.23	45.04	81.59	144	70.36	-1.67	-8.50
23	3.63	0.58	-1.98	84	48.97	-1.45	49.94	145	76.98	-0.83	-10.43
24	3.53	0.66	-1.98	85	36.32	-1.96	-1.23	146	3.37	0.61	-2.16
25	3.71	0.64	2.06	86	61.44	-31.81	66.28	147	18.26	-2.43	-3.49
26	94.59	2.20	6.74	87	34.81	-50.73	14.88	148	43.04	-3.78	-4.07
27	46.34	-30.07	59.01	88	36.66	-54.87	22.68	149	60.69	-0.92	-5.62
28	52.25	-34.03	55.51	89	28.21	30.49	29.91	150	76.13	1.12	8.12
29	58.68	34.66	50.24	90	29.32	0.83	61.91	151	82.23	1.24	-8.33
30	64.40	-32.40	-44.68	91	13.60	7.88	-30.35	152	7.97	-4.37	-6.11
31	70.00	-27.76	-38.47	92	18.51	32.03	35.98	153	32.28	-15.52	-11.09
32	74.61	22.88	32.97	93	51.85	49.87	11.67	154	50.94	-11.75	-12.87
33	79.83	16.16	26.27	94	53.05	46.28	3.44	155	68.57	-6.38	-12.92
34	82.48	12.71	22.80	95	39.96	59.86	27.22	156	82.35	-1.29	-10.10
35	84.90	-9.67	-19.50	96	54.21	12.34	30.42	157	88.74	0.11	-8.87
36	87.06	-6.79	16.55	97	49.69	42.47	53.29	158	91.35	1.25	-7.79
37	89.59	-3.49	-13.09	98	71.84	-1.71	49.21	159	33.84	29.07	-43.50
38	91.37	-1.75	-11.05	99	44.73	-42.56	38.14	160	36.84	62.27	-1.86
39	93.13	0.72	8.46	100	51.67	-45.57	13.18	161	64.76	4.61	74.09
40	50.82	80.09	1.49	101	33.29	-55.95	-4.63	162	16.11	19.25	-46.30
41	54.88	76.25	7.09	102	51.31	-31.73	-33.87	163	37.79	59.19	18.79
42	60.13	69.01	-12.41	103	21.66	3.78	-49.16	164	46.05	60.16	45.78
43	65.05	59.53	-15.13	104	33.87	13.31	-42.09	165	53.75	7.81	-29.94
44	70.24	50.43	-15.67	105	18.60	18.43	-8.63	166	64.13	-26.39	-4.73
45	74.96	41.39	-14.95	106	45.43	30.00	-9.54	167	65.04	25.60	15.04
46	79.93	30.65	-13.59	107	70.51	19.83	-10.38	168	14.15	8.64	-31.43
47	82.64	25.75	-12.40	108	23.19	16.11	8.53	169	33.72	-50.40	14.46
48	85.18	20.79	-11.36	109	70.96	16.17	5.95	170	39.08	45.92	32.37
49	87.03	16.31	-10.48	110	30.62	-5.83	19.83	171	41.46	4.46	-23.89
50	89.59	11.25	-9.29	111	57.44	-3.06	26.65	172	50.81	-23.97	-5.03
51	91.18	8.22	8.49	112	77.46	-0.45	12.48	173	51.00	20.05	12.78
52	93.17	4.54	-7.47	113	81.24	2.87	-6.46	174	19.02	-19.10	14.36
53	86.87	5.15	99.10	114	23.57	-24.93	3.20	175	18.70	18.48	-8.86
54	88.19	1.04	88.65	115	46.84	-30.39	8.19	176	30.95	-5.57	19.95
55	89.79	-1.76	74.04	116	70.80	-14.53	0.55	177	7.98	0.15	-10.58
56	90.36	-3.39	60.53	117	18.37	-19.17	-13.72	178	23.28	-25.09	3.49
57	91.33	3.81	47.71	118	64.54	3.67	-20.75	179	23.18	15.67	7.93
58	92.03	-3.54	36.33	119	7.94	0.25	-10.79	180	21.98	-1.22	-10.01
59	92.47	-2.47	23.35	120	70.25	-10.41	-17.20	181	30.66	-13.95	1.29
60	92.75	1.75	17.37	121	45.62	-23.52	20.93	182	29.35	-6.89	4.18
61	93.19	-1.12	12.52	122	3.60	0.67	-2.12				

Sample #17											
ID#	L*	a*	b*	ID#	L*	a*	b*	ID#	L*	a*	b*
1	40.90	-23.62	-61.16	62	93.62	-0.44	8.17	123	3.89	0.70	-2.26
2	48.14	80.89	10.57	63	93.74	0.21	3.95	124	4.28	0.32	-2.78
3	85.58	9.21	105.19	64	93.92	1.09	-0.85	125	3.71	0.69	-2.04
4	16.40	28.68	-56.30	65	94.26	1.80	-4.38	126	4.80	0.41	-2.67
5	39.52	-63.96	22.56	66	7.13	-0.14	-3.56	127	8.51	-2.52	-4.84
6	52.14	71.98	57.41	67	20.71	-2.48	-2.54	128	16.11	-6.88	-5.46
7	3.74	0.65	-2.14	68	35.39	-3.16	-1.97	129	3.78	0.62	-1.89
8	35.01	20.62	-53.42	69	45.63	-1.78	-2.70	130	6.91	-0.74	3.81
9	55.91	-57.60	20.73	70	56.17	0.28	-3.88	131	19.90	-6.60	5.19
10	61.07	57.40	45.05	71	64.83	1.58	-4.26	132	33.01	-10.59	-7.20
11	63.21	10.62	-34.70	72	73.53	2.62	-5.48	133	42.01	-12.18	-10.70
12	76.50	29.58	18.14	73	77.48	2.96	6.22	134	3.66	0.61	-2.06
13	63.79	2.01	-3.56	74	81.02	3.12	-6.36	135	10.68	2.44	-3.79
14	74.89	28.54	6.03	75	84.28	2.96	6.47	136	31.39	-7.44	-5.25
15	79.82	6.72	-20.46	76	87.75	2.93	6.79	137	44.34	8.71	-7.89
16	85.81	-11.00	-1.97	77	89.49	2.76	-6.84	138	57.04	-6.96	-9.31
17	85.93	13.99	4.00	78	92.70	2.44	6.40	139	63.03	-6.92	-10.29
18	3.62	0.67	-2.25	79	26.48	50.06	-25.83	140	3.50	0.64	-1.97
19	3.56	0.63	-2.22	80	28.17	45.08	-5.05	141	14.76	2.66	-3.51
20	3.43	0.65	-2.26	81	48.11	78.02	32.03	142	38.79	-4.56	-4.10
21	3.43	0.62	-2.22	82	38.94	46.04	33.05	143	54.08	-4.04	6.24
22	3.50	0.63	-2.05	83	67.24	44.87	81.72	144	70.23	-1.75	-8.43
23	3.49	0.71	-2.23	84	48.70	-1.36	49.48	145	77.24	-1.02	-10.32
24	3.53	0.64	2.16	85	35.70	-2.32	-1.28	146	3.50	0.61	-2.00
25	3.59	0.59	-2.08	86	61.57	-31.59	66.69	147	18.00	-2.84	3.92
26	94.28	2.26	-6.88	87	34.50	50.83	15.17	148	42.97	-3.66	-4.02
27	46.19	-29.73	-59.00	88	36.44	55.01	22.34	149	60.48	-0.88	5.39
28	52.10	-34.25	-55.87	89	28.09	-30.45	29.77	150	76.14	1.17	-7.82
29	58.62	-34.77	-50.57	90	29.07	1.25	62.03	151	82.36	1.10	-8.34
30	64.28	-31.77	44.47	91	13.31	8.10	30.40	152	7.64	4.13	6.17
31	70.23	27.49	-38.35	92	18.45	32.16	35.79	153	31.94	-15.61	-10.70
32	74.68	22.56	32.96	93	51.82	50.50	11.52	154	50.81	-11.89	-13.08
33	79.80	-16.18	26.36	94	52.81	46.83	4.22	155	68.57	-6.34	-12.81
34	82.48	-12.73	22.87	95	40.06	60.11	27.71	156	82.15	-1.22	-10.11
35	84.96	-9.68	-19.59	96	54.36	42.06	30.02	157	88.87	0.04	-8.86
36	87.31	-6.79	16.56	97	49.62	42.27	53.31	158	91.47	1.31	-7.69
37	89.78	-3.52	-13.12	98	71.68	2.14	50.42	159	33.79	-29.13	43.45
38	91.11	-1.61	-11.19	99	44.95	-41.86	38.27	160	36.87	62.20	1.75
39	93.04	0.84	-8.51	100	51.42	46.06	13.71	161	64.90	4.53	74.01
40	50.87	80.30	1.73	101	33.07	56.38	4.05	162	16.15	19.24	46.06
41	54.79	76.49	-6.84	102	51.15	32.05	33.88	163	37.66	-59.01	18.71
42	60.05	69.07	-12.33	103	21.70	3.78	49.32	164	45.95	59.91	45.37
43	65.14	60.19	-15.03	104	33.68	13.52	42.19	165	53.28	8.16	-30.23
44	70.61	50.27	-15.37	105	18.74	18.46	8.48	166	64.04	-26.98	5.32
45	74.78	41.20	-15.03	106	45.27	29.87	-9.43	167	64.69	25.71	15.01
46	80.11	31.02	13.53	107	70.20	20.15	-10.51	168	14.24	8.65	-31.19
47	82.48	25.76	-12.52	108	22.98	15.80	8.22	169	33.39	-50.01	14.81
48	84.77	20.83	-11.58	109	71.06	16.06	6.07	170	39.11	46.28	33.19
49	87.43	16.43	-10.34	110	30.56	-5.99	19.51	171	41.43	3.95	-23.81
50	89.52	11.26	-9.36	111	57.12	-3.52	27.32	172	50.23	-24.84	5.78
51	91.26	8.32	-8.49	112	77.52	-0.58	12.15	173	50.93	20.02	12.47
52	93.12	4.60	-7.50	113	80.98	3.13	-6.57	174	19.08	-19.14	-14.06
53	86.90	5.03	99.41	114	23.11	-24.91	3.22	175	18.72	18.47	-8.76
54	88.22	1.02	89.66	115	46.60	-30.38	8.29	176	30.70	-5.57	19.54
55	89.58	-1.85	75.01	116	70.76	-14.18	0.76	177	8.25	0.45	-11.03
56	90.15	-3.36	60.47	117	17.96	-19.01	-13.70	178	23.16	-25.08	3.24
57	91.32	-3.72	46.90	118	64.38	5.75	-20.98	179	23.05	15.27	7.46
58	91.70	-3.48	36.01	119	7.69	0.23	-10.88	180	21.86	-1.17	-10.13
59	92.69	-2.50	23.92	120	70.10	-10.60	-17.59	181	30.39	-13.97	1.10
60	92.93	-1.79	17.55	121	45.45	23.42	-20.90	182	29.23	6.98	4.67
61	93.35	-1.15	12.63	122	3.65	0.62	2.06				

Sample #18											
ID#	L*	a*	b*	ID#	L*	a*	b*	ID#	L*	a*	b*
1	41.19	-24.35	-60.62	62	93.38	-0.45	7.82	123	4.24	0.68	-2.14
2	48.31	81.06	9.80	63	93.77	0.25	3.61	124	4.55	0.45	-2.82
3	85.63	8.77	104.80	64	93.98	1.04	-0.88	125	3.60	0.74	-2.08
4	16.80	28.32	-56.49	65	94.39	1.79	-4.44	126	5.01	0.58	-2.77
5	39.84	-65.09	22.59	66	7.33	-0.03	-3.42	127	9.39	-2.80	-4.44
6	52.32	71.77	57.29	67	21.61	-2.47	-2.19	128	17.07	-6.69	-5.69
7	3.70	0.71	-2.03	68	36.29	-2.96	-2.20	129	3.64	0.71	-2.03
8	35.37	20.44	-53.25	69	46.43	-2.02	-2.70	130	7.46	-0.81	-3.72
9	56.30	-57.58	20.17	70	56.69	-0.25	-3.79	131	20.65	-6.15	-5.63
10	61.53	56.33	43.86	71	65.43	1.30	-4.40	132	33.90	-10.58	-7.34
11	63.84	10.51	-34.11	72	73.96	2.44	-5.43	133	42.66	-11.66	-10.90
12	76.70	29.00	17.37	73	77.25	2.96	-6.37	134	3.45	0.66	-2.04
13	64.95	1.64	3.89	74	81.31	3.12	-6.50	135	10.90	-2.29	-3.84
14	75.60	-28.59	3.92	75	84.53	2.90	-6.39	136	31.97	-6.67	-5.65
15	80.06	6.44	-20.12	76	88.01	2.90	-6.72	137	45.54	-7.87	-7.76
16	85.65	-10.97	-2.31	77	89.73	2.72	-6.85	138	57.31	-7.27	-9.27
17	86.11	13.64	3.99	78	92.60	2.38	-6.52	139	63.40	-6.60	-10.52
18	3.50	0.65	-1.99	79	26.96	50.65	-25.74	140	3.60	0.76	-2.04
19	3.53	0.73	-1.98	80	28.57	45.83	-4.82	141	15.79	-2.52	-3.57
20	3.56	0.76	1.98	81	47.92	77.65	30.79	142	39.58	5.28	-4.47
21	3.49	0.68	2.14	82	39.26	46.22	33.34	143	55.59	-3.77	-6.49
22	3.75	0.74	-1.95	83	67.44	44.04	81.92	144	70.67	-1.85	-8.43
23	3.49	0.69	2.02	84	49.47	-1.28	50.55	145	77.72	-0.79	-9.97
24	3.47	0.69	2.16	85	36.74	-2.23	-1.60	146	3.52	0.65	2.01
25	3.44	0.68	2.08	86	61.85	-31.74	66.93	147	18.61	-3.01	-3.64
26	94.32	2.20	6.85	87	35.12	-51.19	15.40	148	43.33	-4.17	-3.98
27	46.64	-30.43	-58.76	88	37.06	-55.17	-22.95	149	60.90	-0.96	-5.81
28	52.43	-34.58	55.39	89	28.80	-30.80	-30.46	150	76.42	0.89	-7.93
29	58.95	-35.29	50.22	90	29.64	0.25	-62.06	151	82.48	1.20	-8.34
30	64.93	-32.13	44.07	91	14.13	8.89	-31.31	152	7.93	-4.10	-5.99
31	70.34	27.46	-38.06	92	18.88	32.60	-35.89	153	32.68	-15.94	-10.90
32	74.86	-22.36	-32.50	93	52.32	50.03	-12.01	154	51.66	-11.76	-13.02
33	80.40	-16.06	25.89	94	53.14	46.30	3.40	155	69.09	-6.48	13.01
34	82.45	-12.55	22.56	95	40.25	60.13	27.46	156	82.75	-1.35	-9.91
35	85.35	-9.51	19.21	96	54.41	41.89	29.96	157	89.26	0.04	8.66
36	87.38	-6.70	-16.38	97	50.10	42.09	53.76	158	91.93	1.24	-7.57
37	89.86	-3.38	-12.94	98	72.31	-2.09	48.39	159	34.18	-29.19	43.74
38	91.12	-1.67	-11.17	99	45.39	42.25	38.90	160	36.96	62.26	1.29
39	93.25	0.76	8.45	100	52.10	-45.77	13.51	161	65.24	4.06	74.54
40	50.97	80.07	1.01	101	33.70	56.47	-4.82	162	16.53	19.37	-46.61
41	55.09	75.92	-7.60	102	52.01	-32.08	-33.73	163	38.32	-59.33	18.95
42	60.21	68.76	-12.71	103	22.13	3.46	49.74	164	46.30	60.01	45.77
43	65.24	59.32	-15.24	104	35.53	12.92	-41.95	165	53.91	7.44	-29.93
44	70.51	49.86	-15.68	105	19.25	19.11	-8.32	166	64.39	-26.65	4.65
45	75.18	40.69	-14.99	106	45.82	29.58	-9.80	167	65.33	25.55	14.87
46	80.23	30.17	-13.41	107	70.68	19.75	-10.38	168	14.29	8.74	-31.94
47	82.65	25.31	12.41	108	23.33	15.92	8.86	169	34.85	-51.19	14.79
48	85.00	20.45	-11.47	109	71.30	15.71	6.03	170	39.51	46.29	33.21
49	87.33	16.13	-10.39	110	31.28	-5.78	20.32	171	42.12	4.08	-23.81
50	90.06	11.12	-9.17	111	57.77	-3.50	25.54	172	50.99	-24.18	5.09
51	91.35	8.20	8.47	112	77.68	-0.62	11.97	173	51.35	19.96	12.64
52	93.15	4.53	-7.46	113	81.44	2.78	-6.54	174	19.39	-19.32	-14.24
53	86.96	4.79	98.63	114	23.61	-25.38	3.51	175	19.14	19.46	-8.26
54	88.31	0.84	88.59	115	47.33	-30.30	7.38	176	31.51	-5.62	20.31
55	89.43	-2.11	74.04	116	71.14	-14.20	0.14	177	8.14	0.10	-10.69
56	90.54	-3.49	59.51	117	19.10	-19.64	-13.79	178	23.78	-25.39	3.85
57	91.17	-3.88	46.44	118	64.98	5.68	-20.75	179	23.13	15.47	8.09
58	91.86	-3.47	35.28	119	7.95	0.13	-11.00	180	22.87	-1.54	-9.96
59	92.38	-2.46	22.88	120	70.60	-10.48	-17.35	181	30.94	-14.00	1.12
60	92.93	-1.78	17.16	121	45.99	-23.50	-21.01	182	30.68	6.90	4.67
61	93.32	-1.14	12.40	122	3.67	0.74	-2.05				



Sample #19											
ID#	L*	a*	b*	ID#	L*	a*	b*	ID#	L*	a*	b*
1	41.23	24.30	-61.11	62	93.60	-0.38	7.83	123	3.67	0.49	-2.41
2	48.32	80.96	9.81	63	93.69	0.28	3.80	124	4.19	0.19	-2.94
3	85.85	8.69	104.89	64	94.10	1.07	-0.63	125	3.46	0.55	-2.26
4	16.63	28.35	-56.84	65	94.45	1.73	-4.15	126	4.70	0.25	-2.97
5	39.98	-65.52	22.40	66	7.51	-0.19	-3.73	127	8.83	-2.74	-5.13
6	52.33	71.95	57.39	67	20.84	-2.71	-3.04	128	16.42	-7.00	-5.83
7	3.28	0.61	-2.22	68	35.91	-3.05	-2.03	129	3.39	0.62	-2.17
8	34.85	20.61	-54.12	69	46.82	-1.83	-2.75	130	6.40	-0.90	-4.23
9	56.30	-58.43	20.53	70	56.97	0.15	-3.78	131	20.38	-6.00	-5.85
10	61.62	56.39	44.19	71	65.39	1.30	-4.10	132	33.48	10.83	-7.49
11	64.00	10.30	-33.74	72	74.22	2.56	-5.34	133	42.34	-12.09	-10.87
12	76.80	28.90	18.17	73	77.91	2.85	-5.92	134	3.37	0.55	-2.27
13	63.98	1.52	-2.68	74	81.64	2.79	-6.13	135	10.57	-2.84	-4.47
14	75.74	-28.07	5.95	75	85.17	2.98	-5.85	136	31.61	-7.39	-5.23
15	80.50	6.40	-19.60	76	88.05	2.86	-6.31	137	44.96	-8.67	-7.29
16	85.85	-10.63	-2.10	77	89.93	2.81	-6.37	138	57.48	-7.26	-9.15
17	86.39	13.69	4.29	78	92.53	2.32	-6.23	139	63.87	-7.39	-9.69
18	3.39	0.62	-2.17	79	27.10	51.05	25.99	140	3.47	0.62	-2.12
19	3.34	0.56	-2.19	80	28.46	45.56	-5.19	141	15.14	2.12	-3.68
20	3.46	0.60	-2.03	81	48.18	77.84	31.47	142	39.21	4.19	-3.64
21	3.34	0.55	-2.17	82	39.47	46.39	33.52	143	54.10	-3.80	-5.47
22	3.35	0.56	-2.13	83	67.80	43.97	81.92	144	70.75	-1.87	-8.24
23	3.49	0.62	-2.09	84	49.21	-1.40	49.87	145	77.81	-0.94	-9.78
24	3.49	0.62	-2.12	85	36.04	-2.95	-1.43	146	3.55	0.54	-2.20
25	3.38	0.62	-2.09	86	62.00	-32.57	66.78	147	18.59	-2.59	-3.58
26	94.21	2.19	-6.67	87	34.92	-51.77	15.16	148	43.49	-3.91	-4.11
27	46.52	30.55	-58.98	88	36.88	-55.77	23.17	149	60.98	-1.09	-5.01
28	52.36	-34.94	-55.45	89	28.43	-31.86	29.72	150	76.55	0.98	-7.37
29	59.02	35.17	-49.88	90	29.13	0.86	62.27	151	82.62	1.15	-7.93
30	65.05	32.24	-43.91	91	12.73	8.22	31.18	152	7.61	-4.21	-6.33
31	70.83	-27.33	-37.54	92	18.64	32.67	36.59	153	32.06	-16.23	-11.17
32	75.18	22.46	-32.27	93	52.37	50.00	-11.60	154	51.36	-12.04	-12.27
33	80.32	15.78	-25.57	94	53.20	46.48	3.96	155	68.85	-6.31	-12.23
34	82.58	-12.52	-22.36	95	40.47	60.15	27.05	156	82.36	1.23	-9.60
35	85.14	-9.16	-18.90	96	54.73	41.78	29.93	157	88.76	0.13	-8.57
36	87.47	-6.61	-16.06	97	49.91	42.27	53.27	158	91.82	1.24	-7.16
37	89.88	-3.29	-12.67	98	72.23	2.45	49.87	159	34.04	29.76	43.58
38	91.37	-1.55	-10.78	99	45.28	-42.89	38.78	160	37.20	62.39	1.33
39	93.13	0.77	-8.28	100	51.98	46.73	13.94	161	65.32	4.01	74.29
40	51.21	80.19	1.24	101	33.46	-57.38	-4.59	162	16.12	19.24	-46.89
41	55.18	76.60	-6.98	102	51.95	32.55	-33.23	163	37.96	-60.53	18.70
42	60.41	68.65	-12.39	103	21.70	2.94	-48.97	164	46.33	59.98	45.53
43	65.65	59.06	-14.78	104	33.14	12.90	-42.32	165	53.84	7.34	-29.79
44	70.89	48.89	-15.17	105	18.98	18.93	-8.86	166	64.49	26.64	-5.13
45	75.26	40.57	-14.66	106	45.84	29.40	-9.48	167	65.38	25.30	-15.48
46	80.80	30.03	-12.89	107	70.77	19.68	-10.01	168	13.72	8.82	-31.76
47	82.86	25.15	-12.06	108	23.30	16.01	8.43	169	32.77	-50.99	14.60
48	85.39	19.96	-11.02	109	71.60	15.60	-6.12	170	39.57	-46.07	32.63
49	87.64	15.86	-10.02	110	30.98	-6.47	19.71	171	41.71	3.76	-23.76
50	90.06	10.89	-8.91	111	57.58	-3.83	27.13	172	50.52	-25.06	-5.36
51	91.28	8.22	-8.24	112	77.87	-0.61	12.21	173	51.54	19.66	12.10
52	93.05	4.38	-7.25	113	81.50	2.98	-6.30	174	19.39	-19.96	-14.57
53	87.11	4.56	98.56	114	23.30	-25.55	3.11	175	18.80	18.39	-8.96
54	88.43	0.63	88.89	115	47.15	-30.70	8.50	176	30.94	-6.08	19.36
55	89.40	-2.12	73.24	116	70.95	-14.04	1.23	177	8.00	0.01	-11.45
56	90.57	-3.45	58.59	117	17.35	-19.62	-13.45	178	23.14	-25.74	3.25
57	91.28	-3.78	45.35	118	64.86	5.36	-20.37	179	22.98	15.58	7.92
58	91.93	-3.54	35.51	119	7.86	-0.17	-11.18	180	22.06	-1.25	-9.82
59	92.73	-2.41	23.01	120	70.56	-10.65	-17.22	181	30.29	-13.95	1.65
60	93.22	-1.72	17.13	121	46.37	-23.42	-20.74	182	28.47	-6.61	-4.49
61	93.13	-1.08	11.90	122	3.40	0.57	-2.24				



Sample #20											
ID#	L*	a*	b*	ID#	L*	a*	b*	ID#	L*	a*	b*
1	41.13	24.24	-61.11	62	93.37	-0.41	7.90	123	4.02	0.52	2.68
2	48.40	80.75	10.65	63	93.77	0.25	3.75	124	4.46	0.29	-3.33
3	85.50	9.06	105.42	64	93.96	1.11	-0.95	125	3.60	0.51	-2.39
4	16.30	28.79	-56.86	65	94.35	1.73	-4.37	126	4.61	0.37	-3.31
5	39.60	64.39	22.99	66	6.52	0.26	-4.01	127	8.45	-2.92	-5.47
6	52.48	71.92	57.30	67	20.50	-2.42	-2.55	128	16.37	-6.35	-5.88
7	3.38	0.56	-2.31	68	35.66	-2.48	-1.47	129	3.66	0.57	-2.37
8	34.63	20.82	-54.01	69	45.93	-1.75	-1.65	130	6.53	-0.97	-4.56
9	56.39	57.19	21.42	70	56.27	0.22	-3.08	131	19.39	-6.15	-5.27
10	61.48	57.02	45.45	71	64.99	1.59	-4.05	132	33.35	-10.16	-6.81
11	64.04	10.68	-33.79	72	74.19	2.66	-5.00	133	42.32	-11.88	10.54
12	76.72	28.94	17.76	73	77.47	3.00	-5.91	134	3.52	0.48	-2.41
13	65.15	1.56	-3.29	74	81.42	3.21	-6.41	135	10.08	-2.10	-4.40
14	75.56	-28.34	6.37	75	84.77	3.11	-5.90	136	31.10	-6.38	4.62
15	80.31	6.59	-19.74	76	88.17	2.90	6.45	137	44.87	-7.94	-6.90
16	85.84	-10.55	-2.13	77	89.97	2.74	-6.64	138	57.02	-7.19	8.47
17	86.52	13.70	4.16	78	92.49	2.43	-6.25	139	63.40	-6.66	-9.34
18	3.36	0.57	-2.36	79	26.90	50.24	25.66	140	3.48	0.49	-2.37
19	3.49	0.64	-2.33	80	28.69	45.34	-4.52	141	14.76	-2.39	-3.65
20	3.60	0.61	-2.38	81	48.53	77.97	31.86	142	38.82	-4.75	-3.78
21	3.53	0.62	-2.36	82	39.39	46.22	33.56	143	55.75	-3.65	-5.75
22	3.50	0.59	-2.37	83	67.39	45.03	82.18	144	70.52	-1.77	-8.01
23	3.44	0.62	-2.41	84	48.97	-1.20	49.79	145	77.40	-0.87	-9.68
24	3.45	0.60	-2.34	85	35.83	-1.97	-0.95	146	3.60	0.50	2.51
25	3.37	0.59	2.27	86	61.76	-32.30	67.15	147	17.66	-2.64	3.59
26	94.31	2.18	-6.75	87	34.75	-50.48	15.37	148	42.97	-3.58	-2.99
27	46.50	30.73	-59.10	88	36.69	55.74	-22.18	149	60.57	-0.88	4.92
28	52.46	34.78	55.39	89	28.32	-30.83	-30.25	150	76.47	1.24	-7.49
29	59.11	-34.61	49.69	90	29.35	0.94	62.38	151	82.53	1.24	-7.94
30	64.76	32.51	-44.19	91	13.91	8.27	-31.24	152	7.74	-4.23	6.84
31	70.40	27.86	-38.13	92	18.62	32.02	35.73	153	31.91	15.78	-10.47
32	74.98	22.29	32.39	93	52.34	49.74	-10.77	154	51.29	11.77	12.15
33	80.17	15.80	25.73	94	53.12	46.41	4.67	155	68.78	-6.49	-12.45
34	82.63	-12.48	22.40	95	40.28	60.06	27.73	156	82.63	-1.40	9.71
35	85.51	-9.40	-18.99	96	54.53	42.37	31.55	157	89.13	0.17	8.51
36	87.08	6.56	16.34	97	49.90	42.45	53.50	158	91.71	1.23	-7.42
37	89.94	3.30	-12.77	98	72.10	-1.64	50.09	159	33.91	29.19	-43.66
38	91.07	-1.60	-10.99	99	44.87	42.55	38.82	160	37.05	61.95	1.84
39	92.98	0.83	-8.33	100	51.81	46.25	14.69	161	64.94	4.49	74.26
40	51.13	80.40	2.07	101	33.23	-56.70	-4.09	162	16.11	19.07	46.36
41	55.28	76.65	-6.22	102	51.64	-31.96	-33.34	163	37.96	-58.66	18.95
42	60.29	68.68	-12.00	103	21.77	3.66	-49.57	164	46.28	60.00	45.35
43	65.46	59.72	-14.65	104	34.86	13.10	-42.16	165	53.78	7.56	-29.56
44	70.54	50.08	-15.36	105	18.97	18.64	-8.63	166	64.30	-26.25	5.71
45	75.44	40.86	-14.56	106	45.62	29.92	-8.60	167	65.23	25.26	15.33
46	80.42	30.16	-13.15	107	70.55	19.80	-9.91	168	14.11	8.43	31.36
47	82.81	25.22	-12.13	108	22.61	15.49	7.72	169	34.75	-51.03	15.06
48	85.28	20.05	-11.11	109	71.41	15.95	6.79	170	39.03	45.63	31.87
49	87.48	15.89	-10.13	110	30.64	-5.77	19.60	171	41.60	4.10	-22.86
50	90.12	11.08	-9.02	111	57.58	-2.88	27.76	172	50.38	-24.23	6.20
51	91.47	8.10	-8.27	112	77.26	-0.48	12.71	173	50.87	20.26	14.03
52	93.15	4.39	-7.38	113	81.56	2.92	-6.05	174	18.75	-19.05	-14.15
53	86.65	4.89	99.27	114	22.83	-24.61	2.65	175	18.63	18.08	-9.08
54	88.06	1.01	88.56	115	47.15	-30.06	9.04	176	31.07	-5.49	19.32
55	89.36	-1.89	73.68	116	71.06	-14.33	1.05	177	7.85	-0.13	-11.21
56	90.38	-3.43	60.82	117	18.45	-19.22	-14.27	178	22.89	-24.65	3.13
57	91.20	-3.89	47.26	118	64.76	5.70	-20.27	179	22.92	15.34	6.88
58	92.13	3.54	36.46	119	7.80	-0.08	-11.08	180	21.57	-0.95	-10.00
59	92.83	-2.41	23.23	120	70.38	-10.32	-16.87	181	29.88	-13.60	1.10
60	92.94	-1.75	17.16	121	45.59	-23.63	-20.10	182	29.90	6.97	4.25
61	93.08	-1.06	12.06	122	3.57	0.55	-2.43				

Sample #21											
ID#	L*	a*	b*	ID#	L*	a*	b*	ID#	L*	a*	b*
1	41.35	-24.42	-61.19	62	93.64	-0.42	7.85	123	3.90	0.49	-2.41
2	48.60	80.76	10.28	63	93.77	0.28	3.57	124	4.23	0.12	-3.11
3	85.63	8.74	105.43	64	93.92	1.14	-1.08	125	3.95	0.54	-2.38
4	16.38	29.08	-57.05	65	94.15	1.80	-4.63	126	4.73	0.35	-3.18
5	39.70	-64.65	23.27	66	7.05	-0.04	-3.82	127	8.34	-2.80	-5.42
6	52.55	71.41	57.43	67	21.28	-2.11	-2.66	128	16.02	-6.78	-6.06
7	3.45	0.47	-2.20	68	35.77	-2.88	-1.51	129	3.52	0.53	-2.32
8	35.40	20.62	-53.45	69	46.36	-1.79	-2.07	130	6.83	-0.89	-4.60
9	57.14	55.08	20.11	70	56.81	-0.02	-3.43	131	19.87	-5.95	-5.37
10	61.61	56.23	44.81	71	65.74	1.46	-3.98	132	33.90	-9.83	-6.85
11	64.04	10.60	-33.78	72	74.30	2.59	-5.09	133	42.41	-11.87	-10.00
12	76.80	28.53	17.50	73	78.03	2.96	-5.78	134	3.47	0.50	2.37
13	65.46	1.43	-3.43	74	81.46	2.97	-6.04	135	10.35	-2.03	-4.56
14	75.88	-28.03	6.52	75	84.68	2.98	-6.04	136	32.02	-6.55	4.78
15	80.47	6.30	-19.63	76	88.07	2.85	-6.65	137	44.89	-7.89	6.98
16	86.21	-10.46	-1.76	77	89.92	2.71	-6.56	138	57.58	-6.70	-8.64
17	86.46	13.51	4.02	78	92.40	2.39	-6.33	139	63.91	-6.24	9.52
18	3.45	0.53	-2.26	79	27.28	50.68	25.65	140	3.44	0.50	-2.31
19	3.53	0.57	-2.23	80	28.88	45.72	-4.76	141	14.78	-2.50	3.87
20	3.56	0.57	-2.25	81	48.50	77.91	31.23	142	39.59	5.04	4.04
21	3.52	0.51	-2.19	82	39.67	46.72	33.73	143	55.99	-3.94	6.13
22	3.52	0.60	-2.23	83	67.64	44.26	81.98	144	70.83	-1.53	-8.19
23	3.38	0.51	2.26	84	49.70	-1.20	50.54	145	77.77	-0.78	-9.78
24	3.41	0.50	2.18	85	36.02	-2.23	-1.16	146	3.57	0.52	2.35
25	3.55	0.54	-2.13	86	62.11	-31.78	67.15	147	17.86	-2.64	-3.74
26	94.47	2.21	6.68	87	35.42	-50.61	15.01	148	43.62	-3.37	-3.28
27	46.77	-30.83	59.22	88	36.87	-55.76	-22.60	149	61.46	-0.64	-4.90
28	52.77	-34.61	55.22	89	28.50	-31.17	30.47	150	76.80	1.06	-7.52
29	59.09	35.27	50.05	90	29.71	0.48	62.53	151	82.86	1.07	-7.84
30	65.14	32.46	44.11	91	14.24	8.34	-31.55	152	8.10	4.45	-6.66
31	70.69	27.66	-37.90	92	19.09	32.44	36.19	153	32.03	-15.55	-11.03
32	75.64	21.73	31.81	93	52.51	50.03	-11.11	154	51.97	-11.60	-12.43
33	80.44	-15.84	-25.66	94	53.18	46.85	4.35	155	69.30	-6.35	12.24
34	82.96	-12.25	-22.17	95	40.75	60.40	27.96	156	82.87	-1.09	-9.76
35	85.50	-9.04	-18.76	96	55.10	41.90	31.05	157	88.86	0.26	-8.66
36	87.40	-6.51	-16.14	97	50.48	42.00	53.92	158	91.88	1.16	-7.12
37	90.08	-3.31	-12.67	98	72.42	-2.15	51.01	159	34.05	-29.44	-43.62
38	91.31	-1.53	-10.81	99	45.47	42.41	39.00	160	37.40	62.47	1.80
39	93.34	0.73	-8.25	100	52.60	-43.69	13.50	161	65.36	4.18	74.67
40	51.40	80.17	1.57	101	33.42	-56.96	-4.12	162	16.36	19.43	-46.70
41	55.57	75.92	6.80	102	51.98	32.06	-33.51	163	38.16	-59.66	19.18
42	60.46	68.85	-12.20	103	22.20	3.31	-49.90	164	46.50	60.04	45.41
43	65.90	59.30	-14.52	104	35.53	12.93	-41.84	165	54.59	7.74	29.06
44	71.09	49.27	-15.09	105	19.25	18.85	-8.73	166	64.41	-26.61	5.60
45	75.45	39.76	-14.51	106	46.17	29.93	-9.16	167	65.37	25.40	15.00
46	80.73	30.01	-12.95	107	71.03	19.86	-9.80	168	14.19	8.75	-32.07
47	83.02	24.87	-12.07	108	23.11	15.83	8.09	169	35.04	-51.68	14.91
48	85.55	19.90	-10.99	109	71.83	15.60	6.33	170	39.70	46.36	32.89
49	87.43	15.74	-10.15	110	31.44	-5.41	19.95	171	42.12	4.05	23.20
50	89.88	10.91	9.05	111	57.80	-3.77	28.32	172	50.58	-24.99	6.16
51	91.66	8.00	-8.13	112	78.05	-0.46	12.56	173	51.37	20.21	13.64
52	93.27	4.48	-7.35	113	81.87	2.91	-5.89	174	19.15	-19.13	-14.51
53	87.06	4.70	99.23	114	22.88	-25.21	2.78	175	19.29	18.83	-8.70
54	88.61	0.86	87.97	115	47.43	-30.25	8.26	176	31.17	-5.50	19.50
55	89.72	-2.19	75.51	116	71.36	-14.11	0.65	177	7.91	0.20	-11.28
56	90.53	-3.52	60.12	117	18.76	-19.45	-14.30	178	23.56	-24.72	3.15
57	91.26	-3.82	46.14	118	65.24	5.75	-20.32	179	23.10	15.62	7.36
58	92.16	3.39	34.88	119	8.23	0.15	-11.22	180	21.87	-1.34	-10.20
59	92.76	-2.46	23.20	120	70.70	-10.33	-16.91	181	30.50	14.28	1.19
60	93.29	-1.74	17.16	121	45.94	-24.03	-20.33	182	30.69	6.51	4.37
61	93.49	-1.05	11.84	122	3.49	0.45	-2.21				

Sample #22									
ID#	L*	a*	b*		ID#	L*	a*	b*	
1	41.08	-24.38	-61.18		62	93.61	0.30	3.44	
2	48.21	81.16	10.19		63	93.96	1.12	-0.93	
3	85.16	9.28	103.81		64	94.01	1.80	-4.47	
4	16.01	29.41	-57.41		65	6.90	-0.03	-3.86	
5	39.68	-65.81	22.04		66	20.30	-2.94	-3.37	
6	52.39	72.15	57.04		67	35.23	-3.09	-2.26	
7	3.32	0.62	-2.42		68	45.81	-1.85	-3.03	
8	34.39	20.65	-54.68		69	56.41	0.24	-4.16	
9	56.04	-58.72	20.14		70	65.35	1.43	-4.34	
10	61.28	57.06	43.41		71	73.73	2.76	-5.78	
11	63.37	10.50	-34.18		72	77.71	3.06	-6.14	
12	76.67	29.20	16.91		73	81.53	2.93	-6.37	
13	65.21	1.46	-4.21		74	84.71	2.91	-6.23	
14	75.63	-28.31	5.63		75	87.94	2.87	-6.52	
15	80.19	6.36	-19.76		76	90.00	2.62	6.48	
16	86.06	-10.47	-2.21		77	92.26	2.48	6.33	
17	86.43	13.75	3.68		78	26.50	50.37	26.39	
18	3.45	0.67	2.37		79	28.15	45.09	-6.00	
19	3.37	0.59	-2.34		80	48.19	78.12	31.18	
20	3.47	0.65	-2.42		81	38.98	46.12	32.73	
21	3.49	0.59	-2.44		82	67.22	45.02	81.14	
22	3.48	0.62	-2.32		83	49.07	-1.49	49.33	
23	3.43	0.71	2.41		84	35.79	2.17	-1.81	
24	3.45	0.58	-2.29		85	61.39	33.02	66.02	
25	3.48	0.62	-2.42		86	34.44	-51.83	14.28	
26	94.43	2.18	6.57		87	36.76	55.72	-22.67	
27	46.22	-30.60	58.90		88	28.24	30.97	-30.37	
28	52.25	34.82	55.41		89	29.43	0.60	62.23	
29	58.81	35.87	50.19		90	13.93	8.51	-31.71	
30	64.88	32.72	-44.10		91	18.16	32.25	-36.76	
31	70.38	-27.61	37.76		92	51.97	50.43	-11.78	
32	75.02	-22.60	-32.27		93	52.66	47.05	3.67	
33	80.23	15.95	25.60		94	39.93	59.86	26.37	
34	82.63	-12.64	22.32		95	54.31	42.10	29.86	
35	85.03	9.42	-19.07		96	49.74	12.24	52.95	
36	87.11	-6.65	-16.21		97	71.80	-2.21	49.16	
37	89.91	3.38	-12.64		98	44.86	42.75	37.94	
38	91.16	-1.58	-10.80		99	51.63	47.13	13.95	
39	93.15	0.75	8.22		100	33.33	56.59	-4.81	
40	50.83	80.39	1.45		101	51.37	-32.81	-33.88	
41	55.07	76.61	-6.91		102	21.87	3.54	-49.75	
42	60.01	69.50	-12.39		103	34.86	12.60	-42.56	
43	65.42	60.41	-14.78		104	18.48	18.16	-9.23	
44	70.64	49.66	-15.35		105	45.41	29.79	-9.53	
45	75.30	40.60	-14.60		106	70.45	19.99	-10.27	
46	80.24	30.15	-13.02		107	22.55	15.33	7.22	
47	82.84	25.20	-12.07		108	71.30	16.05	6.26	
48	85.16	20.32	-11.13		109	30.80	6.04	19.00	
49	87.27	15.79	-10.13		110	57.26	-3.56	26.64	
50	90.02	11.00	-8.86		111	77.37	-0.50	12.06	
51	91.23	8.11	-8.19		112	81.35	3.16	-6.54	
52	93.45	4.45	-7.07		113	22.95	-24.98	2.21	
53	86.44	5.03	98.09		114	46.61	-31.59	7.99	
54	88.33	1.19	88.52		115	70.80	-14.32	0.19	
55	89.40	-1.96	73.97		116	18.84	-19.41	-14.34	
56	90.46	-3.28	59.46		117	64.55	5.44	-20.61	
57	91.15	-3.64	45.33		118	7.46	-0.01	-10.93	
58	91.90	-3.35	34.79		119	70.16	-10.61	-17.49	
59	92.53	2.26	22.49		120	45.43	-24.01	-20.79	
60	92.83	-1.62	16.63		121	3.53	0.63	-2.47	
61	93.06	-1.00	11.79		122	3.65	0.56	-2.43	
					123	3.76	0.48	-2.69	
					124	4.42	0.18	-3.36	
					125	3.59	0.61	-2.32	
					126	4.55	0.36	-3.44	
					127	8.88	-3.01	-5.42	
					128	15.72	-6.93	-6.29	
					129	3.63	0.70	-2.46	
					130	6.76	-0.89	-4.66	
					131	19.28	-6.07	-5.74	
					132	32.93	-10.95	-7.84	
					133	41.84	-12.53	-10.77	
					134	3.44	0.56	-2.52	
					135	10.10	2.36	-4.74	
					136	31.34	6.71	-5.84	
					137	44.50	8.28	-7.70	
					138	57.11	7.39	-9.45	
					139	63.29	-7.10	-9.94	
					140	3.53	0.72	-2.54	
					141	14.22	2.22	-4.19	
					142	38.85	5.27	-4.75	
					143	55.42	-3.71	-6.44	
					144	70.47	1.90	-8.39	
					145	77.49	-0.81	-9.91	
					146	3.56	0.58	-2.44	
					147	17.24	2.88	-3.87	
					148	43.11	3.83	-4.18	
					149	60.97	-1.07	-5.15	
					150	76.58	1.00	-7.34	
					151	82.51	1.16	-8.00	
					152	7.51	-4.21	-6.61	
					153	31.80	-15.99	-11.24	
					154	51.09	12.22	-13.08	
					155	68.88	6.49	-12.83	
					156	82.73	1.27	-9.83	
					157	88.62	0.11	-8.70	
					158	91.51	1.32	-7.34	
					159	33.75	29.55	43.39	
					160	36.68	61.88	1.06	
					161	64.76	4.31	73.60	
					162	16.10	19.21	-46.71	
					163	37.70	59.73	18.27	
					164	46.01	59.78	44.62	
					165	53.33	7.79	-30.19	
					166	64.23	-26.85	5.21	
					167	65.02	25.43	15.08	
					168	14.06	8.25	-32.09	
					169	34.68	-51.48	14.08	
					170	38.96	45.81	31.90	
					171	41.30	3.89	-23.73	
					172	50.22	-24.91	5.77	
					173	50.75	20.29	12.81	
					174	18.86	-19.45	-14.59	
					175	18.75	18.27	-9.47	
					176	30.61	-5.82	18.53	
					177	7.68	-0.09	-11.31	
					178	22.76	-25.21	2.67	
					179	22.66	15.06	6.62	
					180	21.52	-1.51	-10.34	
					181	29.87	-14.22	0.44	
					182	29.98	6.77	3.63	

Sample #23											
ID#	L*	a*	b*	ID#	L*	a*	b*	ID#	L*	a*	b*
1	40.94	-24.10	-61.34	62	93.56	-0.41	7.85	123	3.74	0.61	2.62
2	48.17	80.95	10.08	63	93.53	0.28	3.64	124	4.30	0.23	-3.02
3	85.39	8.83	105.06	64	94.07	1.08	-0.74	125	3.62	0.66	2.28
4	16.24	29.11	-57.27	65	94.28	1.74	-4.22	126	4.67	0.42	-2.96
5	39.66	-65.89	23.19	66	6.71	-0.24	-4.13	127	8.55	-2.61	-4.82
6	52.27	72.19	58.02	67	20.71	2.47	-2.79	128	16.85	-6.41	5.56
7	3.56	0.66	-2.39	68	35.67	-3.19	-1.58	129	3.56	0.67	-2.28
8	35.08	20.27	-53.67	69	46.14	-2.01	-2.71	130	6.67	-1.12	-4.19
9	56.15	-58.89	21.46	70	56.25	-0.34	-3.56	131	19.43	-6.41	-5.59
10	61.26	56.64	44.87	71	64.97	1.10	-3.86	132	33.17	-10.57	-7.23
11	64.08	10.36	-33.50	72	73.97	2.35	-5.20	133	42.19	-12.43	-10.50
12	76.83	28.79	18.15	73	77.72	2.88	-5.93	134	3.48	0.66	-2.36
13	64.71	1.25	-3.36	74	81.32	2.97	-6.12	135	9.87	-2.40	-4.14
14	75.46	-28.66	6.15	75	84.66	2.92	-6.11	136	31.03	-7.47	-5.11
15	80.02	6.63	-19.77	76	87.92	2.90	-6.45	137	44.44	-8.56	-7.45
16	85.86	-10.61	2.01	77	89.86	2.76	-6.45	138	57.04	-7.73	8.66
17	86.48	13.62	4.63	78	92.25	2.41	-6.25	139	63.41	-7.28	-9.65
18	3.41	0.63	-2.32	79	26.55	50.12	-26.56	140	3.36	0.60	-2.35
19	3.57	0.64	-2.32	80	28.32	45.25	-5.24	141	15.51	-2.13	-3.63
20	3.50	0.70	-2.27	81	48.08	77.76	31.22	142	38.72	5.86	-4.10
21	3.41	0.65	-2.39	82	39.30	46.29	33.66	143	55.02	-4.55	-5.87
22	3.40	0.70	-2.33	83	67.39	44.98	81.93	144	70.44	-1.89	8.17
23	3.41	0.70	2.44	84	48.63	-1.97	49.16	145	77.28	-1.00	9.89
24	3.59	0.65	2.32	85	35.65	-2.80	-1.52	146	3.44	0.61	2.31
25	3.49	0.66	2.33	86	61.60	-32.55	66.78	147	17.84	2.90	3.63
26	94.12	2.22	-6.65	87	34.55	-51.91	15.20	148	42.59	-4.35	-3.78
27	46.28	-30.56	-59.05	88	36.69	-56.08	22.15	149	60.73	-1.23	-4.78
28	52.30	34.67	-55.35	89	28.37	-31.54	-29.88	150	76.25	1.03	-7.52
29	58.81	35.43	-50.00	90	29.29	0.78	62.33	151	82.57	1.07	-7.85
30	64.81	-32.32	43.99	91	13.50	7.87	-31.16	152	7.57	-4.43	6.39
31	70.19	27.81	38.01	92	18.32	32.15	36.71	153	31.76	-16.51	-10.92
32	74.98	22.54	32.34	93	52.01	50.11	-11.43	154	51.54	11.46	-12.42
33	80.36	-16.02	25.57	94	52.76	46.08	4.02	155	68.61	-6.65	12.44
34	82.76	-12.51	22.27	95	40.20	60.12	27.49	156	82.42	-1.40	9.78
35	85.18	-9.32	-19.00	96	54.37	42.34	31.31	157	88.73	0.06	8.57
36	87.40	6.53	16.09	97	49.36	41.65	52.75	158	91.67	1.14	-7.25
37	89.77	3.36	-12.74	98	71.74	-2.22	50.09	159	33.86	-29.55	43.57
38	91.28	-1.65	-10.80	99	44.85	43.22	38.37	160	36.96	62.20	1.43
39	92.88	0.71	-8.38	100	51.45	-17.52	14.52	161	64.84	4.03	74.14
40	50.87	80.11	1.13	101	33.22	-57.25	-4.10	162	16.01	18.90	-46.39
41	55.05	76.55	-6.86	102	51.80	-31.96	-33.13	163	37.81	-60.07	19.15
42	60.23	68.80	-12.39	103	21.65	3.09	-49.32	164	46.08	59.76	45.54
43	65.30	59.77	-14.87	104	34.16	12.28	-42.39	165	53.54	7.28	-29.80
44	70.51	50.00	-15.36	105	18.56	18.18	-8.98	166	64.21	-27.17	5.61
45	75.21	40.90	-14.66	106	45.45	29.97	-9.21	167	65.31	25.26	15.04
46	80.45	30.22	-13.01	107	70.44	19.41	-10.05	168	14.03	8.26	-31.81
47	82.75	25.16	-12.13	108	22.97	15.96	8.05	169	33.78	-51.51	14.71
48	85.19	20.37	-11.09	109	71.27	15.80	6.32	170	39.02	45.67	32.19
49	87.43	15.88	-10.08	110	30.59	-6.45	19.68	171	41.25	3.73	-23.76
50	89.81	10.95	-9.02	111	57.20	-3.78	27.39	172	50.40	-24.94	5.74
51	91.18	8.12	-8.26	112	77.35	-0.82	12.73	173	51.19	20.22	12.95
52	92.99	4.51	-7.29	113	81.37	3.10	-6.19	174	18.92	-19.59	-14.25
53	86.71	4.80	99.20	114	22.95	-25.56	3.38	175	18.66	17.89	9.06
54	88.26	0.86	89.14	115	47.22	-29.25	7.70	176	30.81	-6.56	18.97
55	89.53	-2.04	75.07	116	70.76	-14.41	0.88	177	7.99	-0.08	-11.07
56	90.20	-3.45	59.31	117	18.24	-19.66	-13.95	178	22.84	-25.25	3.00
57	91.26	3.93	46.96	118	64.77	5.49	-20.22	179	22.71	15.03	7.02
58	91.74	-3.57	36.05	119	7.63	-0.14	-11.30	180	21.79	-1.53	-10.13
59	92.59	2.47	23.35	120	70.55	-10.74	-16.83	181	29.98	-14.61	1.17
60	92.83	-1.75	17.06	121	45.67	-23.81	-20.53	182	29.50	5.98	4.24
61	93.11	-1.10	12.40	122	3.41	0.59	-2.33				



Sample #24											
ID#	L*	a*	b*	ID#	L*	a*	b*	ID#	L*	a*	b*
1	41.06	-24.18	-61.19	62	93.66	-0.42	8.29	123	3.62	0.40	-2.40
2	48.28	81.07	10.47	63	93.40	0.26	4.00	124	4.11	0.01	-2.92
3	85.38	8.84	105.16	64	93.91	1.12	-0.63	125	3.45	0.45	-2.30
4	16.04	29.21	-57.39	65	94.17	1.75	-4.25	126	4.40	0.27	-2.93
5	39.53	-65.62	23.32	66	6.72	-0.32	-3.70	127	8.32	-3.06	-5.17
6	52.24	72.13	58.02	67	20.26	-2.50	-2.68	128	15.55	6.93	-5.46
7	3.31	0.50	-2.25	68	35.35	-3.58	-1.39	129	3.32	0.43	-2.14
8	34.71	20.62	-54.19	69	45.83	-1.92	-2.15	130	6.49	-1.16	-4.25
9	56.13	-58.14	21.07	70	56.26	-0.19	-3.68	131	19.68	6.78	-5.37
10	61.00	56.95	46.08	71	65.24	0.99	3.73	132	32.93	-10.75	-7.14
11	63.46	10.46	-34.00	72	73.86	2.54	-5.03	133	41.91	-12.40	-10.54
12	76.63	29.11	19.51	73	77.46	2.92	-5.78	134	3.39	0.41	-2.22
13	64.00	1.30	-2.58	74	81.18	2.94	-5.84	135	10.29	-2.37	-4.11
14	75.54	28.31	6.27	75	84.71	3.01	-5.87	136	31.07	7.52	-5.17
15	80.39	6.51	-19.69	76	87.64	2.82	-6.42	137	44.46	8.87	-7.15
16	85.90	-10.60	-2.00	77	89.54	2.72	-6.43	138	56.97	-7.54	-8.68
17	86.43	13.65	4.21	78	92.41	2.49	-6.04	139	63.37	6.56	-9.70
18	3.42	0.53	-2.20	79	26.48	50.03	26.54	140	3.35	0.37	-2.13
19	3.50	0.52	-2.28	80	28.23	45.01	-5.33	141	14.33	2.27	-3.44
20	3.67	0.55	2.32	81	48.16	77.96	31.84	142	37.69	5.70	-2.91
21	3.45	0.57	2.19	82	39.06	45.98	33.34	143	54.09	4.43	-5.28
22	3.44	0.60	-2.30	83	67.25	44.92	81.72	144	70.50	1.79	8.05
23	3.40	0.49	2.16	84	48.71	-2.10	49.64	145	77.17	-0.85	-9.89
24	3.37	0.54	2.27	85	35.47	-2.68	-1.44	146	3.41	0.42	-2.21
25	3.31	0.47	2.27	86	61.34	-32.76	66.51	147	17.29	-2.95	-3.53
26	94.28	2.20	6.65	87	34.50	-51.31	15.52	148	42.81	-4.30	-3.37
27	46.38	-30.64	59.26	88	36.21	-56.46	-21.37	149	60.94	-1.00	-4.92
28	52.33	-35.00	-55.65	89	27.60	-31.59	28.91	150	76.27	0.90	-7.35
29	58.70	35.52	50.18	90	28.33	1.79	62.39	151	82.53	1.02	-7.82
30	64.81	-32.88	44.26	91	12.83	7.13	30.17	152	7.84	-4.74	-6.32
31	70.42	-27.72	-37.91	92	18.24	32.43	36.62	153	31.30	16.53	-10.21
32	74.76	22.60	32.46	93	52.14	50.16	-11.32	154	50.30	-12.42	-12.05
33	80.01	15.98	25.74	94	53.12	46.59	4.23	155	68.15	6.41	-11.95
34	82.56	12.55	22.43	95	39.89	59.70	27.09	156	82.06	-1.32	-9.65
35	85.09	-9.29	-19.01	96	54.43	42.34	31.10	157	88.78	0.09	-8.65
36	87.11	-6.65	-16.24	97	49.68	41.99	53.64	158	91.58	1.16	-7.32
37	89.75	-3.35	-12.78	98	71.74	-1.96	50.31	159	33.72	29.74	-43.30
38	91.19	-1.56	-10.87	99	44.72	-42.96	38.27	160	36.89	62.06	1.40
39	93.19	0.82	-8.17	100	51.72	-45.47	13.98	161	64.85	4.13	74.17
40	50.99	80.46	1.57	101	32.76	-57.14	3.45	162	16.03	19.18	-46.57
41	55.01	76.48	-6.91	102	50.89	-32.68	33.24	163	37.66	-59.64	18.75
42	60.00	69.22	12.32	103	20.71	3.36	-48.94	164	46.11	59.82	45.30
43	65.35	59.94	-14.79	104	33.28	12.19	-41.99	165	53.77	7.44	-29.38
44	70.66	49.94	-15.16	105	18.42	18.51	-8.67	166	63.80	-26.88	6.17
45	75.35	40.49	-14.49	106	45.34	29.88	-9.34	167	64.66	25.43	16.42
46	80.32	30.00	-13.07	107	70.75	19.69	-9.68	168	13.15	7.63	-31.10
47	82.87	25.23	-11.99	108	22.40	15.43	7.72	169	32.54	-50.47	14.60
48	85.27	20.07	-11.03	109	71.19	15.75	6.55	170	39.05	45.61	32.50
49	87.41	15.97	-10.03	110	30.65	-6.34	19.69	171	41.18	3.84	-23.46
50	89.79	11.04	-8.96	111	57.20	-3.31	27.31	172	50.26	-25.17	-5.67
51	91.09	8.15	-8.26	112	77.50	-0.70	12.97	173	50.67	20.12	13.31
52	93.12	4.48	-7.19	113	81.37	2.99	-6.03	174	18.70	-19.51	-14.23
53	86.73	4.76	99.23	114	22.58	-25.11	3.56	175	18.55	17.98	-9.00
54	88.19	0.81	89.43	115	46.22	-30.58	9.61	176	30.48	-6.48	18.98
55	89.20	-2.18	75.20	116	70.31	-14.56	1.70	177	7.73	-0.40	-11.18
56	90.24	-3.54	60.59	117	17.40	-19.60	-13.31	178	22.81	-25.17	3.23
57	91.40	-3.81	46.91	118	64.71	5.84	20.48	179	22.29	14.74	7.29
58	92.00	-3.57	35.77	119	7.46	-0.20	-10.91	180	20.64	2.06	-9.62
59	92.65	-2.43	23.42	120	70.39	-10.55	-16.99	181	28.82	-14.67	1.75
60	92.95	-1.69	17.43	121	45.36	24.47	-20.30	182	28.44	6.15	5.07
61	93.13	-1.01	12.21	122	3.42	0.42	-2.23				



Sample #25											
ID#	L*	a*	b*	ID#	L*	a*	b*	ID#	L*	a*	b*
1	41.44	-24.67	-61.20	62	93.58	-0.49	7.89	123	3.68	0.41	-2.44
2	48.52	80.85	10.35	63	93.93	0.24	3.67	124	4.08	0.12	-2.88
3	85.74	8.92	105.37	64	94.09	1.06	-0.85	125	3.37	0.55	-2.26
4	16.71	28.61	-56.86	65	94.44	1.70	-4.34	126	4.74	0.30	-2.94
5	39.87	-64.44	22.99	66	6.91	-0.35	-3.61	127	8.59	-2.96	-4.89
6	52.37	71.74	57.01	67	20.42	-2.96	-2.84	128	16.24	-7.08	-5.95
7	3.36	0.49	-2.43	68	35.61	-3.45	-1.76	129	3.44	0.62	-2.38
8	35.44	20.31	-53.37	69	46.20	-2.26	-2.42	130	6.86	-0.95	-3.90
9	56.43	-57.60	21.67	70	56.54	-0.23	-3.79	131	19.86	-6.33	-5.29
10	61.53	56.35	45.02	71	65.18	1.12	-3.99	132	33.18	-11.04	-7.05
11	63.98	10.30	33.72	72	74.13	2.32	-5.14	133	42.29	-12.09	-10.02
12	77.09	28.26	17.36	73	77.85	2.98	-5.89	134	3.56	0.59	-2.30
13	65.48	1.65	-3.52	74	81.43	2.75	-6.28	135	10.43	2.55	-4.05
14	75.77	-28.00	6.20	75	84.52	2.89	-6.14	136	31.35	-7.35	-5.07
15	80.37	6.33	-19.75	76	88.18	2.94	-6.44	137	44.71	8.63	-7.17
16	86.32	-10.71	-1.65	77	90.11	2.68	-6.52	138	57.65	-7.17	-8.65
17	86.32	13.50	3.87	78	92.53	2.36	-6.30	139	63.32	-7.20	-9.72
18	3.46	0.63	-2.40	79	26.44	50.50	-26.59	140	3.41	0.56	-2.20
19	3.58	0.59	2.35	80	28.05	44.99	-5.63	141	14.73	-2.56	-3.70
20	3.52	0.55	-2.45	81	48.27	78.05	31.52	142	39.54	-5.14	-4.18
21	3.43	0.55	-2.33	82	39.29	46.35	33.95	143	55.57	-4.17	-6.21
22	3.42	0.62	-2.34	83	67.44	44.57	82.28	144	70.66	-1.86	-7.92
23	3.39	0.56	2.39	84	48.94	-2.04	49.73	145	77.45	-1.12	-9.64
24	3.47	0.63	2.42	85	36.00	-3.04	-1.54	146	3.34	0.56	-2.33
25	3.51	0.55	2.36	86	62.05	-32.29	67.32	147	18.21	2.62	-3.91
26	94.56	2.15	-6.67	87	34.79	-51.96	15.45	148	43.19	4.55	-3.82
27	46.86	31.14	59.06	88	36.93	-56.23	-22.27	149	60.73	-0.91	-5.19
28	52.65	34.91	55.13	89	28.41	-31.82	-29.98	150	76.51	0.94	-7.32
29	59.19	-35.35	-49.86	90	29.72	-0.07	-62.24	151	82.57	0.97	-7.72
30	65.26	31.73	43.60	91	13.89	8.12	-31.45	152	7.80	-4.47	-6.25
31	70.75	-27.47	37.68	92	18.37	32.06	36.40	153	31.74	-16.76	-10.67
32	75.10	22.06	32.12	93	52.17	50.09	-11.68	154	51.34	-12.08	-12.84
33	80.52	-15.66	-25.50	94	52.98	46.62	4.23	155	68.75	-6.49	-12.54
34	82.94	-12.17	-22.10	95	40.14	60.13	27.60	156	82.82	-1.33	-9.68
35	85.49	-9.13	-18.93	96	54.65	42.27	30.74	157	89.01	0.04	-8.40
36	87.37	6.35	-16.05	97	49.69	41.90	53.64	158	91.64	1.13	-7.29
37	89.88	3.23	-12.72	98	71.92	-2.16	49.92	159	33.92	29.75	-43.47
38	91.36	-1.45	-10.75	99	45.26	-42.51	39.14	160	36.85	62.00	1.19
39	93.24	0.75	8.28	100	51.93	-46.98	14.44	161	65.03	4.47	74.47
40	51.10	79.93	1.31	101	33.44	-57.57	-4.05	162	16.08	18.93	-46.50
41	55.29	76.04	6.77	102	51.60	-32.98	-33.50	163	37.96	-59.42	19.15
42	60.63	68.64	-12.09	103	22.12	2.67	-49.58	164	46.12	59.46	45.45
43	65.89	58.86	-14.61	104	35.01	12.52	-42.26	165	53.56	7.39	-29.80
44	70.90	49.18	-15.19	105	18.56	18.17	-9.11	166	64.18	-26.79	5.13
45	75.48	40.18	-14.55	106	45.42	29.27	-9.57	167	65.18	25.34	15.10
46	80.53	29.82	-13.07	107	70.36	19.69	-10.28	168	14.35	8.41	-32.04
47	82.94	24.93	-12.14	108	22.97	15.59	8.01	169	34.73	52.00	14.81
48	85.40	20.04	-11.10	109	71.19	15.58	6.18	170	39.04	45.98	32.59
49	87.69	15.67	-10.05	110	31.15	-6.71	19.95	171	41.45	3.56	-23.49
50	90.18	10.81	-8.93	111	57.27	-3.83	27.22	172	50.32	-25.26	5.98
51	91.48	8.00	8.24	112	77.63	-0.57	12.04	173	51.04	20.08	12.71
52	93.20	4.39	-7.34	113	81.39	2.93	-6.25	174	19.04	-19.60	-14.04
53	87.09	4.75	99.26	114	23.12	-25.21	3.26	175	18.58	18.02	-9.06
54	88.08	0.74	88.79	115	46.92	-31.50	8.36	176	30.68	-6.46	19.28
55	89.74	-2.09	74.60	116	70.99	-14.30	0.38	177	8.28	-0.02	-11.65
56	90.60	-3.40	59.16	117	18.80	-20.25	-13.78	178	23.23	-25.36	3.24
57	91.39	-3.85	46.47	118	64.81	5.38	-20.32	179	22.87	14.89	7.27
58	91.96	-3.50	35.58	119	7.69	-0.25	-10.92	180	21.98	-1.84	-10.35
59	92.43	-2.47	23.12	120	70.53	-10.83	-17.09	181	30.67	-14.40	0.71
60	93.01	-1.69	16.65	121	45.77	-24.11	-20.50	182	30.33	6.24	-4.07
61	93.43	-1.07	12.08	122	3.45	0.54	2.27				

Sample #26											
ID#	L*	a*	b*	ID#	L*	a*	b*	ID#	L*	a*	b*
1	41.45	-25.02	-60.86	62	93.70	-0.42	7.84	123	3.83	0.60	-2.64
2	48.34	81.11	9.57	63	93.81	0.27	3.64	124	4.40	0.36	-3.25
3	85.53	8.88	104.61	64	94.32	1.07	-0.70	125	3.56	0.64	-2.35
4	16.57	28.91	-57.41	65	94.26	1.70	-4.32	126	4.77	0.38	-3.11
5	39.98	-65.77	22.85	66	7.20	-0.51	-3.56	127	8.65	-3.00	-5.10
6	52.28	71.90	57.04	67	20.50	-3.15	-2.90	128	16.93	-6.96	-6.12
7	3.45	0.59	-2.36	68	35.90	-3.19	-2.04	129	3.52	0.67	-2.40
8	35.05	20.60	53.87	69	46.41	-2.08	-2.53	130	7.07	-0.91	-4.42
9	56.42	-58.18	20.69	70	56.58	-0.14	-3.80	131	20.06	-6.47	-5.56
10	61.75	56.72	44.15	71	65.38	1.07	-4.01	132	33.48	-10.91	-7.71
11	63.98	10.18	-33.71	72	74.19	2.50	-5.39	133	42.60	12.16	-11.04
12	76.64	28.93	17.32	73	77.74	3.02	-5.86	134	3.40	0.57	2.38
13	65.26	1.40	-3.82	74	81.24	2.78	-6.10	135	10.31	-2.62	-4.31
14	75.77	-28.36	6.08	75	85.07	2.67	-5.73	136	31.66	-7.16	-5.14
15	80.11	6.27	-19.71	76	87.86	2.97	-6.66	137	45.14	8.10	-7.75
16	86.11	-10.76	-1.84	77	89.87	2.72	-6.53	138	57.50	-7.15	-8.51
17	86.56	13.68	4.11	78	92.34	2.37	-6.17	139	63.76	-6.73	-9.93
18	3.51	0.65	-2.36	79	26.94	51.01	-26.35	140	3.38	0.63	-2.39
19	3.51	0.54	-2.34	80	28.49	45.44	-5.46	141	15.28	-2.20	-3.63
20	3.39	0.63	-2.46	81	48.34	78.03	30.98	142	39.61	5.49	-4.56
21	3.41	0.60	-2.39	82	39.43	46.28	33.54	143	56.23	-3.58	-6.19
22	3.45	0.59	-2.35	83	67.61	44.45	82.13	144	70.86	-1.87	8.00
23	3.34	0.57	-2.40	84	49.13	-1.43	49.76	145	77.90	-0.97	-9.72
24	3.41	0.66	-2.31	85	36.32	2.25	-1.59	146	3.44	0.60	-2.25
25	3.45	0.66	2.47	86	61.89	-32.61	66.93	147	18.62	-3.10	-3.34
26	94.15	2.18	-6.59	87	34.93	-51.74	15.29	148	43.53	-3.92	-3.38
27	46.68	-31.06	58.68	88	36.97	-55.94	-23.02	149	61.26	-1.09	-5.11
28	52.63	-35.31	55.16	89	28.72	-31.30	-30.49	150	77.01	0.74	-7.36
29	59.08	35.67	49.74	90	29.72	0.04	-62.32	151	82.66	0.94	-7.95
30	64.86	32.36	43.62	91	13.88	8.72	31.90	152	7.67	-4.40	6.49
31	70.61	28.20	-37.74	92	18.65	32.37	-36.76	153	32.44	-16.25	-10.98
32	74.97	-22.75	-32.26	93	52.38	50.06	-11.52	154	51.83	-11.60	-12.56
33	80.39	-16.03	25.44	94	53.47	46.06	3.70	155	69.21	-6.69	-12.36
34	82.63	-12.60	22.15	95	40.21	59.92	27.07	156	83.04	-1.27	-9.88
35	85.34	-9.53	-18.86	96	54.70	41.71	30.44	157	89.22	0.10	-8.39
36	87.21	-6.49	15.95	97	49.94	42.17	53.55	158	91.70	1.12	-7.24
37	89.89	-3.44	-12.61	98	72.15	2.42	49.41	159	34.20	-30.20	-43.60
38	91.29	-1.67	-10.66	99	44.95	-43.46	38.39	160	37.24	62.61	1.41
39	93.04	0.70	-8.12	100	52.29	46.63	14.23	161	65.19	4.28	74.62
40	51.06	80.16	0.69	101	33.54	-57.68	4.37	162	15.93	19.20	-46.98
41	55.20	76.33	-7.38	102	52.29	-31.32	-33.30	163	38.34	-60.19	19.23
42	60.24	68.60	-12.67	103	22.13	3.21	-49.81	164	46.22	59.98	45.67
43	65.63	59.07	14.87	104	35.39	12.65	-42.27	165	54.05	7.37	-29.63
44	70.70	49.62	-15.34	105	19.08	18.21	-8.64	166	64.65	-26.72	4.80
45	75.17	40.84	-14.71	106	45.77	29.81	-9.54	167	65.44	25.08	14.63
46	80.49	30.06	-13.01	107	70.85	19.49	-9.89	168	14.06	8.42	-32.18
47	82.62	25.17	12.10	108	23.08	15.45	8.08	169	34.98	-52.13	14.86
48	85.43	20.23	-10.96	109	71.86	15.50	6.19	170	39.30	45.71	32.40
49	87.18	15.85	-10.11	110	30.86	-6.45	19.84	171	41.68	3.47	-23.90
50	90.08	11.00	-8.80	111	57.77	-3.65	26.98	172	50.94	-25.48	5.10
51	91.36	8.14	-8.14	112	77.80	-0.53	12.60	173	51.25	20.04	12.74
52	93.26	4.39	-7.09	113	81.44	2.95	-6.06	174	18.93	-20.11	-14.33
53	86.89	4.72	98.53	114	23.29	-25.58	3.31	175	18.59	18.50	-9.15
54	88.28	0.79	88.80	115	47.49	-29.73	7.27	176	31.12	-6.45	19.72
55	89.54	-2.02	73.36	116	71.30	-13.92	0.35	177	7.47	-0.12	-11.12
56	90.57	-3.40	59.36	117	18.79	-19.83	-14.32	178	23.15	-25.57	3.02
57	91.23	-3.88	46.35	118	65.22	5.49	-20.37	179	23.12	15.87	7.76
58	91.99	-3.49	35.71	119	7.62	-0.09	-11.27	180	22.10	-1.42	-10.08
59	92.62	-2.45	22.98	120	70.63	-10.40	-17.02	181	30.64	-15.33	0.74
60	92.77	-1.73	16.81	121	46.19	-24.46	-20.61	182	30.48	6.80	4.10
61	93.25	-1.08	11.98	122	3.52	0.64	-2.38				

Sample #27											
ID#	L*	a*	b*	ID#	L*	a*	b*	ID#	L*	a*	b*
1	41.30	-24.67	-60.95	62	93.51	-0.45	8.13	123	3.52	0.49	-2.41
2	48.49	81.24	9.81	63	93.86	0.29	3.70	124	4.11	0.08	-2.73
3	85.60	8.87	105.01	64	93.85	1.10	-0.75	125	3.34	0.57	-2.19
4	16.84	28.66	-57.32	65	94.42	1.73	-4.05	126	4.49	0.15	-3.05
5	40.32	-65.45	22.72	66	6.81	-0.33	-3.42	127	8.40	-2.73	-4.96
6	52.53	71.63	57.50	67	20.39	-3.15	-2.62	128	15.70	-7.06	-5.83
7	3.50	0.50	-1.91	68	35.90	-3.16	-1.82	129	3.41	0.64	-2.31
8	35.72	20.04	-52.97	69	46.20	-2.12	-2.36	130	6.84	-1.24	-4.07
9	56.76	-56.72	19.35	70	56.71	-0.32	-3.56	131	19.98	6.38	-5.44
10	61.81	56.06	43.04	71	65.55	1.30	-3.62	132	33.30	-11.16	-7.50
11	63.78	10.06	-33.87	72	74.04	2.59	-5.18	133	42.14	-12.19	-10.50
12	76.78	28.80	17.29	73	77.66	2.83	-5.83	134	3.30	0.66	-2.16
13	65.19	1.16	-3.67	74	81.40	3.08	-6.06	135	10.12	-2.74	-4.49
14	75.66	-28.26	6.02	75	84.81	2.77	-5.53	136	31.67	-7.37	-5.00
15	80.43	6.60	-19.57	76	88.25	2.87	-6.29	137	44.77	-8.98	-7.12
16	86.12	-10.61	-1.57	77	89.76	2.81	-6.42	138	57.30	-7.63	-8.59
17	86.25	13.61	4.02	78	92.72	2.31	-5.83	139	63.46	-6.86	-9.83
18	3.27	0.41	-2.09	79	26.36	50.41	-26.44	140	3.42	0.67	-2.33
19	3.39	0.40	-2.01	80	28.24	45.63	-4.80	141	14.88	-2.50	-3.73
20	4.11	0.52	-2.12	81	48.26	78.15	32.15	142	39.51	-5.57	-4.30
21	3.39	0.46	-2.05	82	39.14	46.28	33.77	143	55.90	-3.81	-6.03
22	3.41	0.44	-2.12	83	67.57	44.61	82.45	144	70.78	-1.65	-7.95
23	3.37	0.52	-2.01	84	49.12	-1.72	50.13	145	77.40	-0.89	-9.81
24	3.45	0.44	-2.03	85	35.74	-3.45	-1.64	146	3.31	0.66	-2.26
25	3.46	0.47	2.14	86	61.73	-32.76	67.03	147	17.94	-2.99	-3.48
26	94.32	2.18	-6.55	87	34.78	-52.34	15.37	148	42.99	-4.08	-3.49
27	46.31	30.70	-59.08	88	36.76	-56.03	-22.64	149	60.93	-1.25	-4.98
28	52.52	35.04	-55.17	89	28.47	-31.26	-30.34	150	76.68	0.97	-7.54
29	59.08	-35.37	49.56	90	29.62	0.17	62.36	151	82.39	1.18	-7.89
30	64.82	32.44	-43.89	91	13.90	8.54	32.02	152	7.80	-4.61	-6.48
31	70.23	-28.19	-38.01	92	18.07	32.36	36.42	153	32.19	16.41	-11.25
32	75.06	-22.29	-32.01	93	52.26	49.95	-11.33	154	51.45	-11.99	12.49
33	80.38	-15.98	-25.44	94	53.42	46.05	3.95	155	68.74	-6.47	-12.41
34	82.85	-12.58	-22.11	95	40.05	60.10	27.93	156	82.69	-1.50	9.77
35	85.29	-9.45	-18.88	96	55.03	42.03	30.11	157	88.82	0.26	8.68
36	87.50	-6.74	-15.99	97	49.98	42.61	54.28	158	91.75	1.24	-7.36
37	89.81	-3.43	-12.63	98	72.12	-2.17	48.51	159	33.82	-29.48	-43.81
38	91.41	-1.57	-10.52	99	45.21	-42.35	39.08	160	36.98	62.49	1.70
39	93.16	0.78	8.03	100	52.34	-45.53	13.50	161	64.95	4.22	74.52
40	51.00	80.49	1.25	101	33.37	-57.79	-4.46	162	15.90	19.38	-47.06
41	55.10	76.51	-7.07	102	52.01	-32.24	33.56	163	37.87	-60.29	19.41
42	60.33	69.14	-12.37	103	22.02	2.97	-49.66	164	46.20	59.99	46.08
43	65.46	59.64	-14.84	104	35.47	12.84	-41.84	165	53.91	7.58	29.72
44	70.84	49.74	-15.16	105	18.33	18.07	8.97	166	64.45	-26.86	5.26
45	75.41	40.49	-14.56	106	45.55	29.62	-9.53	167	65.10	25.47	15.07
46	80.21	30.00	-13.09	107	70.73	19.45	-9.89	168	14.01	8.48	-31.80
47	82.79	25.19	-12.05	108	22.71	15.30	7.80	169	34.75	-51.79	14.80
48	85.19	20.26	-11.04	109	71.65	15.34	6.38	170	38.88	45.94	32.79
49	87.47	15.89	-10.00	110	30.97	-6.02	20.07	171	41.64	3.98	-23.81
50	89.95	10.92	-8.82	111	57.97	-3.03	26.69	172	50.40	25.13	5.64
51	91.36	8.19	-8.10	112	77.68	-0.49	12.18	173	51.04	19.96	13.24
52	93.33	4.50	-7.08	113	81.53	3.07	-6.06	174	18.65	-19.97	-14.51
53	87.05	4.77	99.34	114	23.45	-25.25	3.89	175	18.54	18.22	-8.79
54	88.15	0.65	88.04	115	47.42	-30.87	7.39	176	30.72	-6.25	19.57
55	89.39	2.05	73.52	116	71.19	-14.46	0.71	177	7.59	0.16	-11.02
56	90.67	-3.37	59.32	117	18.84	-19.95	-14.44	178	23.08	-25.37	2.83
57	91.38	-3.71	46.23	118	64.85	5.39	-20.38	179	23.01	15.92	7.84
58	91.98	-3.43	35.31	119	7.48	-0.19	-11.26	180	21.84	-1.63	-10.40
59	92.74	2.40	23.33	120	70.67	-10.46	-16.84	181	30.25	-15.28	0.57
60	92.82	-1.71	17.04	121	45.81	-23.68	-20.37	182	30.51	7.61	4.19
61	93.18	-1.03	12.16	122	3.21	0.58	-2.25				

Sample #28											
ID#	L*	a*	b*	ID#	L*	a*	b*	ID#	L*	a*	b*
1	40.93	24.20	-61.00	62	93.51	-0.47	8.08	123	3.89	0.58	-2.63
2	48.28	81.02	9.94	63	93.88	0.34	3.59	124	4.71	0.24	-3.10
3	85.41	9.04	104.72	64	94.03	1.09	-0.79	125	3.56	0.62	-2.35
4	16.41	28.74	-57.50	65	94.16	1.75	4.29	126	4.97	0.35	3.30
5	39.82	-65.57	22.58	66	7.23	-0.24	-3.76	127	8.86	-2.89	-5.20
6	52.55	71.76	57.50	67	21.31	-2.74	-2.49	128	16.40	-6.60	-5.63
7	3.54	0.52	-2.32	68	36.56	-2.48	-2.07	129	3.50	0.70	-2.50
8	35.05	19.71	-53.93	69	46.83	-1.58	-3.04	130	7.43	-0.78	4.42
9	56.32	-57.48	19.99	70	57.15	0.08	-3.67	131	20.15	-6.92	-5.19
10	61.52	56.26	44.20	71	65.48	1.23	-4.11	132	33.41	-11.06	-7.21
11	63.71	9.99	-33.89	72	74.41	2.48	-4.64	133	42.60	-12.18	-10.61
12	76.89	28.71	17.16	73	77.85	2.89	-5.90	134	3.51	0.66	-2.37
13	65.14	0.87	-3.66	74	81.70	3.16	-6.22	135	10.91	-2.21	-4.42
14	75.94	27.73	5.85	75	84.64	2.88	-5.98	136	32.15	-7.52	-5.09
15	80.23	6.44	-19.44	76	88.12	2.91	-6.34	137	44.99	8.70	-7.36
16	86.17	-10.52	-1.70	77	89.67	2.59	-6.45	138	57.59	7.60	8.78
17	86.45	13.57	3.96	78	92.36	2.36	-6.03	139	63.53	6.63	-10.02
18	3.72	0.60	-2.21	79	26.77	50.50	-26.28	140	3.77	0.67	-2.39
19	3.41	0.63	-2.44	80	28.43	45.09	-5.47	141	15.13	2.67	-3.49
20	3.52	0.60	-2.37	81	48.35	77.90	30.65	142	39.66	-5.89	-4.38
21	3.65	0.60	-2.33	82	39.45	46.36	33.57	143	55.92	-3.59	-6.31
22	3.48	0.56	-2.42	83	67.72	43.80	81.53	144	70.78	1.69	8.00
23	3.56	0.60	-2.29	84	49.37	-1.66	49.69	145	77.59	-0.96	9.84
24	3.61	0.56	-2.31	85	36.24	-2.99	-2.02	146	3.71	0.72	-2.45
25	3.50	0.61	-2.26	86	62.07	-32.52	66.76	147	18.31	2.81	3.56
26	94.35	2.15	-6.45	87	35.14	51.50	14.63	148	43.25	-4.27	-3.83
27	46.45	30.83	-59.19	88	37.07	-55.69	-22.89	149	60.92	-1.32	4.87
28	52.48	-35.00	-55.05	89	28.77	31.39	-30.58	150	76.66	1.15	-7.77
29	59.06	35.19	-49.60	90	29.81	0.12	62.22	151	82.60	1.12	-7.79
30	64.96	32.90	-43.92	91	14.29	8.35	-31.76	152	8.17	-4.85	-6.59
31	70.61	27.76	-37.54	92	18.69	32.79	-36.27	153	32.22	16.44	-11.21
32	75.26	22.17	-31.85	93	52.32	49.87	-11.36	154	51.40	-12.41	-12.72
33	80.39	-15.79	25.32	94	53.54	46.00	3.70	155	69.02	-6.09	-12.15
34	82.60	-12.47	22.07	95	40.30	59.82	26.99	156	82.84	-1.31	9.75
35	85.45	-9.39	-18.67	96	55.07	41.26	30.09	157	89.12	0.23	8.56
36	87.31	-6.75	-16.04	97	50.11	42.14	53.37	158	91.57	1.27	-7.56
37	89.98	-3.38	-12.42	98	72.29	2.44	49.42	159	34.11	29.73	-43.65
38	91.35	-1.72	-10.57	99	45.42	-42.84	38.81	160	37.16	62.53	1.39
39	93.38	0.78	-7.90	100	52.46	-45.53	13.56	161	65.26	4.39	74.23
40	51.20	80.33	1.11	101	33.69	-57.44	-4.23	162	16.18	19.37	-47.05
41	55.33	76.17	-7.12	102	52.01	32.76	33.24	163	38.25	59.80	19.04
42	60.24	68.40	-12.60	103	22.33	3.13	-50.01	164	46.33	59.63	45.37
43	65.89	59.06	-14.63	104	35.45	13.17	-41.99	165	54.40	7.95	-29.12
44	71.14	48.90	-14.95	105	18.72	18.29	8.92	166	64.69	26.35	5.03
45	75.40	40.24	-14.53	106	45.81	29.76	-9.49	167	65.73	25.14	14.16
46	80.27	29.99	-13.06	107	70.94	19.31	-9.97	168	14.28	8.32	32.30
47	82.77	24.95	-12.02	108	22.95	15.60	7.89	169	35.34	-51.48	14.72
48	85.25	20.16	-11.00	109	71.80	15.59	6.11	170	39.21	46.15	32.94
49	87.41	15.89	-10.00	110	31.29	-6.40	19.79	171	41.89	3.95	-23.69
50	89.92	10.75	-8.80	111	58.16	-3.47	26.53	172	50.79	25.19	5.43
51	91.47	8.08	-7.99	112	77.99	-0.74	12.28	173	51.18	19.52	13.10
52	93.07	4.48	-7.13	113	81.41	2.87	-6.18	174	19.20	19.83	-14.67
53	87.15	4.78	99.49	114	23.46	-24.82	2.88	175	18.77	18.38	-9.02
54	88.41	0.63	88.81	115	47.54	-30.93	7.06	176	31.15	-6.20	19.56
55	89.26	-2.23	74.45	116	71.45	-14.27	0.18	177	8.10	0.01	-11.27
56	90.46	3.48	59.19	117	19.22	-19.62	-14.13	178	23.47	25.22	3.06
57	91.08	-3.91	46.37	118	65.16	5.55	-20.05	179	23.35	15.77	8.14
58	91.76	-3.47	35.32	119	8.20	-0.05	-11.57	180	22.17	-1.92	-10.47
59	92.61	-2.41	23.11	120	70.98	-10.06	-16.74	181	30.73	-15.09	0.48
60	92.81	-1.67	16.58	121	46.72	-22.32	-20.19	182	30.62	6.83	3.58



Sample #29											
ID#	L*	a*	b*	ID#	L*	a*	b*	ID#	L*	a*	b*
1	41.25	24.41	-61.11	62	93.54	-0.42	7.73	123	3.65	0.68	-2.50
2	48.38	81.09	9.64	63	93.87	0.21	3.90	124	4.17	0.34	-3.08
3	85.57	8.69	104.79	64	93.89	1.07	-0.79	125	3.58	0.67	-2.29
4	16.81	28.39	-57.03	65	94.24	1.69	-4.29	126	4.71	0.44	-3.00
5	39.93	-65.55	22.89	66	7.28	-0.17	-3.65	127	8.57	-2.93	-4.92
6	52.26	71.90	57.69	67	21.04	-2.81	-2.96	128	16.31	-7.05	-5.95
7	3.48	0.77	2.29	68	36.14	-3.15	-1.90	129	3.44	0.68	-2.35
8	35.26	20.32	-53.75	69	46.83	-1.90	-2.57	130	7.03	-1.06	-4.01
9	56.19	-58.63	20.71	70	56.84	-0.55	-3.43	131	20.37	-6.98	-5.26
10	61.68	56.80	45.12	71	65.28	1.09	-3.96	132	33.44	-11.58	-7.45
11	63.73	10.36	33.83	72	73.91	2.50	-5.15	133	42.42	-12.70	-10.87
12	76.77	28.64	17.41	73	77.83	2.78	-5.98	134	3.45	0.75	-2.22
13	65.21	1.14	-3.69	74	81.33	2.74	-6.21	135	10.34	-2.70	-3.93
14	75.92	28.48	6.38	75	84.56	2.84	-6.19	136	31.74	-7.88	-5.40
15	80.25	6.39	-19.71	76	88.10	2.83	-6.47	137	44.84	-9.08	-7.38
16	85.95	-10.66	-1.86	77	89.62	2.73	-6.57	138	57.46	-7.61	-8.98
17	86.32	13.56	4.19	78	92.29	2.40	-6.26	139	63.50	-7.07	-9.92
18	3.65	0.76	2.43	79	27.01	50.66	-26.52	140	3.40	0.71	-2.34
19	3.41	0.77	2.27	80	28.54	45.48	-5.42	141	15.45	2.52	-3.71
20	3.46	0.77	2.36	81	48.32	77.97	31.25	142	39.49	-5.99	-4.71
21	3.45	0.74	2.32	82	39.40	45.85	33.38	143	55.94	-3.88	6.13
22	3.40	0.80	2.31	83	67.60	44.45	81.98	144	70.87	-1.80	-8.13
23	3.59	0.77	2.30	84	49.05	-2.14	49.86	145	77.43	-0.98	-9.82
24	3.43	0.72	2.37	85	36.14	-2.75	-1.41	146	3.45	0.74	-2.23
25	3.45	0.69	2.23	86	61.90	-32.69	66.94	147	19.11	2.88	-3.22
26	94.18	2.20	6.64	87	34.95	-51.93	15.33	148	43.53	-4.19	-3.77
27	46.57	-30.78	58.96	88	37.02	-55.89	22.79	149	61.01	-1.17	-5.11
28	52.45	-34.89	-55.38	89	28.51	-31.70	-30.16	150	76.62	1.02	-7.53
29	59.13	35.49	49.95	90	29.67	0.28	62.52	151	82.56	1.07	-7.99
30	65.25	-31.93	-43.54	91	14.12	8.18	31.75	152	7.70	-4.57	-6.25
31	70.49	-27.70	-37.73	92	18.73	32.28	36.33	153	32.44	-16.42	-10.80
32	75.33	22.52	32.06	93	52.21	49.96	-11.71	154	51.56	-12.07	-12.58
33	80.34	-15.88	-25.52	94	53.22	46.18	3.73	155	69.02	-6.57	-12.53
34	82.80	12.53	-22.15	95	40.33	60.26	27.17	156	82.71	-1.25	-9.76
35	85.29	-9.44	-18.97	96	54.70	41.93	30.52	157	88.79	0.14	-8.52
36	87.16	-6.58	-16.14	97	50.12	42.01	54.01	158	91.76	1.12	-7.19
37	90.13	-3.38	-12.48	98	72.02	-2.36	50.46	159	34.19	29.85	-43.64
38	91.22	-1.54	-10.71	99	45.18	-43.32	38.72	160	37.26	62.64	1.48
39	92.88	0.79	-8.21	100	52.17	-46.63	14.04	161	65.24	4.18	74.51
40	51.13	80.08	0.83	101	33.63	57.69	-4.41	162	16.21	19.51	-47.17
41	55.30	76.50	-7.13	102	51.76	-33.02	-33.60	163	38.04	-60.38	18.98
42	60.33	68.56	-12.51	103	22.05	2.96	-49.78	164	46.43	59.95	46.11
43	65.74	58.87	-14.72	104	35.45	12.79	-42.37	165	54.04	7.43	-29.79
44	70.75	49.76	-15.29	105	19.18	18.92	8.52	166	64.49	-27.00	5.23
45	75.55	40.62	-14.52	106	45.78	29.35	-9.34	167	65.41	25.19	15.02
46	80.43	30.11	-13.06	107	70.65	19.51	-10.05	168	14.21	8.63	-32.42
47	82.86	25.25	-12.06	108	23.68	16.33	9.03	169	35.12	-52.27	14.74
48	85.21	20.18	-11.09	109	71.71	15.70	6.33	170	39.31	45.74	32.75
49	87.56	15.65	-9.91	110	31.09	-6.19	19.96	171	41.75	3.27	-23.57
50	90.40	10.86	-8.63	111	57.39	-3.87	27.56	172	50.66	-25.12	5.73
51	91.50	8.08	-8.06	112	77.84	-0.51	12.29	173	51.70	19.77	12.97
52	92.96	4.46	-7.25	113	81.45	3.02	-6.21	174	19.33	-19.90	-14.42
53	86.85	4.60	98.40	114	23.46	-25.88	3.40	175	18.90	18.49	-8.86
54	88.08	0.69	88.71	115	47.32	-31.08	8.36	176	31.11	-6.39	19.77
55	89.54	-2.16	74.36	116	71.19	-14.47	0.61	177	7.95	-0.36	-10.83
56	90.58	3.44	58.17	117	18.96	-20.14	-14.60	178	23.40	-25.92	3.55
57	91.26	-3.91	46.48	118	64.59	5.32	-20.42	179	23.05	15.27	7.70
58	91.93	3.56	35.69	119	7.85	-0.25	-11.20	180	22.21	-1.68	-10.33
59	92.56	-2.51	23.19	120	70.63	-10.63	-16.84	181	30.86	-14.55	0.99
60	93.04	-1.74	17.00	121	46.49	-23.38	-20.41	182	30.73	6.60	3.92
61	93.30	-1.08	12.15	122	3.52	0.72	-2.31				



Sample #30							
ID#	L*	a*	b*	ID#	L*	a*	b*
1	40.96	-24.32	-60.89	62	93.63	-0.53	8.44
2	48.33	80.96	9.79	63	94.02	0.26	3.86
3	85.65	8.97	104.45	64	94.22	1.01	-0.42
4	16.72	28.36	-57.20	65	94.05	1.69	-4.10
5	39.99	-65.58	22.32	66	7.70	-0.47	-3.83
6	52.51	71.53	56.74	67	21.36	-2.72	-2.85
7	3.68	0.52	-2.37	68	36.35	-3.22	-1.96
8	35.04	19.73	-53.76	69	46.69	-1.48	-2.48
9	56.27	58.33	20.02	70	57.29	0.36	-3.54
10	61.70	56.36	44.16	71	65.57	1.39	-3.54
11	63.71	10.19	-33.99	72	74.26	2.34	-4.93
12	76.74	28.73	17.55	73	77.70	2.87	-6.09
13	65.06	0.94	-3.45	74	81.38	2.99	-6.05
14	75.48	-28.62	6.02	75	84.69	2.81	-5.67
15	80.12	6.30	-19.49	76	87.76	2.90	-6.49
16	85.98	-10.96	-1.36	77	89.93	2.65	-6.27
17	86.09	13.88	4.31	78	92.40	2.26	-6.01
18	3.73	0.61	-2.41	79	26.76	50.12	-26.50
19	3.78	0.55	-2.37	80	28.57	44.97	-5.57
20	3.63	0.53	-2.43	81	48.29	77.62	30.51
21	3.56	0.52	-2.40	82	39.43	45.71	32.56
22	3.83	0.59	-2.41	83	68.04	44.37	81.71
23	3.59	0.56	-2.56	84	49.54	-1.56	49.63
24	3.71	0.54	-2.44	85	36.68	-3.09	-2.06
25	3.70	0.64	-2.39	86	62.21	32.27	66.60
26	94.54	2.15	-6.26	87	35.42	51.51	14.99
27	46.43	30.92	58.68	88	37.19	55.31	-23.27
28	52.56	35.01	-54.85	89	28.84	31.26	30.83
29	58.88	35.72	-49.81	90	29.85	-0.19	-62.20
30	64.83	-32.56	-43.77	91	14.47	8.69	-31.93
31	70.36	27.71	-37.66	92	18.54	31.60	-36.34
32	74.93	-22.76	-32.15	93	52.24	49.96	-11.56
33	80.07	16.16	-25.55	94	53.42	46.02	3.80
34	82.51	-12.91	-22.22	95	40.31	59.79	27.17
35	85.20	9.55	-18.81	96	54.94	42.11	30.57
36	87.37	6.84	-16.00	97	50.13	42.08	53.55
37	90.05	3.54	-12.47	98	72.37	2.44	50.47
38	91.03	-1.74	-10.65	99	45.33	-43.47	38.70
39	93.12	0.72	-8.01	100	52.26	46.09	13.95
40	51.24	80.30	1.20	101	33.73	-57.58	4.26
41	55.22	76.40	-7.16	102	51.74	32.88	-33.81
42	60.31	68.62	-12.42	103	22.26	3.14	49.98
43	65.65	59.64	-14.59	104	35.42	12.97	-42.06
44	70.76	49.37	-15.12	105	19.03	18.37	-8.76
45	75.37	40.67	-14.42	106	45.70	29.16	-9.63
46	80.46	30.29	-12.88	107	70.63	19.47	-10.21
47	82.97	25.37	-11.87	108	23.36	15.33	7.83
48	85.13	20.21	-11.06	109	71.85	15.20	6.18
49	87.44	16.12	-9.92	110	31.35	-6.49	19.61
50	89.74	10.95	-8.81	111	57.92	-4.11	26.58
51	91.33	8.10	-7.97	112	77.71	-0.80	12.26
52	93.00	4.31	-7.09	113	81.50	3.00	6.14
53	86.75	4.64	98.47	114	23.66	-25.70	3.10
54	87.90	0.55	87.17	115	47.73	-30.31	7.40
55	89.30	-2.18	73.50	116	71.37	-14.33	0.24
56	90.28	-3.54	59.14	117	19.30	-19.92	-14.34
57	91.40	-3.78	46.06	118	64.49	5.61	-20.64
58	91.93	3.49	35.53	119	7.99	-0.14	-11.22
59	92.55	-2.50	23.33	120	70.42	-10.65	-16.94
60	92.83	-1.81	17.28	121	45.91	-23.66	-20.72
61	93.24	-1.13	12.43	122	3.67	0.59	-2.36
123	3.92	0.53	-2.57				
124	4.28	0.10	-3.19				
125	3.92	0.60	-2.49				
126	5.10	0.31	-3.28				
127	8.98	2.98	-5.22				
128	16.55	-7.32	-5.84				
129	3.71	0.64	-2.28				
130	7.54	-1.04	-4.40				
131	20.08	-6.89	-5.39				
132	33.49	-11.36	-7.60				
133	42.49	-12.72	-10.42				
134	3.49	0.60	-2.40				
135	10.71	-2.34	-4.23				
136	31.91	-7.77	-5.44				
137	44.99	8.66	-7.44				
138	57.56	7.34	-8.94				
139	63.74	6.91	-10.03				
140	3.64	0.58	-2.50				
141	15.19	3.06	-3.82				
142	39.75	5.59	-4.40				
143	55.80	4.43	-6.13				
144	70.54	2.06	-8.16				
145	77.45	1.25	-9.65				
146	3.62	0.60	-2.40				
147	18.47	-3.10	-3.44				
148	43.41	-3.73	-3.65				
149	60.87	-0.85	-4.79				
150	76.54	0.90	-7.61				
151	82.28	0.99	-7.78				
152	8.15	-4.60	-6.37				
153	32.33	-17.36	-11.34				
154	51.39	-12.81	-12.37				
155	69.14	6.69	-12.19				
156	82.87	-1.56	-9.58				
157	88.79	0.21	-8.53				
158	91.77	1.14	-7.13				
159	34.30	-29.49	44.12				
160	37.35	62.49	1.38				
161	65.83	4.23	74.93				
162	16.61	19.02	-46.80				
163	38.47	-60.08	18.46				
164	46.68	59.55	44.84				
165	54.60	7.92	-29.19				
166	64.70	-25.96	4.44				
167	65.63	24.81	13.95				
168	14.62	8.13	-31.76				
169	35.34	-51.50	14.60				
170	39.27	45.43	32.38				
171	42.19	3.69	-23.67				
172	50.78	-25.01	5.34				
173	51.36	19.18	12.82				
174	19.25	-19.96	-14.57				
175	19.14	18.41	-9.51				
176	31.25	-6.72	19.11				
177	8.10	-0.15	-11.55				
178	23.73	25.68	3.06				
179	23.33	15.48	7.30				
180	22.50	2.56	-10.62				
181	31.04	-14.64	0.62				
182	30.89	6.85	4.24				

Average							
ID#	L*	a*	b*	ID#	L*	a*	b*
1	39.79	23.43	-57.57	62	88.35	1.65	10.76
2	46.64	78.32	11.25	63	90.94	2.37	6.69
3	82.66	8.80	104.18	64	94.38	3.20	2.30
4	15.98	27.86	-54.40	65	89.23	3.88	-1.13
5	38.47	-62.59	23.24	66	7.69	1.98	-3.24
6	50.53	69.70	57.12	67	22.18	-0.31	-1.89
7	3.40	0.83	-2.00	68	34.65	-0.49	-0.70
8	33.94	20.04	-50.71	69	42.89	0.49	-0.96
9	54.38	-55.32	21.65	70	55.37	2.37	-1.80
10	59.31	55.14	44.88	71	64.51	3.63	1.88
11	61.49	10.54	-30.91	72	70.37	4.83	-2.69
12	74.04	28.57	19.80	73	75.59	5.28	-3.33
13	62.45	1.86	-1.22	74	78.53	5.33	-3.38
14	73.04	-26.99	8.30	75	82.04	5.34	-3.11
15	77.49	-6.77	-16.64	76	84.39	5.34	-3.46
16	83.07	-9.89	0.93	77	86.76	5.24	-3.44
17	83.41	13.88	6.77	78	89.50	4.93	-3.03
18	3.40	1.21	-1.97	79	25.79	51.37	-24.37
19	3.42	1.24	-1.98	80	27.40	46.52	-4.10
20	3.45	1.28	-2.00	81	46.50	78.03	31.81
21	3.39	1.31	-2.00	82	37.88	47.46	33.54
22	3.40	1.35	-1.97	83	65.13	45.89	81.32
23	3.38	1.39	-1.99	84	47.36	1.32	49.76
24	3.39	1.41	-1.99	85	34.74	0.40	-0.33
25	3.43	1.45	-1.97	86	59.59	-28.29	66.61
26	91.24	3.01	-3.38	87	33.46	-46.55	15.83
27	44.93	-28.60	-55.43	88	33.58	-50.72	-20.57
28	50.68	-32.51	-51.75	89	25.56	-27.01	28.09
29	56.96	-32.99	-46.41	90	26.66	3.70	-59.08
30	62.71	-30.13	-40.46	91	11.71	10.97	-29.55
31	68.04	-25.66	-34.40	92	16.73	34.31	-34.43
32	72.48	-20.64	-28.88	93	49.31	51.43	-9.58
33	77.51	-14.39	-22.33	94	50.48	47.98	5.45
34	79.88	-11.04	-18.98	95	38.10	61.23	27.68
35	82.37	-7.97	-15.70	96	52.11	43.76	31.08
36	84.39	-5.26	-12.86	97	47.68	44.03	53.45
37	86.85	-2.06	-9.45	98	69.17	1.15	50.48
38	88.19	-0.29	-7.55	99	43.19	37.84	38.81
39	90.03	2.05	-4.97	100	49.95	-41.03	15.18
40	49.27	78.88	2.84	101	32.29	-51.55	2.95
41	53.23	75.21	-5.09	102	49.67	-27.70	-30.64
42	58.16	67.92	-10.16	103	20.59	6.81	-47.05
43	63.28	59.03	-12.31	104	32.79	15.98	39.60
44	68.28	49.54	-12.63	105	17.72	21.37	-7.80
45	72.65	40.87	-11.87	106	43.59	32.23	-7.69
46	77.60	30.89	-10.20	107	67.78	22.67	-7.56
47	79.98	26.12	-9.13	108	21.83	18.79	8.63
48	82.34	21.32	-8.07	109	68.67	18.84	8.28
49	84.43	17.16	-7.03	110	29.53	-2.16	20.11
50	86.88	12.36	-5.81	111	55.26	0.28	28.06
51	88.29	9.64	-5.03	112	74.74	3.17	14.46
52	90.07	6.08	-4.03	113	78.44	6.72	-3.41
53	83.94	6.47	98.45	114	25.67	-20.42	3.97
54	85.24	2.65	88.52	115	48.35	-25.63	9.56
55	86.47	-0.11	74.62	116	71.01	-9.90	3.04
56	87.44	-1.42	60.61	117	19.71	-14.83	-12.76
57	88.25	-1.77	47.90	118	64.17	9.34	-17.75
58	88.85	-1.44	37.47	119	8.76	3.95	-10.30
59	89.53	-0.40	25.55	120	68.88	-6.18	-14.28
60	89.83	0.31	19.61	121	44.93	-18.77	-18.40
61	90.17	0.99	14.88	122	3.84	-4.70	2.01
123	3.97	4.68	-2.20				
124	4.33	4.40	-2.68				
125	3.45	4.80	-2.01				
126	4.47	4.60	-2.70				
127	8.31	1.56	-4.41				
128	15.68	-2.24	-4.93				
129	3.35	4.95	-1.99				
130	6.60	3.47	-3.70				
131	19.23	-1.77	-4.54				
132	32.15	-5.95	-5.98				
133	40.73	-7.31	-8.89				
134	3.18	5.08	-2.03				
135	9.94	2.27	-3.60				
136	30.31	-2.33	-4.06				
137	43.02	-3.59	-5.80				
138	55.09	-2.40	-6.87				
139	61.14	-1.91	-7.57				
140	2.53	5.30	-2.00				
141	14.33	2.38	-2.92				
142	38.79	-0.25	-2.63				
143	54.31	0.95	-4.00				
144	70.96	3.11	-5.74				
145	76.51	3.94	-7.08				
146	3.33	5.48	-2.00				
147	19.88	2.18	-2.78				
148	42.31	1.19	-2.22				
149	58.09	4.02	-3.07				
150	72.96	5.98	-4.85				
151	77.74	6.08	-5.06				
152	6.46	0.88	-5.79				
153	29.82	-10.40	9.35				
154	49.14	-6.41	-10.47				
155	66.60	-1.05	-9.81				
156	80.73	3.94	-6.77				
157	86.95	5.38	-5.51				
158	90.40	6.47	-4.22				
159	34.54	-23.11	-41.06				
160	37.05	65.57	2.65				
161	63.31	9.51	73.97				
162	15.49	24.06	-44.52				
163	35.61	-52.10	19.59				
164	42.94	63.37	45.39				
165	50.64	12.94	-27.02				
166	61.88	-20.19	7.16				
167	62.62	30.12	16.74				
168	13.22	13.81	-30.09				
169	33.16	-43.57	15.36				
170	38.08	50.13	32.89				
171	40.98	9.54	-21.47				
172	49.82	-18.13	7.07				
173	49.82	25.13	14.12				
174	18.24	-13.05	-13.11				
175	18.29	23.77	-7.87				
176	30.21	0.18	19.93				
177	7.74	5.98	-10.32				
178	21.95	-18.36	4.03				
179	21.52	21.05	8.24				
180	20.78	4.61	-8.96				
181	28.68	-7.69	2.19				
182	28.06	12.59	5.30				

ID#	Delta Es of each sample														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	0.16	0.57	1.32	0.44	0.45	0.86	0.53	0.66	0.49	0.75	0.31	0.17	0.36	0.23	0.36
2	0.27	0.86	0.82	0.31	0.58	0.61	0.48	0.23	0.80	0.32	0.44	0.15	0.44	0.22	0.40
3	0.33	1.02	0.69	0.44	0.38	0.36	0.60	0.09	0.64	0.45	1.83	0.64	0.23	0.03	0.32
4	0.66	0.56	1.11	1.34	0.59	0.52	0.20	0.35	0.26	0.64	0.43	0.25	0.77	0.69	0.57
5	0.54	0.51	1.10	1.07	0.44	0.81	0.60	0.38	0.66	0.80	1.48	0.67	1.42	0.37	0.58
6	0.26	0.92	0.51	0.33	0.56	0.36	0.33	0.29	0.41	0.71	1.29	0.42	0.14	0.06	0.25
7	0.18	0.16	0.17	0.13	0.13	0.31	0.31	0.10	0.12	0.17	0.20	0.14	0.31	0.32	0.06
8	0.60	0.35	0.72	0.65	0.44	0.74	0.48	0.48	0.27	0.49	0.19	0.61	0.94	0.54	0.33
9	0.85	1.37	2.18	0.77	0.37	1.01	1.24	0.71	0.27	1.08	1.59	0.56	0.40	0.61	0.48
10	0.76	1.45	0.29	0.73	1.13	1.82	0.81	1.90	0.39	1.74	2.93	1.24	0.86	0.37	0.43
11	0.22	0.46	0.46	0.48	0.70	0.21	0.62	1.52	0.65	1.37	0.40	0.46	0.60	0.23	0.61
12	0.73	1.82	0.77	0.24	0.69	0.49	1.09	2.74	0.46	3.24	1.33	0.35	1.22	0.38	1.04
13	0.56	1.30	1.28	0.62	0.42	0.52	0.88	2.55	0.17	2.77	1.27	0.44	1.30	0.45	1.02
14	0.53	0.59	0.59	0.20	0.46	0.54	0.51	0.38	0.23	0.26	1.47	0.53	0.12	0.31	0.36
15	0.58	0.51	0.31	0.42	0.39	0.25	0.33	0.48	0.40	0.67	0.37	0.18	0.30	0.27	0.17
16	0.33	0.34	0.47	0.28	0.35	0.48	0.52	0.34	0.31	0.22	0.94	0.16	0.25	0.14	0.18
17	0.25	0.69	0.39	0.28	0.30	0.35	0.31	0.21	0.14	0.59	1.17	0.14	0.18	0.23	0.33
18	0.12	0.13	0.20	0.34	0.12	0.17	0.24	0.16	0.14	0.17	0.16	0.11	0.33	0.31	0.13
19	0.18	0.17	0.18	0.28	0.18	0.21	0.19	0.19	0.33	0.16	0.15	0.22	0.23	0.35	0.31
20	0.28	0.12	0.25	0.13	0.26	0.24	0.29	0.12	0.08	0.23	0.19	0.21	0.25	0.40	0.18
21	0.20	0.35	0.13	0.24	0.29	0.15	0.18	0.26	0.15	0.13	0.11	0.07	0.18	0.37	0.13
22	0.14	0.22	0.12	0.16	0.40	0.24	0.21	0.17	0.16	0.15	0.24	0.12	0.26	0.28	0.19
23	0.16	0.17	0.19	0.26	0.10	0.21	0.25	0.19	0.12	0.24	0.21	0.18	0.22	0.40	0.19
24	0.16	0.17	0.19	0.22	0.14	0.22	0.24	0.19	0.17	0.17	0.15	0.13	0.10	0.39	0.17
25	0.24	0.20	0.71	0.22	0.05	0.31	0.22	0.08	0.21	0.19	0.15	0.12	0.24	0.25	0.17
26	0.16	0.30	0.24	0.25	0.36	0.08	0.20	0.26	0.29	0.18	0.18	0.22	0.14	0.15	0.20
27	0.26	0.44	1.05	0.25	0.25	0.74	0.74	0.56	0.23	0.60	0.24	0.22	0.27	0.44	0.62
28	0.10	0.33	0.82	0.38	0.19	0.70	0.43	0.64	0.40	0.76	0.21	0.25	0.52	0.57	0.70
29	0.31	0.52	0.82	0.19	0.15	0.19	0.39	0.60	0.41	0.54	0.15	0.59	0.37	0.53	0.40
30	0.29	0.62	0.74	0.17	0.38	0.15	0.79	0.86	0.38	0.59	0.18	0.40	0.31	0.90	0.44
31	0.24	0.25	0.74	0.23	0.36	0.37	0.51	0.47	0.40	0.52	0.09	0.58	0.87	0.36	0.38
32	0.59	0.27	0.47	0.48	0.30	0.32	0.52	0.57	0.27	0.48	0.15	0.19	0.31	0.28	0.41
33	0.38	0.43	0.36	0.43	0.36	0.35	0.61	0.46	0.36	0.63	0.15	0.50	0.38	0.39	0.65
34	0.41	0.39	0.32	0.34	0.38	0.12	0.64	0.45	0.50	0.39	0.19	0.19	0.27	0.27	0.31
35	0.32	0.30	0.29	0.46	0.46	0.28	0.48	0.39	0.55	0.47	0.27	0.27	0.26	0.20	0.55
36	0.47	0.34	0.27	0.36	0.39	0.31	0.42	0.34	0.40	0.40	0.11	0.24	0.34	0.20	0.35
37	0.34	0.43	0.21	0.40	0.38	0.14	0.24	0.28	0.37	0.55	0.31	0.34	0.21	0.15	0.21
38	0.46	0.37	0.22	0.41	0.30	0.12	0.29	0.50	0.28	0.36	0.18	0.12	0.20	0.16	0.43
39	0.44	0.35	0.28	0.33	0.22	0.08	0.12	0.35	0.30	0.38	0.23	0.30	0.24	0.11	0.29
40	0.04	0.94	0.63	0.25	0.63	0.83	0.34	0.16	0.41	0.29	0.48	0.32	0.46	0.08	0.52
41	0.14	1.05	0.46	0.43	0.77	0.80	0.57	0.21	0.62	0.29	0.80	0.34	0.24	0.24	0.23
42	0.07	0.86	0.17	0.44	0.40	0.48	0.70	0.47	0.66	0.26	0.58	0.75	0.40	0.07	0.25
43	0.17	0.71	0.63	0.59	0.78	0.40	0.93	0.40	0.85	0.18	0.73	0.26	0.18	0.16	0.39
44	0.21	0.70	0.62	0.53	0.70	0.40	0.68	0.49	0.91	0.49	0.52	0.63	0.62	0.56	0.28
45	0.66	0.67	0.16	0.69	0.49	0.42	0.70	0.89	0.66	0.70	0.36	0.24	0.21	0.27	0.49
46	0.44	0.55	0.31	0.54	0.66	0.15	0.64	0.71	0.91	0.62	0.31	0.36	0.38	0.34	0.48
47	0.46	0.57	0.28	0.47	0.55	0.21	0.53	0.60	0.53	0.60	0.48	0.31	0.32	0.41	0.39
48	0.77	0.46	0.31	0.45	0.57	0.32	0.44	0.68	0.60	0.60	0.39	0.25	0.22	0.32	0.36
49	0.29	0.49	0.40	0.44	0.42	0.06	0.57	0.59	0.52	0.37	0.28	0.26	0.22	0.46	0.52
50	0.52	0.37	0.28	0.48	0.30	0.17	0.42	0.56	0.43	0.41	0.12	0.40	0.49	0.27	0.37
51	0.31	0.38	0.40	0.39	0.40	0.13	0.27	0.38	0.47	0.49	0.21	0.19	0.35	0.18	0.18
52	0.29	0.37	0.22	0.33	0.27	0.11	0.11	0.54	0.31	0.27	0.24	0.21	0.17	0.19	0.21
53	0.50	0.61	0.65	0.42	0.29	0.40	0.50	0.13	0.92	0.79	1.40	0.54	0.19	0.10	0.13
54	0.61	1.14	0.39	0.27	0.64	0.34	0.32	0.73	0.48	0.31	1.66	0.28	0.55	0.38	1.17
55	0.27	1.19	0.33	0.57	0.27	0.21	0.57	1.21	0.62	0.08	2.24	1.70	0.15	0.24	0.68
56	0.50	1.16	0.62	0.48	0.80	0.40	0.41	0.78	0.96	1.47	2.10	0.76	0.14	0.61	0.40
57	0.17	1.00	0.54	0.16	0.12	0.23	0.14	0.56	0.71	0.25	1.87	1.14	0.56	0.49	0.12
58	0.46	0.61	0.24	0.51	0.39	0.31	0.04	0.52	0.13	0.45	1.85	0.45	0.31	0.46	0.17
59	0.05	0.81	0.25	0.20	0.46	0.24	0.22	0.29	0.57	0.38	1.28	0.20	0.63	0.49	0.47
60	0.25	0.60	0.36	0.45	0.21	0.44	0.43	0.22	0.53	0.34	1.21	0.23	0.23	0.11	0.15



61	0.26	0.68	0.39	0.07	0.17	0.05	0.17	0.51	0.10	0.31	0.75	0.02	0.30	0.50	0.21
62	0.22	0.42	0.36	0.22	0.13	0.05	0.21	0.34	0.14	0.48	0.90	0.14	0.31	0.22	0.23
63	0.26	0.81	0.55	0.11	0.42	0.26	0.16	0.48	0.16	0.56	0.45	0.26	0.22	0.13	0.32
64	0.13	0.59	0.54	0.43	0.45	0.12	0.11	0.34	0.22	0.34	0.30	0.11	0.15	0.03	0.32
65	0.15	0.49	0.32	0.29	0.32	0.20	0.04	0.43	0.46	0.06	0.20	0.28	0.08	0.29	0.15
66	0.48	0.18	0.13	0.51	0.46	0.87	0.29	0.30	0.12	0.10	0.44	0.34	0.28	0.38	0.13
67	0.47	0.27	0.94	0.84	0.71	0.87	0.26	0.21	0.22	0.37	0.73	0.32	0.35	0.65	0.53
68	0.43	1.03	0.35	0.17	0.35	0.78	0.70	0.53	0.41	0.23	1.77	0.71	0.54	0.48	0.37
69	0.55	0.62	0.24	0.14	0.58	0.33	0.72	0.39	0.43	0.52	1.32	0.53	0.09	0.61	0.38
70	0.35	0.83	0.55	0.22	0.20	0.36	0.81	0.36	0.36	0.42	1.33	0.72	0.40	0.26	0.34
71	0.10	0.85	0.34	0.19	0.35	0.13	0.44	0.32	0.33	0.31	1.12	0.40	0.19	0.26	0.31
72	0.16	0.65	0.36	0.31	0.33	0.16	0.49	0.33	0.19	0.43	0.96	0.41	0.37	0.13	0.45
73	0.31	0.60	0.50	0.37	0.43	0.04	0.61	0.24	0.60	0.20	0.79	0.37	0.22	0.15	0.14
74	0.32	0.43	0.33	0.19	0.26	0.32	0.36	0.26	0.49	0.33	0.64	0.23	0.19	0.38	0.69
75	0.17	0.25	0.27	0.23	0.16	0.42	0.09	0.33	0.26	0.49	0.60	0.21	0.28	0.03	0.24
76	0.19	0.30	0.34	0.31	0.30	0.17	0.12	0.17	0.39	0.36	0.53	0.17	0.16	0.19	0.36
77	0.17	0.49	0.29	0.29	0.39	0.12	0.14	0.24	0.35	0.40	0.23	0.14	0.35	0.24	0.42
78	0.14	0.35	0.26	0.12	0.26	0.27	0.11	0.18	0.39	0.21	0.18	0.12	0.08	0.23	0.11
79	0.54	0.55	0.17	0.32	0.41	0.25	0.53	0.21	0.38	0.17	0.45	0.27	1.07	0.49	0.29
80	0.41	0.76	0.15	0.25	0.55	0.27	0.34	0.28	0.46	0.30	0.91	0.16	1.07	0.46	0.21
81	0.28	1.08	0.50	0.46	0.64	0.20	0.45	0.32	0.30	0.33	0.79	0.36	0.30	0.03	0.38
82	0.23	0.82	0.21	0.19	0.56	0.62	0.65	0.29	0.41	0.15	1.04	0.39	0.66	0.53	0.64
83	0.12	0.89	0.49	0.51	0.44	0.56	0.54	0.50	0.58	0.58	0.95	0.45	0.32	0.39	0.28
84	0.30	0.96	0.29	0.73	0.43	0.43	0.76	0.63	0.40	0.38	1.00	0.77	0.73	0.35	0.52
85	0.67	0.63	0.49	0.39	0.80	0.65	0.44	0.66	0.35	0.64	1.23	0.50	0.61	0.74	0.66
86	0.44	0.69	0.73	0.32	0.38	0.56	1.05	0.45	0.19	0.38	0.90	0.63	0.87	0.65	0.40
87	0.49	0.81	0.52	1.03	0.43	0.47	0.51	0.99	0.34	0.91	1.07	0.34	0.98	0.52	0.47
88	0.64	0.69	1.03	0.70	0.22	0.68	0.73	1.09	0.33	1.35	0.92	0.67	0.77	0.34	0.26
89	0.46	1.20	1.16	0.47	0.35	0.60	0.33	2.15	0.19	2.23	0.93	0.34	0.83	0.38	0.26
90	0.73	0.90	0.83	0.62	0.80	0.91	0.69	2.96	0.48	3.31	0.47	0.26	0.97	0.38	0.78
91	1.15	0.94	0.72	0.50	0.63	0.24	0.76	3.28	0.33	3.31	0.67	0.24	1.70	0.90	0.90
92	0.38	0.41	0.25	0.52	0.23	0.71	0.26	0.24	0.26	0.38	0.65	0.46	0.80	0.44	0.28
93	0.44	1.01	0.17	0.49	0.69	0.69	0.55	0.40	0.69	0.12	0.83	0.53	0.22	0.22	0.57
94	0.66	0.80	0.36	0.40	0.40	0.47	0.70	0.21	0.41	0.35	1.24	0.40	0.09	0.33	0.41
95	0.37	0.87	0.53	0.77	0.55	0.43	0.39	0.65	0.32	0.38	1.25	0.51	0.27	0.17	0.26
96	0.52	1.05	0.40	0.37	0.70	0.87	0.60	0.51	0.50	0.49	1.21	0.79	0.90	0.18	0.54
97	0.38	0.79	0.31	0.24	0.62	0.64	0.32	0.49	0.56	0.49	1.11	0.17	0.77	0.44	0.46
98	0.23	0.36	0.30	0.34	0.67	0.20	0.92	0.43	0.46	0.45	2.01	0.54	0.35	0.31	0.76
99	0.76	0.19	0.62	0.65	0.43	0.34	1.42	0.99	0.41	0.64	1.24	0.53	0.77	0.59	0.78
100	0.92	1.43	1.28	1.30	0.57	1.18	0.79	1.05	0.36	1.29	1.21	1.01	0.34	0.77	0.49
101	0.79	0.59	0.56	0.66	0.34	0.56	0.46	1.64	0.48	1.51	1.58	0.64	0.67	0.53	0.37
102	0.56	0.41	0.46	0.39	0.25	0.54	0.42	1.25	0.69	1.37	0.81	0.35	0.62	1.34	0.51
103	0.48	0.86	1.15	0.48	0.46	0.44	0.90	2.79	0.22	2.62	0.74	0.31	1.12	0.44	0.90
104	0.65	1.19	0.93	0.78	0.65	0.71	0.88	3.37	0.32	3.30	0.72	0.39	1.57	1.06	1.44
105	0.36	0.49	0.42	0.33	0.61	0.26	0.43	0.32	0.26	0.13	0.68	0.33	0.62	0.30	0.60
106	0.16	0.69	0.16	0.36	0.39	0.62	0.42	0.47	0.19	0.24	1.00	0.47	0.11	0.35	0.03
107	0.18	0.59	0.37	0.26	0.53	0.36	0.53	0.37	0.39	0.40	0.60	0.28	0.29	0.38	0.41
108	0.68	0.27	0.25	0.20	0.47	0.64	0.24	0.37	0.61	0.48	0.85	0.71	0.46	0.83	0.26
109	0.15	0.49	0.37	0.54	0.36	0.34	0.28	0.33	0.28	0.27	1.10	0.40	0.13	0.07	0.24
110	0.53	0.63	0.69	0.27	0.45	0.63	0.37	0.39	0.35	0.55	1.28	0.26	0.61	0.40	0.31
111	0.44	0.46	0.20	0.37	0.46	0.37	0.70	0.44	0.52	0.55	1.71	0.67	0.36	0.51	0.44
112	0.13	0.49	0.22	0.14	0.70	0.20	0.33	0.22	0.43	0.51	0.96	0.71	0.40	0.37	0.16
113	0.19	0.56	0.38	0.25	0.14	0.16	0.12	0.21	0.25	0.22	0.53	0.15	0.29	0.21	0.35
114	0.71	0.23	0.09	0.47	0.47	1.17	0.13	1.22	0.41	1.02	0.86	0.71	0.77	0.39	0.29
115	1.32	0.86	0.34	0.98	0.90	0.58	0.89	2.47	0.75	2.35	0.50	0.67	0.88	1.23	0.65
116	0.41	0.78	0.81	0.29	0.40	0.31	0.73	2.02	0.41	2.06	0.52	0.33	0.63	0.66	0.36
117	0.98	1.10	1.05	0.17	0.41	0.31	0.80	2.85	0.35	2.96	0.89	0.49	1.56	1.00	0.88
118	0.27	0.41	0.23	0.27	0.43	0.30	0.40	0.24	0.15	0.40	0.53	0.29	0.25	0.27	0.41
119	0.63	0.28	0.42	0.37	0.48	0.54	0.31	0.81	0.50	0.49	0.45	0.21	0.32	0.44	0.21
120	0.30	0.50	0.47	0.18	0.18	0.09	0.47	0.25	0.33	0.24	0.45	0.28	0.39	0.30	0.39
121	0.40	0.72	0.37	0.32	0.63	0.39	0.94	0.13	0.66	1.00	0.81	0.61	0.42	0.57	0.39
122	0.16	0.13	0.09	0.21	0.25	0.17	0.27	0.39	0.18	0.27	0.25	0.04	0.15	0.21	0.34
123	0.21	0.11	0.22	0.19	0.34	0.19	0.29	0.22	0.17	0.22	0.26	0.16	0.16	0.12	0.29

124	0.29	0.16	0.13	0.37	0.30	0.20	0.28	0.34	0.19	0.20	0.23	0.24	0.30	0.18	0.50
125	0.29	0.04	0.02	0.09	0.26	0.26	0.33	0.27	0.18	0.22	0.26	0.11	0.31	0.10	0.31
126	0.22	0.12	0.25	0.20	0.32	0.17	0.28	0.27	0.26	0.24	0.34	0.18	0.22	0.41	0.46
127	0.47	0.06	0.25	0.22	0.41	0.84	0.53	0.58	0.34	0.50	0.36	0.43	0.20	0.72	0.36
128	0.33	0.56	0.32	0.46	0.26	0.52	0.36	0.99	0.35	1.26	0.43	0.07	0.40	1.14	0.47
129	0.13	0.12	0.17	0.17	0.30	0.17	0.18	0.33	0.21	0.33	0.24	0.12	0.29	0.12	0.29
130	0.29	0.17	0.40	0.48	0.44	0.50	0.55	0.76	0.28	0.85	0.54	0.34	0.29	0.65	0.43
131	0.28	0.34	0.30	0.19	0.39	0.85	0.27	0.13	0.55	0.47	0.32	0.55	0.51	0.66	0.32
132	0.24	0.36	0.40	1.07	0.40	0.40	0.54	0.33	0.42	0.21	1.03	0.52	0.41	0.61	0.25
133	0.35	0.61	0.66	0.26	0.13	0.81	0.62	0.62	0.18	0.52	0.82	0.26	0.63	0.12	0.36
134	0.28	0.07	0.12	0.21	0.20	0.24	0.22	0.30	0.25	0.29	0.29	0.12	0.19	0.16	0.24
135	0.12	0.29	0.41	0.48	0.42	0.82	0.47	0.42	0.69	0.56	0.32	0.61	0.62	0.49	0.52
136	0.48	0.38	0.32	0.22	0.32	0.63	0.18	0.43	0.63	0.37	1.39	0.52	0.61	0.95	0.45
137	0.04	0.69	0.52	0.34	0.41	0.36	0.58	0.48	0.34	0.47	0.87	0.71	0.70	0.26	0.31
138	0.33	0.75	0.50	0.12	0.27	0.10	0.52	0.58	0.07	0.37	1.02	0.45	0.54	0.54	0.46
139	0.33	0.73	0.58	0.39	0.41	0.49	0.47	0.43	0.24	0.45	0.73	0.28	0.14	0.42	0.08
140	0.15	0.08	0.17	0.18	0.21	0.23	0.25	0.33	0.25	0.30	0.32	0.16	0.10	0.19	0.43
141	0.54	0.51	0.14	0.63	0.73	0.81	0.39	1.13	0.32	1.31	0.60	0.14	0.37	1.47	0.76
142	0.66	1.00	0.68	0.65	0.79	0.62	0.97	2.88	0.17	3.31	1.12	0.10	1.54	0.99	0.68
143	1.04	1.35	1.03	1.00	0.71	0.82	0.85	3.12	0.43	3.28	0.88	0.40	1.47	0.90	1.15
144	0.30	0.72	0.47	0.64	0.50	0.42	0.29	0.21	0.21	0.15	0.74	0.43	0.19	0.18	0.30
145	0.47	0.32	0.33	0.10	0.17	0.09	0.23	0.17	0.32	0.29	0.51	0.31	0.26	0.15	0.41
146	0.17	0.05	0.15	0.12	0.32	0.13	0.48	0.30	0.27	0.40	0.27	0.23	0.29	0.17	0.26
147	0.17	0.55	0.39	0.60	0.46	0.90	0.16	0.37	0.33	0.74	0.41	0.85	0.66	1.01	0.32
148	0.22	0.92	0.51	0.39	0.14	0.56	0.69	0.42	0.36	0.23	0.86	0.42	1.17	0.15	0.45
149	0.22	0.69	0.40	0.34	0.49	0.64	0.56	0.56	0.22	0.13	0.79	0.49	0.44	0.31	0.38
150	0.37	0.29	0.29	0.35	0.22	0.26	0.34	0.45	0.29	0.29	0.66	0.22	0.34	0.06	0.08
151	0.30	0.30	0.30	0.30	0.47	0.24	0.29	0.18	0.26	0.17	0.50	0.30	0.30	0.31	0.39
152	0.22	0.14	0.36	0.34	0.45	0.51	0.69	0.56	0.47	0.52	0.76	0.14	0.17	0.41	0.56
153	0.52	0.36	0.30	0.42	0.47	0.67	0.57	1.32	0.44	1.38	0.96	0.47	1.12	0.54	0.45
154	0.36	0.79	0.74	0.16	0.54	0.27	0.55	1.75	0.62	1.80	0.51	0.22	0.81	0.87	0.52
155	0.30	0.64	0.47	0.15	0.28	0.39	0.47	1.37	0.45	1.43	0.36	0.19	0.59	0.57	0.42
156	0.67	0.46	0.51	0.62	0.46	0.26	0.29	1.04	0.36	0.86	0.16	0.48	0.33	0.34	0.38
157	0.39	0.53	0.21	0.28	0.35	0.05	0.08	0.19	0.40	0.48	0.30	0.30	0.19	0.18	0.36
158	0.20	0.40	0.49	0.30	0.36	0.11	0.24	0.34	0.48	0.48	0.26	0.25	0.22	0.18	0.51
159	0.31	0.61	1.03	0.52	0.20	0.26	0.30	0.36	0.54	0.23	0.23	0.42	0.49	0.63	0.36
160	0.12	0.88	0.69	0.29	0.28	0.40	0.43	0.47	0.58	0.27	0.31	0.44	0.76	0.55	0.34
161	0.23	0.30	0.41	0.20	0.58	0.23	0.33	0.22	0.23	0.76	0.75	0.91	0.34	0.30	0.44
162	0.35	0.44	0.63	0.38	0.30	0.42	0.14	0.35	0.46	0.28	0.73	0.32	0.42	0.47	0.37
163	0.60	0.48	0.77	0.95	0.38	0.47	0.44	0.54	0.44	0.58	0.71	0.12	0.71	0.47	0.27
164	0.40	1.11	0.49	0.39	0.33	0.40	0.47	0.64	0.34	0.68	0.61	0.23	0.45	0.15	0.47
165	0.64	0.29	0.59	0.32	0.47	0.57	0.21	0.83	0.44	1.03	0.62	0.32	0.37	0.20	0.62
166	0.35	0.55	0.50	0.12	0.36	0.52	0.56	0.71	0.32	1.19	1.14	0.48	0.32	0.36	0.44
167	0.19	1.28	0.58	0.26	0.76	0.21	0.41	2.58	0.19	2.50	0.72	0.15	0.75	0.94	0.44
168	0.63	0.78	0.96	0.59	0.35	0.12	0.37	2.22	0.06	2.45	0.92	0.27	1.04	1.04	0.69
169	1.41	0.95	1.03	0.38	0.87	0.87	0.95	4.14	0.45	4.43	0.89	1.31	2.30	1.03	1.58
170	0.34	0.33	0.84	0.56	0.32	0.70	0.54	0.24	0.37	0.51	0.63	0.19	0.59	0.19	0.40
171	0.29	0.74	0.38	0.21	0.35	0.32	0.65	0.33	0.63	0.26	0.84	0.46	0.25	0.74	0.16
172	0.22	0.73	0.23	0.48	0.26	0.78	0.94	0.64	0.17	0.27	0.72	0.55	0.48	0.88	0.41
173	0.16	0.86	0.25	0.24	0.52	0.54	0.97	0.21	0.46	0.51	0.59	0.80	0.14	0.30	0.24
174	0.57	0.34	0.67	0.48	0.66	0.60	0.32	0.55	0.34	0.46	0.59	0.17	0.63	0.61	0.36
175	0.67	0.54	0.57	0.32	0.21	1.10	0.37	0.48	0.50	0.74	0.99	0.53	0.24	0.58	0.39
176	0.36	0.34	0.38	0.29	0.28	0.86	0.29	0.72	0.36	0.65	0.91	0.40	0.55	0.65	0.39
177	0.43	0.18	0.51	0.28	0.33	0.32	0.30	0.54	0.39	0.64	0.34	0.36	0.38	1.17	0.67
178	0.51	0.34	0.59	0.49	0.32	0.87	0.32	0.91	0.31	0.91	0.32	0.28	0.38	0.62	0.27
179	0.36	0.13	0.29	0.71	0.83	1.25	0.32	0.70	0.35	1.00	0.65	0.71	0.57	0.60	0.42
180	0.39	0.92	0.98	0.54	0.41	0.64	0.39	1.54	0.27	1.68	0.67	0.74	0.48	1.07	0.53
181	0.60	0.86	0.70	0.57	0.46	0.46	0.71	2.89	0.29	2.77	0.71	0.47	1.24	1.34	0.75
182	0.98	1.06	0.89	0.94	0.72	0.61	0.75	3.31	0.33	3.44	0.99	0.36	1.64	1.35	0.95
Average	0.39	0.59	0.48	0.40	0.42	0.44	0.47	0.72	0.38	0.74	0.72	0.39	0.49	0.43	0.42
SD	0.23	0.33	0.30	0.23	0.18	0.28	0.25	0.77	0.18	0.81	0.49	0.25	0.37	0.30	0.23



ID#	Delta Es of each sample														
	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
1	0.48	0.73	0.37	0.15	0.14	0.32	0.24	0.46	0.25	0.24	0.81	0.42	0.24	0.21	0.22
2	0.37	0.61	0.21	0.17	0.72	0.50	0.31	0.14	0.52	0.11	0.44	0.41	0.08	0.38	0.20
3	0.20	0.44	0.25	0.46	0.60	0.67	1.11	0.31	0.39	0.27	0.24	0.24	0.15	0.31	0.40
4	0.43	0.57	0.59	0.36	0.25	0.45	1.04	0.65	0.88	0.46	0.59	0.56	0.65	0.45	0.52
5	0.67	1.02	0.17	0.66	0.67	0.68	1.07	1.09	0.98	0.40	0.87	0.73	0.63	0.66	0.75
6	0.21	0.20	0.13	0.14	0.21	0.57	0.38	0.80	0.78	0.77	0.24	0.43	0.38	0.41	0.69
7	0.03	0.24	0.27	0.23	0.18	0.16	0.30	0.21	0.24	0.32	0.18	0.30	0.17	0.19	0.27
8	0.28	0.31	0.50	0.54	0.68	0.41	1.25	0.19	0.67	0.39	0.25	1.03	0.79	0.23	0.74
9	0.40	0.44	0.28	0.87	1.05	2.66	1.21	1.67	0.86	1.02	0.68	1.48	0.47	1.10	0.88
10	0.22	1.08	0.58	0.40	1.21	0.73	0.97	0.58	1.84	0.98	0.42	1.47	0.46	0.89	0.49
11	0.26	0.67	0.24	0.62	0.60	0.59	0.24	0.83	0.23	0.38	0.68	0.57	0.60	0.39	0.38
12	0.34	0.57	0.47	0.46	0.22	0.70	0.91	0.52	1.69	0.67	0.53	0.64	0.83	0.65	0.49
13	0.67	0.99	0.53	1.05	0.58	0.84	0.91	0.28	1.13	0.57	0.71	0.67	0.81	0.70	0.69
14	0.61	0.69	0.19	0.39	0.39	0.73	0.38	0.31	0.30	0.40	0.23	0.18	0.79	0.53	0.23
15	0.48	0.65	0.19	0.50	0.29	0.49	0.24	0.30	0.36	0.34	0.34	0.49	0.54	0.29	0.52
16	0.34	0.25	0.46	0.21	0.29	0.49	0.40	0.20	0.19	0.47	0.23	0.50	0.46	0.19	0.66
17	0.46	0.43	0.22	0.29	0.27	0.30	0.37	0.65	0.26	0.35	0.29	0.16	0.26	0.26	0.37
18	0.25	0.15	0.17	0.12	0.26	0.15	0.22	0.19	0.14	0.50	0.20	0.33	0.22	0.33	0.33
19	0.18	0.06	0.22	0.20	0.17	0.08	0.23	0.16	0.15	0.35	0.19	0.31	0.29	0.22	0.33
20	0.17	0.15	0.23	0.18	0.21	0.10	0.26	0.12	0.20	0.44	0.33	0.57	0.20	0.25	0.28
21	0.07	0.08	0.07	0.18	0.18	0.11	0.26	0.23	0.07	0.27	0.23	0.23	0.21	0.19	0.25
22	0.10	0.11	0.33	0.19	0.22	0.08	0.17	0.22	0.17	0.38	0.21	0.23	0.28	0.25	0.40
23	0.25	0.08	0.17	0.09	0.24	0.19	0.25	0.28	0.18	0.29	0.28	0.24	0.13	0.20	0.40
24	0.20	0.03	0.07	0.06	0.17	0.16	0.13	0.17	0.19	0.37	0.17	0.25	0.18	0.23	0.34
25	0.20	0.10	0.13	0.17	0.21	0.10	0.27	0.18	0.30	0.35	0.33	0.18	0.11	0.13	0.28
26	0.21	0.18	0.12	0.19	0.08	0.11	0.18	0.28	0.14	0.25	0.28	0.21	0.30	0.23	0.51
27	0.47	0.84	0.27	0.06	0.26	0.51	0.27	0.22	0.35	0.28	0.64	0.28	0.39	0.28	0.49
28	0.62	0.72	0.06	0.37	0.19	0.36	0.30	0.15	0.52	0.73	0.76	0.48	0.50	0.29	0.65
29	0.57	0.71	0.24	0.20	0.66	0.22	0.76	0.32	0.47	0.57	0.64	0.56	0.47	0.42	0.63
30	0.78	0.83	0.10	0.25	0.34	0.36	0.51	0.16	0.69	0.29	0.50	0.31	0.72	0.72	0.48
31	0.62	0.40	0.17	0.70	0.28	0.32	0.25	0.28	0.15	0.36	0.68	0.60	0.54	0.31	0.36
32	0.77	0.60	0.16	0.27	0.17	1.16	0.24	0.14	0.27	0.53	0.36	0.47	0.72	0.53	0.43
33	0.56	0.65	0.23	0.40	0.25	0.37	0.27	0.34	0.21	0.27	0.47	0.47	0.62	0.40	0.36
34	0.38	0.44	0.21	0.15	0.13	0.56	0.17	0.26	0.10	0.49	0.33	0.43	0.43	0.37	0.44
35	0.51	0.54	0.15	0.40	0.35	0.65	0.21	0.22	0.26	0.29	0.35	0.30	0.56	0.22	0.38
36	0.37	0.27	0.09	0.31	0.26	0.26	0.23	0.28	0.22	0.23	0.42	0.38	0.28	0.25	0.36
37	0.35	0.28	0.08	0.24	0.18	0.32	0.24	0.16	0.15	0.29	0.26	0.24	0.47	0.48	0.46
38	0.21	0.26	0.25	0.23	0.17	0.18	0.18	0.17	0.11	0.38	0.31	0.47	0.42	0.26	0.40
39	0.11	0.20	0.14	0.08	0.18	0.22	0.14	0.28	0.20	0.17	0.27	0.33	0.51	0.31	0.35
40	0.37	0.57	0.23	0.25	0.92	0.58	0.35	0.16	0.46	0.23	0.50	0.28	0.26	0.41	0.28
41	0.25	0.44	0.64	0.30	1.00	0.78	0.34	0.35	0.28	0.48	0.26	0.16	0.34	0.26	0.15
42	0.26	0.37	0.15	0.35	0.61	0.48	0.73	0.20	0.51	0.38	0.25	0.42	0.42	0.31	0.29
43	0.43	0.68	0.42	0.60	0.36	0.71	0.85	0.27	0.42	0.51	0.56	0.16	0.77	0.82	0.45
44	0.82	0.55	0.26	0.94	0.38	1.16	0.16	0.32	0.39	0.52	0.20	0.39	1.12	0.24	0.54
45	0.71	0.64	0.13	0.27	0.44	1.06	0.32	0.28	0.48	0.38	0.20	0.45	0.63	0.53	0.49
46	0.54	0.72	0.21	0.74	0.29	0.67	0.36	0.37	0.43	0.29	0.47	0.43	0.44	0.38	0.47
47	0.39	0.50	0.16	0.36	0.25	0.63	0.31	0.29	0.37	0.36	0.32	0.32	0.52	0.30	0.49
48	0.42	0.68	0.27	0.53	0.38	0.67	0.17	0.19	0.41	0.29	0.43	0.27	0.36	0.28	0.29
49	0.45	0.39	0.13	0.44	0.26	0.35	0.32	0.28	0.27	0.37	0.32	0.35	0.33	0.59	0.38
50	0.40	0.49	0.19	0.31	0.25	0.15	0.29	0.16	0.18	0.25	0.37	0.32	0.43	0.73	0.35
51	0.22	0.20	0.12	0.12	0.18	0.44	0.22	0.20	0.27	0.33	0.22	0.25	0.40	0.35	0.39
52	0.11	0.18	0.10	0.22	0.11	0.09	0.41	0.21	0.20	0.17	0.31	0.33	0.27	0.26	0.39
53	0.39	0.60	0.26	0.49	0.47	0.48	0.86	0.38	0.41	0.54	0.34	0.55	0.73	0.51	0.44
54	0.22	1.16	0.16	0.52	0.19	0.70	0.35	0.63	0.92	0.98	0.32	0.52	0.45	0.28	1.41
55	0.43	0.92	0.12	0.88	0.46	1.44	0.16	0.96	1.13	0.75	0.76	0.59	0.44	0.30	0.65
56	0.98	0.97	0.12	0.97	1.27	0.58	0.16	0.36	1.07	0.43	0.22	0.31	0.37	1.39	0.47
57	1.32	0.51	0.15	1.04	0.88	0.26	1.08	0.58	0.53	0.10	0.11	0.21	0.24	0.15	0.35
58	0.76	0.49	0.30	0.08	0.91	0.74	0.80	0.51	0.22	0.07	0.15	0.28	0.30	0.13	0.05
59	0.19	0.69	0.43	0.25	0.22	0.15	0.77	0.12	0.19	0.22	0.25	0.16	0.13	0.09	0.13
60	0.35	0.48	0.10	0.30	0.09	0.38	0.46	0.10	0.37	0.45	0.30	0.11	0.51	0.13	0.24

61	0.37	0.48	0.25	0.31	0.23	0.38	0.44	0.30	0.18	0.23	0.19	0.12	0.21	0.02	0.28
62	0.30	0.30	0.15	0.12	0.14	0.14	0.53	0.07	0.42	0.09	0.20	0.24	0.19	0.17	0.57
63	0.21	0.27	0.08	0.13	0.07	0.12	0.28	0.22	0.47	0.18	0.07	0.11	0.17	0.26	0.32
64	0.45	0.11	0.08	0.24	0.11	0.25	0.10	0.13	0.26	0.08	0.34	0.21	0.07	0.15	0.49
65	0.11	0.05	0.12	0.31	0.09	0.26	0.28	0.19	0.20	0.19	0.12	0.39	0.17	0.15	0.39
66	0.48	0.11	0.32	0.37	0.77	0.32	0.42	0.70	0.47	0.28	0.28	0.41	0.18	0.14	0.63
67	0.30	0.34	0.82	0.38	0.54	0.60	1.01	0.33	0.73	0.67	0.74	0.79	0.40	0.33	0.42
68	0.31	0.60	0.45	0.20	0.68	0.48	0.78	0.56	1.08	0.69	0.33	0.33	0.76	0.37	0.56
69	0.47	0.63	0.26	0.60	1.00	0.54	0.62	0.20	0.60	0.41	0.26	0.33	0.80	0.59	0.62
70	0.64	0.49	0.30	0.41	0.81	0.44	0.44	0.56	0.41	0.27	0.17	0.45	0.59	0.74	0.82
71	0.54	0.49	0.29	0.19	0.40	0.57	0.22	0.47	0.56	0.28	0.34	0.66	0.28	0.33	0.74
72	0.33	0.47	0.13	0.25	0.42	0.42	0.56	0.22	0.32	0.32	0.23	0.18	0.82	0.19	0.53
73	0.32	0.16	0.43	0.38	0.26	0.54	0.15	0.23	0.37	0.34	0.30	0.32	0.33	0.31	0.13
74	0.17	0.40	0.26	0.36	0.28	0.28	0.17	0.19	0.51	0.21	0.30	0.28	0.39	0.24	0.26
75	0.59	0.50	0.29	0.59	0.31	0.11	0.12	0.03	0.28	0.14	0.64	0.65	0.17	0.15	0.48
76	0.29	0.28	0.12	0.32	0.26	0.12	0.10	0.17	0.38	0.28	0.13	0.43	0.32	0.21	0.24
77	0.49	0.37	0.21	0.31	0.16	0.16	0.30	0.21	0.36	0.34	0.15	0.25	0.31	0.22	0.42
78	0.40	0.27	0.26	0.15	0.08	0.06	0.20	0.21	0.29	0.10	0.19	0.56	0.30	0.17	0.34
79	0.42	0.57	0.49	0.71	0.54	0.75	0.37	0.57	0.64	0.56	0.63	0.50	0.15	0.50	0.48
80	0.48	0.43	0.63	0.19	0.76	0.74	0.86	0.16	0.43	0.67	0.24	0.54	0.37	0.24	0.55
81	0.21	0.80	0.59	0.25	0.71	0.32	0.20	0.20	0.60	0.32	0.32	0.94	0.61	0.14	0.80
82	0.34	0.48	0.05	0.31	0.27	0.73	0.68	0.33	0.35	0.63	0.27	0.46	0.32	0.44	0.97
83	0.52	0.34	0.59	0.74	0.58	0.44	0.80	0.40	0.38	0.49	0.41	0.67	0.89	0.29	0.64
84	0.22	0.51	0.91	0.22	0.35	1.05	0.45	0.87	0.68	0.52	0.12	0.40	0.33	0.61	0.49
85	0.72	0.48	0.77	0.48	0.86	0.51	0.45	0.48	0.60	0.54	0.39	0.99	0.68	0.34	1.00
86	0.71	0.67	0.54	0.43	0.39	0.71	1.13	0.34	0.70	0.64	0.43	0.58	0.44	0.51	0.51
87	0.52	0.49	0.37	0.61	0.73	0.81	1.17	0.80	0.52	0.85	0.59	1.19	0.69	0.79	0.69
88	0.66	0.65	0.58	0.66	0.46	0.27	0.23	0.72	1.64	0.79	0.65	0.52	0.46	0.50	0.83
89	0.57	0.69	0.64	0.91	0.27	0.46	0.33	0.55	1.49	0.81	0.63	0.39	0.76	0.71	0.94
90	0.28	0.62	0.56	0.27	0.33	0.59	0.17	0.20	1.49	0.87	0.79	0.64	0.96	0.66	1.04
91	0.81	0.76	0.86	0.91	0.32	0.77	0.75	0.38	1.63	0.46	0.99	1.03	0.95	0.83	1.28
92	0.42	0.53	0.54	0.48	0.62	0.51	0.67	0.55	0.52	0.38	0.50	0.56	0.48	0.14	0.73
93	0.30	0.61	0.37	0.27	0.99	0.71	0.46	0.31	0.42	0.11	0.32	0.40	0.42	0.10	0.19
94	0.41	0.65	0.44	0.18	0.85	0.69	0.80	0.51	0.45	0.48	0.51	0.49	0.60	0.27	0.50
95	0.30	0.49	0.25	0.35	0.51	0.98	0.92	0.26	0.49	0.37	0.22	0.71	0.36	0.26	0.31
96	0.55	0.33	0.34	0.41	1.36	0.96	0.49	1.14	0.94	0.59	0.33	0.50	0.87	0.30	0.52
97	0.42	0.36	0.32	0.29	0.26	0.73	0.62	1.10	0.30	0.37	0.06	0.84	0.30	0.55	0.27
98	0.73	0.76	1.38	0.38	0.67	1.35	0.60	0.44	0.67	0.20	0.42	1.23	0.50	0.75	0.87
99	0.55	0.80	0.57	0.43	0.30	0.61	0.69	0.70	0.59	0.60	0.90	0.57	0.50	0.76	0.93
100	0.82	0.60	0.41	0.85	0.91	2.31	1.30	1.84	0.49	1.24	0.89	0.64	0.68	0.79	0.37
101	0.97	0.57	0.77	0.67	0.23	0.18	0.63	0.46	1.03	0.77	0.88	0.99	0.69	0.92	0.84
102	0.68	0.64	0.46	0.54	0.28	0.37	0.78	0.46	0.92	0.79	1.11	0.38	0.72	0.84	0.76
103	0.41	0.32	0.49	0.72	0.22	0.67	0.34	0.42	1.15	0.91	0.60	0.63	0.89	0.70	0.83
104	0.70	0.97	1.10	1.33	0.43	1.12	0.65	0.76	1.41	0.70	0.98	1.07	1.04	1.02	0.97
105	0.28	0.27	0.84	0.48	0.21	0.53	0.71	0.50	0.44	0.58	0.37	0.71	0.31	0.58	0.22
106	0.36	0.39	0.36	0.38	0.97	0.73	0.21	0.46	0.38	0.45	0.21	0.08	0.23	0.43	0.54
107	0.16	0.60	0.17	0.32	0.34	0.65	0.26	0.42	0.60	0.22	0.53	0.50	0.64	0.32	0.29
108	0.61	0.14	0.84	0.53	0.59	0.17	1.07	0.27	0.77	0.16	0.27	0.59	0.26	1.30	0.60
109	0.65	0.48	0.13	0.23	0.72	0.49	0.37	0.27	0.50	0.28	0.51	0.54	0.41	0.38	0.69
110	0.37	0.40	0.75	0.43	0.40	0.86	0.73	0.51	0.39	0.75	0.42	0.35	0.53	0.34	0.65
111	0.63	0.45	1.53	0.31	0.99	1.34	0.45	0.50	0.45	0.39	0.32	0.80	0.86	0.62	0.85
112	0.28	0.16	0.33	0.28	0.56	0.54	0.33	0.56	0.70	0.25	0.38	0.16	0.42	0.25	0.25
113	0.28	0.49	0.35	0.13	0.35	0.66	0.24	0.15	0.31	0.15	0.29	0.30	0.24	0.14	0.22
114	0.44	0.19	0.58	0.52	0.86	0.60	1.10	0.54	0.65	0.14	0.52	0.69	0.56	0.87	0.82
115	0.22	0.42	0.98	0.32	0.91	0.52	1.17	1.42	1.54	0.98	1.38	1.04	1.39	0.65	1.17
116	0.33	0.18	0.60	0.58	0.40	0.47	0.51	0.29	1.22	0.32	0.61	0.35	0.74	0.37	0.65
117	0.26	0.58	0.78	1.13	0.43	0.58	0.66	0.32	1.15	0.97	0.76	0.93	0.92	1.20	1.17
118	0.31	0.59	0.26	0.33	0.34	0.55	0.29	0.39	0.28	0.35	0.49	0.30	0.66	0.38	0.31
119	0.32	0.30	0.18	0.28	0.16	0.49	0.39	0.44	0.44	0.29	0.40	0.52	0.72	0.35	0.33
120	0.24	0.54	0.22	0.16	0.39	0.42	0.43	0.43	0.21	0.32	0.28	0.42	0.84	0.40	0.28
121	0.42	0.56	0.41	0.51	0.61	0.52	0.65	0.33	1.08	0.54	0.91	0.28	1.58	0.66	0.11
122	0.09	0.17	0.21	0.18	0.25	0.21	0.27	0.21	0.27	0.17	0.19	0.36	0.24	0.14	0.21
123	0.37	0.19	0.49	0.19	0.34	0.12	0.32	0.24	0.29	0.24	0.24	0.33	0.23	0.23	0.20

124	0.49	0.17	0.29	0.17	0.42	0.26	0.45	0.11	0.35	0.31	0.34	0.36	0.41	0.24	0.32
125	0.26	0.21	0.15	0.17	0.23	0.42	0.12	0.08	0.26	0.25	0.15	0.26	0.15	0.09	0.44
126	0.30	0.29	0.35	0.18	0.39	0.23	0.53	0.10	0.40	0.12	0.15	0.40	0.40	0.08	0.47
127	0.40	0.34	0.79	0.26	0.67	0.67	0.60	0.26	0.58	0.24	0.33	0.35	0.35	0.24	0.46
128	0.28	0.33	0.74	0.32	0.45	0.51	0.90	0.62	0.83	0.46	0.79	0.73	0.16	0.42	0.65
129	0.15	0.38	0.18	0.16	0.24	0.20	0.29	0.10	0.33	0.23	0.22	0.19	0.32	0.20	0.19
130	0.41	0.31	0.65	0.54	0.63	0.54	0.61	0.35	0.53	0.19	0.38	0.35	0.63	0.20	0.72
131	0.45	0.34	0.70	0.68	0.67	0.43	0.86	0.62	0.54	0.19	0.21	0.06	0.62	0.73	0.54
132	0.20	0.43	0.51	0.21	0.76	1.12	0.73	0.29	0.52	0.49	0.43	0.49	0.37	0.88	0.71
133	0.66	0.31	0.65	0.23	0.30	0.71	0.62	0.34	0.49	0.63	0.48	0.23	0.29	0.60	0.63
134	0.12	0.24	0.19	0.16	0.24	0.20	0.31	0.14	0.25	0.11	0.19	0.21	0.15	0.12	0.18
135	0.18	0.37	0.47	0.66	0.56	0.57	0.77	0.64	0.22	0.26	0.43	0.70	0.54	0.45	0.26
136	0.24	0.39	0.69	0.31	1.09	0.88	0.70	0.68	0.66	0.40	0.20	0.42	0.76	0.81	0.77
137	0.44	0.59	1.00	0.41	0.82	0.80	0.32	0.34	0.65	0.42	0.56	0.69	0.41	0.67	0.35
138	0.87	0.41	0.21	0.27	0.65	0.79	0.41	0.66	0.56	0.61	0.64	0.63	0.59	0.44	0.38
139	0.42	0.53	0.53	0.81	0.69	0.85	0.38	0.64	0.40	0.55	0.31	0.21	0.15	0.32	0.31
140	0.23	0.22	0.20	0.09	0.24	0.21	0.35	0.23	0.33	0.14	0.24	0.17	0.32	0.20	0.34
141	0.40	0.35	0.80	0.35	0.27	0.42	1.04	0.59	0.68	0.35	0.37	0.25	0.30	0.50	0.74
142	0.52	0.66	0.66	1.08	0.57	0.55	0.70	0.78	1.88	0.50	0.80	0.65	0.99	1.12	0.88
143	0.55	1.01	0.68	1.16	0.81	0.91	0.55	0.64	1.36	0.56	1.21	0.84	0.94	0.87	0.87
144	0.28	0.37	0.13	0.23	0.37	0.37	0.19	0.29	0.34	0.47	0.47	0.47	0.42	0.37	0.38
145	0.65	0.39	0.31	0.42	0.32	0.42	0.15	0.21	0.31	0.40	0.53	0.20	0.21	0.18	0.47
146	0.14	0.19	0.18	0.11	0.36	0.21	0.26	0.14	0.24	0.23	0.09	0.21	0.34	0.12	0.24
147	0.39	0.50	0.42	0.41	0.63	0.50	1.09	0.45	0.98	0.46	0.48	0.36	0.08	0.90	0.35
148	0.36	0.43	0.35	0.39	0.91	0.81	0.42	0.82	0.75	0.67	0.50	0.45	0.39	0.41	0.26
149	0.41	0.44	0.54	0.30	0.49	0.76	0.17	0.58	0.36	0.20	0.41	0.40	0.53	0.28	0.50
150	0.63	0.46	0.33	0.28	0.28	0.30	0.31	0.31	0.42	0.34	0.62	0.19	0.22	0.15	0.12
151	0.45	0.34	0.30	0.17	0.21	0.37	0.13	0.23	0.27	0.38	0.21	0.28	0.29	0.09	0.43
152	0.24	0.27	0.38	0.23	0.58	0.51	0.46	0.28	0.48	0.14	0.27	0.35	0.72	0.26	0.46
153	0.62	0.48	0.58	0.42	0.47	0.55	0.55	0.61	1.12	0.83	0.42	0.59	0.58	0.50	1.44
154	0.44	0.64	0.63	0.37	0.19	0.84	0.57	0.61	1.18	0.29	0.70	0.25	0.50	0.35	0.90
155	0.43	0.35	0.59	0.33	0.11	0.62	0.33	0.28	0.83	0.07	0.56	0.13	0.57	0.30	0.58
156	0.36	0.53	0.16	0.36	0.17	0.35	0.13	0.22	0.58	0.28	0.44	0.23	0.26	0.15	0.46
157	0.21	0.16	0.37	0.25	0.33	0.16	0.31	0.29	0.19	0.39	0.48	0.17	0.30	0.28	0.27
158	0.43	0.28	0.26	0.38	0.10	0.45	0.25	0.28	0.23	0.25	0.30	0.17	0.12	0.36	0.41
159	0.40	0.40	0.28	0.37	0.23	0.06	0.40	0.23	0.57	0.41	0.83	0.27	0.35	0.48	0.56
160	0.43	0.34	0.18	0.25	0.53	0.55	0.67	0.12	0.28	0.44	0.38	0.30	0.28	0.42	0.40
161	0.48	0.39	0.39	0.38	0.24	0.51	0.73	0.35	0.27	0.28	0.37	0.27	0.24	0.32	1.02
162	0.34	0.57	0.35	0.28	0.36	0.23	0.15	0.50	0.21	0.40	0.45	0.53	0.43	0.58	0.53
163	0.43	0.66	0.38	1.03	0.87	0.32	0.76	0.61	0.40	0.24	0.80	0.90	0.38	0.85	0.87
164	0.51	0.19	0.47	0.28	0.17	0.39	0.75	0.25	0.10	0.46	0.34	0.74	0.33	0.82	0.82
165	0.22	0.87	0.28	0.34	0.29	1.04	0.67	0.52	0.50	0.42	0.40	0.14	0.91	0.31	0.99
166	0.54	0.50	0.53	0.16	0.65	0.43	0.26	0.72	1.16	0.24	0.50	0.29	0.46	0.42	1.05
167	0.22	0.53	0.33	0.50	0.32	0.26	0.10	0.24	1.43	0.09	0.63	0.07	1.13	0.36	1.37
168	0.28	0.52	0.46	0.47	0.30	0.52	0.51	0.29	1.35	0.51	0.55	0.16	0.72	0.81	0.70
169	0.67	1.16	0.83	1.31	0.79	1.25	1.01	0.65	1.60	1.26	1.51	1.10	1.38	1.70	1.39
170	0.32	0.61	0.70	0.39	0.88	0.67	0.81	0.60	0.44	0.16	0.40	0.34	0.32	0.30	0.64
171	0.60	0.34	0.43	0.25	0.81	0.60	0.45	0.55	0.60	0.53	0.57	0.18	0.17	0.72	0.55
172	0.93	0.45	0.80	0.43	0.82	0.66	0.48	0.36	0.59	0.75	0.97	0.48	0.55	0.46	0.43
173	0.13	0.42	0.32	0.93	1.23	0.86	0.45	0.23	0.65	0.16	0.17	0.41	0.58	0.65	0.88
174	0.43	0.41	0.36	0.64	0.58	0.47	0.42	0.18	0.38	0.22	0.62	0.69	0.55	0.50	0.58
175	0.16	0.15	1.11	0.21	0.57	0.55	0.71	0.72	0.66	0.63	0.41	0.44	0.27	0.10	0.77
176	0.52	0.41	0.99	0.26	0.47	0.44	1.06	0.89	0.94	0.68	0.61	0.43	0.37	0.57	0.98
177	0.38	0.47	0.31	0.50	0.36	0.35	0.49	0.20	0.59	0.77	0.56	0.39	0.35	0.46	0.65
178	0.16	0.13	0.80	0.63	0.62	0.57	0.82	0.53	0.43	0.26	0.56	0.59	0.40	0.84	0.81
179	0.30	0.43	0.43	0.21	0.88	0.37	1.26	0.94	1.19	0.85	0.30	0.34	0.59	0.35	0.56
180	0.24	0.29	0.99	0.34	0.59	0.20	0.48	0.16	1.45	0.52	0.22	0.41	0.71	0.50	1.40
181	0.47	0.28	0.70	0.51	0.72	0.24	0.86	0.50	1.62	0.66	1.27	1.25	1.23	0.72	1.06
182	0.50	0.64	0.96	1.31	0.30	0.95	0.81	0.83	1.60	0.83	0.78	1.16	1.19	1.09	1.14
Average	0.41	0.46	0.40	0.41	0.46	0.53	0.50	0.41	0.58	0.42	0.44	0.46	0.49	0.44	0.55
SD	0.20	0.23	0.27	0.26	0.28	0.35	0.30	0.28	0.41	0.23	0.25	0.27	0.27	0.28	0.29

## Appendix H



ID#	Original					30 min after					$\Delta C^*$	$\Delta E$
NUM	L*	a*	b*	C*	h	L*	a*	b*	C*	h		
1	42.01	-24.72	-61.69	66.46	248.16	42.08	-24.97	-61.59	66.46	247.93	0.00	0.28
2	49.38	82.49	10.58	83.16	7.31	49.34	82.56	10.45	83.22	7.21	0.06	0.15
3	87.00	10.27	105.69	106.18	84.45	86.90	10.48	105.20	105.72	84.31	0.46	0.54
4	17.26	28.88	-56.94	63.84	296.89	17.17	29.07	-57.17	64.13	296.96	0.29	0.31
5	40.58	-65.34	21.53	68.80	161.76	40.66	-65.59	21.12	68.91	162.15	0.11	0.49
6	53.37	73.54	57.31	93.24	37.93	53.32	73.67	56.80	93.03	37.63	0.21	0.53
7	3.92	0.66	-2.24	2.33	286.55	3.92	0.78	-2.32	2.45	288.67	0.12	0.14
8	36.37	20.12	-53.42	57.08	290.64	36.45	20.01	-53.49	57.11	290.51	0.03	0.15
9	57.52	-56.97	19.19	60.12	161.38	57.67	-57.01	18.41	59.90	162.10	0.22	0.80
10	62.52	58.16	43.34	72.53	36.69	62.55	58.21	42.05	71.81	35.84	0.72	1.29
11	64.73	10.50	-34.48	36.05	286.94	64.86	10.42	-34.39	35.93	286.86	0.12	0.18
12	78.22	30.25	17.84	35.12	30.53	78.29	30.27	16.89	34.66	29.16	0.46	0.95
13	66.30	1.74	-4.24	4.58	292.29	66.40	1.82	-4.85	5.18	290.53	0.60	0.62
14	77.20	-28.53	5.17	28.99	169.73	77.33	-28.46	4.83	28.87	170.36	0.12	0.37
15	81.82	6.28	-19.71	20.69	287.66	81.85	6.21	-19.65	20.61	287.52	0.08	0.10
16	87.81	-11.29	-1.58	11.40	187.97	87.87	-11.26	-1.82	11.40	189.20	0.00	0.25
17	88.21	14.35	3.99	14.89	15.54	88.25	14.35	3.70	14.82	14.46	0.07	0.29
18	4.12	0.71	-2.20	2.32	287.97	4.08	0.88	-2.44	2.60	289.79	0.28	0.30
19	4.00	0.66	-2.28	2.38	286.06	3.99	0.85	-2.42	2.57	289.34	0.19	0.24
20	3.95	0.66	-2.36	2.45	285.51	3.93	0.84	-2.45	2.59	288.93	0.14	0.20
21	4.00	0.69	-2.14	2.25	287.75	4.00	0.92	-2.30	2.48	291.80	0.23	0.28
22	3.99	0.66	-2.29	2.38	286.22	3.95	0.85	-2.35	2.50	289.79	0.12	0.20
23	4.12	0.71	-2.12	2.23	288.54	4.09	0.89	-2.27	2.44	291.33	0.21	0.24
24	4.06	0.62	-2.18	2.27	285.85	4.02	0.82	-2.32	2.46	289.56	0.19	0.25
25	3.83	0.69	-2.23	2.33	287.31	3.80	0.85	-2.38	2.53	289.55	0.20	0.22
26	96.48	2.08	-5.82	6.18	289.71	96.47	2.09	-5.77	6.14	289.90	0.04	0.05
27	47.42	-30.88	-59.48	67.02	242.56	47.52	-31.16	-59.33	67.02	242.30	0.00	0.33
28	53.78	-35.07	-55.66	65.79	237.79	53.88	-35.26	-55.50	65.75	237.57	0.04	0.27
29	60.36	-35.48	-50.23	61.50	234.76	60.44	-35.67	-50.05	61.46	234.52	0.04	0.27
30	66.25	-32.85	-44.37	55.20	233.48	66.36	-32.97	-44.15	55.10	233.25	0.10	0.27
31	72.01	-28.15	-37.94	47.24	233.43	72.09	-28.24	-37.74	47.14	233.19	0.10	0.23
32	76.58	-23.12	-32.35	39.76	234.44	76.66	-23.20	-32.17	39.66	234.20	0.10	0.21
33	81.87	-16.99	-25.74	30.84	236.57	81.91	-17.05	-25.59	30.75	236.32	0.09	0.17
34	84.52	-13.46	-22.23	25.99	238.80	84.57	-13.49	-22.08	25.87	238.57	0.12	0.16
35	87.01	-10.19	-18.87	21.44	241.63	87.03	-10.24	-18.75	21.37	241.36	0.07	0.13
36	89.18	-7.41	-15.91	17.55	245.01	89.23	-7.42	-15.77	17.43	244.80	0.12	0.15
37	91.72	-3.99	-12.38	13.01	252.14	91.74	-4.00	-12.30	12.93	252.00	0.08	0.08
38	93.15	-2.07	-10.38	10.59	258.74	93.15	-2.05	-10.31	10.51	258.76	0.08	0.07
39	95.28	0.48	-7.56	7.58	273.65	95.28	0.48	-7.51	7.52	273.66	0.06	0.05
40	52.28	81.64	1.66	81.66	1.16	52.26	81.70	1.42	81.71	1.00	0.05	0.25
41	56.45	77.80	-6.43	78.06	355.28	56.45	77.83	-6.66	78.12	355.11	0.06	0.23
42	61.57	70.02	-12.02	71.05	350.26	61.58	70.03	-12.28	71.09	350.05	0.04	0.26
43	66.96	60.75	-14.53	62.46	346.54	67.02	60.65	-14.70	62.41	346.37	0.05	0.21
44	72.33	50.61	-14.93	52.76	343.57	72.35	50.60	-15.03	52.79	343.45	0.03	0.10
45	76.71	41.97	-14.44	44.38	341.02	76.78	41.84	-14.46	44.27	340.93	0.11	0.15
46	82.00	31.26	-12.83	33.79	337.68	82.03	31.19	-12.81	33.72	337.67	0.07	0.08
47	84.49	26.00	-11.85	28.57	335.49	84.53	25.91	-11.84	28.49	335.45	0.08	0.10
48	87.06	20.86	-10.71	23.45	332.83	87.06	20.79	-10.70	23.38	332.78	0.07	0.07
49	89.20	16.59	-9.67	19.20	329.77	89.21	16.53	-9.64	19.14	329.76	0.06	0.07
50	91.89	11.29	-8.39	14.06	323.38	91.90	11.26	-8.34	14.02	323.47	0.04	0.06
51	93.27	8.34	-7.65	11.32	317.46	93.30	8.31	-7.60	11.27	317.56	0.05	0.07
52	95.31	4.38	-6.55	7.88	303.75	95.27	4.46	-6.56	7.93	304.21	0.05	0.09



53	88.62	5.87	99.71	99.88	86.63	88.60	5.94	99.15	99.33	86.57	0.55	0.56
54	90.03	1.56	88.73	88.74	88.99	90.03	1.59	88.03	88.05	88.97	0.69	0.70
55	91.50	-1.37	74.05	74.07	91.06	91.52	-1.38	73.15	73.16	91.08	0.91	0.90
56	92.49	-2.91	58.54	58.61	92.84	92.55	-2.93	57.60	57.67	92.92	0.94	0.94
57	93.28	-3.37	46.46	46.58	94.15	93.35	-3.35	45.53	45.65	94.21	0.93	0.93
58	94.20	-3.28	36.69	36.83	95.11	94.25	-3.21	35.80	35.94	95.13	0.89	0.89
59	94.88	-2.41	24.13	24.25	95.69	94.93	-2.32	23.49	23.60	95.65	0.65	0.65
60	95.30	-1.70	17.71	17.79	95.47	95.31	-1.61	17.11	17.18	95.38	0.61	0.61
61	95.42	-1.11	13.15	13.20	94.83	95.45	-1.04	12.68	12.72	94.67	0.48	0.48
62	95.63	-0.56	9.20	9.22	93.48	95.66	-0.48	8.78	8.79	93.11	0.43	0.43
63	95.90	0.14	4.63	4.63	88.25	95.95	0.21	4.28	4.29	87.16	0.34	0.36
64	96.24	0.91	0.19	0.93	12.09	96.25	0.92	0.15	0.94	9.35	0.01	0.04
65	96.46	1.62	-3.73	4.07	293.53	96.48	1.65	-3.75	4.09	293.72	0.02	0.04
66	8.55	-0.16	-3.71	3.72	267.53	8.64	0.01	-3.89	3.89	270.15	0.17	0.26
67	22.52	-1.85	-3.61	4.06	242.91	22.59	-1.97	-3.78	4.26	242.47	0.20	0.22
68	37.58	-2.06	-2.31	3.09	228.29	37.67	-1.84	-2.85	3.39	237.15	0.30	0.59
69	47.80	-0.19	-4.11	4.11	267.38	47.89	-0.25	-4.50	4.51	266.79	0.40	0.40
70	57.99	0.64	-4.21	4.26	278.68	58.10	0.70	-4.56	4.61	278.67	0.35	0.37
71	66.46	2.19	-4.40	4.92	296.45	66.60	2.22	-4.61	5.12	295.75	0.20	0.25
72	75.34	2.74	-5.02	5.72	298.64	75.39	2.79	-5.35	6.03	297.57	0.31	0.34
73	79.23	3.18	-6.02	6.81	297.85	79.29	3.24	-6.10	6.90	298.00	0.09	0.12
74	82.78	3.05	-6.02	6.75	296.83	82.91	3.10	-6.04	6.79	297.16	0.04	0.14
75	86.47	2.85	-5.24	5.96	298.52	86.50	2.82	-5.38	6.08	297.70	0.12	0.15
76	89.97	2.86	-6.08	6.72	295.19	90.01	2.88	-6.21	6.85	294.87	0.13	0.14
77	91.84	2.69	-6.00	6.57	294.12	91.88	2.73	-6.02	6.61	294.37	0.04	0.06
78	94.66	2.28	-5.46	5.92	292.66	94.73	2.29	-5.41	5.88	292.96	0.04	0.09
79	27.46	50.83	-25.68	56.95	333.20	27.40	50.90	-25.79	57.06	333.12	0.11	0.14
80	29.24	46.67	-5.80	47.03	352.91	29.23	46.80	-6.05	47.19	352.63	0.16	0.28
81	49.23	79.63	30.65	85.33	21.05	49.21	79.72	30.41	85.32	20.88	0.01	0.26
82	40.36	48.06	33.31	58.48	34.73	40.36	48.30	33.01	58.50	34.35	0.02	0.38
83	69.06	45.80	82.97	94.78	61.10	69.00	46.01	82.76	94.70	60.93	0.08	0.30
84	50.15	-0.20	50.15	50.15	90.23	50.03	-0.08	49.72	49.72	90.09	0.43	0.46
85	36.94	-2.48	-2.53	3.54	225.67	37.01	-2.35	-3.05	3.85	232.37	0.31	0.54
86	63.01	-30.99	67.49	74.27	114.67	62.90	-31.08	67.08	73.93	114.86	0.34	0.43
87	35.46	-51.32	14.50	53.33	164.22	35.45	-51.38	14.17	53.30	164.58	0.03	0.34
88	37.48	-54.51	-24.36	59.71	204.08	37.54	-54.65	-24.45	59.87	204.11	0.16	0.18
89	28.96	-29.56	-32.09	43.64	227.35	28.97	-29.37	-32.48	43.79	227.88	0.15	0.43
90	30.16	0.45	-62.76	62.76	270.41	30.18	0.42	-62.82	62.82	270.38	0.06	0.07
91	14.83	10.03	-33.48	34.95	286.68	14.65	10.24	-33.80	35.32	286.85	0.37	0.42
92	19.30	33.10	-36.66	49.40	312.08	19.15	33.16	-36.93	49.63	311.92	0.23	0.31
93	53.12	50.78	-11.97	52.17	346.74	53.25	50.88	-12.03	52.28	346.70	0.11	0.17
94	54.41	46.85	3.23	46.96	3.95	54.45	46.83	2.84	46.92	3.46	0.04	0.39
95	40.97	61.33	26.60	66.85	23.44	40.96	61.48	26.25	66.85	23.12	0.00	0.38
96	55.82	42.67	28.07	51.08	33.34	55.90	42.57	27.65	50.76	33.00	0.32	0.44
97	50.96	43.90	53.82	69.45	50.80	50.91	44.00	53.51	69.27	50.57	0.18	0.33
98	73.35	-1.76	50.06	50.09	92.01	73.44	-1.79	49.31	49.34	92.08	0.75	0.76
99	45.91	-41.60	38.28	56.53	137.38	45.86	-41.75	37.90	56.39	137.76	0.14	0.41
100	53.15	-44.79	13.25	46.71	163.51	53.12	-45.03	12.72	46.79	164.23	0.08	0.58
101	33.84	-56.92	-4.77	57.12	184.79	33.91	-57.02	-5.18	57.26	185.19	0.14	0.43
102	52.85	-32.01	-34.18	46.83	226.88	52.88	-32.14	-34.59	47.22	227.10	0.39	0.43
103	22.52	4.15	-50.64	50.81	274.68	22.50	4.37	-50.96	51.14	274.91	0.33	0.39
104	35.93	13.75	-43.14	45.28	287.68	35.96	13.63	-43.23	45.32	287.50	0.04	0.15
105	19.45	19.26	-9.72	21.58	333.21	19.26	19.22	-10.17	21.74	332.11	0.16	0.49
106	46.53	30.75	-10.03	32.34	341.93	46.51	30.70	-10.26	32.37	341.52	0.03	0.24
107	71.84	20.66	-10.05	22.98	334.07	71.90	20.63	-10.18	23.01	333.73	0.03	0.15
108	24.34	17.38	7.85	19.07	24.32	24.11	17.47	7.49	19.01	23.21	0.06	0.44
109	72.96	16.37	6.23	17.52	20.83	73.03	16.41	5.71	17.38	19.19	0.14	0.53

110	31.54	-5.49	19.00	19.77	106.12	31.32	-5.47	18.49	19.28	106.47	0.49	0.56
111	58.32	-2.87	26.76	26.91	96.13	58.38	-2.70	26.13	26.26	95.90	0.65	0.66
112	79.13	-0.32	12.42	12.42	91.46	79.19	-0.38	11.98	11.98	91.81	0.44	0.45
113	83.05	3.08	-6.18	6.90	296.53	83.14	2.97	-6.24	6.92	295.47	0.02	0.15
114	23.81	-25.50	2.83	25.66	173.66	23.76	-25.63	2.58	25.76	174.24	0.10	0.29
115	47.99	-30.67	7.84	31.66	165.65	48.04	-30.56	7.22	31.40	166.70	0.26	0.63
116	72.49	-14.22	0.49	14.23	178.02	72.59	-14.13	0.14	14.13	179.43	0.10	0.37
117	19.83	-18.79	-15.29	24.23	219.13	19.69	-18.68	-15.66	24.37	219.97	0.14	0.41
118	65.99	6.53	-20.80	21.80	287.44	66.11	6.43	-20.90	21.86	287.11	0.06	0.19
119	8.51	0.59	-11.84	11.85	272.85	8.39	0.58	-11.88	11.89	272.78	0.04	0.13
120	71.91	-10.41	-17.10	20.02	238.67	71.87	-10.36	-17.37	20.23	239.20	0.21	0.28
121	47.41	-21.37	-21.22	30.12	224.80	47.43	-21.55	-21.35	30.34	224.73	0.22	0.22
122	3.73	0.83	-2.40	2.54	289.09	3.74	0.75	-2.27	2.39	288.36	0.15	0.15
123	4.10	0.68	-2.67	2.75	284.25	4.16	0.65	-2.72	2.80	283.51	0.05	0.08
124	4.80	0.29	-3.32	3.33	274.97	4.78	0.29	-3.24	3.25	275.14	0.08	0.08
125	3.79	0.81	-2.35	2.49	288.97	3.75	0.78	-2.33	2.46	288.48	0.03	0.05
126	5.48	0.37	-3.46	3.48	276.09	5.46	0.50	-3.42	3.45	278.33	0.03	0.14
127	9.43	-2.77	-5.33	6.01	242.52	9.31	-2.79	-5.62	6.28	243.58	0.27	0.31
128	17.37	-6.42	-6.56	9.18	225.64	17.41	-6.23	-6.99	9.36	228.27	0.18	0.47
129	3.69	0.79	-2.34	2.47	288.70	3.63	0.76	-2.32	2.44	288.25	0.03	0.07
130	7.95	-1.17	-4.34	4.50	254.94	7.92	-1.11	-4.46	4.59	256.03	0.09	0.14
131	21.56	-6.39	-6.11	8.84	223.70	21.56	-6.21	-6.13	8.73	224.64	0.11	0.18
132	34.23	-9.99	-8.44	13.08	220.18	34.30	-9.99	-8.82	13.33	221.45	0.25	0.39
133	43.39	-11.55	-11.63	16.39	225.20	43.53	-11.33	-11.97	16.48	226.58	0.09	0.43
134	3.95	0.83	-2.36	2.50	289.27	3.86	0.82	-2.31	2.45	289.55	0.05	0.10
135	12.32	-1.94	-4.77	5.16	247.84	12.51	-1.93	-4.71	5.09	247.70	0.07	0.20
136	33.07	-5.83	-6.02	8.38	225.90	33.09	-5.91	-6.28	8.63	226.74	0.25	0.27
137	45.67	-7.77	-8.05	11.19	226.02	45.71	-7.81	-8.37	11.45	226.99	0.26	0.32
138	58.71	-6.25	-8.94	10.91	235.04	58.91	-6.04	-9.13	10.95	236.55	0.04	0.35
139	64.79	-6.40	-10.01	11.88	237.42	64.88	-6.39	-10.23	12.06	237.99	0.18	0.24
140	4.01	0.74	-2.36	2.47	287.34	3.96	0.80	-2.35	2.48	288.76	0.01	0.08
141	16.39	-2.39	-3.94	4.61	238.76	16.42	-2.48	-4.36	5.02	240.40	0.41	0.43
142	40.50	-4.62	-4.98	6.80	227.17	40.43	-4.37	-5.58	7.09	231.92	0.29	0.65
143	56.82	-2.97	-7.01	7.62	247.06	56.98	-2.99	-7.19	7.79	247.43	0.17	0.24
144	72.10	-1.25	-7.97	8.07	261.12	72.19	-1.32	-8.21	8.32	260.90	0.25	0.27
145	78.85	-0.79	-9.95	9.98	265.49	79.00	-0.79	-9.89	9.92	265.40	0.06	0.16
146	3.81	0.86	-2.33	2.48	290.19	3.79	0.79	-2.17	2.30	289.95	0.18	0.18
147	20.67	-1.88	-3.91	4.34	244.28	20.70	-1.74	-4.03	4.39	246.61	0.05	0.19
148	44.88	-2.29	-4.75	5.27	244.28	45.05	-2.18	-4.99	5.44	246.43	0.17	0.31
149	62.00	-0.37	-5.23	5.24	265.95	62.21	-0.30	-5.55	5.56	266.86	0.32	0.39
150	77.98	1.20	-7.52	7.62	279.09	78.17	0.97	-7.37	7.44	277.53	0.18	0.33
151	84.43	0.86	-7.28	7.33	276.72	84.52	0.97	-7.30	7.37	277.55	0.04	0.14
152	8.60	-4.38	-6.85	8.13	237.42	8.48	-4.12	-7.07	8.19	239.77	0.06	0.36
153	32.70	-15.37	-11.88	19.43	217.71	32.68	-15.65	-12.22	19.85	217.98	0.42	0.44
154	52.15	-11.63	-13.19	17.59	228.59	52.15	-11.84	-13.33	17.83	228.39	0.24	0.25
155	70.19	-6.39	-12.68	14.20	243.25	70.25	-6.33	-12.71	14.20	243.52	0.00	0.09
156	84.51	-1.52	-9.51	9.63	260.89	84.62	-1.66	-9.63	9.77	260.25	0.14	0.21
157	90.97	0.09	-8.04	8.04	270.61	90.98	0.12	-8.01	8.01	270.83	0.03	0.04
158	93.70	1.04	-6.86	6.93	278.64	93.65	1.08	-6.89	6.97	278.91	0.04	0.07
159	34.75	-28.47	-45.33	53.53	237.87	34.76	-28.65	-45.18	53.50	237.61	0.03	0.23
160	38.18	63.85	1.52	63.87	1.36	38.12	63.81	1.23	63.82	1.11	0.05	0.30
161	66.55	6.06	75.64	75.89	85.42	66.55	5.93	75.47	75.71	85.51	0.18	0.21
162	16.96	20.02	-47.27	51.33	292.95	17.07	19.91	-47.21	51.24	292.86	0.09	0.17
163	38.41	-59.33	18.35	62.10	162.81	38.57	-59.49	18.18	62.21	163.00	0.11	0.28
164	46.98	61.43	45.51	76.45	36.54	46.96	61.50	45.18	76.31	36.31	0.14	0.34
165	54.77	9.11	-30.15	31.49	286.81	54.79	9.02	-30.14	31.46	286.66	0.03	0.09
166	65.52	-26.36	5.36	26.89	168.51	65.59	-26.45	5.07	26.94	169.15	0.05	0.31

167	66.32	26.38	15.00	30.35	29.62	66.41	26.38	14.62	30.16	28.99	0.19	0.39
168	14.66	9.80	-32.90	34.33	286.60	14.64	10.08	-33.11	34.61	286.94	0.28	0.35
169	35.13	-51.44	14.42	53.42	164.34	35.16	-51.62	14.00	53.49	164.83	0.07	0.46
170	39.86	47.77	32.63	57.85	34.33	39.74	47.71	32.40	57.67	34.18	0.18	0.27
171	42.56	4.54	-24.21	24.63	280.61	42.59	4.77	-24.45	24.91	281.03	0.28	0.33
172	51.90	-23.67	5.22	24.24	167.56	51.98	-23.61	4.96	24.12	168.13	0.12	0.28
173	52.36	20.31	12.09	23.64	30.77	52.32	20.14	11.69	23.29	30.14	0.35	0.44
174	19.67	-18.77	-15.93	24.62	220.31	19.67	-18.46	-16.00	24.43	220.90	0.19	0.32
175	19.42	19.44	-9.63	21.69	333.63	19.32	19.19	-9.86	21.57	332.79	0.12	0.35
176	31.38	-4.85	19.21	19.81	104.17	31.39	-5.00	19.16	19.80	104.62	0.01	0.16
177	8.80	0.51	-12.02	12.03	272.43	8.62	0.52	-11.92	11.94	272.50	0.09	0.21
178	23.79	-25.30	2.94	25.47	173.37	23.66	-25.28	2.61	25.41	174.11	0.06	0.36
179	23.37	16.79	7.74	18.49	24.75	23.13	16.71	7.28	18.22	23.53	0.27	0.52
180	22.98	-0.79	-11.45	11.48	266.04	22.83	-0.75	-11.72	11.74	266.36	0.26	0.31
181	31.54	-14.05	0.19	14.05	179.24	31.48	-14.19	-0.37	14.19	181.51	0.14	0.58
182	31.12	7.30	3.73	8.19	27.08	31.03	7.19	3.22	7.88	24.13	0.31	0.53

30 min after vs Original

Average	$\Delta C^*$	$\Delta E$
	0.19	0.31

Average  $\Delta E$  - overprint color excluded

C	0.07	0.19
M	0.06	0.13
Y	0.57	0.58
K	0.19	0.24
Paper	0.04	0.05

Average  $\Delta E$  - overprint color only

0.17	0.32
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ID# NUM	Original					1 hr after					$\Delta C^*$	$\Delta E$
	L*	a*	b*	C*	h	L*	a*	b*	C*	h		
1	42.01	-24.72	-61.69	66.46	248.16	42.10	-25.02	-61.55	66.45	247.88	0.01	0.34
2	49.38	82.49	10.58	83.16	7.31	49.33	82.57	10.44	83.23	7.21	0.07	0.17
3	87.00	10.27	105.69	106.18	84.45	86.90	10.46	105.13	105.65	84.32	0.53	0.60
4	17.26	28.88	-56.94	63.84	296.89	17.13	29.19	-57.24	64.25	297.02	0.41	0.45
5	40.58	-65.34	21.53	68.80	161.76	40.69	-65.75	21.06	69.04	162.24	0.24	0.63
6	53.37	73.54	57.31	93.24	37.93	53.30	73.71	56.74	93.02	37.59	0.22	0.60
7	3.92	0.66	-2.24	2.33	286.55	3.90	0.79	-2.31	2.44	288.88	0.11	0.15
8	36.37	20.12	-53.42	57.08	290.64	36.49	19.95	-53.47	57.07	290.46	0.01	0.21
9	57.52	-56.97	19.19	60.12	161.38	57.73	-57.06	18.31	59.93	162.21	0.19	0.91
10	62.52	58.16	43.34	72.53	36.69	62.57	58.16	41.87	71.67	35.75	0.86	1.47
11	64.73	10.50	-34.48	36.05	286.94	64.88	10.41	-34.33	35.87	286.86	0.18	0.23
12	78.22	30.25	17.84	35.12	30.53	78.31	30.24	16.70	34.55	28.91	0.57	1.14
13	66.30	1.74	-4.24	4.58	292.29	66.46	1.78	-4.97	5.28	289.72	0.70	0.75
14	77.20	-28.53	5.17	28.99	169.73	77.35	-28.43	4.63	28.81	170.75	0.18	0.57
15	81.82	6.28	-19.71	20.69	287.66	81.84	6.16	-19.59	20.54	287.45	0.15	0.17
16	87.81	-11.29	-1.58	11.40	187.97	87.89	-11.19	-1.92	11.36	189.73	0.04	0.36
17	88.21	14.35	3.99	14.89	15.54	88.26	14.35	3.59	14.79	14.06	0.10	0.40
18	4.12	0.71	-2.20	2.32	287.97	4.09	0.88	-2.40	2.55	290.26	0.23	0.26
19	4.00	0.66	-2.28	2.38	286.06	4.01	0.78	-2.33	2.46	288.39	0.08	0.13
20	3.95	0.66	-2.36	2.45	285.51	3.93	0.81	-2.43	2.56	288.48	0.11	0.17
21	4.00	0.69	-2.14	2.25	287.75	4.01	0.91	-2.33	2.50	291.35	0.25	0.29
22	3.99	0.66	-2.29	2.38	286.22	3.97	0.84	-2.42	2.56	289.10	0.18	0.22
23	4.12	0.71	-2.12	2.23	288.54	4.07	0.87	-2.28	2.44	291.00	0.21	0.23
24	4.06	0.62	-2.18	2.27	285.85	4.03	0.82	-2.31	2.45	289.55	0.18	0.24
25	3.83	0.69	-2.23	2.33	287.31	3.82	0.84	-2.40	2.54	289.22	0.21	0.23
26	96.48	2.08	-5.82	6.18	289.71	96.46	2.10	-5.72	6.10	290.17	0.08	0.10
27	47.42	-30.88	-59.48	67.02	242.56	47.55	-31.24	-59.27	67.00	242.21	0.02	0.44
28	53.78	-35.07	-55.66	65.79	237.79	53.89	-35.32	-55.41	65.71	237.49	0.08	0.37
29	60.36	-35.48	-50.23	61.50	234.76	60.46	-35.74	-49.96	61.43	234.42	0.07	0.39
30	66.25	-32.85	-44.37	55.20	233.48	66.38	-33.00	-44.05	55.04	233.17	0.16	0.38
31	72.01	-28.15	-37.94	47.24	233.43	72.10	-28.26	-37.62	47.05	233.09	0.19	0.35
32	76.58	-23.12	-32.35	39.76	234.44	76.66	-23.22	-32.07	39.60	234.09	0.16	0.31
33	81.87	-16.99	-25.74	30.84	236.57	81.92	-17.06	-25.49	30.67	236.20	0.17	0.26
34	84.52	-13.46	-22.23	25.99	238.80	84.59	-13.48	-21.97	25.77	238.47	0.22	0.27
35	87.01	-10.19	-18.87	21.44	241.63	87.03	-10.24	-18.66	21.29	241.24	0.15	0.22
36	89.18	-7.41	-15.91	17.55	245.01	89.22	-7.44	-15.71	17.38	244.67	0.17	0.21
37	91.72	-3.99	-12.38	13.01	252.14	91.72	-4.02	-12.24	12.89	251.81	0.12	0.14
38	93.15	-2.07	-10.38	10.59	258.74	93.12	-2.05	-10.26	10.46	258.68	0.13	0.13
39	95.28	0.48	-7.56	7.58	273.65	95.27	0.49	-7.45	7.47	273.77	0.11	0.11
40	52.28	81.64	1.66	81.66	1.16	52.26	81.70	1.34	81.72	0.94	0.06	0.33
41	56.45	77.80	-6.43	78.06	355.28	56.46	77.82	-6.73	78.11	355.05	0.05	0.30
42	61.57	70.02	-12.02	71.05	350.26	61.60	69.99	-12.33	71.07	350.01	0.02	0.31
43	66.96	60.75	-14.53	62.46	346.54	67.03	60.61	-14.72	62.37	346.35	0.09	0.25
44	72.33	50.61	-14.93	52.76	343.57	72.36	50.57	-15.02	52.75	343.46	0.01	0.10
45	76.71	41.97	-14.44	44.38	341.02	76.80	41.79	-14.43	44.21	340.96	0.17	0.20
46	82.00	31.26	-12.83	33.79	337.68	82.05	31.15	-12.76	33.66	337.72	0.13	0.14
47	84.49	26.00	-11.85	28.57	335.49	84.54	25.89	-11.78	28.45	335.53	0.12	0.14
48	87.06	20.86	-10.71	23.45	332.83	87.06	20.77	-10.65	23.34	332.86	0.11	0.11
49	89.20	16.59	-9.67	19.20	329.77	89.22	16.52	-9.59	19.10	329.87	0.10	0.11
50	91.89	11.29	-8.39	14.06	323.38	91.90	11.27	-8.29	14.00	323.66	0.06	0.10
51	93.27	8.34	-7.65	11.32	317.46	93.31	8.29	-7.54	11.20	317.72	0.12	0.13
52	95.31	4.38	-6.55	7.88	303.75	95.27	4.45	-6.50	7.88	304.38	0.00	0.09



53	88.62	5.87	99.71	99.88	86.63	88.62	5.89	99.04	99.22	86.60	0.66	0.67
54	90.03	1.56	88.73	88.74	88.99	90.06	1.53	87.79	87.80	89.00	0.94	0.94
55	91.50	-1.37	74.05	74.07	91.06	91.55	-1.44	72.84	72.86	91.13	1.21	1.21
56	92.49	-2.91	58.54	58.61	92.84	92.58	-2.96	57.24	57.32	92.96	1.29	1.30
57	93.28	-3.37	46.46	46.58	94.15	93.37	-3.35	45.16	45.28	94.24	1.30	1.30
58	94.20	-3.28	36.69	36.83	95.11	94.27	-3.19	35.44	35.59	95.15	1.24	1.26
59	94.88	-2.41	24.13	24.25	95.69	94.94	-2.29	23.22	23.33	95.64	0.92	0.92
60	95.30	-1.70	17.71	17.79	95.47	95.32	-1.58	16.88	16.95	95.34	0.84	0.84
61	95.42	-1.11	13.15	13.20	94.83	95.45	-1.00	12.49	12.53	94.58	0.67	0.67
62	95.63	-0.56	9.20	9.22	93.48	95.66	-0.45	8.64	8.65	92.96	0.57	0.57
63	95.90	0.14	4.63	4.63	88.25	95.95	0.23	4.20	4.21	86.82	0.42	0.44
64	96.24	0.91	0.19	0.93	12.09	96.25	0.94	0.13	0.95	7.85	0.02	0.07
65	96.46	1.62	-3.73	4.07	293.53	96.47	1.65	-3.71	4.06	293.94	0.01	0.04
66	8.55	-0.16	-3.71	3.72	267.53	8.64	0.11	-4.00	4.01	271.53	0.29	0.41
67	22.52	-1.85	-3.61	4.06	242.91	22.59	-1.94	-3.86	4.32	243.28	0.26	0.27
68	37.58	-2.06	-2.31	3.09	228.29	37.70	-1.85	-2.94	3.47	237.85	0.38	0.67
69	47.80	-0.19	-4.11	4.11	267.38	47.94	-0.27	-4.58	4.58	266.67	0.47	0.50
70	57.99	0.64	-4.21	4.26	278.68	58.15	0.66	-4.65	4.70	278.09	0.44	0.47
71	66.46	2.19	-4.40	4.92	296.45	66.65	2.20	-4.72	5.20	295.04	0.28	0.37
72	75.34	2.74	-5.02	5.72	298.64	75.43	2.78	-5.41	6.08	297.21	0.36	0.40
73	79.23	3.18	-6.02	6.81	297.85	79.33	3.25	-6.15	6.95	297.84	0.14	0.18
74	82.78	3.05	-6.02	6.75	296.83	82.93	3.12	-6.11	6.86	297.04	0.11	0.19
75	86.47	2.85	-5.24	5.96	298.52	86.51	2.82	-5.42	6.11	297.50	0.15	0.19
76	89.97	2.86	-6.08	6.72	295.19	90.02	2.88	-6.23	6.86	294.85	0.14	0.16
77	91.84	2.69	-6.00	6.57	294.12	91.88	2.73	-6.03	6.62	294.38	0.05	0.06
78	94.66	2.28	-5.46	5.92	292.66	94.72	2.31	-5.41	5.89	293.06	0.03	0.08
79	27.46	50.83	-25.68	56.95	333.20	27.38	50.94	-25.84	57.12	333.11	0.17	0.21
80	29.24	46.67	-5.80	47.03	352.91	29.21	46.84	-6.10	47.23	352.58	0.20	0.35
81	49.23	79.63	30.65	85.33	21.05	49.21	79.76	30.32	85.33	20.81	0.00	0.36
82	40.36	48.06	33.31	58.48	34.73	40.34	48.33	32.87	58.45	34.22	0.03	0.52
83	69.06	45.80	82.97	94.78	61.10	69.00	46.03	82.70	94.65	60.90	0.13	0.36
84	50.15	-0.20	50.15	50.15	90.23	50.03	-0.08	49.59	49.59	90.10	0.56	0.59
85	36.94	-2.48	-2.53	3.54	225.67	37.04	-2.33	-3.14	3.91	233.48	0.37	0.64
86	63.01	-30.99	67.49	74.27	114.67	62.92	-31.10	66.99	73.85	114.90	0.42	0.52
87	35.46	-51.32	14.50	53.33	164.22	35.47	-51.47	14.06	53.35	164.73	0.02	0.46
88	37.48	-54.51	-24.36	59.71	204.08	37.59	-54.71	-24.49	59.94	204.12	0.23	0.26
89	28.96	-29.56	-32.09	43.64	227.35	28.98	-29.39	-32.52	43.83	227.90	0.19	0.46
90	30.16	0.45	-62.76	62.76	270.41	30.20	0.42	-62.85	62.85	270.38	0.09	0.10
91	14.83	10.03	-33.48	34.95	286.68	14.67	10.24	-33.78	35.29	286.86	0.34	0.40
92	19.30	33.10	-36.66	49.40	312.08	19.13	33.21	-36.97	49.70	311.93	0.30	0.37
93	53.12	50.78	-11.97	52.17	346.74	53.28	50.86	-12.07	52.27	346.65	0.10	0.20
94	54.41	46.85	3.23	46.96	3.95	54.48	46.82	2.75	46.90	3.36	0.06	0.49
95	40.97	61.33	26.60	66.85	23.44	40.96	61.51	26.21	66.86	23.08	0.01	0.43
96	55.82	42.67	28.07	51.08	33.34	55.93	42.55	27.51	50.67	32.89	0.41	0.58
97	50.96	43.90	53.82	69.45	50.80	50.90	44.03	53.37	69.18	50.48	0.27	0.47
98	73.35	-1.76	50.06	50.09	92.01	73.48	-1.81	49.09	49.13	92.12	0.96	0.98
99	45.91	-41.60	38.28	56.53	137.38	45.87	-41.83	37.82	56.39	137.88	0.14	0.52
100	53.15	-44.79	13.25	46.71	163.51	53.18	-45.08	12.64	46.82	164.34	0.11	0.68
101	33.84	-56.92	-4.77	57.12	184.79	33.94	-57.01	-5.27	57.25	185.28	0.13	0.52
102	52.85	-32.01	-34.18	46.83	226.88	52.92	-32.14	-34.60	47.22	227.11	0.39	0.45
103	22.52	4.15	-50.64	50.81	274.68	22.50	4.45	-50.99	51.18	274.99	0.37	0.46
104	35.93	13.75	-43.14	45.28	287.68	35.99	13.59	-43.26	45.34	287.44	0.06	0.21
105	19.45	19.26	-9.72	21.58	333.21	19.23	19.23	-10.30	21.81	331.82	0.23	0.62
106	46.53	30.75	-10.03	32.34	341.93	46.54	30.71	-10.33	32.40	341.41	0.06	0.30
107	71.84	20.66	-10.05	22.98	334.07	71.93	20.62	-10.23	23.02	333.62	0.04	0.21
108	24.34	17.38	7.85	19.07	24.32	24.08	17.51	7.32	18.98	22.68	0.09	0.60
109	72.96	16.37	6.23	17.52	20.83	73.06	16.41	5.61	17.34	18.87	0.18	0.63



110	31.54	-5.49	19.00	19.77	106.12	31.30	-5.46	18.33	19.12	106.58	0.65	0.71
111	58.32	-2.87	26.76	26.91	96.13	58.41	-2.75	26.01	26.16	96.04	0.75	0.76
112	79.13	-0.32	12.42	12.42	91.46	79.22	-0.39	11.83	11.83	91.88	0.59	0.60
113	83.05	3.08	-6.18	6.90	296.53	83.17	2.97	-6.28	6.95	295.29	0.05	0.19
114	23.81	-25.50	2.83	25.66	173.66	23.74	-25.68	2.49	25.80	174.45	0.14	0.39
115	47.99	-30.67	7.84	31.66	165.65	48.09	-30.61	7.13	31.43	166.88	0.23	0.72
116	72.49	-14.22	0.49	14.23	178.02	72.63	-14.15	0.02	14.15	179.94	0.08	0.50
117	19.83	-18.79	-15.29	24.23	219.13	19.66	-18.63	-15.77	24.41	220.25	0.18	0.53
118	65.99	6.53	-20.80	21.80	287.44	66.13	6.41	-20.90	21.86	287.05	0.06	0.21
119	8.51	0.59	-11.84	11.85	272.85	8.35	0.64	-11.95	11.97	273.07	0.12	0.20
120	71.91	-10.41	-17.10	20.02	238.67	71.90	-10.37	-17.39	20.25	239.19	0.23	0.29
121	47.41	-21.37	-21.22	30.12	224.80	47.47	-21.58	-21.40	30.39	224.76	0.27	0.28
122	3.73	0.83	-2.40	2.54	289.09	4.49	0.78	-1.88	2.04	292.46	0.50	0.92
123	4.10	0.68	-2.67	2.75	284.25	4.18	0.66	-2.58	2.67	284.39	0.08	0.12
124	4.80	0.29	-3.32	3.33	274.97	4.76	0.33	-3.21	3.23	275.91	0.10	0.12
125	3.79	0.81	-2.35	2.49	288.97	3.73	0.77	-2.24	2.37	288.95	0.12	0.13
126	5.48	0.37	-3.46	3.48	276.09	5.44	0.49	-3.35	3.39	276.37	0.09	0.17
127	9.43	-2.77	-5.33	6.01	242.52	9.26	-2.80	-5.68	6.33	243.76	0.32	0.39
128	17.37	-6.42	-6.56	9.18	225.64	17.39	-6.22	-7.09	9.43	228.73	0.25	0.57
129	3.69	0.79	-2.34	2.47	288.70	3.62	0.75	-2.18	2.30	288.93	0.17	0.18
130	7.95	-1.17	-4.34	4.50	254.94	7.97	-1.10	-4.46	4.60	256.12	0.10	0.14
131	21.56	-6.39	-6.11	8.84	223.70	21.55	-6.16	-6.16	8.71	225.00	0.13	0.24
132	34.23	-9.99	-8.44	13.08	220.18	34.31	-10.02	-8.88	13.38	221.55	0.30	0.45
133	43.39	-11.55	-11.63	16.39	225.20	43.56	-11.38	-12.01	16.55	226.53	0.16	0.45
134	3.95	0.83	-2.36	2.50	289.27	3.87	0.73	-2.38	2.49	287.08	0.01	0.13
135	12.32	-1.94	-4.77	5.16	247.84	12.49	-1.96	-4.74	5.13	247.55	0.03	0.17
136	33.07	-5.83	-6.02	8.38	225.90	33.10	-5.94	-6.35	8.69	226.92	0.31	0.35
137	45.67	-7.77	-8.05	11.19	226.02	45.75	-7.83	-8.42	11.50	227.07	0.31	0.38
138	58.71	-6.25	-8.94	10.91	235.04	58.95	-6.06	-9.18	11.00	236.57	0.09	0.39
139	64.79	-6.40	-10.01	11.88	237.42	64.92	-6.41	-10.28	12.11	238.03	0.23	0.30
140	4.01	0.74	-2.36	2.47	287.34	3.96	0.74	-2.37	2.48	287.43	0.01	0.05
141	16.39	-2.39	-3.94	4.61	238.76	16.40	-2.49	-4.36	5.02	240.23	0.41	0.43
142	40.50	-4.62	-4.98	6.80	227.17	40.45	-4.40	-5.64	7.16	232.06	0.36	0.70
143	56.82	-2.97	-7.01	7.62	247.06	57.03	-3.04	-7.28	7.89	247.34	0.27	0.35
144	72.10	-1.25	-7.97	8.07	261.12	72.22	-1.36	-8.31	8.42	260.68	0.35	0.38
145	78.85	-0.79	-9.95	9.98	265.49	79.03	-0.80	-9.94	9.97	265.42	0.01	0.18
146	3.81	0.86	-2.33	2.48	290.19	3.77	0.70	-2.25	2.35	287.22	0.13	0.18
147	20.67	-1.88	-3.91	4.34	244.28	20.70	-1.68	-4.17	4.50	247.99	0.16	0.33
148	44.88	-2.29	-4.75	5.27	244.28	45.08	-2.18	-5.08	5.53	246.77	0.26	0.40
149	62.00	-0.37	-5.23	5.24	265.95	62.24	-0.34	-5.61	5.62	266.50	0.38	0.45
150	77.98	1.20	-7.52	7.62	279.09	78.19	0.97	-7.42	7.48	277.41	0.14	0.33
151	84.43	0.86	-7.28	7.33	276.72	84.55	0.96	-7.31	7.37	277.48	0.04	0.16
152	8.60	-4.38	-6.85	8.13	237.42	8.47	-4.09	-6.99	8.10	239.71	0.03	0.35
153	32.70	-15.37	-11.88	19.43	217.71	32.71	-15.71	-12.27	19.93	217.98	0.50	0.52
154	52.15	-11.63	-13.19	17.59	228.59	52.18	-11.86	-13.39	17.89	228.45	0.30	0.31
155	70.19	-6.39	-12.68	14.20	243.25	70.29	-6.33	-12.75	14.24	243.61	0.04	0.14
156	84.51	-1.52	-9.51	9.63	260.89	84.62	-1.64	-9.63	9.77	260.31	0.14	0.20
157	90.97	0.09	-8.04	8.04	270.61	90.98	0.10	-8.01	8.01	270.71	0.03	0.03
158	93.70	1.04	-6.86	6.93	278.64	93.65	1.08	-6.86	6.95	278.93	0.02	0.06
159	34.75	-28.47	-45.33	53.53	237.87	34.77	-28.67	-45.22	53.54	237.63	0.01	0.23
160	38.18	63.85	1.52	63.87	1.36	38.10	63.86	1.15	63.87	1.03	0.00	0.38
161	66.55	6.06	75.64	75.89	85.42	66.51	6.00	75.34	75.58	85.45	0.31	0.31
162	16.96	20.02	-47.27	51.33	292.95	17.02	20.01	-47.29	51.35	292.94	0.02	0.06
163	38.41	-59.33	18.35	62.10	162.81	38.58	-59.56	18.05	62.23	163.14	0.13	0.41
164	46.98	61.43	45.51	76.45	36.54	46.95	61.55	45.02	76.26	36.18	0.19	0.51
165	54.77	9.11	-30.15	31.49	286.81	54.82	8.98	-30.16	31.47	286.59	0.02	0.14
166	65.52	-26.36	5.36	26.89	168.51	65.63	-26.47	4.91	26.92	169.49	0.03	0.48

167	66.32	26.38	15.00	30.35	29.62	66.45	26.34	14.46	30.05	28.76	0.30	0.56
168	14.66	9.80	-32.90	34.33	286.60	14.57	10.15	-33.20	34.72	287.00	0.39	0.47
169	35.13	-51.44	14.42	53.42	164.34	35.18	-51.75	13.93	53.60	164.94	0.18	0.58
170	39.86	47.77	32.63	57.85	34.33	39.71	47.77	32.25	57.64	34.02	0.21	0.41
171	42.56	4.54	-24.21	24.63	280.61	42.62	4.77	-24.53	24.99	281.00	0.36	0.40
172	51.90	-23.67	5.22	24.24	167.56	52.01	-23.62	4.83	24.11	168.44	0.13	0.41
173	52.36	20.31	12.09	23.64	30.77	52.35	20.12	11.54	23.20	29.84	0.44	0.58
174	19.67	-18.77	-15.93	24.62	220.31	19.62	-18.44	-16.13	24.50	221.17	0.12	0.39
175	19.42	19.44	-9.63	21.69	333.63	19.27	19.23	-10.03	21.69	332.45	0.00	0.48
176	31.38	-4.85	19.21	19.81	104.17	31.35	-4.96	18.94	19.58	104.67	0.23	0.29
177	8.80	0.51	-12.02	12.03	272.43	8.55	0.65	-12.05	12.07	273.07	0.04	0.29
178	23.79	-25.30	2.94	25.47	173.37	23.63	-25.29	2.49	25.41	174.39	0.06	0.48
179	23.37	16.79	7.74	18.49	24.75	23.05	16.76	7.08	18.20	22.89	0.29	0.73
180	22.98	-0.79	-11.45	11.48	266.04	22.81	-0.72	-11.82	11.84	266.49	0.36	0.41
181	31.54	-14.05	0.19	14.05	179.24	31.49	-14.22	-0.48	14.23	181.94	0.18	0.69
182	31.12	7.30	3.73	8.19	27.08	31.02	7.20	3.11	7.84	23.38	0.35	0.64

## 1 hr after vs Original

Average	$\Delta C^*$	$\Delta E$
	0.24	0.40

Average  $\Delta E$  - overprint color excluded

C	0.13	0.28
M	0.08	0.18
Y	0.76	0.77
K	0.24	0.30
Paper	0.08	0.10

Average  $\Delta E$  - overprint color only

0.21	0.40
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ID# NUM	Original					2 hr after					$\Delta C^*$	$\Delta E$
	L*	a*	b*	C*	h	L*	a*	b*	C*	h		
1	42.01	-24.72	-61.69	66.46	248.16	42.14	-25.19	-61.47	66.43	247.72	0.03	0.53
2	49.38	82.49	10.58	83.16	7.31	49.30	82.62	10.37	83.27	7.16	0.11	0.26
3	87.00	10.27	105.69	106.18	84.45	86.93	10.36	105.00	105.50	84.37	0.68	0.70
4	17.26	28.88	-56.94	63.84	296.89	17.08	29.25	-57.38	64.41	297.01	0.57	0.60
5	40.58	-65.34	21.53	68.80	161.76	40.79	-66.11	21.04	69.38	162.34	0.58	0.94
6	53.37	73.54	57.31	93.24	37.93	53.27	73.73	56.73	93.03	37.58	0.21	0.62
7	3.92	0.66	-2.24	2.33	286.55	3.87	0.83	-2.41	2.55	289.10	0.22	0.25
8	36.37	20.12	-53.42	57.08	290.64	36.57	19.85	-53.47	57.03	290.37	0.05	0.34
9	57.52	-56.97	19.19	60.12	161.38	57.85	-57.25	17.94	60.00	162.60	0.12	1.32
10	62.52	58.16	43.34	72.53	36.69	62.61	58.09	41.59	71.45	35.60	1.08	1.75
11	64.73	10.50	-34.48	36.05	286.94	64.93	10.34	-34.22	35.75	286.81	0.30	0.36
12	78.22	30.25	17.84	35.12	30.53	78.40	30.16	16.40	34.33	28.53	0.79	1.45
13	66.30	1.74	-4.24	4.58	292.29	66.56	1.74	-5.12	5.40	288.75	0.82	0.92
14	77.20	-28.53	5.17	28.99	169.73	77.46	-28.41	4.40	28.75	171.20	0.24	0.82
15	81.82	6.28	-19.71	20.69	287.66	81.93	6.11	-19.39	20.33	287.50	0.36	0.38
16	87.81	-11.29	-1.58	11.40	187.97	87.94	-11.17	-2.03	11.36	190.32	0.04	0.48
17	88.21	14.35	3.99	14.89	15.54	88.36	14.24	3.59	14.69	14.16	0.20	0.44
18	4.12	0.71	-2.20	2.32	287.97	4.09	0.79	-2.26	2.39	289.23	0.07	0.10
19	4.00	0.66	-2.28	2.38	286.06	3.95	0.81	-2.35	2.49	288.95	0.11	0.17
20	3.95	0.66	-2.36	2.45	285.51	3.92	0.69	-2.33	2.43	286.46	0.02	0.05
21	4.00	0.69	-2.14	2.25	287.75	3.96	0.87	-2.32	2.48	290.57	0.23	0.26
22	3.99	0.66	-2.29	2.38	286.22	3.93	0.83	-2.33	2.48	289.61	0.10	0.18
23	4.12	0.71	-2.12	2.23	288.54	4.07	0.82	-2.30	2.44	289.72	0.21	0.22
24	4.06	0.62	-2.18	2.27	285.85	3.97	0.73	-2.26	2.37	287.89	0.10	0.16
25	3.83	0.69	-2.23	2.33	287.31	3.80	0.80	-2.36	2.50	288.81	0.17	0.17
26	96.48	2.08	-5.82	6.18	289.71	96.49	2.08	-5.62	5.99	290.30	0.19	0.20
27	47.42	-30.88	-59.48	67.02	242.56	47.60	-31.44	-59.15	66.99	242.01	0.03	0.67
28	53.78	-35.07	-55.66	65.79	237.79	53.91	-35.52	-55.31	65.73	237.29	0.06	0.58
29	60.36	-35.48	-50.23	61.50	234.76	60.50	-35.84	-49.81	61.36	234.26	0.14	0.57
30	66.25	-32.85	-44.37	55.20	233.48	66.39	-33.15	-43.92	55.03	232.95	0.17	0.56
31	72.01	-28.15	-37.94	47.24	233.43	72.13	-28.30	-37.45	46.94	232.93	0.30	0.53
32	76.58	-23.12	-32.35	39.76	234.44	76.67	-23.33	-31.93	39.54	233.85	0.22	0.48
33	81.87	-16.99	-25.74	30.84	236.57	81.96	-17.11	-25.32	30.56	235.95	0.28	0.45
34	84.52	-13.46	-22.23	25.99	238.80	84.62	-13.51	-21.81	25.66	238.23	0.33	0.43
35	87.01	-10.19	-18.87	21.44	241.63	87.08	-10.26	-18.48	21.14	240.96	0.30	0.40
36	89.18	-7.41	-15.91	17.55	245.01	89.23	-7.49	-15.59	17.29	244.35	0.26	0.33
37	91.72	-3.99	-12.38	13.01	252.14	91.72	-4.07	-12.14	12.80	251.48	0.21	0.25
38	93.15	-2.07	-10.38	10.59	258.74	93.15	-2.04	-10.06	10.27	258.53	0.32	0.32
39	95.28	0.48	-7.56	7.58	273.65	95.27	0.44	-7.36	7.37	273.44	0.21	0.20
40	52.28	81.64	1.66	81.66	1.16	52.25	81.68	1.20	81.69	0.84	0.03	0.46
41	56.45	77.80	-6.43	78.06	355.28	56.49	77.79	-6.86	78.09	354.96	0.03	0.43
42	61.57	70.02	-12.02	71.05	350.26	61.65	69.89	-12.37	70.98	349.96	0.07	0.38
43	66.96	60.75	-14.53	62.46	346.54	67.09	60.48	-14.74	62.25	346.30	0.21	0.37
44	72.33	50.61	-14.93	52.76	343.57	72.44	50.41	-14.97	52.59	343.46	0.17	0.23
45	76.71	41.97	-14.44	44.38	341.02	76.84	41.75	-14.34	44.14	341.04	0.24	0.27
46	82.00	31.26	-12.83	33.79	337.68	82.14	30.99	-12.63	33.47	337.82	0.32	0.36
47	84.49	26.00	-11.85	28.57	335.49	84.55	25.89	-11.66	28.40	335.75	0.17	0.23
48	87.06	20.86	-10.71	23.45	332.83	87.14	20.70	-10.50	23.22	333.10	0.23	0.28
49	89.20	16.59	-9.67	19.20	329.77	89.27	16.45	-9.46	18.98	330.09	0.22	0.26
50	91.89	11.29	-8.39	14.06	323.38	91.88	11.35	-8.21	14.00	324.12	0.06	0.19
51	93.27	8.34	-7.65	11.32	317.46	93.28	8.31	-7.45	11.16	318.13	0.16	0.20
52	95.31	4.38	-6.55	7.88	303.75	95.30	4.38	-6.38	7.74	304.50	0.14	0.17

53	88.62	5.87	99.71	99.88	86.63	88.65	5.79	98.81	98.98	86.65	0.90	0.90
54	90.03	1.56	88.73	88.74	88.99	90.12	1.40	87.35	87.36	89.08	1.38	1.39
55	91.50	-1.37	74.05	74.07	91.06	91.61	-1.53	72.32	72.33	91.21	1.74	1.74
56	92.49	-2.91	58.54	58.61	92.84	92.62	-2.99	56.66	56.73	93.02	1.88	1.89
57	93.28	-3.37	46.46	46.58	94.15	93.39	-3.34	44.52	44.64	94.29	1.94	1.94
58	94.20	-3.28	36.69	36.83	95.11	94.29	-3.18	34.97	35.11	95.20	1.72	1.73
59	94.88	-2.41	24.13	24.25	95.69	94.97	-2.25	22.80	22.92	95.64	1.33	1.34
60	95.30	-1.70	17.71	17.79	95.47	95.33	-1.53	16.59	16.66	95.28	1.13	1.13
61	95.42	-1.11	13.15	13.20	94.83	95.47	-0.97	12.27	12.30	94.51	0.90	0.89
62	95.63	-0.56	9.20	9.22	93.48	95.66	-0.42	8.48	8.49	92.85	0.73	0.73
63	95.90	0.14	4.63	4.63	88.25	95.93	0.24	4.16	4.16	86.69	0.47	0.48
64	96.24	0.91	0.19	0.93	12.09	96.25	0.96	-0.01	0.96	359.69	0.03	0.21
65	96.46	1.62	-3.73	4.07	293.53	96.45	1.65	-3.68	4.04	294.12	0.03	0.06
66	8.55	-0.16	-3.71	3.72	267.53	8.47	0.14	-4.03	4.03	271.94	0.31	0.45
67	22.52	-1.85	-3.61	4.06	242.91	22.56	-1.77	-4.06	4.43	246.50	0.37	0.46
68	37.58	-2.06	-2.31	3.09	228.29	37.73	-2.07	-2.88	3.55	234.32	0.46	0.59
69	47.80	-0.19	-4.11	4.11	267.38	48.02	-0.29	-4.72	4.73	266.46	0.62	0.66
70	57.99	0.64	-4.21	4.26	278.68	58.20	0.60	-4.83	4.87	277.06	0.61	0.66
71	66.46	2.19	-4.40	4.92	296.45	66.72	2.22	-5.00	5.47	293.94	0.55	0.65
72	75.34	2.74	-5.02	5.72	298.64	75.51	2.66	-5.49	6.10	295.85	0.38	0.51
73	79.23	3.18	-6.02	6.81	297.85	79.39	3.23	-6.34	7.12	296.97	0.31	0.36
74	82.78	3.05	-6.02	6.75	296.83	82.90	3.09	-6.34	7.06	295.96	0.31	0.34
75	86.47	2.85	-5.24	5.96	298.52	86.58	2.88	-5.52	6.23	297.58	0.27	0.30
76	89.97	2.86	-6.08	6.72	295.19	90.02	2.83	-6.27	6.88	294.28	0.16	0.20
77	91.84	2.69	-6.00	6.57	294.12	91.91	2.74	-5.98	6.58	294.66	0.01	0.09
78	94.66	2.28	-5.46	5.92	292.66	94.69	2.26	-5.37	5.82	292.84	0.10	0.10
79	27.46	50.83	-25.68	56.95	333.20	27.32	51.00	-25.93	57.21	333.05	0.26	0.33
80	29.24	46.67	-5.80	47.03	352.91	29.19	46.91	-6.22	47.32	352.45	0.29	0.49
81	49.23	79.63	30.65	85.33	21.05	49.15	79.78	30.22	85.31	20.75	0.02	0.46
82	40.36	48.06	33.31	58.48	34.73	40.24	48.23	32.68	58.25	34.12	0.23	0.66
83	69.06	45.80	82.97	94.78	61.10	69.01	45.95	82.52	94.46	60.89	0.32	0.48
84	50.15	-0.20	50.15	50.15	90.23	50.09	-0.25	49.55	49.55	90.29	0.60	0.61
85	36.94	-2.48	-2.53	3.54	225.67	37.09	-2.50	-3.17	4.04	231.68	0.50	0.66
86	63.01	-30.99	67.49	74.27	114.67	63.01	-31.16	66.93	73.83	114.97	0.44	0.59
87	35.46	-51.32	14.50	53.33	164.22	35.54	-51.71	13.89	53.54	164.96	0.21	0.73
88	37.48	-54.51	-24.36	59.71	204.08	37.69	-54.75	-24.69	60.06	204.27	0.35	0.46
89	28.96	-29.56	-32.09	43.64	227.35	29.06	-29.51	-32.54	43.93	227.79	0.29	0.46
90	30.16	0.45	-62.76	62.76	270.41	30.22	0.35	-62.83	62.83	270.32	0.07	0.14
91	14.83	10.03	-33.48	34.95	286.68	14.68	10.26	-33.81	35.33	286.89	0.38	0.43
92	19.30	33.10	-36.66	49.40	312.08	19.09	33.30	-37.13	49.88	311.89	0.48	0.55
93	53.12	50.78	-11.97	52.17	346.74	53.32	50.85	-12.20	52.29	346.51	0.12	0.31
94	54.41	46.85	3.23	46.96	3.95	54.57	46.81	2.66	46.89	3.25	0.07	0.59
95	40.97	61.33	26.60	66.85	23.44	40.89	61.54	26.05	66.83	22.94	0.02	0.59
96	55.82	42.67	28.07	51.08	33.34	56.01	42.48	27.33	50.52	32.75	0.56	0.79
97	50.96	43.90	53.82	69.45	50.80	50.89	44.06	53.33	69.18	50.44	0.27	0.52
98	73.35	-1.76	50.06	50.09	92.01	73.52	-1.82	48.85	48.88	92.13	1.21	1.22
99	45.91	-41.60	38.28	56.53	137.38	46.01	-41.86	37.82	56.41	137.91	0.12	0.54
100	53.15	-44.79	13.25	46.71	163.51	53.39	-45.00	12.62	46.74	164.34	0.03	0.71
101	33.84	-56.92	-4.77	57.12	184.79	34.07	-57.14	-5.43	57.39	185.43	0.27	0.73
102	52.85	-32.01	-34.18	46.83	226.88	53.02	-32.12	-34.46	47.11	227.02	0.28	0.35
103	22.52	4.15	-50.64	50.81	274.68	22.46	4.49	-51.01	51.21	275.03	0.40	0.51
104	35.93	13.75	-43.14	45.28	287.68	36.09	13.53	-43.25	45.32	287.37	0.04	0.29
105	19.45	19.26	-9.72	21.58	333.21	19.20	19.27	-10.39	21.89	331.67	0.31	0.72
106	46.53	30.75	-10.03	32.34	341.93	46.69	30.70	-10.40	32.41	341.29	0.07	0.41
107	71.84	20.66	-10.05	22.98	334.07	72.00	20.46	-10.31	22.92	333.25	0.06	0.36
108	24.34	17.38	7.85	19.07	24.32	24.14	17.45	7.32	18.93	22.75	0.14	0.57
109	72.96	16.37	6.23	17.52	20.83	73.09	16.28	5.53	17.20	18.75	0.32	0.72



110	31.54	-5.49	19.00	19.77	106.12	31.38	-5.48	18.31	19.11	106.68	0.66	0.71
111	58.32	-2.87	26.76	26.91	96.13	58.50	-2.98	25.85	26.02	96.57	0.89	0.93
112	79.13	-0.32	12.42	12.42	91.46	79.25	-0.28	11.52	11.53	91.37	0.89	0.91
113	83.05	3.08	-6.18	6.90	296.53	83.21	3.05	-6.42	7.11	295.42	0.21	0.29
114	23.81	-25.50	2.83	25.66	173.66	23.73	-25.59	2.24	25.69	175.00	0.03	0.60
115	47.99	-30.67	7.84	31.66	165.65	48.19	-30.64	7.00	31.43	167.13	0.23	0.86
116	72.49	-14.22	0.49	14.23	178.02	72.64	-14.19	-0.20	14.19	180.82	0.04	0.71
117	19.83	-18.79	-15.29	24.23	219.13	19.72	-18.57	-15.81	24.39	220.41	0.16	0.58
118	65.99	6.53	-20.80	21.80	287.44	66.25	6.33	-20.99	21.93	286.77	0.13	0.38
119	8.51	0.59	-11.84	11.85	272.85	8.36	0.77	-11.96	11.98	273.71	0.13	0.26
120	71.91	-10.41	-17.10	20.02	238.67	71.96	-10.44	-17.42	20.31	239.06	0.29	0.33
121	47.41	-21.37	-21.22	30.12	224.80	47.55	-21.51	-21.50	30.41	224.99	0.29	0.34
122	3.73	0.83	-2.40	2.54	289.09	3.74	0.92	-2.44	2.61	290.71	0.07	0.10
123	4.10	0.68	-2.67	2.75	284.25	4.26	0.71	-2.84	2.92	283.97	0.17	0.24
124	4.80	0.29	-3.32	3.33	274.97	4.81	0.41	-3.43	3.46	276.83	0.13	0.16
125	3.79	0.81	-2.35	2.49	288.97	3.73	0.86	-2.41	2.56	289.61	0.07	0.10
126	5.48	0.37	-3.46	3.48	276.09	5.44	0.62	-3.58	3.63	279.89	0.15	0.28
127	9.43	-2.77	-5.33	6.01	242.52	9.35	-2.65	-5.62	6.21	244.72	0.20	0.32
128	17.37	-6.42	-6.56	9.18	225.64	17.40	-6.42	-7.03	9.52	227.61	0.34	0.47
129	3.69	0.79	-2.34	2.47	288.70	3.69	0.85	-2.45	2.59	289.18	0.12	0.13
130	7.95	-1.17	-4.34	4.50	254.94	8.03	-0.85	-4.68	4.75	259.69	0.25	0.47
131	21.56	-6.39	-6.11	8.84	223.70	21.61	-6.13	-6.34	8.82	225.98	0.02	0.35
132	34.23	-9.99	-8.44	13.08	220.18	34.38	-10.02	-9.04	13.49	222.06	0.41	0.62
133	43.39	-11.55	-11.63	16.39	225.20	43.61	-11.48	-12.20	16.75	226.74	0.36	0.61
134	3.95	0.83	-2.36	2.50	289.27	3.93	0.93	-2.53	2.70	290.19	0.20	0.20
135	12.32	-1.94	-4.77	5.16	247.84	12.50	-1.76	-4.91	5.21	250.24	0.05	0.29
136	33.07	-5.83	-6.02	8.38	225.90	33.13	-5.93	-6.50	8.80	227.62	0.42	0.49
137	45.67	-7.77	-8.05	11.19	226.02	45.86	-7.88	-8.63	11.68	227.59	0.49	0.62
138	58.71	-6.25	-8.94	10.91	235.04	59.06	-6.14	-9.37	11.21	236.76	0.30	0.57
139	64.79	-6.40	-10.01	11.88	237.42	64.93	-6.48	-10.47	12.31	238.27	0.43	0.49
140	4.01	0.74	-2.36	2.47	287.34	3.98	0.83	-2.52	2.65	288.18	0.18	0.19
141	16.39	-2.39	-3.94	4.61	238.76	16.34	-2.35	-4.40	4.99	241.86	0.38	0.46
142	40.50	-4.62	-4.98	6.80	227.17	40.63	-4.61	-5.69	7.33	230.98	0.53	0.72
143	56.82	-2.97	-7.01	7.62	247.06	57.12	-2.97	-7.48	8.05	248.32	0.43	0.56
144	72.10	-1.25	-7.97	8.07	261.12	72.29	-1.34	-8.35	8.46	260.88	0.39	0.43
145	78.85	-0.79	-9.95	9.98	265.49	79.04	-0.85	-10.02	10.06	265.18	0.08	0.21
146	3.81	0.86	-2.33	2.48	290.19	3.79	0.86	-2.40	2.55	289.69	0.07	0.07
147	20.67	-1.88	-3.91	4.34	244.28	20.69	-1.66	-4.28	4.59	248.80	0.25	0.43
148	44.88	-2.29	-4.75	5.27	244.28	45.14	-2.24	-5.26	5.72	246.93	0.45	0.57
149	62.00	-0.37	-5.23	5.24	265.95	62.28	-0.45	-5.77	5.78	265.53	0.54	0.61
150	77.98	1.20	-7.52	7.62	279.09	78.15	1.03	-7.67	7.74	277.67	0.12	0.28
151	84.43	0.86	-7.28	7.33	276.72	84.59	0.88	-7.38	7.43	276.78	0.10	0.19
152	8.60	-4.38	-6.85	8.13	237.42	8.49	-3.99	-7.08	8.13	240.62	0.00	0.47
153	32.70	-15.37	-11.88	19.43	217.71	32.75	-15.55	-12.34	19.85	218.44	0.42	0.50
154	52.15	-11.63	-13.19	17.59	228.59	52.36	-11.70	-13.73	18.04	229.56	0.45	0.58
155	70.19	-6.39	-12.68	14.20	243.25	70.33	-6.36	-12.95	14.43	243.84	0.23	0.31
156	84.51	-1.52	-9.51	9.63	260.89	84.61	-1.63	-9.61	9.75	260.35	0.12	0.18
157	90.97	0.09	-8.04	8.04	270.61	91.08	-0.04	-7.82	7.82	269.73	0.22	0.28
158	93.70	1.04	-6.86	6.93	278.64	93.65	1.09	-6.80	6.88	279.08	0.05	0.09
159	34.75	-28.47	-45.33	53.53	237.87	34.84	-28.81	-45.24	53.63	237.51	0.10	0.36
160	38.18	63.85	1.52	63.87	1.36	38.04	63.90	0.96	63.91	0.86	0.04	0.58
161	66.55	6.06	75.64	75.89	85.42	66.53	5.87	75.23	75.46	85.54	0.43	0.45
162	16.96	20.02	-47.27	51.33	292.95	16.94	20.19	-47.46	51.57	293.05	0.24	0.26
163	38.41	-59.33	18.35	62.10	162.81	38.62	-59.92	17.91	62.54	163.36	0.44	0.77
164	46.98	61.43	45.51	76.45	36.54	46.88	61.50	45.00	76.21	36.19	0.24	0.52
165	54.77	9.11	-30.15	31.49	286.81	54.94	8.90	-30.25	31.53	286.40	0.04	0.29
166	65.52	-26.36	5.36	26.89	168.51	65.75	-26.45	4.65	26.86	170.02	0.03	0.75



167	66.32	26.38	15.00	30.35	29.62	66.50	26.31	14.19	29.89	28.33	0.46	0.83
168	14.66	9.80	-32.90	34.33	286.60	14.49	10.18	-33.40	34.92	286.95	0.59	0.65
169	35.13	-51.44	14.42	53.42	164.34	35.23	-51.87	13.75	53.66	165.16	0.24	0.80
170	39.86	47.77	32.63	57.85	34.33	39.67	47.77	32.24	57.63	34.02	0.22	0.43
171	42.56	4.54	-24.21	24.63	280.61	42.70	4.58	-24.49	24.91	280.59	0.28	0.32
172	51.90	-23.67	5.22	24.24	167.56	52.11	-23.67	4.59	24.11	169.04	0.13	0.66
173	52.36	20.31	12.09	23.64	30.77	52.44	20.04	11.43	23.07	29.71	0.57	0.72
174	19.67	-18.77	-15.93	24.62	220.31	19.61	-18.59	-16.15	24.62	221.00	0.00	0.29
175	19.42	19.44	-9.63	21.69	333.63	19.26	19.35	-10.16	21.85	332.29	0.16	0.56
176	31.38	-4.85	19.21	19.81	104.17	31.30	-4.83	18.82	19.43	104.38	0.38	0.40
177	8.80	0.51	-12.02	12.03	272.43	8.67	0.69	-12.07	12.09	273.28	0.06	0.23
178	23.79	-25.30	2.94	25.47	173.37	23.65	-25.39	2.44	25.50	174.50	0.03	0.53
179	23.37	16.79	7.74	18.49	24.75	23.04	16.77	7.04	18.19	22.77	0.30	0.77
180	22.98	-0.79	-11.45	11.48	266.04	22.93	-0.82	-11.89	11.92	266.06	0.44	0.44
181	31.54	-14.05	0.19	14.05	179.24	31.62	-14.09	-0.49	14.10	181.99	0.05	0.69
182	31.12	7.30	3.73	8.19	27.08	31.14	7.33	2.93	7.89	21.80	0.30	0.80

## 2 hr after vs Original

Average	$\Delta C^*$	$\Delta E$
	0.32	0.52

Average  $\Delta E$  - overprint color excluded

C	0.20	0.45
M	0.15	0.29
Y	1.06	1.08
K	0.33	0.40
Paper	0.19	0.20

Average  $\Delta E$  - overprint color only

	0.27	0.50
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ID# NUM	Original					4 hr after					$\Delta C^*$	$\Delta E$
	L*	a*	b*	C*	h	L*	a*	b*	C*	h		
1	42.01	-24.72	-61.69	66.46	248.16	42.17	-25.23	-61.40	66.38	247.66	0.08	0.61
2	49.38	82.49	10.58	83.16	7.31	49.34	82.67	10.45	83.32	7.21	0.16	0.23
3	87.00	10.27	105.69	106.18	84.45	86.94	10.28	105.09	105.60	84.41	0.58	0.60
4	17.26	28.88	-56.94	63.84	296.89	17.01	29.36	-57.49	64.55	297.05	0.71	0.77
5	40.58	-65.34	21.53	68.80	161.76	40.79	-66.19	21.21	69.50	162.24	0.70	0.93
6	53.37	73.54	57.31	93.24	37.93	53.25	73.71	56.88	93.11	37.66	0.13	0.48
7	3.92	0.66	-2.24	2.33	286.55	3.95	0.80	-2.21	2.35	289.82	0.02	0.15
8	36.37	20.12	-53.42	57.08	290.64	36.56	19.86	-53.48	57.04	290.37	0.04	0.33
9	57.52	-56.97	19.19	60.12	161.38	57.88	-57.24	18.19	60.06	162.37	0.06	1.10
10	62.52	58.16	43.34	72.53	36.69	62.60	58.01	41.56	71.35	35.62	1.18	1.79
11	64.73	10.50	-34.48	36.05	286.94	64.95	10.30	-34.18	35.70	286.77	0.35	0.42
12	78.22	30.25	17.84	35.12	30.53	78.42	30.13	16.36	34.29	28.50	0.83	1.50
13	66.30	1.74	-4.24	4.58	292.29	66.49	1.82	-5.09	5.41	289.71	0.83	0.87
14	77.20	-28.53	5.17	28.99	169.73	77.37	-28.48	4.12	28.77	171.78	0.22	1.06
15	81.82	6.28	-19.71	20.69	287.66	81.84	6.18	-19.39	20.35	287.67	0.34	0.34
16	87.81	-11.29	-1.58	11.40	187.97	87.88	-11.21	-1.99	11.39	190.07	0.01	0.42
17	88.21	14.35	3.99	14.89	15.54	88.28	14.36	3.53	14.79	13.80	0.10	0.47
18	4.12	0.71	-2.20	2.32	287.97	3.88	0.84	-2.34	2.48	289.74	0.16	0.31
19	4.00	0.66	-2.28	2.38	286.06	3.91	0.74	-2.34	2.45	287.63	0.07	0.13
20	3.95	0.66	-2.36	2.45	285.51	3.88	0.84	-2.46	2.59	288.81	0.14	0.22
21	4.00	0.69	-2.14	2.25	287.75	3.93	0.87	-2.33	2.49	290.43	0.24	0.27
22	3.99	0.66	-2.29	2.38	286.22	3.92	0.84	-2.34	2.49	289.84	0.11	0.20
23	4.12	0.71	-2.12	2.23	288.54	4.07	0.85	-2.29	2.44	290.29	0.21	0.23
24	4.06	0.62	-2.18	2.27	285.85	4.00	0.79	-2.29	2.42	289.05	0.15	0.21
25	3.83	0.69	-2.23	2.33	287.31	3.82	0.78	-2.31	2.44	288.63	0.11	0.12
26	96.48	2.08	-5.82	6.18	289.71	96.41	2.07	-5.57	5.94	290.39	0.24	0.26
27	47.42	-30.88	-59.48	67.02	242.56	47.63	-31.48	-59.13	66.98	241.97	0.04	0.73
28	53.78	-35.07	-55.66	65.79	237.79	53.88	-35.61	-55.31	65.78	237.23	0.01	0.65
29	60.36	-35.48	-50.23	61.50	234.76	60.50	-35.88	-49.75	61.34	234.20	0.16	0.64
30	66.25	-32.85	-44.37	55.20	233.48	66.37	-33.17	-43.86	55.00	232.90	0.20	0.61
31	72.01	-28.15	-37.94	47.24	233.43	72.04	-28.50	-37.50	47.10	232.77	0.14	0.56
32	76.58	-23.12	-32.35	39.76	234.44	76.66	-23.34	-31.85	39.49	233.77	0.27	0.55
33	81.87	-16.99	-25.74	30.84	236.57	81.93	-17.13	-25.26	30.52	235.85	0.32	0.50
34	84.52	-13.46	-22.23	25.99	238.80	84.62	-13.51	-21.72	25.57	238.12	0.42	0.52
35	87.01	-10.19	-18.87	21.44	241.63	87.06	-10.25	-18.42	21.08	240.90	0.36	0.46
36	89.18	-7.41	-15.91	17.55	245.01	89.23	-7.47	-15.50	17.20	244.28	0.35	0.42
37	91.72	-3.99	-12.38	13.01	252.14	91.70	-4.06	-12.04	12.70	251.34	0.31	0.35
38	93.15	-2.07	-10.38	10.59	258.74	93.08	-2.19	-10.14	10.37	257.81	0.22	0.28
39	95.28	0.48	-7.56	7.58	273.65	95.23	0.46	-7.31	7.32	273.62	0.26	0.26
40	52.28	81.64	1.66	81.66	1.16	52.28	81.73	1.32	81.74	0.93	0.08	0.35
41	56.45	77.80	-6.43	78.06	355.28	56.51	77.82	-6.82	78.12	354.99	0.06	0.40
42	61.57	70.02	-12.02	71.05	350.26	61.67	69.90	-12.40	71.00	349.94	0.05	0.41
43	66.96	60.75	-14.53	62.46	346.54	67.13	60.39	-14.71	62.16	346.31	0.30	0.44
44	72.33	50.61	-14.93	52.76	343.57	72.43	50.40	-14.92	52.57	343.51	0.19	0.23
45	76.71	41.97	-14.44	44.38	341.02	76.84	41.75	-14.30	44.13	341.10	0.25	0.29
46	82.00	31.26	-12.83	33.79	337.68	82.07	30.97	-12.56	33.42	337.93	0.37	0.40
47	84.49	26.00	-11.85	28.57	335.49	84.55	25.87	-11.60	28.36	335.86	0.21	0.29
48	87.06	20.86	-10.71	23.45	332.83	87.14	20.64	-10.42	23.12	333.21	0.33	0.37
49	89.20	16.59	-9.67	19.20	329.77	89.21	16.48	-9.39	18.97	330.32	0.23	0.30
50	91.89	11.29	-8.39	14.06	323.38	91.86	11.25	-8.13	13.88	324.16	0.18	0.26
51	93.27	8.34	-7.65	11.32	317.46	93.23	8.32	-7.39	11.13	318.40	0.19	0.26
52	95.31	4.38	-6.55	7.88	303.75	95.19	4.47	-6.34	7.76	305.18	0.12	0.26

53	88.62	5.87	99.71	99.88	86.63	88.67	5.68	98.90	99.07	86.71	0.81	0.83
54	90.03	1.56	88.73	88.74	88.99	90.15	1.29	87.23	87.24	89.16	1.50	1.53
55	91.50	-1.37	74.05	74.07	91.06	91.57	-1.59	72.39	72.41	91.26	1.66	1.68
56	92.49	-2.91	58.54	58.61	92.84	92.61	-3.00	56.34	56.42	93.05	2.19	2.21
57	93.28	-3.37	46.46	46.58	94.15	93.34	-3.37	44.35	44.48	94.34	2.10	2.11
58	94.20	-3.28	36.69	36.83	95.11	94.25	-3.18	34.74	34.88	95.22	1.95	1.95
59	94.88	-2.41	24.13	24.25	95.69	94.88	-2.23	22.64	22.75	95.62	1.50	1.50
60	95.30	-1.70	17.71	17.79	95.47	95.32	-1.52	16.41	16.48	95.30	1.31	1.31
61	95.42	-1.11	13.15	13.20	94.83	95.42	-0.95	12.12	12.15	94.48	1.05	1.04
62	95.63	-0.56	9.20	9.22	93.48	95.61	-0.42	8.43	8.44	92.86	0.78	0.78
63	95.90	0.14	4.63	4.63	88.25	95.86	0.26	4.07	4.08	86.41	0.55	0.57
64	96.24	0.91	0.19	0.93	12.09	96.20	0.98	0.04	0.99	2.28	0.06	0.17
65	96.46	1.62	-3.73	4.07	293.53	96.42	1.66	-3.67	4.02	294.31	0.05	0.08
66	8.55	-0.16	-3.71	3.72	267.53	8.32	-0.03	-4.04	4.04	269.58	0.32	0.42
67	22.52	-1.85	-3.61	4.06	242.91	22.55	-1.57	-3.75	4.06	247.27	0.00	0.31
68	37.58	-2.06	-2.31	3.09	228.29	37.58	-2.02	-2.87	3.51	234.88	0.42	0.56
69	47.80	-0.19	-4.11	4.11	267.38	47.93	-0.46	-4.74	4.76	264.49	0.65	0.70
70	57.99	0.64	-4.21	4.26	278.68	58.25	0.77	-4.93	4.99	278.91	0.73	0.78
71	66.46	2.19	-4.40	4.92	296.45	66.68	2.04	-5.02	5.42	292.12	0.50	0.67
72	75.34	2.74	-5.02	5.72	298.64	75.63	2.52	-5.38	5.94	295.04	0.22	0.51
73	79.23	3.18	-6.02	6.81	297.85	79.31	3.26	-6.27	7.06	297.46	0.25	0.27
74	82.78	3.05	-6.02	6.75	296.83	82.95	3.00	-6.19	6.87	295.85	0.12	0.25
75	86.47	2.85	-5.24	5.96	298.52	86.53	2.81	-5.39	6.08	297.56	0.12	0.17
76	89.97	2.86	-6.08	6.72	295.19	90.03	2.79	-6.07	6.68	294.69	0.04	0.09
77	91.84	2.69	-6.00	6.57	294.12	91.82	2.77	-6.02	6.63	294.72	0.06	0.08
78	94.66	2.28	-5.46	5.92	292.66	94.66	2.17	-5.25	5.68	292.49	0.24	0.24
79	27.46	50.83	-25.68	56.95	333.20	27.20	51.05	-26.00	57.29	333.01	0.34	0.47
80	29.24	46.67	-5.80	47.03	352.91	29.00	46.81	-6.15	47.21	352.52	0.18	0.45
81	49.23	79.63	30.65	85.33	21.05	49.18	79.81	30.53	85.45	20.93	0.12	0.22
82	40.36	48.06	33.31	58.48	34.73	40.28	48.07	32.80	58.20	34.31	0.28	0.52
83	69.06	45.80	82.97	94.78	61.10	68.96	45.95	82.65	94.57	60.93	0.21	0.37
84	50.15	-0.20	50.15	50.15	90.23	50.13	-0.53	49.80	49.81	90.62	0.34	0.48
85	36.94	-2.48	-2.53	3.54	225.67	37.10	-2.56	-3.02	3.96	229.77	0.42	0.52
86	63.01	-30.99	67.49	74.27	114.67	63.07	-31.12	67.16	74.02	114.86	0.25	0.36
87	35.46	-51.32	14.50	53.33	164.22	35.48	-51.89	13.97	53.74	164.93	0.41	0.78
88	37.48	-54.51	-24.36	59.71	204.08	37.68	-54.99	-24.55	60.22	204.06	0.51	0.55
89	28.96	-29.56	-32.09	43.64	227.35	29.01	-29.74	-32.42	44.00	227.47	0.36	0.38
90	30.16	0.45	-62.76	62.76	270.41	30.20	0.37	-62.85	62.85	270.34	0.09	0.13
91	14.83	10.03	-33.48	34.95	286.68	14.63	10.30	-33.82	35.35	286.94	0.40	0.48
92	19.30	33.10	-36.66	49.40	312.08	19.04	33.31	-37.23	49.95	311.82	0.55	0.66
93	53.12	50.78	-11.97	52.17	346.74	53.26	50.83	-12.16	52.27	346.55	0.10	0.24
94	54.41	46.85	3.23	46.96	3.95	54.47	47.12	2.55	47.19	3.10	0.23	0.73
95	40.97	61.33	26.60	66.85	23.44	40.86	61.48	26.21	66.83	23.09	0.02	0.43
96	55.82	42.67	28.07	51.08	33.34	56.01	42.67	27.51	50.77	32.81	0.31	0.59
97	50.96	43.90	53.82	69.45	50.80	50.78	43.77	53.34	69.00	50.62	0.45	0.53
98	73.35	-1.76	50.06	50.09	92.01	73.51	-2.06	48.95	48.99	92.41	1.10	1.16
99	45.91	-41.60	38.28	56.53	137.38	45.99	-41.91	38.03	56.59	137.78	0.06	0.41
100	53.15	-44.79	13.25	46.71	163.51	53.44	-45.02	12.69	46.78	164.26	0.07	0.67
101	33.84	-56.92	-4.77	57.12	184.79	34.01	-57.43	-5.16	57.66	185.13	0.54	0.66
102	52.85	-32.01	-34.18	46.83	226.88	53.06	-32.13	-34.30	47.00	226.87	0.17	0.27
103	22.52	4.15	-50.64	50.81	274.68	22.42	4.55	-51.12	51.32	275.09	0.51	0.63
104	35.93	13.75	-43.14	45.28	287.68	36.12	13.48	-43.24	45.29	287.32	0.01	0.34
105	19.45	19.26	-9.72	21.58	333.21	19.11	19.14	-10.30	21.74	331.72	0.16	0.68
106	46.53	30.75	-10.03	32.34	341.93	46.63	30.79	-10.66	32.58	340.91	0.24	0.64
107	71.84	20.66	-10.05	22.98	334.07	72.12	20.43	-10.28	22.87	333.28	0.11	0.43
108	24.34	17.38	7.85	19.07	24.32	24.14	17.68	7.56	19.22	23.15	0.15	0.46
109	72.96	16.37	6.23	17.52	20.83	73.01	16.33	5.25	17.16	17.82	0.36	0.98

110	31.34	-5.49	19.00	19.77	106.12	31.36	-5.53	18.44	19.26	106.70	0.51	0.59
111	58.32	-2.87	26.76	26.91	96.13	58.51	-3.23	26.09	26.29	97.05	0.62	0.78
112	79.13	-0.32	12.42	12.42	91.46	79.28	-0.19	11.59	11.59	90.95	0.83	0.85
113	83.05	3.08	-6.18	6.90	296.53	83.18	3.04	-6.37	7.06	295.53	0.16	0.23
114	23.81	-25.50	2.83	25.66	173.66	23.70	-25.73	2.38	25.84	174.71	0.18	0.52
115	47.99	-30.67	7.84	31.66	165.65	48.19	-30.74	7.14	31.56	166.93	0.10	0.73
116	72.49	-14.22	0.49	14.23	178.02	72.65	-14.24	-0.39	14.25	181.56	0.02	0.89
117	19.83	-18.79	-15.29	24.23	219.13	19.63	-18.85	-15.74	24.56	219.86	0.33	0.50
118	65.99	6.53	-20.80	21.80	287.44	66.24	6.26	-20.78	21.70	286.77	0.10	0.37
119	8.51	0.59	-11.84	11.85	272.85	8.37	0.69	-11.95	11.97	273.30	0.12	0.20
120	71.91	-10.41	-17.10	20.02	238.67	72.05	-10.49	-17.46	20.37	239.01	0.35	0.39
121	47.41	-21.37	-21.22	30.12	224.80	47.66	-21.44	-21.38	30.28	224.91	0.16	0.30
122	3.73	0.83	-2.40	2.54	289.09	3.85	0.78	-2.26	2.39	288.94	0.15	0.19
123	4.10	0.68	-2.67	2.75	284.25	4.01	0.67	-2.61	2.69	284.36	0.06	0.11
124	4.80	0.29	-3.32	3.33	274.97	4.66	0.40	-3.24	3.26	277.06	0.07	0.20
125	3.79	0.81	-2.35	2.49	288.97	3.68	0.81	-2.31	2.45	289.36	0.04	0.12
126	5.48	0.37	-3.46	3.48	276.09	5.35	0.57	-3.54	3.59	279.10	0.11	0.25
127	9.43	-2.77	-5.33	6.01	242.52	9.30	-2.73	-5.53	6.17	243.70	0.16	0.24
128	17.37	-6.42	-6.56	9.18	225.64	17.37	-6.42	-6.85	9.39	226.86	0.21	0.29
129	3.69	0.79	-2.34	2.47	288.70	3.58	0.73	-2.25	2.37	288.00	0.10	0.15
130	7.95	-1.17	-4.34	4.50	254.94	7.76	-1.03	-4.56	4.67	257.29	0.17	0.32
131	21.56	-6.39	-6.11	8.84	223.70	21.34	-6.34	-6.35	8.97	225.06	0.13	0.33
132	34.23	-9.99	-8.44	13.08	220.18	34.21	-10.61	-8.83	13.80	219.79	0.72	0.73
133	43.39	-11.55	-11.63	16.39	225.20	43.55	-11.48	-11.82	16.48	225.85	0.09	0.26
134	3.95	0.83	-2.36	2.50	289.27	3.91	0.85	-2.31	2.46	290.14	0.04	0.07
135	12.32	-1.94	-4.77	5.16	247.84	12.10	-1.82	-4.72	5.06	248.90	0.10	0.26
136	33.07	-5.83	-6.02	8.38	225.90	33.28	-5.71	-6.30	8.50	227.81	0.12	0.37
137	45.67	-7.77	-8.05	11.19	226.02	45.94	-7.92	-8.41	11.55	226.72	0.36	0.47
138	58.71	-6.25	-8.94	10.91	235.04	58.98	-6.17	-9.48	11.31	236.94	0.40	0.61
139	64.79	-6.40	-10.01	11.88	237.42	64.96	-6.48	-10.48	12.32	238.25	0.44	0.51
140	4.01	0.74	-2.36	2.47	287.34	3.91	0.81	-2.44	2.57	288.37	0.10	0.15
141	16.39	-2.39	-3.94	4.61	238.76	16.30	-2.22	-4.28	4.82	242.61	0.21	0.39
142	40.50	-4.62	-4.98	6.80	227.17	40.61	-4.59	-5.63	7.27	230.79	0.47	0.66
143	56.82	-2.97	-7.01	7.62	247.06	57.13	-3.02	-7.56	8.14	248.22	0.52	0.63
144	72.10	-1.25	-7.97	8.07	261.12	72.29	-1.37	-8.51	8.62	260.85	0.55	0.58
145	78.85	-0.79	-9.95	9.98	265.49	79.03	-0.65	-9.93	9.95	266.24	0.03	0.23
146	3.81	0.86	-2.33	2.48	290.19	3.86	0.82	-2.38	2.51	288.98	0.03	0.08
147	20.67	-1.88	-3.91	4.34	244.28	20.68	-1.68	-4.03	4.36	247.41	0.02	0.23
148	44.88	-2.29	-4.75	5.27	244.28	45.03	-2.41	-5.02	5.57	244.30	0.30	0.33
149	62.00	-0.37	-5.23	5.24	265.95	62.36	-0.21	-5.61	5.61	267.87	0.37	0.55
150	77.98	1.20	-7.52	7.62	279.09	78.09	1.06	-7.91	7.98	277.66	0.36	0.43
151	84.43	0.86	-7.28	7.33	276.72	84.48	1.00	-7.39	7.46	277.71	0.13	0.18
152	8.60	-4.38	-6.85	8.13	237.42	8.42	-4.06	-7.07	8.16	240.17	0.03	0.43
153	32.70	-15.37	-11.88	19.43	217.71	32.85	-15.45	-12.21	19.69	218.32	0.26	0.37
154	52.15	-11.63	-13.19	17.59	228.59	52.43	-11.78	-13.65	18.03	229.21	0.44	0.56
155	70.19	-6.39	-12.68	14.20	243.25	70.39	-6.41	-12.99	14.48	243.75	0.28	0.37
156	84.51	-1.52	-9.51	9.63	260.89	84.57	-1.55	-9.64	9.77	260.88	0.14	0.15
157	90.97	0.09	-8.04	8.04	270.61	90.91	0.11	-8.04	8.04	270.77	0.00	0.06
158	93.70	1.04	-6.86	6.93	278.64	93.78	1.12	-6.58	6.68	279.67	0.25	0.30
159	34.75	-28.47	-45.33	53.53	237.87	34.84	-28.63	-45.35	53.63	237.74	0.10	0.18
160	38.18	63.85	1.52	63.87	1.36	37.98	63.90	1.11	63.91	0.99	0.04	0.46
161	66.55	6.06	75.64	75.89	85.42	66.58	5.68	75.36	75.57	85.69	0.32	0.47
162	16.96	20.02	-47.27	51.33	292.95	16.77	20.33	-47.66	51.82	293.10	0.49	0.53
163	38.41	-59.33	18.35	62.10	162.81	38.54	-59.97	18.07	62.64	163.23	0.54	0.71
164	46.98	61.43	45.51	76.45	36.54	46.90	61.55	45.12	76.31	36.24	0.14	0.42
165	54.77	9.11	-30.15	31.49	286.81	54.97	8.92	-30.29	31.58	286.41	0.09	0.31
166	65.52	-26.36	5.36	26.89	168.51	65.74	-26.36	4.54	26.75	170.22	0.14	0.85



167	66.32	26.38	15.00	30.35	29.62	66.51	26.27	14.06	29.80	28.15	0.55	0.97
168	14.66	9.80	-32.90	34.33	286.60	14.45	10.07	-33.29	34.78	286.83	0.45	0.52
169	35.13	-51.44	14.42	53.42	164.34	35.21	-51.97	13.96	53.82	164.97	0.40	0.71
170	39.86	47.77	32.63	57.85	34.33	39.64	48.06	32.48	58.01	34.05	0.16	0.39
171	42.56	4.54	-24.21	24.63	280.61	42.62	4.60	-24.54	24.97	280.61	0.34	0.34
172	51.90	-23.67	5.22	24.24	167.56	52.04	-23.99	4.82	24.47	168.64	0.23	0.53
173	52.36	20.31	12.09	23.64	30.77	52.66	20.03	11.27	22.99	29.35	0.65	0.92
174	19.67	-18.77	-15.93	24.62	220.31	19.52	-18.64	-16.13	24.65	220.86	0.03	0.28
175	19.42	19.44	-9.63	21.69	333.63	19.22	19.63	-9.90	21.98	333.24	0.29	0.39
176	31.38	-4.85	19.21	19.81	104.17	31.15	-5.04	18.70	19.37	105.08	0.44	0.59
177	8.80	0.51	-12.02	12.03	272.43	8.82	0.58	-12.13	12.14	272.75	0.11	0.13
178	23.79	-25.30	2.94	25.47	173.37	23.66	-25.45	2.62	25.58	174.13	0.11	0.38
179	23.37	16.79	7.74	18.49	24.75	22.98	16.67	7.06	18.10	22.96	0.39	0.79
180	22.98	-0.79	-11.45	11.48	266.04	23.01	-0.82	-11.79	11.81	266.01	0.33	0.34
181	31.54	-14.05	0.19	14.05	179.24	31.62	-14.20	-0.23	14.21	180.92	0.16	0.45
182	31.12	7.30	3.73	8.19	27.08	31.19	7.21	3.22	7.89	24.07	0.30	0.52

## 4 hr after vs Original

Average	$\Delta C^*$	$\Delta E$
	0.33	0.51

Average  $\Delta E$  - overprint color excluded

C	0.22	0.51
M	0.19	0.32
Y	1.15	1.17
K	0.27	0.37
Paper	0.24	0.26

Average  $\Delta E$  - overprint color only

0.27	0.47
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ID#	Original					8 hr after					$\Delta C^*$	$\Delta E$	
	NUM	L*	a*	b*	C*	h	L*	a*	b*	C*			h
1	1	42.01	-24.72	-61.69	66.46	248.16	42.24	-25.51	-61.25	66.35	247.39	0.11	0.93
2	2	49.38	82.49	10.58	83.16	7.31	49.30	82.70	10.22	83.33	7.04	0.17	0.42
3	3	87.00	10.27	105.69	106.18	84.45	87.16	9.76	105.81	106.26	84.73	0.08	0.55
4	4	17.26	28.88	-56.94	63.84	296.89	17.02	29.42	-57.60	64.67	297.06	0.83	0.89
5	5	40.58	-65.34	21.53	68.80	161.76	40.96	-66.64	21.89	70.14	161.82	1.34	1.40
6	6	53.37	73.54	57.31	93.24	37.93	53.22	73.67	57.86	93.68	38.14	0.44	0.58
7	7	3.92	0.66	-2.24	2.33	286.55	3.94	0.91	-2.50	2.66	289.98	0.33	0.36
8	8	36.37	20.12	-53.42	57.08	290.64	36.66	19.69	-53.46	56.98	290.22	0.10	0.52
9	9	57.52	-56.97	19.19	60.12	161.38	58.00	-57.43	18.41	60.31	162.22	0.19	1.02
10	10	62.52	58.16	43.34	72.53	36.69	62.62	57.86	42.31	71.67	36.18	0.86	1.08
11	11	64.73	10.50	-34.48	36.05	286.94	65.00	10.20	-34.04	35.54	286.68	0.51	0.60
12	12	78.22	30.25	17.84	35.12	30.53	78.43	30.10	16.47	34.31	28.69	0.81	1.39
13	13	66.30	1.74	-4.24	4.58	292.29	66.66	1.63	-5.00	5.26	288.10	0.68	0.85
14	14	77.20	-28.53	5.17	28.99	169.73	77.45	-28.48	4.30	28.80	171.41	0.19	0.91
15	15	81.82	6.28	-19.71	20.69	287.66	81.87	6.07	-19.22	20.16	287.53	0.53	0.54
16	16	87.81	-11.29	-1.58	11.40	187.97	87.94	-11.21	-1.80	11.35	189.11	0.05	0.27
17	17	88.21	14.35	3.99	14.89	15.54	88.32	14.30	3.64	14.75	14.28	0.14	0.37
18	18	4.12	0.71	-2.20	2.32	287.97	3.93	0.96	-2.55	2.73	290.54	0.41	0.47
19	19	4.00	0.66	-2.28	2.38	286.06	3.91	0.95	-2.47	2.65	291.06	0.27	0.36
20	20	3.95	0.66	-2.36	2.45	285.51	3.92	0.85	-2.47	2.61	289.08	0.16	0.22
21	21	4.00	0.69	-2.14	2.25	287.75	3.98	0.94	-2.34	2.52	291.87	0.27	0.32
22	22	3.99	0.66	-2.29	2.38	286.22	3.96	0.92	-2.45	2.62	290.61	0.24	0.31
23	23	4.12	0.71	-2.12	2.23	288.54	4.11	1.01	-2.40	2.61	292.85	0.38	0.41
24	24	4.06	0.62	-2.18	2.27	285.85	3.97	0.85	-2.45	2.59	289.15	0.32	0.37
25	25	3.83	0.69	-2.23	2.33	287.31	3.83	0.91	-2.48	2.65	290.15	0.32	0.33
26	26	96.48	2.08	-5.82	6.18	289.71	96.44	2.04	-5.42	5.79	290.63	0.39	0.40
27	27	47.42	-30.88	-59.48	67.02	242.56	47.72	-31.77	-58.93	66.94	241.67	0.08	1.09
28	28	53.78	-35.07	-55.66	65.79	237.79	53.96	-35.84	-55.10	65.73	236.96	0.06	0.97
29	29	60.36	-35.48	-50.23	61.50	234.76	60.56	-36.03	-49.57	61.28	233.99	0.22	0.88
30	30	66.25	-32.85	-44.37	55.20	233.48	66.46	-33.23	-43.60	54.82	232.69	0.38	0.88
31	31	72.01	-28.15	-37.94	47.24	233.43	72.08	-28.64	-37.32	47.04	232.50	0.20	0.79
32	32	76.58	-23.12	-32.35	39.76	234.44	76.70	-23.44	-31.66	39.39	233.48	0.37	0.77
33	33	81.87	-16.99	-25.74	30.84	236.57	81.97	-17.21	-25.06	30.40	235.53	0.44	0.72
34	34	84.52	-13.46	-22.23	25.99	238.80	84.65	-13.57	-21.53	25.45	237.78	0.54	0.72
35	35	87.01	-10.19	-18.87	21.44	241.63	87.09	-10.32	-18.22	20.94	240.48	0.50	0.67
36	36	89.18	-7.41	-15.91	17.55	245.01	89.22	-7.56	-15.34	17.11	243.76	0.44	0.59
37	37	91.72	-3.99	-12.38	13.01	252.14	91.70	-4.12	-11.87	12.57	250.85	0.44	0.53
38	38	93.15	-2.07	-10.38	10.59	258.74	93.13	-2.15	-9.90	10.13	257.73	0.46	0.49
39	39	95.28	0.48	-7.56	7.58	273.65	95.26	0.46	-7.07	7.09	273.73	0.49	0.49
40	40	52.28	81.64	1.66	81.66	1.16	52.27	81.70	1.02	81.71	0.71	0.05	0.64
41	41	56.45	77.80	-6.43	78.06	355.28	56.52	77.76	-7.01	78.08	354.85	0.02	0.59
42	42	61.57	70.02	-12.02	71.05	350.26	61.71	69.81	-12.49	70.91	349.86	0.14	0.53
43	43	66.96	60.75	-14.53	62.46	346.54	67.18	60.32	-14.70	62.08	346.31	0.38	0.51
44	44	72.33	50.61	-14.93	52.76	343.57	72.49	50.31	-14.83	52.45	343.57	0.31	0.35
45	45	76.71	41.97	-14.44	44.38	341.02	76.87	41.71	-14.16	44.04	341.25	0.34	0.41
46	46	82.00	31.26	-12.83	33.79	337.68	82.12	30.89	-12.40	33.28	338.12	0.51	0.58
47	47	84.49	26.00	-11.85	28.57	335.49	84.59	25.81	-11.44	28.23	336.10	0.34	0.46
48	48	87.06	20.86	-10.71	23.45	332.83	87.16	20.62	-10.27	23.04	333.52	0.41	0.51
49	49	89.20	16.59	-9.67	19.20	329.77	89.27	16.38	-9.22	18.80	330.64	0.40	0.50
50	50	91.89	11.29	-8.39	14.06	323.38	91.92	11.14	-7.94	13.68	324.50	0.38	0.48
51	51	93.27	8.34	-7.65	11.32	317.46	93.27	8.20	-7.20	10.91	318.74	0.41	0.47
52	52	95.31	4.38	-6.55	7.88	303.75	95.28	4.26	-6.14	7.48	304.75	0.40	0.43

53	88.62	5.87	99.71	99.88	86.63	88.79	5.37	99.34	99.49	86.90	0.39	0.64
54	90.03	1.56	88.73	88.74	88.99	90.20	1.16	87.57	87.58	89.24	1.16	1.24
55	91.50	-1.37	74.05	74.07	91.06	91.63	-1.64	72.34	72.36	91.30	1.71	1.74
56	92.49	-2.91	58.54	58.61	92.84	92.63	-3.03	56.36	56.44	93.08	2.17	2.19
57	93.28	-3.37	46.46	46.58	94.15	93.35	-3.37	44.42	44.55	94.34	2.03	2.04
58	94.20	-3.28	36.69	36.83	95.11	94.27	-3.17	34.74	34.89	95.22	1.94	1.95
59	94.88	-2.41	24.13	24.25	95.69	94.89	-2.22	22.66	22.77	95.60	1.48	1.48
60	95.30	-1.70	17.71	17.79	95.47	95.32	-1.52	16.45	16.52	95.29	1.27	1.27
61	95.42	-1.11	13.15	13.20	94.83	95.42	-0.96	12.20	12.24	94.51	0.96	0.96
62	95.63	-0.56	9.20	9.22	93.48	95.60	-0.42	8.49	8.50	92.86	0.72	0.72
63	95.90	0.14	4.63	4.63	88.25	95.87	0.25	4.15	4.16	86.55	0.47	0.49
64	96.24	0.91	0.19	0.93	12.09	96.20	0.97	0.12	0.98	7.00	0.05	0.10
65	96.46	1.62	-3.73	4.07	293.53	96.42	1.63	-3.52	3.88	294.78	0.19	0.21
66	8.55	-0.16	-3.71	3.72	267.53	8.45	0.04	-3.93	3.93	270.61	0.21	0.31
67	22.52	-1.85	-3.61	4.06	242.91	22.55	-1.50	-3.39	3.71	246.06	0.35	0.41
68	37.58	-2.06	-2.31	3.09	228.29	37.72	-2.45	-2.42	3.44	224.69	0.35	0.43
69	47.80	-0.19	-4.11	4.11	267.38	48.04	-0.67	-4.43	4.48	261.45	0.37	0.62
70	57.99	0.64	-4.21	4.26	278.68	58.30	0.70	-4.70	4.75	278.46	0.49	0.58
71	66.46	2.19	-4.40	4.92	296.45	66.80	2.08	-4.97	5.39	292.69	0.47	0.67
72	75.34	2.74	-5.02	5.72	298.64	75.59	2.60	-5.34	5.94	295.98	0.22	0.43
73	79.23	3.18	-6.02	6.81	297.85	79.39	3.19	-6.23	7.00	297.10	0.19	0.26
74	82.78	3.05	-6.02	6.75	296.83	83.01	2.95	-6.03	6.71	296.11	0.04	0.25
75	86.47	2.85	-5.24	5.96	298.52	86.53	2.79	-5.38	6.06	297.37	0.10	0.16
76	89.97	2.86	-6.08	6.72	295.19	89.96	2.87	-6.04	6.69	295.44	0.03	0.04
77	91.84	2.69	-6.00	6.57	294.12	91.85	2.67	-5.89	6.47	294.41	0.10	0.11
78	94.66	2.28	-5.46	5.92	292.66	94.66	2.14	-5.13	5.56	292.66	0.36	0.36
79	27.46	50.83	-25.68	56.95	333.20	27.22	51.14	-26.12	57.42	332.94	0.47	0.59
80	29.24	46.67	-5.80	47.03	352.91	29.03	46.70	-5.60	47.04	353.17	0.01	0.29
81	49.23	79.63	30.65	85.33	21.05	49.13	79.72	31.08	85.56	21.30	0.23	0.45
82	40.36	48.06	33.31	58.48	34.73	40.23	48.09	33.54	58.64	34.89	0.16	0.27
83	69.06	45.80	82.97	94.78	61.10	69.11	45.65	83.24	94.93	61.26	0.15	0.31
84	50.15	-0.20	50.15	50.15	90.23	50.24	-0.72	50.40	50.40	90.82	0.25	0.58
85	36.94	-2.48	-2.53	3.54	225.67	37.21	-2.76	-2.55	3.75	222.70	0.21	0.39
86	63.01	-30.99	67.49	74.27	114.67	63.22	-31.58	67.70	74.70	115.00	0.43	0.66
87	35.46	-51.32	14.50	53.33	164.22	35.63	-52.27	14.59	54.27	164.40	0.94	0.97
88	37.48	-54.51	-24.36	59.71	204.08	37.73	-55.42	-24.18	60.47	203.57	0.76	0.96
89	28.96	-29.56	-32.09	43.64	227.35	29.02	-30.08	-32.17	44.04	226.92	0.40	0.53
90	30.16	0.45	-62.76	62.76	270.41	30.22	0.30	-62.82	62.83	270.27	0.07	0.17
91	14.83	10.03	-33.48	34.95	286.68	14.56	10.10	-33.65	35.13	286.71	0.18	0.33
92	19.30	33.10	-36.66	49.40	312.08	18.98	33.26	-37.10	49.83	311.88	0.43	0.57
93	53.12	50.78	-11.97	52.17	346.74	53.32	50.64	-12.21	52.09	346.44	0.08	0.34
94	54.41	46.85	3.23	46.96	3.95	54.58	46.77	2.80	46.86	3.43	0.10	0.47
95	40.97	61.33	26.60	66.85	23.44	40.84	61.45	27.02	67.13	23.73	0.28	0.46
96	55.82	42.67	28.07	51.08	33.34	56.01	42.43	27.85	50.75	33.28	0.33	0.38
97	50.96	43.90	53.82	69.45	50.80	50.88	43.92	54.11	69.69	50.93	0.24	0.30
98	73.35	-1.76	50.06	50.09	92.01	73.56	-2.01	49.05	49.09	92.35	1.00	1.06
99	45.91	-41.60	38.28	56.53	137.38	46.06	-42.45	38.51	57.31	137.78	0.78	0.89
100	53.15	-44.79	13.25	46.71	163.51	53.49	-45.24	12.95	47.06	164.03	0.35	0.64
101	33.84	-56.92	-4.77	57.12	184.79	34.10	-57.77	-4.87	57.98	184.82	0.86	0.89
102	52.85	-32.01	-34.18	46.83	226.88	53.13	-32.37	-34.31	47.17	226.67	0.34	0.47
103	22.52	4.15	-50.64	50.81	274.68	22.43	4.38	-51.01	51.20	274.91	0.39	0.44
104	35.93	13.75	-43.14	45.28	287.68	36.21	13.29	-43.19	45.19	287.11	0.09	0.54
105	19.45	19.26	-9.72	21.58	333.21	19.12	18.96	-9.74	21.32	332.82	0.26	0.45
106	46.53	30.75	-10.03	32.34	341.93	46.74	30.58	-10.33	32.27	341.33	0.07	0.40
107	71.84	20.66	-10.05	22.98	334.07	72.10	20.52	-10.20	22.91	333.58	0.07	0.33
108	24.34	17.38	7.85	19.07	24.32	24.07	17.24	7.95	18.98	24.75	0.09	0.32
109	72.96	16.37	6.23	17.52	20.83	73.10	16.32	5.45	17.21	18.47	0.31	0.79

110	31.54	-5.49	19.00	19.77	106.12	31.31	-5.70	18.98	19.81	106.72	0.04	0.31
111	58.32	-2.87	26.76	26.91	96.13	58.60	-3.25	26.29	26.49	97.05	0.42	0.67
112	79.13	-0.32	12.42	12.42	91.46	79.31	-0.29	11.52	11.53	91.44	0.89	0.92
113	83.05	3.08	-6.18	6.90	296.53	83.18	3.01	-6.35	7.03	295.32	0.13	0.23
114	23.81	-25.50	2.83	25.66	173.66	23.69	-26.13	2.90	26.29	173.67	0.63	0.65
115	47.99	-30.67	7.84	31.66	165.65	48.31	-31.06	7.37	31.92	166.66	0.26	0.69
116	72.49	-14.22	0.49	14.23	178.02	72.78	-14.16	-0.24	14.16	180.96	0.07	0.79
117	19.83	-18.79	-15.29	24.23	219.13	19.60	-19.14	-15.43	24.58	218.87	0.35	0.44
118	65.99	6.53	-20.80	21.80	287.44	66.24	6.26	-20.75	21.68	286.77	0.12	0.37
119	8.51	0.59	-11.84	11.85	272.85	8.23	0.55	-11.59	11.60	272.71	0.25	0.38
120	71.91	-10.41	-17.10	20.02	238.67	72.06	-10.47	-17.25	20.18	238.74	0.16	0.22
121	47.41	-21.37	-21.22	30.12	224.80	47.71	-21.68	-21.24	30.35	224.41	0.23	0.43
122	3.73	0.83	-2.40	2.54	289.09	3.84	0.84	-2.29	2.43	290.11	0.11	0.16
123	4.10	0.68	-2.67	2.75	284.25	4.04	0.67	-2.51	2.60	284.99	0.15	0.17
124	4.80	0.29	-3.32	3.33	274.97	4.78	0.32	-3.12	3.13	275.84	0.20	0.20
125	3.79	0.81	-2.35	2.49	288.97	3.72	0.81	-2.23	2.38	290.00	0.11	0.14
126	5.48	0.37	-3.46	3.48	276.09	5.40	0.56	-3.32	3.37	279.50	0.11	0.25
127	9.43	-2.77	-5.33	6.01	242.52	9.14	-2.79	-5.59	6.25	243.47	0.24	0.39
128	17.37	-6.42	-6.56	9.18	225.64	17.41	-6.44	-6.67	9.27	226.00	0.09	0.12
129	3.69	0.79	-2.34	2.47	288.70	3.58	0.86	-2.23	2.39	291.00	0.08	0.17
130	7.95	-1.17	-4.34	4.50	254.94	7.83	-0.99	-4.50	4.61	257.62	0.11	0.27
131	21.56	-6.39	-6.11	8.84	223.70	21.57	-6.64	-5.79	8.81	221.06	0.03	0.41
132	34.23	-9.99	-8.44	13.08	220.18	34.55	-10.48	-8.36	13.41	218.60	0.33	0.59
133	43.39	-11.55	-11.63	16.39	225.20	43.70	-11.87	-11.80	16.74	224.82	0.35	0.48
134	3.95	0.83	-2.36	2.50	289.27	3.79	0.91	-2.42	2.59	290.64	0.09	0.19
135	12.32	-1.94	-4.77	5.16	247.84	12.28	-1.98	-4.65	5.05	246.90	0.11	0.13
136	33.07	-5.83	-6.02	8.38	225.90	33.24	-6.13	-6.05	8.61	224.62	0.23	0.35
137	45.67	-7.77	-8.05	11.19	226.02	45.93	-8.10	-8.25	11.56	225.51	0.37	0.47
138	58.71	-6.25	-8.94	10.91	235.04	59.15	-6.38	-9.37	11.34	235.73	0.43	0.63
139	64.79	-6.40	-10.01	11.88	237.42	65.01	-6.50	-10.53	12.37	238.33	0.49	0.57
140	4.01	0.74	-2.36	2.47	287.34	3.89	0.84	-2.42	2.57	289.19	0.10	0.17
141	16.39	-2.39	-3.94	4.61	238.76	16.25	-2.59	-4.03	4.79	237.28	0.18	0.26
142	40.50	-4.62	-4.98	6.80	227.17	40.73	-4.75	-5.62	7.36	229.79	0.56	0.69
143	56.82	-2.97	-7.01	7.62	247.06	57.21	-3.32	-7.51	8.21	246.19	0.59	0.72
144	72.10	-1.25	-7.97	8.07	261.12	72.24	-1.36	-8.32	8.43	260.69	0.36	0.39
145	78.85	-0.79	-9.95	9.98	265.49	79.00	-0.81	-9.97	10.01	265.34	0.03	0.15
146	3.81	0.86	-2.33	2.48	290.19	3.76	0.85	-2.23	2.39	290.73	0.09	0.11
147	20.67	-1.88	-3.91	4.34	244.28	20.66	-1.86	-4.00	4.41	245.03	0.07	0.09
148	44.88	-2.29	-4.75	5.27	244.28	45.16	-2.57	-4.92	5.55	242.40	0.28	0.43
149	62.00	-0.37	-5.23	5.24	265.95	62.34	-0.52	-5.73	5.76	264.82	0.52	0.62
150	77.98	1.20	-7.52	7.62	279.09	78.17	0.97	-7.65	7.71	277.25	0.09	0.33
151	84.43	0.86	-7.28	7.33	276.72	84.60	0.85	-7.28	7.33	276.63	0.00	0.17
152	8.60	-4.38	-6.85	8.13	237.42	8.37	-4.03	-6.97	8.05	239.97	0.08	0.44
153	32.70	-15.37	-11.88	19.43	217.71	32.85	-15.98	-12.03	20.00	216.98	0.57	0.65
154	52.15	-11.63	-13.19	17.59	228.59	52.43	-11.92	-13.52	18.03	228.60	0.44	0.52
155	70.19	-6.39	-12.68	14.20	243.25	70.43	-6.49	-13.01	14.54	243.47	0.34	0.42
156	84.51	-1.52	-9.51	9.63	260.89	84.67	-1.67	-9.55	9.70	260.08	0.07	0.22
157	90.97	0.09	-8.04	8.04	270.61	91.02	0.00	-7.72	7.72	270.01	0.32	0.34
158	93.70	1.04	-6.86	6.93	278.64	93.69	1.05	-6.61	6.70	279.01	0.23	0.25
159	34.75	-28.47	-45.33	53.53	237.87	34.89	-29.02	-45.14	53.66	237.27	0.13	0.60
160	38.18	63.85	1.52	63.87	1.36	38.01	63.94	1.29	63.95	1.16	0.08	0.30
161	66.55	6.06	75.64	75.89	85.42	66.67	5.61	75.79	76.00	85.76	0.11	0.49
162	16.96	20.02	-47.27	51.33	292.95	16.84	20.24	-47.48	51.62	293.08	0.29	0.33
163	38.41	-59.33	18.35	62.10	162.81	38.74	-60.27	18.45	63.03	162.98	0.93	1.00
164	46.98	61.43	45.51	76.45	36.54	46.87	61.60	45.72	76.72	36.58	0.27	0.29
165	54.77	9.11	-30.15	31.49	286.81	55.02	8.71	-30.13	31.36	286.13	0.13	0.47
166	65.52	-26.36	5.36	26.89	168.51	65.78	-26.61	4.44	26.97	170.52	0.08	0.99

167	66.32	26.38	15.00	30.35	29.62	66.57	26.26	14.06	29.79	28.16	0.56	0.98
168	14.66	9.80	-32.90	34.33	286.60	14.43	9.94	-33.06	34.52	286.73	0.19	0.31
169	35.13	-51.44	14.42	53.42	164.34	35.35	-52.30	14.32	54.23	164.69	0.81	0.89
170	39.86	47.77	32.63	57.85	34.33	39.66	47.92	33.04	58.20	34.58	0.35	0.48
171	42.56	4.54	-24.21	24.63	280.61	42.88	4.30	-24.23	24.61	280.07	0.02	0.40
172	51.90	-23.67	5.22	24.24	167.56	52.25	-23.93	4.73	24.39	168.82	0.15	0.66
173	52.36	20.31	12.09	23.64	30.77	52.53	19.99	11.70	23.16	30.34	0.48	0.53
174	19.67	-18.77	-15.93	24.62	220.31	19.52	-18.76	-15.87	24.58	220.23	0.04	0.16
175	19.42	19.44	-9.63	21.69	333.63	19.10	19.14	-9.80	21.50	332.89	0.19	0.47
176	31.38	-4.85	19.21	19.81	104.17	31.24	-5.17	19.24	19.92	105.03	0.11	0.35
177	8.80	0.51	-12.02	12.03	272.43	8.53	0.70	-11.93	11.95	273.34	0.08	0.34
178	23.79	-25.30	2.94	25.47	173.37	23.68	-25.66	2.91	25.82	173.54	0.35	0.38
179	23.37	16.79	7.74	18.49	24.75	23.04	17.11	7.67	18.75	24.14	0.26	0.46
180	22.98	-0.79	-11.45	11.48	266.04	22.88	-0.87	-11.65	11.69	265.75	0.21	0.24
181	31.54	-14.05	0.19	14.05	179.24	31.58	-14.48	-0.11	14.48	180.42	0.43	0.53
182	31.12	7.30	3.73	8.19	27.08	31.02	7.11	3.50	7.93	26.22	0.26	0.31

8 hr after vs Original

Average	$\Delta C^*$	$\Delta E$
	0.36	0.54

Average  $\Delta E$  - overprint color excluded

C	0.34	0.75
M	0.30	0.49
Y	1.04	1.11
K	0.26	0.36
Paper	0.39	0.40

Average  $\Delta E$  - overprint color only

0.30	0.48
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ID# NUM	Original					24 hr after					$\Delta C^*$	$\Delta E$
	L*	a*	b*	C*	h	L*	a*	b*	C*	h		
1	42.01	-24.72	-61.69	66.46	248.16	42.21	-24.97	-61.70	66.56	247.96	0.10	0.32
2	49.38	82.49	10.58	83.16	7.31	49.55	82.79	10.45	83.45	7.20	0.29	0.37
3	87.00	10.27	105.69	106.18	84.45	87.25	9.53	104.95	105.38	84.81	0.80	1.08
4	17.26	28.88	-56.94	63.84	296.89	16.98	29.82	-57.98	65.20	297.21	1.36	1.43
5	40.58	-65.34	21.53	68.80	161.76	40.96	-67.14	21.12	70.39	162.54	1.59	1.88
6	53.37	73.54	57.31	93.24	37.93	53.41	73.80	57.56	93.60	37.95	0.36	0.36
7	3.92	0.66	-2.24	2.33	286.55	3.94	0.94	-2.36	2.54	291.67	0.21	0.31
8	36.37	20.12	-53.42	57.08	290.64	36.76	19.84	-53.56	57.11	290.33	0.03	0.50
9	57.52	-56.97	19.19	60.12	161.38	58.14	-57.38	17.31	59.94	163.21	0.18	2.02
10	62.52	58.16	43.34	72.53	36.69	62.91	57.73	41.05	70.83	35.42	1.70	2.36
11	64.73	10.50	-34.48	36.05	286.94	65.12	10.30	-34.05	35.57	286.84	0.48	0.61
12	78.22	30.25	17.84	35.12	30.53	78.66	30.09	15.71	33.95	27.57	1.17	2.18
13	66.30	1.74	-4.24	4.58	292.29	66.70	1.96	-5.73	6.05	288.89	1.47	1.56
14	77.20	-28.53	5.17	28.99	169.73	77.47	-28.31	3.41	28.52	173.13	0.47	1.79
15	81.82	6.28	-19.71	20.69	287.66	81.92	6.09	-19.23	20.17	287.56	0.52	0.53
16	87.81	-11.29	-1.58	11.40	187.97	87.95	-11.09	-2.27	11.32	191.58	0.08	0.73
17	88.21	14.35	3.99	14.89	15.54	88.38	14.39	3.29	14.76	12.87	0.13	0.72
18	4.12	0.71	-2.20	2.32	287.97	3.99	0.97	-2.38	2.57	292.18	0.25	0.34
19	4.00	0.66	-2.28	2.38	286.06	3.94	0.97	-2.42	2.60	291.78	0.22	0.35
20	3.95	0.66	-2.36	2.45	285.51	3.93	0.95	-2.47	2.65	291.04	0.20	0.31
21	4.00	0.69	-2.14	2.25	287.75	4.00	1.03	-2.32	2.54	293.90	0.29	0.38
22	3.99	0.66	-2.29	2.38	286.22	4.06	1.01	-2.45	2.65	292.42	0.27	0.39
23	4.12	0.71	-2.12	2.23	288.54	4.15	1.00	-2.27	2.48	293.90	0.25	0.33
24	4.06	0.62	-2.18	2.27	285.85	4.09	0.96	-2.40	2.58	291.80	0.31	0.41
25	3.83	0.69	-2.23	2.33	287.31	3.93	0.99	-2.36	2.56	292.85	0.23	0.34
26	96.48	2.08	-5.82	6.18	289.71	96.40	2.03	-5.28	5.66	291.09	0.52	0.55
27	47.42	-30.88	-59.48	67.02	242.56	47.69	-31.35	-59.29	67.07	242.13	0.05	0.57
28	53.78	-35.07	-55.66	65.79	237.79	53.94	-35.56	-55.35	65.79	237.28	0.00	0.60
29	60.36	-35.48	-50.23	61.50	234.76	60.55	-35.81	-49.78	61.32	234.27	0.18	0.59
30	66.25	-32.85	-44.37	55.20	233.48	66.46	-33.05	-43.78	54.85	232.95	0.35	0.66
31	72.01	-28.15	-37.94	47.24	233.43	72.13	-28.31	-37.32	46.84	232.82	0.40	0.65
32	76.58	-23.12	-32.35	39.76	234.44	76.73	-23.26	-31.73	39.34	233.75	0.42	0.65
33	81.87	-16.99	-25.74	30.84	236.57	82.00	-17.02	-25.10	30.33	235.85	0.51	0.65
34	84.52	-13.46	-22.23	25.99	238.80	84.68	-13.46	-21.54	25.40	237.99	0.59	0.71
35	87.01	-10.19	-18.87	21.44	241.63	87.09	-10.29	-18.26	20.96	240.60	0.48	0.62
36	89.18	-7.41	-15.91	17.55	245.01	89.30	-7.42	-15.27	16.98	244.10	0.57	0.65
37	91.72	-3.99	-12.38	13.01	252.14	91.77	-4.01	-11.75	12.41	251.14	0.60	0.63
38	93.15	-2.07	-10.38	10.59	258.74	93.12	-2.20	-9.84	10.08	257.41	0.51	0.56
39	95.28	0.48	-7.56	7.58	273.65	95.25	0.43	-6.97	6.98	273.51	0.60	0.59
40	52.28	81.64	1.66	81.66	1.16	52.53	81.82	1.21	81.83	0.85	0.17	0.55
41	56.45	77.80	-6.43	78.06	355.28	56.76	77.72	-6.83	78.02	354.98	0.04	0.51
42	61.57	70.02	-12.02	71.05	350.26	61.96	69.77	-12.20	70.82	350.08	0.23	0.50
43	66.96	60.75	-14.53	62.46	346.54	67.41	60.31	-14.40	62.01	346.57	0.45	0.64
44	72.33	50.61	-14.93	52.76	343.57	72.66	50.29	-14.56	52.35	343.85	0.41	0.59
45	76.71	41.97	-14.44	44.38	341.02	77.08	41.69	-13.94	43.96	341.51	0.42	0.68
46	82.00	31.26	-12.83	33.79	337.68	82.31	30.99	-12.23	33.32	338.46	0.47	0.73
47	84.49	26.00	-11.85	28.57	335.49	84.73	25.78	-11.25	28.13	336.41	0.44	0.68
48	87.06	20.86	-10.71	23.45	332.83	87.27	20.60	-10.10	22.95	333.88	0.50	0.70
49	89.20	16.59	-9.67	19.20	329.77	89.35	16.46	-9.07	18.79	331.15	0.41	0.63
50	91.89	11.29	-8.39	14.06	323.38	91.87	11.21	-7.84	13.68	325.02	0.38	0.56
51	93.27	8.34	-7.65	11.32	317.46	93.23	8.18	-7.06	10.81	319.22	0.51	0.61
52	95.31	4.38	-6.55	7.88	303.75	95.11	4.42	-6.06	7.50	306.09	0.38	0.53



53	88.62	5.87	99.71	99.88	86.63	88.80	5.11	98.24	98.37	87.02	1.51	1.66
54	90.03	1.56	88.73	88.74	88.99	90.21	0.89	85.97	85.97	89.41	2.77	2.85
55	91.50	-1.37	74.05	74.07	91.06	91.63	-1.81	70.71	70.73	91.46	3.34	3.37
56	92.49	-2.91	58.54	58.61	92.84	92.65	-3.06	54.93	55.02	93.19	3.59	3.62
57	93.28	-3.37	46.46	46.58	94.15	93.34	-3.35	43.13	43.26	94.45	3.32	3.33
58	94.20	-3.28	36.69	36.83	95.11	94.26	-3.12	33.79	33.94	95.27	2.89	2.91
59	94.88	-2.41	24.13	24.25	95.69	94.87	-2.14	21.95	22.06	95.56	2.19	2.20
60	95.30	-1.70	17.71	17.79	95.47	95.27	-1.45	15.84	15.91	95.23	1.88	1.89
61	95.42	-1.11	13.15	13.20	94.83	95.40	-0.87	11.65	11.68	94.27	1.52	1.52
62	95.63	-0.56	9.20	9.22	93.48	95.59	-0.36	8.12	8.12	92.55	1.10	1.10
63	95.90	0.14	4.63	4.63	88.25	95.82	0.31	3.99	4.01	85.61	0.62	0.67
64	96.24	0.91	0.19	0.93	12.09	96.15	1.00	0.12	1.01	6.64	0.08	0.15
65	96.46	1.62	-3.73	4.07	293.53	96.31	1.62	-3.45	3.81	295.11	0.26	0.32
66	8.55	-0.16	-3.71	3.72	267.53	8.46	0.36	-4.17	4.19	274.93	0.47	0.70
67	22.52	-1.85	-3.61	4.06	242.91	22.58	-1.27	-3.73	3.94	251.20	0.12	0.60
68	37.58	-2.06	-2.31	3.09	228.29	37.80	-2.21	-2.99	3.72	233.55	0.63	0.73
69	47.80	-0.19	-4.11	4.11	267.38	48.19	-0.54	-5.08	5.10	263.93	0.99	1.10
70	57.99	0.64	-4.21	4.26	278.68	58.39	0.85	-5.31	5.38	279.04	1.12	1.19
71	66.46	2.19	-4.40	4.92	296.45	66.83	2.30	-5.39	5.86	293.14	0.94	1.06
72	75.34	2.74	-5.02	5.72	298.64	75.64	2.73	-5.74	6.35	295.45	0.63	0.78
73	79.23	3.18	-6.02	6.81	297.85	79.38	3.17	-6.56	7.29	295.79	0.48	0.56
74	82.78	3.05	-6.02	6.75	296.83	82.98	3.08	-6.34	7.05	295.88	0.30	0.38
75	86.47	2.85	-5.24	5.96	298.52	86.58	2.86	-5.56	6.25	297.17	0.29	0.34
76	89.97	2.86	-6.08	6.72	295.19	89.98	2.84	-6.14	6.77	294.81	0.05	0.06
77	91.84	2.69	-6.00	6.57	294.12	91.78	2.70	-5.89	6.48	294.65	0.09	0.13
78	94.66	2.28	-5.46	5.92	292.66	94.53	2.15	-5.09	5.53	292.88	0.39	0.41
79	27.46	50.83	-25.68	56.95	333.20	27.24	51.30	-26.12	57.57	333.02	0.62	0.68
80	29.24	46.67	-5.80	47.03	352.91	29.07	47.00	-5.94	47.38	352.79	0.35	0.40
81	49.23	79.63	30.65	85.33	21.05	49.27	79.86	30.88	85.62	21.14	0.29	0.33
82	40.36	48.06	33.31	58.48	34.73	40.32	48.31	33.31	58.68	34.59	0.20	0.25
83	69.06	45.80	82.97	94.78	61.10	69.14	45.59	82.92	94.63	61.20	0.15	0.23
84	50.15	-0.20	50.15	50.15	90.23	50.31	-0.75	50.06	50.07	90.86	0.08	0.58
85	36.94	-2.48	-2.53	3.54	225.67	37.34	-2.57	-3.19	4.10	231.08	0.56	0.78
86	63.01	-30.99	67.49	74.27	114.67	63.30	-31.67	67.27	74.35	115.21	0.08	0.77
87	35.46	-51.32	14.50	53.33	164.22	35.64	-52.55	14.08	54.40	165.00	1.07	1.31
88	37.48	-54.51	-24.36	59.71	204.08	37.78	-55.36	-24.59	60.57	203.95	0.86	0.93
89	28.96	-29.56	-32.09	43.64	227.35	29.04	-29.85	-32.63	44.22	227.55	0.58	0.62
90	30.16	0.45	-62.76	62.76	270.41	30.23	0.39	-63.02	63.02	270.36	0.26	0.28
91	14.83	10.03	-33.48	34.95	286.68	14.42	10.24	-33.87	35.38	286.82	0.43	0.60
92	19.30	33.10	-36.66	49.40	312.08	19.00	33.38	-37.25	50.02	311.87	0.62	0.72
93	53.12	50.78	-11.97	52.17	346.74	53.46	50.64	-12.10	52.07	346.56	0.10	0.39
94	54.41	46.85	3.23	46.96	3.95	54.67	46.83	2.24	46.88	2.74	0.08	1.02
95	40.97	61.33	26.60	66.85	23.44	40.95	61.64	26.67	67.16	23.40	0.31	0.32
96	55.82	42.67	28.07	51.08	33.34	56.15	42.42	27.11	50.34	32.58	0.74	1.05
97	50.96	43.90	53.82	69.45	50.80	50.93	43.86	53.78	69.40	50.80	0.05	0.06
98	73.35	-1.76	50.06	50.09	92.01	73.69	-2.10	47.68	47.72	92.52	2.37	2.43
99	45.91	-41.60	38.28	56.53	137.38	46.11	-42.50	38.16	57.11	138.08	0.58	0.93
100	53.15	-44.79	13.25	46.71	163.51	53.66	-45.12	12.06	46.71	165.04	0.00	1.34
101	33.84	-56.92	-4.77	57.12	184.79	34.18	-57.81	-5.34	58.05	185.27	0.93	1.11
102	52.85	-32.01	-34.18	46.83	226.88	53.20	-32.18	-34.37	47.08	226.89	0.25	0.43
103	22.52	4.15	-50.64	50.81	274.68	22.41	4.51	-51.16	51.36	275.04	0.55	0.64
104	35.93	13.75	-43.14	45.28	287.68	36.34	13.26	-43.10	45.09	287.10	0.19	0.64
105	19.45	19.26	-9.72	21.58	333.21	19.09	19.14	-9.99	21.59	332.45	0.01	0.47
106	46.53	30.75	-10.03	32.34	341.93	46.92	30.65	-10.54	32.41	341.02	0.07	0.65
107	71.84	20.66	-10.05	22.98	334.07	72.16	20.48	-10.20	22.88	333.53	0.10	0.40
108	24.34	17.38	7.85	19.07	24.32	24.11	17.68	7.86	19.35	23.97	0.28	0.38
109	72.96	16.37	6.23	17.52	20.83	73.07	16.46	4.88	17.17	16.52	0.35	1.36

110	31.54	-5.49	19.00	19.77	106.12	31.48	-5.65	18.71	19.54	106.82	0.23	0.34
111	58.32	-2.87	26.76	26.91	96.13	58.75	-3.40	25.24	25.46	97.67	1.45	1.67
112	79.13	-0.32	12.42	12.42	91.46	79.32	-0.12	10.88	10.88	90.65	1.54	1.56
113	83.05	3.08	-6.18	6.90	296.53	83.18	3.13	-6.58	7.29	295.48	0.39	0.42
114	23.81	-25.50	2.83	25.66	173.66	23.74	-26.14	2.52	26.26	174.48	0.60	0.71
115	47.99	-30.67	7.84	31.66	165.65	48.47	-30.89	6.64	31.59	167.88	0.07	1.31
116	72.49	-14.22	0.49	14.23	178.02	72.72	-14.07	-0.80	14.10	183.26	0.13	1.32
117	19.83	-18.79	-15.29	24.23	219.13	19.65	-18.92	-15.62	24.53	219.55	0.30	0.40
118	65.99	6.53	-20.80	21.80	287.44	66.30	6.35	-20.91	21.85	286.90	0.05	0.37
119	8.51	0.59	-11.84	11.85	272.85	8.46	0.85	-11.71	11.74	274.17	0.11	0.29
120	71.91	-10.41	-17.10	20.02	238.67	72.02	-10.35	-17.67	20.48	239.65	0.46	0.58
121	47.41	-21.37	-21.22	30.12	224.80	47.87	-21.45	-21.59	30.43	225.19	0.31	0.60
122	3.73	0.83	-2.40	2.54	289.09	3.80	0.98	-2.40	2.60	292.14	0.06	0.17
123	4.10	0.68	-2.67	2.75	284.25	4.10	0.79	-2.71	2.82	286.27	0.07	0.12
124	4.80	0.29	-3.32	3.33	274.97	4.87	0.43	-3.19	3.22	277.62	0.11	0.20
125	3.79	0.81	-2.35	2.49	288.97	3.79	0.90	-2.42	2.58	290.37	0.09	0.11
126	5.48	0.37	-3.46	3.48	276.09	5.71	0.69	-3.49	3.56	281.19	0.08	0.40
127	9.43	-2.77	-5.33	6.01	242.52	9.65	-2.44	-5.40	5.93	245.70	0.08	0.40
128	17.37	-6.42	-6.56	9.18	225.64	17.43	-6.45	-6.77	9.35	226.39	0.17	0.22
129	3.69	0.79	-2.34	2.47	288.70	3.70	0.90	-2.35	2.51	290.88	0.04	0.11
130	7.95	-1.17	-4.34	4.50	254.94	7.88	-0.70	-4.69	4.74	261.50	0.24	0.59
131	21.56	-6.39	-6.11	8.84	223.70	21.54	-6.22	-6.32	8.87	225.43	0.03	0.27
132	34.23	-9.99	-8.44	13.08	220.18	34.49	-10.74	-8.81	13.89	219.36	0.81	0.88
133	43.39	-11.55	-11.63	16.39	225.20	43.80	-11.65	-12.12	16.81	226.12	0.42	0.65
134	3.95	0.83	-2.36	2.50	289.27	3.96	0.92	-2.43	2.60	290.78	0.10	0.11
135	12.32	-1.94	-4.77	5.16	247.84	12.21	-1.58	-4.82	5.07	251.80	0.09	0.38
136	33.07	-5.83	-6.02	8.38	225.90	33.51	-5.86	-6.41	8.68	227.58	0.30	0.59
137	45.67	-7.77	-8.05	11.19	226.02	46.23	-7.93	-8.68	11.75	227.60	0.56	0.86
138	58.71	-6.25	-8.94	10.91	235.04	59.21	-6.07	-9.99	11.69	238.72	0.78	1.18
139	64.79	-6.40	-10.01	11.88	237.42	65.06	-6.45	-10.84	12.62	239.24	0.74	0.87
140	4.01	0.74	-2.36	2.47	287.34	4.17	0.92	-2.53	2.69	290.02	0.22	0.29
141	16.39	-2.39	-3.94	4.61	238.76	16.49	-2.24	-4.22	4.78	242.05	0.17	0.33
142	40.50	-4.62	-4.98	6.80	227.17	40.95	-4.77	-5.79	7.50	230.53	0.70	0.94
143	56.82	-2.97	-7.01	7.62	247.06	57.29	-3.11	-8.05	8.63	248.88	1.01	1.15
144	72.10	-1.25	-7.97	8.07	261.12	72.40	-1.42	-8.74	8.86	260.75	0.79	0.84
145	78.85	-0.79	-9.95	9.98	265.49	79.03	-0.62	-10.05	10.06	266.49	0.08	0.27
146	3.81	0.86	-2.33	2.48	290.19	3.98	0.94	-2.41	2.59	291.26	0.11	0.20
147	20.67	-1.88	-3.91	4.34	244.28	20.70	-1.81	-4.17	4.55	246.50	0.21	0.27
148	44.88	-2.29	-4.75	5.27	244.28	45.34	-2.54	-5.22	5.80	244.04	0.53	0.70
149	62.00	-0.37	-5.23	5.24	265.95	62.39	-0.25	-6.09	6.10	267.61	0.86	0.95
150	77.98	1.20	-7.52	7.62	279.09	78.17	1.20	-8.07	8.16	278.43	0.54	0.58
151	84.43	0.86	-7.28	7.33	276.72	84.47	1.04	-7.38	7.45	277.99	0.12	0.21
152	8.60	-4.38	-6.85	8.13	237.42	8.45	-3.76	-7.01	7.96	241.78	0.17	0.66
153	32.70	-15.37	-11.88	19.43	217.71	32.99	-15.68	-12.32	19.94	218.14	0.51	0.61
154	52.15	-11.63	-13.19	17.59	228.59	52.63	-11.78	-14.05	18.33	230.04	0.74	1.00
155	70.19	-6.39	-12.68	14.20	243.25	70.46	-6.31	-13.18	14.62	244.43	0.42	0.57
156	84.51	-1.52	-9.51	9.63	260.89	84.57	-1.51	-9.68	9.80	261.15	0.17	0.18
157	90.97	0.09	-8.04	8.04	270.61	90.95	0.09	-7.90	7.90	270.68	0.14	0.14
158	93.70	1.04	-6.86	6.93	278.64	93.68	1.20	-6.46	6.58	280.52	0.35	0.43
159	34.75	-28.47	-45.33	53.53	237.87	34.98	-28.88	-45.30	53.73	237.48	0.20	0.47
160	38.18	63.85	1.52	63.87	1.36	38.13	64.21	1.33	64.23	1.19	0.36	0.41
161	66.55	6.06	75.64	75.89	85.42	66.72	5.28	75.47	75.66	86.00	0.23	0.82
162	16.96	20.02	-47.27	51.33	292.95	16.73	20.44	-47.83	52.02	293.14	0.69	0.74
163	38.41	-59.33	18.35	62.10	162.81	38.79	-60.51	18.15	63.17	163.30	1.07	1.26
164	46.98	61.43	45.51	76.45	36.54	46.92	61.62	45.52	76.61	36.45	0.16	0.20
165	54.77	9.11	-30.15	31.49	286.81	55.11	8.94	-30.37	31.66	286.40	0.17	0.44
166	65.52	-26.36	5.36	26.89	168.51	65.89	-26.24	3.95	26.53	171.44	0.36	1.46



167	66.32	26.38	15.00	30.35	29.62	66.71	26.11	13.39	29.35	27.15	1.00	1.68
168	14.66	9.80	-32.90	34.33	286.60	14.36	10.08	-33.31	34.80	286.83	0.47	0.58
169	35.13	-51.44	14.42	53.42	164.34	35.39	-52.69	14.25	54.58	164.87	1.16	1.29
170	39.86	47.77	32.63	57.85	34.33	39.69	48.12	33.05	58.37	34.48	0.52	0.57
171	42.56	4.54	-24.21	24.63	280.61	43.06	4.52	-24.37	24.78	280.50	0.15	0.53
172	51.90	-23.67	5.22	24.24	167.56	52.30	-24.18	4.15	24.53	170.26	0.29	1.25
173	52.36	20.31	12.09	23.64	30.77	52.78	19.94	10.90	22.72	28.65	0.92	1.32
174	19.67	-18.77	-15.93	24.62	220.31	19.45	-18.80	-15.99	24.68	220.38	0.06	0.23
175	19.42	19.44	-9.63	21.69	333.63	19.13	19.72	-9.77	22.01	333.63	0.32	0.43
176	31.38	-4.85	19.21	19.81	104.17	31.24	-5.12	19.00	19.68	105.09	0.13	0.37
177	8.80	0.51	-12.02	12.03	272.43	8.73	0.80	-12.01	12.04	273.81	0.01	0.30
178	23.79	-25.30	2.94	25.47	173.37	23.75	-25.90	2.78	26.05	173.87	0.58	0.62
179	23.37	16.79	7.74	18.49	24.75	23.07	16.95	7.61	18.58	24.17	0.09	0.36
180	22.98	-0.79	-11.45	11.48	266.04	23.05	-0.81	-11.71	11.74	266.02	0.26	0.27
181	31.54	-14.05	0.19	14.05	179.24	31.76	-14.45	-0.25	14.45	180.98	0.40	0.63
182	31.12	7.30	3.73	8.19	27.08	31.40	7.09	3.27	7.81	24.79	0.38	0.58

## 24 hr after vs Original

Average	$\Delta C^*$	$\Delta E$
	0.53	0.76

Average  $\Delta E$  - overprint color excluded

C	0.38	0.60
M	0.36	0.59
Y	1.85	1.90
K	0.48	0.60
Paper	0.52	0.55

Average  $\Delta E$  - overprint color only

0.42	0.69
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ID#	Original					220 hr after					$\Delta C^*$	$\Delta E$
NUM	L*	a*	b*	C*	h	L*	a*	b*	C*	h		
1	42.01	-24.72	-61.69	66.46	248.16	42.45	-27.01	-60.19	65.97	245.83	0.49	2.77
2	49.38	82.49	10.58	83.16	7.31	49.05	82.66	9.22	83.17	6.36	0.01	1.41
3	87.00	10.27	105.69	106.18	84.45	87.10	9.34	103.87	104.29	84.86	1.89	2.05
4	17.26	28.88	-56.94	63.84	296.89	17.10	29.41	-57.93	64.97	296.92	1.13	1.13
5	40.58	-65.34	21.53	68.80	161.76	41.29	-67.28	21.33	70.58	162.41	1.78	2.08
6	53.37	73.54	57.31	93.24	37.93	52.98	73.49	56.73	92.84	37.67	0.40	0.70
7	3.92	0.66	-2.24	2.33	286.55	3.89	1.25	-2.54	2.84	296.25	0.51	0.66
8	36.37	20.12	-53.42	57.08	290.64	37.09	18.95	-52.80	56.09	289.74	0.99	1.51
9	57.52	-56.97	19.19	60.12	161.38	58.42	-57.01	16.82	59.44	163.57	0.68	2.54
10	62.52	58.16	43.34	72.53	36.69	62.83	57.15	39.74	69.61	34.81	2.92	3.75
11	64.73	10.50	-34.48	36.05	286.94	65.29	9.59	-33.14	34.50	286.15	1.55	1.71
12	78.22	30.25	17.84	35.12	30.53	78.60	29.82	14.85	33.32	26.47	1.80	3.04
13	66.30	1.74	-4.24	4.58	292.29	66.92	1.61	-5.82	6.04	285.50	1.46	1.70
14	77.20	-28.53	5.17	28.99	169.73	77.58	-28.12	3.38	28.32	173.15	0.67	1.88
15	81.82	6.28	-19.71	20.69	287.66	81.67	5.69	-18.73	19.58	286.90	1.11	1.15
16	87.81	-11.29	-1.58	11.40	187.97	87.84	-11.11	-2.09	11.31	190.66	0.09	0.54
17	88.21	14.35	3.99	14.89	15.54	88.29	14.16	3.23	14.52	12.86	0.37	0.79
18	4.12	0.71	-2.20	2.32	287.97	3.92	1.25	-2.42	2.73	297.21	0.41	0.62
19	4.00	0.66	-2.28	2.38	286.06	3.91	1.32	-2.53	2.85	297.62	0.47	0.71
20	3.95	0.66	-2.36	2.45	285.51	3.90	1.24	-2.50	2.79	296.43	0.34	0.60
21	4.00	0.69	-2.14	2.25	287.75	3.99	1.40	-2.41	2.79	300.05	0.54	0.76
22	3.99	0.66	-2.29	2.38	286.22	4.01	1.33	-2.49	2.82	298.17	0.44	0.70
23	4.12	0.71	-2.12	2.23	288.54	4.13	1.34	-2.44	2.78	298.66	0.55	0.71
24	4.06	0.62	-2.18	2.27	285.85	3.98	1.29	-2.61	2.91	296.27	0.64	0.80
25	3.83	0.69	-2.23	2.33	287.31	3.92	1.34	-2.48	2.82	298.30	0.49	0.70
26	96.48	2.08	-5.82	6.18	289.71	96.16	1.92	-4.55	4.94	292.83	1.24	1.32
27	47.42	-30.88	-59.48	67.02	242.56	47.93	-33.06	-57.78	66.57	240.22	0.45	2.81
28	53.78	-35.07	-55.66	65.79	237.79	54.22	-36.81	-53.76	65.16	235.60	0.63	2.61
29	60.36	-35.48	-50.23	61.50	234.76	60.78	-36.78	-48.30	60.71	232.71	0.79	2.36
30	66.25	-32.85	-44.37	55.20	233.48	66.62	-33.82	-42.46	54.28	231.46	0.92	2.17
31	72.01	-28.15	-37.94	47.24	233.43	72.32	-28.76	-36.11	46.16	231.46	1.08	1.95
32	76.58	-23.12	-32.35	39.76	234.44	76.80	-23.66	-30.61	38.69	232.30	1.07	1.84
33	81.87	-16.99	-25.74	30.84	236.57	82.02	-17.35	-24.13	29.72	234.28	1.12	1.66
34	84.52	-13.46	-22.23	25.99	238.80	84.65	-13.71	-20.64	24.78	236.42	1.21	1.61
35	87.01	-10.19	-18.87	21.44	241.63	87.05	-10.47	-17.39	20.30	238.95	1.14	1.51
36	89.18	-7.41	-15.91	17.55	245.01	89.20	-7.62	-14.46	16.34	242.22	1.21	1.47
37	91.72	-3.99	-12.38	13.01	252.14	91.64	-4.19	-10.95	11.72	249.05	1.29	1.45
38	93.15	-2.07	-10.38	10.59	258.74	92.97	-2.30	-9.02	9.31	255.71	1.28	1.39
39	95.28	0.48	-7.56	7.58	273.65	95.01	0.32	-6.17	6.18	272.93	1.40	1.42
40	52.28	81.64	1.66	81.66	1.16	52.15	81.56	0.30	81.56	0.21	0.10	1.37
41	56.45	77.80	-6.43	78.06	355.28	56.56	77.30	-7.22	77.64	354.66	0.42	0.94
42	61.57	70.02	-12.02	71.05	350.26	61.87	69.13	-12.28	70.21	349.93	0.84	0.97
43	66.96	60.75	-14.53	62.46	346.54	67.32	59.67	-14.32	61.36	346.50	1.10	1.16
44	72.33	50.61	-14.93	52.76	343.57	72.63	49.60	-14.36	51.64	343.85	1.12	1.20
45	76.71	41.97	-14.44	44.38	341.02	77.00	41.05	-13.67	43.27	341.58	1.11	1.23
46	82.00	31.26	-12.83	33.79	337.68	82.21	30.47	-11.91	32.72	338.66	1.07	1.23
47	84.49	26.00	-11.85	28.57	335.49	84.64	25.28	-10.86	27.51	336.75	1.06	1.23
48	87.06	20.86	-10.71	23.45	332.83	87.13	20.24	-9.69	22.44	334.42	1.01	1.20
49	89.20	16.59	-9.67	19.20	329.77	89.22	16.04	-8.60	18.20	331.80	1.00	1.20
50	91.89	11.29	-8.39	14.06	323.38	91.82	10.89	-7.24	13.08	326.39	0.98	1.22
51	93.27	8.34	-7.65	11.32	317.46	93.11	7.98	-6.44	10.26	321.10	1.06	1.27
52	95.31	4.38	-6.55	7.88	303.75	95.03	4.18	-5.31	6.75	308.20	1.13	1.29



53	88.62	5.87	99.71	99.88	86.63	88.76	4.99	96.87	97.00	87.05	2.88	2.98
54	90.03	1.56	88.73	88.74	88.99	90.13	0.93	84.21	84.22	89.37	4.52	4.56
55	91.50	-1.37	74.05	74.07	91.06	91.59	-1.68	68.99	69.01	91.39	5.06	5.07
56	92.49	-2.91	58.54	58.61	92.84	92.56	-2.92	53.64	53.72	93.11	4.89	4.90
57	93.28	-3.37	46.46	46.58	94.15	93.29	-3.16	41.95	42.07	94.31	4.51	4.51
58	94.20	-3.28	36.69	36.83	95.11	94.21	-2.96	32.83	32.96	95.15	3.87	3.87
59	94.88	-2.41	24.13	24.25	95.69	94.79	-2.04	21.42	21.51	95.43	2.74	2.74
60	95.30	-1.70	17.71	17.79	95.47	95.22	-1.37	15.67	15.73	94.99	2.06	2.07
61	95.42	-1.11	13.15	13.20	94.83	95.31	-0.84	11.62	11.65	94.14	1.55	1.56
62	95.63	-0.56	9.20	9.22	93.48	95.49	-0.34	8.17	8.17	92.40	1.05	1.06
63	95.90	0.14	4.63	4.63	88.25	95.72	0.29	4.12	4.13	85.96	0.50	0.56
64	96.24	0.91	0.19	0.93	12.09	96.03	0.96	0.42	1.05	23.37	0.12	0.32
65	96.46	1.62	-3.73	4.07	293.53	96.15	1.53	-2.87	3.26	298.10	0.81	0.92
66	8.55	-0.16	-3.71	3.72	267.53	8.56	0.77	-3.89	3.97	281.22	0.25	0.95
67	22.52	-1.85	-3.61	4.06	242.91	22.86	-1.37	-3.81	4.05	250.18	0.01	0.62
68	37.58	-2.06	-2.31	3.09	228.29	38.29	-2.37	-3.14	3.94	232.98	0.85	1.14
69	47.80	-0.19	-4.11	4.11	267.38	48.64	-0.61	-5.16	5.19	263.28	1.08	1.41
70	57.99	0.64	-4.21	4.26	278.68	58.67	0.43	-5.46	5.47	274.47	1.21	1.44
71	66.46	2.19	-4.40	4.92	296.45	67.07	2.12	-5.48	5.88	291.12	0.96	1.24
72	75.34	2.74	-5.02	5.72	298.64	75.72	2.56	-5.85	6.39	293.64	0.67	0.93
73	79.23	3.18	-6.02	6.81	297.85	79.46	3.08	-6.47	7.17	295.45	0.36	0.52
74	82.78	3.05	-6.02	6.75	296.83	83.04	2.90	-6.24	6.89	294.91	0.14	0.37
75	86.47	2.85	-5.24	5.96	298.52	86.59	2.64	-5.46	6.06	295.79	0.10	0.33
76	89.97	2.86	-6.08	6.72	295.19	89.94	2.72	-5.85	6.45	294.92	0.27	0.27
77	91.84	2.69	-6.00	6.57	294.12	91.71	2.63	-5.67	6.25	294.86	0.32	0.36
78	94.66	2.28	-5.46	5.92	292.66	94.43	2.04	-4.80	5.22	293.02	0.70	0.74
79	27.46	50.83	-25.68	56.95	333.20	27.32	51.90	-26.36	58.21	333.07	1.26	1.28
80	29.24	46.67	-5.80	47.03	352.91	29.17	47.40	-5.83	47.76	352.99	0.73	0.73
81	49.23	79.63	30.65	85.33	21.05	48.83	79.65	30.31	85.22	20.83	0.11	0.53
82	40.36	48.06	33.31	58.48	34.73	40.37	48.33	33.20	58.64	34.49	0.16	0.29
83	69.06	45.80	82.97	94.78	61.10	69.25	44.72	82.37	93.73	61.50	1.05	1.25
84	50.15	-0.20	50.15	50.15	90.23	50.67	-0.85	50.16	50.17	90.98	0.02	0.83
85	36.94	-2.48	-2.53	3.54	225.67	37.69	-2.65	-3.46	4.36	232.50	0.82	1.21
86	63.01	-30.99	67.49	74.27	114.67	63.62	-31.83	67.18	74.34	115.35	0.07	1.08
87	35.46	-51.32	14.50	53.33	164.22	36.06	-52.90	14.29	54.80	164.88	1.47	1.70
88	37.48	-54.51	-24.36	59.71	204.08	38.16	-55.94	-24.36	61.02	203.53	1.31	1.58
89	28.96	-29.56	-32.09	43.64	227.35	29.38	-30.81	-32.23	44.59	226.29	0.95	1.33
90	30.16	0.45	-62.76	62.76	270.41	30.54	-1.22	-62.15	62.16	268.88	0.60	1.82
91	14.83	10.03	-33.48	34.95	286.68	14.47	10.07	-33.75	35.22	286.62	0.27	0.45
92	19.30	33.10	-36.66	49.40	312.08	19.09	33.62	-37.22	50.16	312.09	0.76	0.79
93	53.12	50.78	-11.97	52.17	346.74	53.63	50.11	-12.53	51.65	345.96	0.52	1.01
94	54.41	46.85	3.23	46.96	3.95	54.92	46.24	1.87	46.28	2.31	0.68	1.58
95	40.97	61.33	26.60	66.85	23.44	40.80	61.76	26.70	67.29	23.38	0.44	0.47
96	55.82	42.67	28.07	51.08	33.34	56.36	41.93	25.97	49.32	31.78	1.76	2.29
97	50.96	43.90	53.82	69.45	50.80	51.06	43.59	53.56	69.05	50.86	0.40	0.42
98	73.35	-1.76	50.06	50.09	92.01	73.88	-2.33	46.39	46.45	92.87	3.64	3.75
99	45.91	-41.60	38.28	56.53	137.38	46.42	-42.98	38.20	57.50	138.37	0.97	1.47
100	53.15	-44.79	13.25	46.71	163.51	54.00	-45.06	11.52	46.51	165.66	0.20	1.95
101	33.84	-56.92	-4.77	57.12	184.79	34.53	-58.36	-5.09	58.58	184.99	1.46	1.63
102	52.85	-32.01	-34.18	46.83	226.88	53.60	-32.67	-33.71	46.94	225.89	0.11	1.10
103	22.52	4.15	-50.64	50.81	274.68	22.71	3.52	-50.81	50.93	273.97	0.12	0.68
104	35.93	13.75	-43.14	45.28	287.68	36.75	12.72	-42.67	44.53	286.60	0.75	1.40
105	19.45	19.26	-9.72	21.58	333.21	19.31	19.62	-9.61	21.84	333.89	0.26	0.40
106	46.53	30.75	-10.03	32.34	341.93	47.15	30.25	-10.81	32.12	340.33	0.22	1.11
107	71.84	20.66	-10.05	22.98	334.07	72.24	20.17	-10.36	22.68	332.82	0.30	0.70
108	24.34	17.38	7.85	19.07	24.32	24.33	17.96	8.06	19.68	24.18	0.61	0.62
109	72.96	16.37	6.23	17.52	20.83	73.37	16.06	4.53	16.69	15.76	0.83	1.78



110	31.54	-5.49	19.00	19.77	106.12	31.70	-5.74	18.96	19.81	106.84	0.04	0.30
111	58.32	-2.87	26.76	26.91	96.13	59.11	-3.34	24.39	24.62	97.81	2.29	2.54
112	79.13	-0.32	12.42	12.42	91.46	79.45	-0.22	10.23	10.23	91.24	2.19	2.22
113	83.05	3.08	-6.18	6.90	296.53	83.30	2.89	-6.37	6.99	294.43	0.09	0.37
114	23.81	-25.50	2.83	25.66	173.66	23.98	-26.21	2.70	26.35	174.12	0.69	0.74
115	47.99	-30.67	7.84	31.66	165.65	48.93	-30.97	6.31	31.61	168.48	0.05	1.82
116	72.49	-14.22	0.49	14.23	178.02	72.98	-13.90	-1.00	13.94	184.09	0.29	1.60
117	19.83	-18.79	-15.29	24.23	219.13	19.81	-19.32	-15.47	24.75	218.70	0.52	0.56
118	65.99	6.53	-20.80	21.80	287.44	66.54	6.12	-20.52	21.41	286.61	0.39	0.74
119	8.51	0.59	-11.84	11.85	272.85	8.46	0.95	-11.47	11.51	274.75	0.34	0.52
120	71.91	-10.41	-17.10	20.02	238.67	72.29	-10.58	-17.12	20.13	238.28	0.11	0.42
121	47.41	-21.37	-21.22	30.12	224.80	48.24	-21.85	-21.56	30.70	224.62	0.58	1.02
122	3.73	0.83	-2.40	2.54	289.09	3.94	1.29	-2.50	2.81	297.40	0.27	0.52
123	4.10	0.68	-2.67	2.75	284.25	4.19	1.22	-2.89	3.13	292.90	0.38	0.59
124	4.80	0.29	-3.32	3.33	274.97	5.00	1.01	-3.42	3.57	286.42	0.24	0.75
125	3.79	0.81	-2.35	2.49	288.97	3.94	1.28	-2.36	2.69	298.36	0.20	0.49
126	5.48	0.37	-3.46	3.48	276.09	5.79	1.23	-3.50	3.71	289.33	0.23	0.92
127	9.43	-2.77	-5.33	6.01	242.52	9.53	-2.10	-5.42	5.82	248.79	0.19	0.68
128	17.37	-6.42	-6.56	9.18	225.64	17.74	-5.99	-6.72	9.00	228.28	0.18	0.59
129	3.69	0.79	-2.34	2.47	288.70	3.75	1.26	-2.48	2.78	296.88	0.31	0.49
130	7.95	-1.17	-4.34	4.50	254.94	8.21	-0.20	-4.55	4.55	267.52	0.05	1.03
131	21.56	-6.39	-6.11	8.84	223.70	21.94	-6.17	-6.03	8.62	224.35	0.22	0.45
132	34.23	-9.99	-8.44	13.08	220.18	34.97	-10.35	-8.89	13.64	220.64	0.56	0.94
133	43.39	-11.55	-11.63	16.39	225.20	44.27	-11.84	-12.32	17.09	226.13	0.70	1.16
134	3.95	0.83	-2.36	2.50	289.27	4.13	1.28	-2.47	2.78	297.34	0.28	0.50
135	12.32	-1.94	-4.77	5.16	247.84	12.62	-1.30	-4.53	4.71	253.98	0.45	0.75
136	33.07	-5.83	-6.02	8.38	225.90	33.80	-6.05	-6.37	8.78	226.45	0.40	0.84
137	45.67	-7.77	-8.05	11.19	226.02	46.55	-8.01	-8.90	11.97	227.99	0.78	1.25
138	58.71	-6.25	-8.94	10.91	235.04	59.45	-6.33	-9.81	11.68	237.16	0.77	1.14
139	64.79	-6.40	-10.01	11.88	237.42	65.34	-6.40	-10.73	12.49	239.20	0.61	0.91
140	4.01	0.74	-2.36	2.47	287.34	4.20	1.26	-2.47	2.78	297.02	0.31	0.56
141	16.39	-2.39	-3.94	4.61	238.76	16.68	-2.01	-4.11	4.57	243.97	0.04	0.51
142	40.50	-4.62	-4.98	6.80	227.17	41.38	-4.74	-6.05	7.69	231.94	0.89	1.39
143	56.82	-2.97	-7.01	7.62	247.06	57.69	-3.28	-8.12	8.76	248.00	1.14	1.44
144	72.10	-1.25	-7.97	8.07	261.12	72.55	-1.34	-8.62	8.72	261.17	0.65	0.80
145	78.85	-0.79	-9.95	9.98	265.49	79.15	-0.96	-10.12	10.17	264.57	0.19	0.38
146	3.81	0.86	-2.33	2.48	290.19	3.98	1.24	-2.40	2.70	297.39	0.22	0.42
147	20.67	-1.88	-3.91	4.34	244.28	21.11	-1.25	-3.88	4.08	252.20	0.26	0.77
148	44.88	-2.29	-4.75	5.27	244.28	45.76	-2.70	-5.43	6.06	243.52	0.79	1.19
149	62.00	-0.37	-5.23	5.24	265.95	62.68	-0.64	-6.28	6.31	264.16	1.07	1.28
150	77.98	1.20	-7.52	7.62	279.09	78.31	1.06	-7.78	7.85	277.77	0.23	0.44
151	84.43	0.86	-7.28	7.33	276.72	84.48	0.80	-7.17	7.22	276.36	0.11	0.13
152	8.60	-4.38	-6.85	8.13	237.42	8.46	-3.61	-6.82	7.72	242.10	0.41	0.78
153	32.70	-15.37	-11.88	19.43	217.71	33.42	-16.02	-12.35	20.23	217.63	0.80	1.08
154	52.15	-11.63	-13.19	17.59	228.59	52.92	-11.85	-13.93	18.29	229.61	0.70	1.09
155	70.19	-6.39	-12.68	14.20	243.25	70.68	-6.51	-13.05	14.58	243.51	0.38	0.63
156	84.51	-1.52	-9.51	9.63	260.89	84.63	-1.66	-9.48	9.63	260.10	0.00	0.19
157	90.97	0.09	-8.04	8.04	270.61	90.93	-0.01	-7.57	7.57	269.93	0.47	0.48
158	93.70	1.04	-6.86	6.93	278.64	93.47	1.01	-6.11	6.19	279.35	0.74	0.79
159	34.75	-28.47	-45.33	53.53	237.87	35.29	-30.23	-44.50	53.80	235.81	0.27	2.02
160	38.18	63.85	1.52	63.87	1.36	38.03	64.46	1.04	64.47	0.93	0.60	0.79
161	66.55	6.06	75.64	75.89	85.42	67.00	5.20	75.68	75.86	86.07	0.03	0.97
162	16.96	20.02	-47.27	51.33	292.95	16.95	19.98	-47.71	51.72	292.72	0.39	0.44
163	38.41	-59.33	18.35	62.10	162.81	39.18	-60.91	18.27	63.59	163.31	1.49	1.76
164	46.98	61.43	45.51	76.45	36.54	46.76	61.38	45.27	76.27	36.41	0.18	0.33
165	54.77	9.11	-30.15	31.49	286.81	55.42	8.37	-29.69	30.84	285.74	0.65	1.09
166	65.52	-26.36	5.36	26.89	168.51	66.15	-26.22	3.55	26.45	172.29	0.44	1.92

167	66.32	26.38	15.00	30.35	29.62	66.86	25.94	12.77	28.92	26.20	1.43	2.34
168	14.66	9.80	-32.90	34.33	286.60	14.46	9.93	-33.08	34.54	286.72	0.21	0.30
169	35.13	-51.44	14.42	53.42	164.34	35.80	-52.92	14.35	54.83	164.82	1.41	1.63
170	39.86	47.77	32.63	57.85	34.33	39.73	48.13	32.97	58.34	34.41	0.49	0.51
171	42.56	4.54	-24.21	24.63	280.61	43.49	4.17	-24.21	24.57	279.78	0.06	1.00
172	51.90	-23.67	5.22	24.24	167.56	52.77	-23.64	3.81	23.95	170.84	0.29	1.66
173	52.36	20.31	12.09	23.64	30.77	53.04	19.84	10.67	22.53	28.27	1.11	1.64
174	19.67	-18.77	-15.93	24.62	220.31	19.68	-19.21	-15.74	24.83	219.33	0.21	0.48
175	19.42	19.44	-9.63	21.69	333.63	19.30	19.79	-9.50	21.96	334.35	0.27	0.39
176	31.38	-4.85	19.21	19.81	104.17	31.74	-5.19	19.47	20.15	104.94	0.34	0.56
177	8.80	0.51	-12.02	12.03	272.43	8.88	0.98	-11.54	11.59	274.83	0.44	0.68
178	23.79	-25.30	2.94	25.47	173.37	23.99	-25.86	2.92	26.02	173.56	0.55	0.59
179	23.37	16.79	7.74	18.49	24.75	23.29	17.69	8.04	19.43	24.44	0.94	0.95
180	22.98	-0.79	-11.45	11.48	266.04	23.31	-0.62	-11.46	11.47	266.92	0.01	0.37
181	31.54	-14.05	0.19	14.05	179.24	32.13	-14.50	-0.41	14.51	181.62	0.46	0.95
182	31.12	7.30	3.73	8.19	27.08	31.61	7.23	3.31	7.95	24.60	0.24	0.65

## 220 hr after vs Original

Average	$\Delta C^*$	$\Delta E$
	0.82	1.23

Average  $\Delta E$  - overprint color excluded

C	1.01	1.93
M	0.86	1.21
Y	2.60	2.65
K	0.53	0.79
Paper	1.24	1.32

Average  $\Delta E$  - overprint color only

0.62	1.04
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ID#	Original					384 hr after						
NUM	L*	a*	b*	C*	h	L*	a*	b*	C*	h	$\Delta C^*$	$\Delta E$
1	42.01	-24.72	-61.69	66.46	248.16	42.45	-27.37	-59.73	65.71	245.38	0.75	3.33
2	49.38	82.49	10.58	83.16	7.31	49.09	82.62	9.33	83.14	6.44	0.02	1.29
3	87.00	10.27	105.69	106.18	84.45	87.16	9.10	103.19	103.60	84.96	2.58	2.76
4	17.26	28.88	-56.94	63.84	296.89	17.17	29.17	-57.68	64.63	296.83	0.79	0.80
5	40.58	-65.34	21.53	68.80	161.76	41.44	-67.58	20.87	70.73	162.84	1.93	2.49
6	53.37	73.54	57.31	93.24	37.93	53.04	73.39	56.55	92.65	37.61	0.59	0.84
7	3.92	0.66	-2.24	2.33	286.55	3.99	1.44	-2.46	2.85	300.32	0.52	0.81
8	36.37	20.12	-53.42	57.08	290.64	37.19	18.76	-52.44	55.70	289.69	1.38	1.87
9	57.52	-56.97	19.19	60.12	161.38	58.56	-57.05	16.20	59.30	164.14	0.82	3.17
10	62.52	58.16	43.34	72.53	36.69	62.91	57.03	39.20	69.21	34.50	3.32	4.31
11	64.73	10.50	-34.48	36.05	286.94	65.35	9.44	-32.80	34.13	286.06	1.92	2.08
12	78.22	30.25	17.84	35.12	30.53	78.65	29.68	14.56	33.06	26.13	2.06	3.36
13	66.30	1.74	-4.24	4.58	292.29	67.06	1.69	-5.95	6.19	285.84	1.61	1.87
14	77.20	-28.53	5.17	28.99	169.73	77.62	-28.09	2.96	28.25	173.99	0.74	2.29
15	81.82	6.28	-19.71	20.69	287.66	81.87	5.69	-18.41	19.27	287.19	1.42	1.43
16	87.81	-11.29	-1.58	11.40	187.97	87.84	-11.10	-2.16	11.31	191.03	0.09	0.61
17	88.21	14.35	3.99	14.89	15.54	88.28	14.12	3.18	14.48	12.67	0.41	0.84
18	4.12	0.71	-2.20	2.32	287.97	4.04	1.47	-2.45	2.86	300.99	0.54	0.80
19	4.00	0.66	-2.28	2.38	286.06	4.04	1.39	-2.39	2.77	300.24	0.39	0.74
20	3.95	0.66	-2.36	2.45	285.51	4.06	1.41	-2.43	2.81	300.07	0.36	0.76
21	4.00	0.69	-2.14	2.25	287.75	4.13	1.43	-2.33	2.74	301.53	0.49	0.77
22	3.99	0.66	-2.29	2.38	286.22	4.12	1.45	-2.47	2.86	300.34	0.48	0.82
23	4.12	0.71	-2.12	2.23	288.54	4.21	1.47	-2.37	2.78	301.87	0.55	0.81
24	4.06	0.62	-2.18	2.27	285.85	4.04	1.42	-2.44	2.82	300.12	0.55	0.84
25	3.83	0.69	-2.23	2.33	287.31	4.03	1.40	-2.27	2.67	301.71	0.34	0.74
26	96.48	2.08	-5.82	6.18	289.71	96.14	1.87	-4.39	4.77	293.08	1.41	1.48
27	47.42	-30.88	-59.48	67.02	242.56	47.93	-33.43	-57.33	66.37	239.75	0.65	3.37
28	53.78	-35.07	-55.66	65.79	237.79	54.20	-37.20	-53.37	65.06	235.12	0.73	3.16
29	60.36	-35.48	-50.23	61.50	234.76	60.82	-36.95	-47.85	60.46	232.33	1.04	2.83
30	66.25	-32.85	-44.37	55.20	233.48	66.66	-33.88	-42.00	53.96	231.11	1.24	2.62
31	72.01	-28.15	-37.94	47.24	233.43	72.26	-29.06	-35.82	46.13	230.95	1.11	2.32
32	76.58	-23.12	-32.35	39.76	234.44	76.83	-23.76	-30.27	38.48	231.87	1.28	2.19
33	81.87	-16.99	-25.74	30.84	236.57	82.02	-17.41	-23.83	29.51	233.85	1.33	1.96
34	84.52	-13.46	-22.23	25.99	238.80	84.66	-13.74	-20.33	24.54	235.96	1.45	1.93
35	87.01	-10.19	-18.87	21.44	241.63	87.01	-10.47	-17.10	20.05	238.51	1.39	1.79
36	89.18	-7.41	-15.91	17.55	245.01	89.01	-7.65	-14.17	16.10	241.65	1.45	1.76
37	91.72	-3.99	-12.38	13.01	252.14	91.42	-4.24	-10.71	11.52	248.40	1.49	1.72
38	93.15	-2.07	-10.38	10.59	258.74	92.79	-2.27	-8.73	9.02	255.42	1.57	1.70
39	95.28	0.48	-7.56	7.58	273.65	94.80	0.28	-5.95	5.96	272.71	1.62	1.69
40	52.28	81.64	1.66	81.66	1.16	52.16	81.34	0.47	81.34	0.33	0.32	1.23
41	56.45	77.80	-6.43	78.06	355.28	56.61	77.18	-7.03	77.50	354.80	0.56	0.88
42	61.57	70.02	-12.02	71.05	350.26	61.94	68.97	-12.05	70.02	350.09	1.03	1.11
43	66.96	60.75	-14.53	62.46	346.54	67.40	59.45	-14.05	61.09	346.71	1.37	1.45
44	72.33	50.61	-14.93	52.76	343.57	72.65	49.48	-14.15	51.47	344.05	1.29	1.41
45	76.71	41.97	-14.44	44.38	341.02	77.05	40.91	-13.40	43.05	341.86	1.33	1.52
46	82.00	31.26	-12.83	33.79	337.68	82.27	30.31	-11.64	32.47	338.98	1.32	1.55
47	84.49	26.00	-11.85	28.57	335.49	84.65	25.14	-10.65	27.31	337.04	1.26	1.48
48	87.06	20.86	-10.71	23.45	332.83	87.17	20.10	-9.45	22.21	334.81	1.24	1.48
49	89.20	16.59	-9.67	19.20	329.77	89.19	16.04	-8.40	18.10	332.35	1.10	1.38
50	91.89	11.29	-8.39	14.06	323.38	91.80	10.92	-7.06	13.00	327.10	1.06	1.38
51	93.27	8.34	-7.65	11.32	317.46	93.09	7.94	-6.25	10.11	321.80	1.21	1.47
52	95.31	4.38	-6.55	7.88	303.75	94.96	4.20	-5.15	6.64	309.25	1.24	1.45

53	88.62	5.87	99.71	99.88	86.63	88.82	4.75	95.94	96.05	87.17	3.83	3.94
54	90.03	1.56	88.73	88.74	88.99	90.13	0.99	83.81	83.82	89.33	4.92	4.95
55	91.50	-1.37	74.05	74.07	91.06	91.60	-1.78	68.27	68.29	91.49	5.78	5.80
56	92.49	-2.91	58.54	58.61	92.84	92.61	-2.93	52.91	52.99	93.16	5.62	5.63
57	93.28	-3.37	46.46	46.58	94.15	93.31	-3.19	41.28	41.40	94.42	5.18	5.18
58	94.20	-3.28	36.69	36.83	95.11	94.21	-2.96	32.35	32.49	95.22	4.34	4.35
59	94.88	-2.41	24.13	24.25	95.69	94.81	-2.00	21.10	21.19	95.42	3.06	3.06
60	95.30	-1.70	17.71	17.79	95.47	95.20	-1.36	15.39	15.45	95.06	2.34	2.35
61	95.42	-1.11	13.15	13.20	94.83	95.29	-0.83	11.41	11.44	94.16	1.76	1.77
62	95.63	-0.56	9.20	9.22	93.48	95.50	-0.33	8.00	8.00	92.40	1.22	1.23
63	95.90	0.14	4.63	4.63	88.25	95.69	0.29	4.08	4.10	85.87	0.53	0.61
64	96.24	0.91	0.19	0.93	12.09	96.01	0.94	0.53	1.08	29.33	0.15	0.41
65	96.46	1.62	-3.73	4.07	293.53	96.10	1.48	-2.72	3.10	298.55	0.97	1.08
66	8.55	-0.16	-3.71	3.72	267.53	8.57	1.08	-3.88	4.03	285.57	0.31	1.25
67	22.52	-1.85	-3.61	4.06	242.91	22.96	-0.88	-3.83	3.93	257.12	0.13	1.09
68	37.58	-2.06	-2.31	3.09	228.29	38.38	-2.11	-3.29	3.91	237.29	0.82	1.27
69	47.80	-0.19	-4.11	4.11	267.38	48.64	-0.58	-5.63	5.66	264.15	1.55	1.78
70	57.99	0.64	-4.21	4.26	278.68	58.80	0.69	-5.83	5.88	276.77	1.62	1.81
71	66.46	2.19	-4.40	4.92	296.45	67.17	2.04	-5.67	6.03	289.81	1.11	1.46
72	75.34	2.74	-5.02	5.72	298.64	75.90	2.48	-5.84	6.35	292.98	0.63	1.03
73	79.23	3.18	-6.02	6.81	297.85	79.52	3.09	-6.51	7.21	295.42	0.40	0.58
74	82.78	3.05	-6.02	6.75	296.83	83.01	2.77	-6.33	6.91	293.60	0.16	0.48
75	86.47	2.85	-5.24	5.96	298.52	86.56	2.75	-5.38	6.05	297.06	0.09	0.19
76	89.97	2.86	-6.08	6.72	295.19	89.89	2.75	-5.78	6.40	295.40	0.32	0.33
77	91.84	2.69	-6.00	6.57	294.12	91.72	2.65	-5.60	6.19	295.32	0.38	0.42
78	94.66	2.28	-5.46	5.92	292.66	94.42	2.07	-4.67	5.10	293.91	0.82	0.85
79	27.46	50.83	-25.68	56.95	333.20	27.31	51.92	-26.26	58.18	333.17	1.23	1.24
80	29.24	46.67	-5.80	47.03	352.91	29.25	47.44	-5.74	47.79	353.10	0.76	0.77
81	49.23	79.63	30.65	85.33	21.05	48.89	79.57	30.29	85.14	20.84	0.19	0.50
82	40.36	48.06	33.31	58.48	34.73	40.45	48.26	32.92	58.42	34.30	0.06	0.45
83	69.06	45.80	82.97	94.78	61.10	69.30	44.52	81.83	93.16	61.45	1.62	1.73
84	50.15	-0.20	50.15	50.15	90.23	50.83	-1.26	49.81	49.83	91.45	0.32	1.30
85	36.94	-2.48	-2.53	3.54	225.67	37.87	-2.79	-3.67	4.61	232.79	1.07	1.50
86	63.01	-30.99	67.49	74.27	114.67	63.89	-31.84	66.71	73.92	115.51	0.35	1.45
87	35.46	-51.32	14.50	53.33	164.22	36.17	-53.04	13.74	54.79	165.48	1.46	2.01
88	37.48	-54.51	-24.36	59.71	204.08	38.27	-55.86	-24.67	61.07	203.83	1.36	1.59
89	28.96	-29.56	-32.09	43.64	227.35	29.56	-30.79	-32.42	44.71	226.48	1.07	1.41
90	30.16	0.45	-62.76	62.76	270.41	30.60	-1.61	-61.86	61.88	268.51	0.88	2.29
91	14.83	10.03	-33.48	34.95	286.68	14.56	10.27	-33.73	35.26	286.93	0.31	0.44
92	19.30	33.10	-36.66	49.40	312.08	19.14	33.60	-37.24	50.16	312.06	0.76	0.78
93	53.12	50.78	-11.97	52.17	346.74	53.70	50.04	-12.41	51.56	346.07	0.61	1.04
94	54.41	46.85	3.23	46.96	3.95	55.02	46.43	1.79	46.46	2.21	0.50	1.62
95	40.97	61.33	26.60	66.85	23.44	40.89	61.75	26.73	67.29	23.41	0.44	0.45
96	55.82	42.67	28.07	51.08	33.34	56.56	41.84	25.67	49.09	31.54	1.99	2.65
97	50.96	43.90	53.82	69.45	50.80	51.16	43.42	53.19	68.66	50.78	0.79	0.82
98	73.35	-1.76	50.06	50.09	92.01	73.96	-2.40	45.65	45.71	93.02	4.38	4.50
99	45.91	-41.60	38.28	56.53	137.38	46.68	-43.03	37.90	57.34	138.63	0.81	1.67
100	53.15	-44.79	13.25	46.71	163.51	54.20	-44.88	11.00	46.21	166.23	0.50	2.48
101	33.84	-56.92	-4.77	57.12	184.79	34.61	-58.33	-5.50	58.59	185.38	1.47	1.76
102	52.85	-32.01	-34.18	46.83	226.88	53.67	-32.54	-33.67	46.83	225.97	0.00	1.10
103	22.52	4.15	-50.64	50.81	274.68	22.69	3.55	-50.81	50.93	274.00	0.12	0.65
104	35.93	13.75	-43.14	45.28	287.68	36.85	12.79	-42.56	44.44	286.73	0.84	1.45
105	19.45	19.26	-9.72	21.58	333.21	19.29	19.47	-9.74	21.77	333.44	0.19	0.26
106	46.53	30.75	-10.03	32.34	341.93	47.39	30.15	-10.85	32.05	340.21	0.29	1.33
107	71.84	20.66	-10.05	22.98	334.07	72.39	20.14	-10.28	22.61	332.97	0.37	0.79
108	24.34	17.38	7.85	19.07	24.32	24.49	18.21	8.07	19.92	23.90	0.85	0.87
109	72.96	16.37	6.23	17.52	20.83	73.37	16.10	4.24	16.65	14.75	0.87	2.05



110	31.54	-5.49	19.00	19.77	106.12	31.75	-5.86	18.51	19.41	107.55	0.36	0.65
111	58.32	-2.87	26.76	26.91	96.13	59.18	-3.42	23.96	24.21	98.13	2.70	2.98
112	79.13	-0.32	12.42	12.42	91.46	79.53	-0.13	10.05	10.05	90.72	2.37	2.41
113	83.05	3.08	-6.18	6.90	296.53	83.26	2.93	-6.35	7.00	294.80	0.10	0.31
114	23.81	-25.50	2.83	25.66	173.66	24.04	-26.19	2.43	26.30	174.69	0.64	0.83
115	47.99	-30.67	7.84	31.66	165.65	49.02	-31.03	5.95	31.59	169.14	0.07	2.18
116	72.49	-14.22	0.49	14.23	178.02	73.02	-13.97	-1.14	14.02	184.68	0.21	1.73
117	19.83	-18.79	-15.29	24.23	219.13	19.87	-19.35	-15.66	24.90	218.99	0.67	0.67
118	65.99	6.53	-20.80	21.80	287.44	66.52	6.04	-20.35	21.23	286.52	0.57	0.85
119	8.51	0.59	-11.84	11.85	272.85	8.60	1.16	-11.42	11.47	275.83	0.38	0.71
120	71.91	-10.41	-17.10	20.02	238.67	72.34	-10.59	-17.05	20.07	238.15	0.05	0.47
121	47.41	-21.37	-21.22	30.12	224.80	48.31	-21.76	-21.42	30.53	224.55	0.41	1.00
122	3.73	0.83	-2.40	2.54	289.09	3.95	1.50	-2.50	2.92	300.90	0.38	0.71
123	4.10	0.68	-2.67	2.75	284.25	4.22	1.42	-2.74	3.09	297.35	0.34	0.75
124	4.80	0.29	-3.32	3.33	274.97	4.95	1.17	-3.28	3.48	289.64	0.15	0.89
125	3.79	0.81	-2.35	2.49	288.97	3.94	1.49	-2.46	2.88	301.27	0.39	0.70
126	5.48	0.37	-3.46	3.48	276.09	5.59	1.46	-3.60	3.88	292.04	0.40	1.10
127	9.43	-2.77	-5.33	6.01	242.52	9.67	-1.84	-5.31	5.62	250.90	0.39	0.96
128	17.37	-6.42	-6.56	9.18	225.64	17.68	-5.83	-6.66	8.85	228.78	0.33	0.67
129	3.69	0.79	-2.34	2.47	288.70	3.79	1.51	-2.47	2.90	301.55	0.43	0.74
130	7.95	-1.17	-4.34	4.50	254.94	8.04	0.04	-4.51	4.51	270.45	0.01	1.23
131	21.56	-6.39	-6.11	8.84	223.70	21.96	-5.82	-6.17	8.48	226.68	0.36	0.70
132	34.23	-9.99	-8.44	13.08	220.18	35.14	-10.32	-9.07	13.74	221.32	0.66	1.15
133	43.39	-11.55	-11.63	16.39	225.20	44.43	-11.80	-12.31	17.05	226.21	0.66	1.27
134	3.95	0.83	-2.36	2.50	289.27	4.19	1.59	-2.50	2.96	302.43	0.46	0.81
135	12.32	-1.94	-4.77	5.16	247.84	12.51	-0.75	-4.53	4.59	260.62	0.57	1.23
136	33.07	-5.83	-6.02	8.38	225.90	33.88	-5.91	-6.77	8.98	228.90	0.60	1.11
137	45.67	-7.77	-8.05	11.19	226.02	46.71	-8.05	-9.27	12.27	229.02	1.08	1.63
138	58.71	-6.25	-8.94	10.91	235.04	59.55	-6.23	-10.13	11.89	238.40	0.98	1.46
139	64.79	-6.40	-10.01	11.88	237.42	65.43	-6.39	-10.88	12.61	239.59	0.73	1.08
140	4.01	0.74	-2.36	2.47	287.34	4.27	1.45	-2.45	2.85	300.58	0.38	0.76
141	16.39	-2.39	-3.94	4.61	238.76	16.87	-1.33	-4.00	4.22	251.62	0.39	1.17
142	40.50	-4.62	-4.98	6.80	227.17	41.57	-4.78	-6.21	7.83	232.42	1.03	1.64
143	56.82	-2.97	-7.01	7.62	247.06	57.73	-3.21	-8.25	8.85	248.76	1.23	1.56
144	72.10	-1.25	-7.97	8.07	261.12	72.63	-1.57	-8.77	8.91	259.83	0.84	1.01
145	78.85	-0.79	-9.95	9.98	265.49	79.19	-0.86	-9.81	9.85	264.98	0.13	0.37
146	3.81	0.86	-2.33	2.48	290.19	4.08	1.45	-2.37	2.78	301.54	0.30	0.65
147	20.67	-1.88	-3.91	4.34	244.28	21.18	-0.95	-3.78	3.89	255.83	0.45	1.07
148	44.88	-2.29	-4.75	5.27	244.28	45.83	-2.84	-5.53	6.22	242.79	0.95	1.35
149	62.00	-0.37	-5.23	5.24	265.95	62.81	-0.65	-6.32	6.36	264.09	1.12	1.39
150	77.98	1.20	-7.52	7.62	279.09	78.33	0.98	-7.95	8.01	277.00	0.39	0.60
151	84.43	0.86	-7.28	7.33	276.72	84.48	0.88	-7.32	7.37	276.82	0.04	0.07
152	8.60	-4.38	-6.85	8.13	237.42	8.50	-3.55	-6.90	7.75	242.78	0.38	0.84
153	32.70	-15.37	-11.88	19.43	217.71	33.53	-15.81	-12.57	20.20	218.50	0.77	1.17
154	52.15	-11.63	-13.19	17.59	228.59	53.13	-11.86	-14.01	18.35	229.74	0.76	1.30
155	70.19	-6.39	-12.68	14.20	243.25	70.82	-6.56	-13.08	14.64	243.36	0.44	0.77
156	84.51	-1.52	-9.51	9.63	260.89	84.64	-1.67	-9.27	9.42	259.80	0.21	0.31
157	90.97	0.09	-8.04	8.04	270.61	90.94	-0.06	-7.45	7.45	269.57	0.59	0.61
158	93.70	1.04	-6.86	6.93	278.64	93.57	0.88	-5.92	5.99	278.40	0.94	0.96
159	34.75	-28.47	-45.33	53.53	237.87	35.36	-30.19	-44.60	53.86	235.91	0.33	1.97
160	38.18	63.85	1.52	63.87	1.36	38.15	64.56	1.22	64.57	1.08	0.70	0.77
161	66.55	6.06	75.64	75.89	85.42	67.17	4.67	74.94	75.08	86.44	0.81	1.68
162	16.96	20.02	-47.27	51.33	292.95	16.83	20.07	-47.59	51.65	292.87	0.32	0.35
163	38.41	-59.33	18.35	62.10	162.81	39.26	-61.06	17.79	63.60	163.76	1.50	2.01
164	46.98	61.43	45.51	76.45	36.54	46.92	61.54	45.25	76.39	36.33	0.06	0.29
165	54.77	9.11	-30.15	31.49	286.81	55.55	8.25	-29.70	30.82	285.52	0.67	1.25
166	65.52	-26.36	5.36	26.89	168.51	66.26	-26.15	3.23	26.35	172.96	0.54	2.26

167	66.32	26.38	15.00	30.35	29.62	67.00	25.73	12.44	28.58	25.81	1.77	2.73
168	14.66	9.80	-32.90	34.33	286.60	14.55	9.80	-33.04	34.47	286.52	0.14	0.18
169	35.13	-51.44	14.42	53.42	164.34	35.93	-53.06	13.92	54.85	165.29	1.43	1.87
170	39.86	47.77	32.63	57.85	34.33	39.86	48.19	32.81	58.30	34.25	0.45	0.46
171	42.56	4.54	-24.21	24.63	280.61	43.66	4.27	-24.35	24.72	279.94	0.09	1.14
172	51.90	-23.67	5.22	24.24	167.56	52.94	-23.88	3.60	24.15	171.42	0.09	1.94
173	52.36	20.31	12.09	23.64	30.77	53.24	19.73	10.05	22.15	27.00	1.49	2.30
174	19.67	-18.77	-15.93	24.62	220.31	19.68	-19.14	-16.02	24.96	219.93	0.34	0.38
175	19.42	19.44	-9.63	21.69	333.63	19.35	20.18	-9.51	22.31	334.76	0.62	0.75
176	31.38	-4.85	19.21	19.81	104.17	31.73	-5.37	18.93	19.68	105.83	0.13	0.69
177	8.80	0.51	-12.02	12.03	272.43	8.93	1.16	-11.76	11.82	275.63	0.21	0.71
178	23.79	-25.30	2.94	25.47	173.37	24.14	-25.79	2.55	25.91	174.36	0.44	0.72
179	23.37	16.79	7.74	18.49	24.75	23.54	17.76	7.82	19.40	23.76	0.91	0.99
180	22.98	-0.79	-11.45	11.48	266.04	23.40	-0.49	-11.65	11.66	267.61	0.18	0.55
181	31.54	-14.05	0.19	14.05	179.24	32.35	-14.09	-0.64	14.10	182.58	0.05	1.16
182	31.12	7.30	3.73	8.19	27.08	31.80	7.42	3.07	8.03	22.50	0.16	0.96

## 384 hr after vs Original

Average	$\Delta C^*$	$\Delta E$
	0.95	1.45

Average  $\Delta E$  - overprint color excluded

C	1.22	2.31
M	1.03	1.36
Y	3.02	3.08
K	0.62	0.95
Paper	1.41	1.48

Average  $\Delta E$  - overprint color only

0.72	1.23
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ID#	Original					554 hr after						
NUM	L*	a*	b*	C*	h	L*	a*	b*	C*	h	ΔC*	ΔE
1	42.01	-24.72	-61.69	66.46	248.16	42.34	-27.62	-59.34	65.27	245.04	1.19	3.75
2	49.38	82.49	10.58	83.16	7.31	49.34	82.48	9.97	83.08	6.89	0.08	0.61
3	87.00	10.27	105.69	106.18	84.45	87.33	8.46	102.53	102.88	85.28	3.30	3.66
4	17.26	28.88	-56.94	63.84	296.89	17.29	29.04	-57.19	64.14	296.92	0.30	0.30
5	40.58	-65.34	21.53	68.80	161.76	41.59	-67.76	20.36	70.75	163.27	1.95	2.87
6	53.37	73.54	57.31	93.24	37.93	53.30	73.28	56.59	92.59	37.68	0.65	0.77
7	3.92	0.66	-2.24	2.33	286.55	4.00	1.58	-2.31	2.80	304.32	0.47	0.93
8	36.37	20.12	-53.42	57.08	290.64	37.30	18.66	-51.85	55.10	289.80	1.98	2.34
9	57.52	-56.97	19.19	60.12	161.38	58.74	-56.78	15.81	58.94	164.44	1.18	3.60
10	62.52	58.16	43.34	72.53	36.69	63.14	56.86	38.75	68.81	34.28	3.72	4.81
11	64.73	10.50	-34.48	36.05	286.94	65.44	9.46	-32.18	33.55	286.38	2.50	2.62
12	78.22	30.25	17.84	35.12	30.53	78.82	29.51	14.46	32.86	26.11	2.26	3.51
13	66.30	1.74	-4.24	4.58	292.29	67.10	1.78	-5.83	6.10	286.94	1.52	1.78
14	77.20	-28.53	5.17	28.99	169.73	77.70	-27.96	3.00	28.12	173.87	0.87	2.30
15	81.82	6.28	-19.71	20.69	287.66	81.95	5.71	-17.95	18.84	287.66	1.85	1.85
16	87.81	-11.29	-1.58	11.40	187.97	87.87	-11.09	-1.86	11.24	189.54	0.16	0.35
17	88.21	14.35	3.99	14.89	15.54	88.31	14.02	3.42	14.43	13.72	0.46	0.67
18	4.12	0.71	-2.20	2.32	287.97	4.02	1.60	-2.22	2.74	305.83	0.42	0.90
19	4.00	0.66	-2.28	2.38	286.06	4.00	1.61	-2.33	2.83	304.74	0.45	0.95
20	3.95	0.66	-2.36	2.45	285.51	4.01	1.60	-2.50	2.97	302.56	0.52	0.95
21	4.00	0.69	-2.14	2.25	287.75	4.15	1.68	-2.24	2.80	306.85	0.55	1.01
22	3.99	0.66	-2.29	2.38	286.22	4.10	1.59	-2.26	2.76	305.03	0.38	0.94
23	4.12	0.71	-2.12	2.23	288.54	4.19	1.70	-2.25	2.82	307.05	0.59	1.00
24	4.06	0.62	-2.18	2.27	285.85	4.11	1.65	-2.40	2.91	304.60	0.64	1.05
25	3.83	0.69	-2.23	2.33	287.31	3.96	1.56	-2.29	2.77	304.33	0.44	0.88
26	96.48	2.08	-5.82	6.18	289.71	96.03	1.79	-4.05	4.43	293.86	1.75	1.85
27	47.42	-30.88	-59.48	67.02	242.56	47.85	-33.67	-56.80	66.03	239.34	0.99	3.89
28	53.78	-35.07	-55.66	65.79	237.79	54.22	-37.34	-52.68	64.58	234.67	1.21	3.77
29	60.36	-35.48	-50.23	61.50	234.76	60.81	-37.12	-47.19	60.04	231.81	1.46	3.48
30	66.25	-32.85	-44.37	55.20	233.48	66.68	-34.02	-41.36	53.56	230.56	1.64	3.26
31	72.01	-28.15	-37.94	47.24	233.43	72.42	-28.91	-35.07	45.45	230.50	1.79	3.00
32	76.58	-23.12	-32.35	39.76	234.44	76.85	-23.76	-29.68	38.01	231.32	1.75	2.76
33	81.87	-16.99	-25.74	30.84	236.57	82.06	-17.35	-23.21	28.98	233.22	1.86	2.56
34	84.52	-13.46	-22.23	25.99	238.80	84.64	-13.79	-19.86	24.18	235.22	1.81	2.40
35	87.01	-10.19	-18.87	21.44	241.63	87.04	-10.52	-16.62	19.67	237.67	1.77	2.27
36	89.18	-7.41	-15.91	17.55	245.01	89.13	-7.71	-13.78	15.79	240.77	1.76	2.15
37	91.72	-3.99	-12.38	13.01	252.14	91.56	-4.29	-10.31	11.17	247.40	1.84	2.10
38	93.15	-2.07	-10.38	10.59	258.74	92.88	-2.41	-8.42	8.76	254.07	1.83	2.01
39	95.28	0.48	-7.56	7.58	273.65	94.89	0.20	-5.63	5.63	272.08	1.95	1.99
40	52.28	81.64	1.66	81.66	1.16	52.47	81.37	1.07	81.38	0.75	0.28	0.68
41	56.45	77.80	-6.43	78.06	355.28	56.88	76.94	-6.47	77.21	355.19	0.85	0.96
42	61.57	70.02	-12.02	71.05	350.26	62.12	68.87	-11.44	69.81	350.57	1.24	1.40
43	66.96	60.75	-14.53	62.46	346.54	67.56	59.30	-13.49	60.81	347.18	1.65	1.88
44	72.33	50.61	-14.93	52.76	343.57	72.85	49.13	-13.59	50.98	344.54	1.78	2.06
45	76.71	41.97	-14.44	44.38	341.02	77.13	40.69	-12.96	42.70	342.33	1.68	2.00
46	82.00	31.26	-12.83	33.79	337.68	82.34	30.10	-11.18	32.11	339.63	1.68	2.05
47	84.49	26.00	-11.85	28.57	335.49	84.68	25.02	-10.21	27.03	337.80	1.54	1.92
48	87.06	20.86	-10.71	23.45	332.83	87.14	19.94	-9.09	21.91	335.49	1.54	1.86
49	89.20	16.59	-9.67	19.20	329.77	89.18	15.89	-8.02	17.80	333.23	1.40	1.79
50	91.89	11.29	-8.39	14.06	323.38	91.78	10.79	-6.69	12.70	328.18	1.36	1.78
51	93.27	8.34	-7.65	11.32	317.46	93.09	7.79	-5.88	9.77	322.95	1.55	1.86
52	95.31	4.38	-6.55	7.88	303.75	94.90	4.09	-4.80	6.31	310.44	1.57	1.82

53	88.62	5.87	99.71	99.88	86.63	88.94	4.24	95.02	95.12	87.44	4.76	4.98
54	90.03	1.56	88.73	88.74	88.99	90.29	0.40	82.22	82.22	89.72	6.52	6.62
55	91.50	-1.37	74.05	74.07	91.06	91.70	-2.02	67.18	67.21	91.73	6.86	6.90
56	92.49	-2.91	58.54	58.61	92.84	92.66	-3.10	52.25	52.34	93.39	6.27	6.30
57	93.28	-3.37	46.46	46.58	94.15	93.36	-3.27	40.62	40.75	94.60	5.83	5.84
58	94.20	-3.28	36.69	36.83	95.11	94.25	-2.97	31.70	31.84	95.36	4.99	5.00
59	94.88	-2.41	24.13	24.25	95.69	94.79	-2.02	20.82	20.92	95.54	3.33	3.33
60	95.30	-1.70	17.71	17.79	95.47	95.20	-1.38	15.30	15.37	95.14	2.42	2.43
61	95.42	-1.11	13.15	13.20	94.83	95.30	-0.83	11.29	11.33	94.20	1.87	1.88
62	95.63	-0.56	9.20	9.22	93.48	95.45	-0.37	8.08	8.09	92.64	1.13	1.15
63	95.90	0.14	4.63	4.63	88.25	95.68	0.26	4.30	4.31	86.60	0.32	0.41
64	96.24	0.91	0.19	0.93	12.09	95.97	0.90	0.65	1.11	35.82	0.18	0.53
65	96.46	1.62	-3.73	4.07	293.53	96.06	1.42	-2.49	2.87	299.81	1.20	1.32
66	8.55	-0.16	-3.71	3.72	267.53	8.83	1.62	-3.72	4.06	293.57	0.34	1.80
67	22.52	-1.85	-3.61	4.06	242.91	23.26	-0.63	-3.95	4.00	260.96	0.06	1.47
68	37.58	-2.06	-2.31	3.09	228.29	38.70	-1.55	-3.65	3.97	246.99	0.88	1.82
69	47.80	-0.19	-4.11	4.11	267.38	48.88	-0.20	-5.62	5.62	268.00	1.51	1.86
70	57.99	0.64	-4.21	4.26	278.68	59.00	0.73	-5.77	5.82	277.24	1.56	1.86
71	66.46	2.19	-4.40	4.92	296.45	67.32	2.20	-5.64	6.05	291.28	1.13	1.51
72	75.34	2.74	-5.02	5.72	298.64	75.88	2.60	-5.72	6.28	294.42	0.56	0.90
73	79.23	3.18	-6.02	6.81	297.85	79.62	3.08	-6.34	7.05	295.92	0.24	0.51
74	82.78	3.05	-6.02	6.75	296.83	83.12	2.89	-6.02	6.67	295.67	0.08	0.38
75	86.47	2.85	-5.24	5.96	298.52	86.61	2.56	-5.21	5.81	296.22	0.15	0.32
76	89.97	2.86	-6.08	6.72	295.19	89.91	2.69	-5.45	6.08	296.27	0.64	0.66
77	91.84	2.69	-6.00	6.57	294.12	91.68	2.55	-5.30	5.89	295.69	0.68	0.73
78	94.66	2.28	-5.46	5.92	292.66	94.37	1.94	-4.38	4.79	293.89	1.13	1.17
79	27.46	50.83	-25.68	56.95	333.20	27.59	51.92	-25.63	57.90	333.73	0.95	1.10
80	29.24	46.67	-5.80	47.03	352.91	29.50	47.58	-5.44	47.89	353.47	0.86	1.01
81	49.23	79.63	30.65	85.33	21.05	49.16	79.61	30.42	85.23	20.91	0.10	0.24
82	40.36	48.06	33.31	58.48	34.73	40.72	48.42	32.97	58.58	34.25	0.10	0.61
83	69.06	45.80	82.97	94.78	61.10	69.63	44.02	81.52	92.64	61.63	2.14	2.37
84	50.15	-0.20	50.15	50.15	90.23	51.09	-1.23	49.37	49.38	91.43	0.77	1.60
85	36.94	-2.48	-2.53	3.54	225.67	38.04	-2.16	-4.17	4.70	242.63	1.16	2.00
86	63.01	-30.99	67.49	74.27	114.67	63.92	-32.58	65.96	73.57	116.28	0.70	2.39
87	35.46	-51.32	14.50	53.33	164.22	36.43	-53.08	13.43	54.75	165.81	1.42	2.28
88	37.48	-54.51	-24.36	59.71	204.08	38.37	-55.73	-24.88	61.03	204.06	1.32	1.60
89	28.96	-29.56	-32.09	43.64	227.35	29.52	-30.63	-32.57	44.71	226.76	1.07	1.30
90	30.16	0.45	-62.76	62.76	270.41	30.52	-2.15	-61.18	61.22	267.98	1.54	3.06
91	14.83	10.03	-33.48	34.95	286.68	14.57	10.21	-33.56	35.08	286.92	0.13	0.33
92	19.30	33.10	-36.66	49.40	312.08	19.28	33.75	-36.81	49.94	312.52	0.54	0.67
93	53.12	50.78	-11.97	52.17	346.74	54.04	49.95	-12.17	51.41	346.30	0.76	1.26
94	54.41	46.85	3.23	46.96	3.95	55.27	46.28	1.69	46.31	2.10	0.65	1.85
95	40.97	61.33	26.60	66.85	23.44	41.10	61.81	26.69	67.33	23.36	0.48	0.51
96	55.82	42.67	28.07	51.08	33.34	56.72	41.73	24.99	48.64	30.91	2.44	3.34
97	50.96	43.90	53.82	69.45	50.80	51.35	43.35	52.85	68.35	50.64	1.10	1.18
98	73.35	-1.76	50.06	50.09	92.01	74.19	-2.37	44.60	44.66	93.04	5.43	5.56
99	45.91	-41.60	38.28	56.53	137.38	46.80	-43.48	37.28	57.27	139.39	0.74	2.31
100	53.15	-44.79	13.25	46.71	163.51	54.40	-44.76	10.40	45.95	166.92	0.76	3.11
101	33.84	-56.92	-4.77	57.12	184.79	34.80	-58.23	-5.82	58.52	185.71	1.40	1.93
102	52.85	-32.01	-34.18	46.83	226.88	53.82	-32.61	-33.20	46.54	225.52	0.29	1.50
103	22.52	4.15	-50.64	50.81	274.68	22.75	3.26	-50.42	50.52	273.69	0.29	0.95
104	35.93	13.75	-43.14	45.28	287.68	37.09	12.57	-42.00	43.84	286.66	1.44	2.01
105	19.45	19.26	-9.72	21.58	333.21	19.61	20.20	-9.39	22.28	335.06	0.70	1.01
106	46.53	30.75	-10.03	32.34	341.93	47.58	30.31	-10.81	32.18	340.38	0.16	1.38
107	71.84	20.66	-10.05	22.98	334.07	72.51	20.01	-10.12	22.43	333.17	0.55	0.94
108	24.34	17.38	7.85	19.07	24.32	24.72	18.77	7.99	20.40	23.07	1.33	1.45
109	72.96	16.37	6.23	17.52	20.83	73.59	15.97	4.03	16.47	14.17	1.05	2.32



110	31.54	-5.49	19.00	19.77	106.12	31.97	-5.47	18.33	19.13	106.61	0.64	0.80
111	58.32	-2.87	26.76	26.91	96.13	59.54	-3.01	23.03	23.23	97.46	3.68	3.93
112	79.13	-0.32	12.42	12.42	91.46	79.62	-0.22	9.65	9.65	91.30	2.77	2.81
113	83.05	3.08	-6.18	6.90	296.53	83.36	2.89	-6.00	6.66	295.74	0.24	0.41
114	23.81	-25.50	2.83	25.66	173.66	24.26	-26.02	2.24	26.12	175.08	0.46	0.91
115	47.99	-30.67	7.84	31.66	165.65	49.36	-30.59	5.47	31.07	169.85	0.59	2.74
116	72.49	-14.22	0.49	14.23	178.02	73.21	-13.79	-1.45	13.87	186.02	0.36	2.11
117	19.83	-18.79	-15.29	24.23	219.13	20.04	-19.11	-15.73	24.75	219.46	0.52	0.58
118	65.99	6.53	-20.80	21.80	287.44	66.75	6.01	-20.18	21.05	286.59	0.75	1.11
119	8.51	0.59	-11.84	11.85	272.85	8.67	1.49	-11.48	11.58	277.39	0.27	0.98
120	71.91	-10.41	-17.10	20.02	238.67	72.40	-10.49	-16.97	19.95	238.29	0.07	0.51
121	47.41	-21.37	-21.22	30.12	224.80	48.43	-21.57	-21.70	30.60	225.17	0.48	1.14
122	3.73	0.83	-2.40	2.54	289.09	3.90	1.63	-2.14	2.69	307.27	0.15	0.86
123	4.10	0.68	-2.67	2.75	284.25	4.19	1.61	-2.61	3.06	301.71	0.31	0.94
124	4.80	0.29	-3.32	3.33	274.97	4.98	1.38	-3.06	3.35	294.36	0.02	1.13
125	3.79	0.81	-2.35	2.49	288.97	3.90	1.67	-2.31	2.85	305.93	0.36	0.87
126	5.48	0.37	-3.46	3.48	276.09	5.71	1.74	-3.33	3.76	297.52	0.28	1.40
127	9.43	-2.77	-5.33	6.01	242.52	9.67	-1.53	-5.25	5.47	253.71	0.54	1.27
128	17.37	-6.42	-6.56	9.18	225.64	17.91	-5.27	-6.84	8.64	232.39	0.54	1.30
129	3.69	0.79	-2.34	2.47	288.70	3.81	1.66	-2.30	2.83	305.78	0.36	0.88
130	7.95	-1.17	-4.34	4.50	254.94	8.31	0.62	-4.40	4.45	277.98	0.05	1.83
131	21.56	-6.39	-6.11	8.84	223.70	22.28	-5.25	-6.24	8.16	229.91	0.68	1.35
132	34.23	-9.99	-8.44	13.08	220.18	35.21	-9.94	-9.31	13.62	223.11	0.54	1.31
133	43.39	-11.55	-11.63	16.39	225.20	44.60	-11.44	-12.70	17.09	227.97	0.70	1.62
134	3.95	0.83	-2.36	2.50	289.27	4.18	1.72	-2.37	2.92	305.95	0.42	0.92
135	12.32	-1.94	-4.77	5.16	247.84	12.84	-0.56	-4.56	4.60	263.01	0.56	1.49
136	33.07	-5.83	-6.02	8.38	225.90	34.16	-5.64	-6.88	8.89	230.67	0.51	1.40
137	45.67	-7.77	-8.05	11.19	226.02	47.05	-7.43	-9.56	12.10	232.14	0.91	2.07
138	58.71	-6.25	-8.94	10.91	235.04	59.81	-6.15	-10.16	11.88	238.80	0.97	1.65
139	64.79	-6.40	-10.01	11.88	237.42	65.69	-6.23	-10.89	12.55	240.23	0.67	1.27
140	4.01	0.74	-2.36	2.47	287.34	4.24	1.62	-2.27	2.78	305.52	0.31	0.91
141	16.39	-2.39	-3.94	4.61	238.76	17.13	-1.13	-4.14	4.29	254.78	0.32	1.47
142	40.50	-4.62	-4.98	6.80	227.17	41.81	-4.31	-6.53	7.83	236.60	1.03	2.05
143	56.82	-2.97	-7.01	7.62	247.06	58.02	-2.88	-8.41	8.89	251.10	1.27	1.85
144	72.10	-1.25	-7.97	8.07	261.12	72.79	-1.47	-8.59	8.71	260.26	0.64	0.95
145	78.85	-0.79	-9.95	9.98	265.49	79.32	-1.05	-9.85	9.90	263.88	0.08	0.55
146	3.81	0.86	-2.33	2.48	290.19	4.06	1.68	-2.28	2.83	306.51	0.35	0.86
147	20.67	-1.88	-3.91	4.34	244.28	21.58	-0.47	-3.89	3.92	263.11	0.42	1.68
148	44.88	-2.29	-4.75	5.27	244.28	46.09	-2.41	-5.96	6.43	247.98	1.16	1.72
149	62.00	-0.37	-5.23	5.24	265.95	62.98	-0.25	-6.59	6.59	267.83	1.35	1.68
150	77.98	1.20	-7.52	7.62	279.09	78.45	1.09	-7.78	7.86	277.99	0.24	0.55
151	84.43	0.86	-7.28	7.33	276.72	84.62	0.71	-7.06	7.10	275.72	0.23	0.33
152	8.60	-4.38	-6.85	8.13	237.42	8.58	-3.33	-6.85	7.62	244.12	0.51	1.05
153	32.70	-15.37	-11.88	19.43	217.71	33.84	-15.64	-12.85	20.24	219.42	0.81	1.52
154	52.15	-11.63	-13.19	17.59	228.59	53.34	-11.69	-14.08	18.30	230.29	0.71	1.49
155	70.19	-6.39	-12.68	14.20	243.25	70.97	-6.39	-12.94	14.43	243.72	0.23	0.82
156	84.51	-1.52	-9.51	9.63	260.89	84.66	-1.61	-9.24	9.38	260.09	0.25	0.32
157	90.97	0.09	-8.04	8.04	270.61	90.96	-0.07	-7.26	7.26	269.49	0.78	0.80
158	93.70	1.04	-6.86	6.93	278.64	93.49	0.93	-5.73	5.81	279.24	1.12	1.15
159	34.75	-28.47	-45.33	53.53	237.87	35.45	-30.70	-44.07	53.71	235.13	0.18	2.66
160	38.18	63.85	1.52	63.87	1.36	38.42	64.60	1.61	64.62	1.43	0.75	0.79
161	66.55	6.06	75.64	75.89	85.42	67.39	4.45	74.16	74.29	86.57	1.60	2.34
162	16.96	20.02	-47.27	51.33	292.95	16.87	19.92	-47.38	51.40	292.81	0.07	0.17
163	38.41	-59.33	18.35	62.10	162.81	39.54	-61.15	17.22	63.53	164.27	1.43	2.42
164	46.98	61.43	45.51	76.45	36.54	47.15	61.39	44.89	76.05	36.18	0.40	0.64
165	54.77	9.11	-30.15	31.49	286.81	55.78	8.42	-29.18	30.37	286.10	1.12	1.56
166	65.52	-26.36	5.36	26.89	168.51	66.51	-25.79	2.77	25.94	173.87	0.95	2.83

167	66.32	26.38	15.00	30.35	29.62	67.24	25.88	11.82	28.45	24.56	1.90	3.35
168	14.66	9.80	-32.90	34.33	286.60	14.71	10.13	-32.89	34.42	287.11	0.09	0.33
169	35.13	-51.44	14.42	53.42	164.34	36.20	-52.96	13.41	54.63	165.79	1.21	2.12
170	39.86	47.77	32.63	57.85	34.33	40.18	48.35	32.63	58.33	34.01	0.48	0.66
171	42.56	4.54	-24.21	24.63	280.61	43.87	4.37	-24.06	24.45	280.30	0.18	1.33
172	51.90	-23.67	5.22	24.24	167.56	53.28	-23.24	2.91	23.43	172.86	0.81	2.72
173	52.36	20.31	12.09	23.64	30.77	53.45	19.94	9.75	22.20	26.06	1.44	2.61
174	19.67	-18.77	-15.93	24.62	220.31	19.84	-18.95	-16.04	24.82	220.25	0.20	0.27
175	19.42	19.44	-9.63	21.69	333.63	19.63	20.47	-9.47	22.55	335.17	0.86	1.06
176	31.38	-4.85	19.21	19.81	104.17	32.19	-4.96	18.73	19.38	104.83	0.43	0.95
177	8.80	0.51	-12.02	12.03	272.43	9.05	1.44	-11.39	11.48	277.22	0.55	1.15
178	23.79	-25.30	2.94	25.47	173.37	24.33	-25.30	2.15	25.39	175.14	0.08	0.96
179	23.37	16.79	7.74	18.49	24.75	23.82	18.31	7.82	19.91	23.12	1.42	1.59
180	22.98	-0.79	-11.45	11.48	266.04	23.62	0.05	-11.65	11.65	270.23	0.17	1.07
181	31.54	-14.05	0.19	14.05	179.24	32.60	-13.87	-0.99	13.91	184.10	0.14	1.60
182	31.12	7.30	3.73	8.19	27.08	31.99	7.76	2.50	8.15	17.88	0.04	1.58

## 554 hr after vs Original

Average	$\Delta C^*$	$\Delta E$
	1.12	1.75

Average  $\Delta E$  - overprint color excluded

C	1.55	2.81
M	1.30	1.62
Y	3.50	3.60
K	0.67	1.13
Paper	1.75	1.85

Average  $\Delta E$  - overprint color only

0.83	1.51
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## Appendix I



## Data for Hypothesis H1 Testing

ID#	Loc	CGATS.6 TR-001			Method One				Method Two			
		SWOP Reference			Dupont/Epson w/o cms default				Dupont/Epson w/cms default			
		L*	a*	b*	L*	a*	b*	ΔE	L*	a*	b*	ΔE
1	0A01	56.02	-37.58	-40.01	41.90	-24.29	-61.74	29.12	54.32	-41.98	-40.07	4.72
2	0A02	47.16	68.06	-3.95	49.50	82.52	10.83	20.81	46.18	71.88	2.45	7.52
3	0A03	84.26	-5.79	84.33	87.03	9.91	104.92	26.04	85.87	-2.52	78.83	6.60
4	0A04	26.57	17.60	-41.24	16.93	29.36	-57.49	22.26	28.31	14.52	-41.10	3.54
5	0A05	51.46	-61.59	26.08	40.79	-65.88	20.73	12.68	51.61	-60.28	22.51	3.81
6	0A06	46.94	62.21	41.81	53.50	73.74	57.19	20.31	48.56	63.60	38.15	4.24
7	0A07	24.84	-1.30	-0.51	3.69	0.89	-2.23	21.33	27.01	0.92	-1.92	3.41
8	0A08	40.62	12.83	-31.30	36.56	20.44	-53.21	23.55	40.67	10.78	-30.40	2.24
9	0A09	60.03	-39.96	18.66	57.71	-57.08	17.87	17.29	59.84	-39.62	17.08	1.63
10	0A10	56.79	43.06	34.90	63.04	57.94	41.84	17.57	56.39	44.88	33.27	2.48
11	0A11	57.63	8.39	-19.69	64.83	10.79	-34.17	16.35	57.92	6.22	-19.33	2.22
12	0A12	68.56	23.83	24.19	78.52	30.39	16.61	14.13	67.76	24.17	20.96	3.34
13	0A13	56.05	3.16	5.31	66.57	2.09	-5.20	14.91	55.39	2.45	4.58	1.21
14	0B01	70.75	-23.01	13.70	77.24	-28.39	3.72	13.06	69.82	-21.49	9.88	4.22
15	0B02	71.24	4.10	-10.09	81.90	6.43	-19.16	14.19	71.40	3.40	-9.26	1.10
16	0B03	79.61	-11.20	9.24	87.85	-11.05	-1.90	13.86	78.21	-10.12	6.65	3.14
17	0B04	77.85	11.27	15.09	88.11	14.68	3.61	15.77	76.79	11.25	12.02	3.25
18	0B05	13.54	-7.86	-8.18	3.94	0.88	-2.11	14.33	13.54	-4.13	-5.45	4.62
19	0B06	11.05	13.74	0.04	3.83	0.88	-2.16	14.91	11.42	1.42	-3.52	12.83
20	0B07	16.97	-2.67	11.14	3.83	0.86	-2.13	19.01	16.96	-0.99	-0.42	11.68
21	0B08	8.05	5.90	-7.57	3.86	0.86	-2.25	8.44	8.01	0.55	-4.43	6.20
22	0B09	13.66	-12.90	4.47	3.85	0.84	-2.11	18.12	14.31	-4.69	-2.25	10.63
23	0B10	12.02	9.80	5.97	3.81	0.87	-2.20	14.63	11.09	0.62	-3.42	13.16
24	0B11	9.06	-0.10	0.65	3.75	0.84	-2.18	6.09	6.34	0.95	-3.16	4.80
25	0B12	18.62	0.43	1.03	3.87	0.90	-2.31	15.13	19.88	0.15	-2.07	3.36
26	0B13	88.66	-0.33	3.64	96.52	2.04	-5.51	12.29	88.04	0.72	1.61	2.37
27	0C01	57.98	-35.00	-37.48	47.38	-30.78	-59.56	24.85	56.18	-39.36	-37.68	4.72
28	0C02	60.86	-31.09	-33.48	53.69	-35.07	-55.72	23.70	59.63	-36.52	-34.04	5.60
29	0C03	63.58	-27.19	-29.78	60.22	-35.56	-50.13	22.26	62.00	-32.39	-30.87	5.54
30	0C04	66.80	-23.69	-25.74	66.25	-32.83	-44.02	20.45	64.91	-27.43	-24.83	4.29
31	0C05	69.75	-20.38	-21.79	71.96	-28.11	-37.60	17.74	68.24	-23.15	-21.39	3.18
32	0C06	73.21	-16.57	-17.18	76.43	-23.13	-32.08	16.60	71.07	-18.47	-17.34	2.87
33	0C07	76.68	-12.87	-12.60	81.92	-16.38	-25.11	14.01	74.94	-14.23	-12.42	2.22
34	0C08	78.72	-10.73	-9.86	84.51	-13.16	-21.75	13.45	77.29	-11.05	-10.29	1.53
35	0C09	80.67	-8.48	-7.19	87.05	-10.11	-18.46	13.05	79.69	-8.29	-7.08	1.00
36	0C10	82.35	-6.87	-4.88	89.14	-7.35	-15.56	12.66	82.15	-5.96	-6.12	1.55
37	0C11	84.31	-4.87	-2.23	91.69	-3.94	-12.03	12.30	84.24	-3.34	-2.92	1.68
38	0C12	85.29	-3.90	-0.99	93.35	-2.01	-9.82	12.10	85.28	-2.54	-1.56	1.47
39	0C13	86.76	-2.51	1.02	95.23	0.51	-7.21	12.19	86.52	-0.49	-0.38	2.47
40	0D01	50.28	61.48	-4.25	52.45	81.75	1.87	21.28	48.37	65.26	-0.86	5.42
41	0D02	54.17	53.97	-3.98	56.74	77.62	-6.58	23.93	52.15	57.55	-1.80	4.65
42	0D03	58.45	46.54	-3.57	61.80	70.11	-11.89	25.22	55.77	49.43	-2.29	4.14
43	0D04	61.83	40.27	-3.24	67.07	60.21	-14.39	23.44	60.13	42.06	-2.44	2.60



ID#	Loc	L*	a*	b*	L*	a*	b*	ΔE	L*	a*	b*	ΔE
NUM												
44	OD05	65.55	33.77	-2.85	72.21	50.73	-14.74	21.76	64.03	34.17	-2.54	1.60
45	OD06	69.90	26.59	-2.08	76.73	41.65	-14.08	20.43	68.63	26.55	-1.81	1.30
46	OD07	74.25	19.60	-1.16	82.17	31.21	-12.19	17.87	72.74	20.39	-1.50	1.74
47	OD08	76.65	16.46	-0.38	84.68	25.98	-11.22	16.51	75.44	16.30	-1.16	1.45
48	OD09	79.06	13.39	0.45	87.07	21.09	-10.28	15.45	78.39	12.77	-0.76	1.52
49	OD10	81.14	10.45	1.08	89.19	16.46	-9.31	14.45	80.85	9.56	-0.69	2.00
50	OD11	83.49	7.07	1.75	91.87	11.32	-8.12	13.63	83.41	5.87	0.32	1.87
51	OD12	84.57	5.44	2.04	93.36	8.34	-7.35	13.19	84.55	4.58	1.18	1.22
52	OD13	86.22	2.87	2.45	95.20	4.43	-6.34	12.66	86.15	2.42	1.86	0.75
53	OE01	84.10	-6.31	76.60	88.44	5.33	98.19	24.91	85.88	-2.07	72.42	6.21
54	OE02	84.39	-5.99	68.30	90.32	1.26	87.38	21.25	85.25	-2.57	64.81	4.96
55	OE03	85.19	-5.21	59.44	91.46	-1.72	72.15	14.60	84.91	-2.44	57.01	3.70
56	OE04	85.48	-5.12	51.14	92.68	-3.04	57.25	9.67	84.72	-2.36	46.47	5.48
57	OE05	85.75	-4.93	43.39	93.31	-3.41	44.40	7.78	84.91	-2.32	39.81	4.51
58	OE06	86.28	-4.26	35.58	94.04	-3.15	34.27	7.95	85.46	-1.91	32.01	4.35
59	OE07	86.70	-3.60	27.15	94.84	-2.17	22.36	9.55	86.19	-1.35	26.71	2.35
60	OE08	87.06	-3.17	23.07	95.18	-1.50	16.42	10.63	86.18	-1.16	22.64	2.24
61	OE09	87.54	-2.44	20.12	95.30	-0.95	12.04	11.30	86.66	-1.35	17.49	2.98
62	OE10	87.73	-2.01	16.62	95.66	-0.44	8.46	11.49	86.75	-1.16	14.31	2.65
63	OE11	87.99	-1.63	12.53	95.80	0.34	3.86	11.83	87.39	-0.60	9.76	3.02
64	OE12	88.16	-1.38	10.50	96.14	1.03	-0.02	13.42	87.29	-0.30	6.74	4.01
65	OE13	88.24	-1.07	7.55	96.29	1.64	-3.59	14.01	87.73	0.31	5.33	2.66
66	OF01	26.81	-0.14	0.45	8.31	0.06	-4.26	19.09	30.01	-1.69	-0.86	3.79
67	OF02	35.01	-0.51	0.14	22.54	-1.80	-3.74	13.12	37.59	-1.00	-0.30	2.66
68	OF03	42.52	-0.52	0.22	37.67	-1.99	-3.21	6.12	43.22	-1.91	-0.54	1.73
69	OF04	48.70	-0.75	0.25	47.99	-0.23	-4.45	4.78	49.56	-1.50	-1.06	1.74
70	OF05	54.82	-0.84	0.51	58.46	0.81	-4.49	6.40	56.08	-1.62	-0.08	1.60
71	OF06	61.32	-0.96	0.74	66.95	1.65	-4.89	8.38	61.69	-0.94	-0.46	1.26
72	OF07	67.67	-1.03	1.03	75.63	2.72	-5.53	10.98	68.02	-0.59	-0.09	1.25
73	OF08	71.28	-0.86	1.45	79.54	3.08	-6.03	11.82	71.25	-0.19	0.00	1.60
74	OF09	74.67	-0.52	2.12	83.13	3.16	-6.18	12.41	74.29	-0.23	0.22	1.96
75	OF10	77.55	-0.53	2.36	86.34	3.12	-5.67	12.45	77.69	0.24	0.83	1.72
76	OF11	81.26	-0.48	2.70	89.89	2.88	-6.31	12.92	81.14	0.15	1.00	1.82
77	OF12	82.58	-0.49	2.87	91.74	2.73	-5.75	12.98	83.07	0.42	1.00	2.14
78	OF13	85.02	-0.55	3.02	94.63	2.12	-5.20	12.92	85.54	0.40	2.16	1.38
79	OG01	38.06	45.61	-21.74	27.15	51.24	-25.97	12.99	31.71	47.36	-20.36	6.73
80	OG02	36.93	43.50	-3.21	28.82	46.55	-6.43	9.24	33.31	43.96	-2.97	3.66
81	OG03	47.20	65.02	15.16	49.27	79.79	30.83	21.63	45.74	69.31	19.50	6.27
82	OG04	36.40	39.62	20.77	40.41	48.20	32.91	15.40	39.15	41.65	20.85	3.42
83	OG05	66.77	22.16	61.58	68.83	45.89	82.68	31.82	62.98	27.74	62.33	6.79
84	OG06	54.37	-0.36	39.66	50.18	-0.31	50.17	11.31	49.96	1.07	38.17	4.87
85	OG07	39.28	3.35	4.37	37.62	-1.68	-3.49	9.48	41.83	2.27	4.12	2.78
86	OG08	69.38	-26.43	56.40	63.00	-31.56	67.09	13.46	66.23	-24.93	55.76	3.55
87	OG09	40.77	-37.42	14.49	35.37	-52.25	13.66	15.80	43.23	-38.97	13.59	3.04
88	OG10	54.23	-50.24	-11.24	37.66	-54.57	-25.02	21.98	51.37	-54.91	-13.44	5.90
89	OG11	42.55	-27.75	-16.18	29.08	-29.21	-33.08	21.66	39.63	-33.35	-18.22	6.64
90	OG12	44.29	-16.71	-39.19	29.91	0.83	-62.99	32.88	40.36	-22.79	-41.54	7.61
91	OG13	26.27	9.28	-23.90	14.55	10.23	-33.54	15.20	28.09	7.36	-24.78	2.79
92	OH01	30.82	29.83	-23.35	19.10	33.90	-37.09	18.51	28.30	31.91	-22.44	3.39
93	OH02	51.86	34.93	-1.19	53.35	51.25	-11.95	19.60	49.03	37.59	-0.67	3.92
94	OH03	51.36	33.42	9.65	54.27	47.32	2.65	15.83	49.13	35.88	9.34	3.33
95	OH04	41.44	52.39	17.76	41.21	61.87	26.34	12.79	40.09	54.03	17.93	2.13
96	OH05	50.78	31.76	24.68	55.72	43.01	27.99	12.72	50.67	33.84	24.45	2.10
97	OH06	50.45	30.00	39.81	50.86	44.18	53.84	19.95	49.17	32.46	40.57	2.88
98	OH07	68.60	-1.82	38.52	73.52	-1.84	46.81	9.64	64.77	0.32	35.89	5.12
99	OH08	53.27	-29.68	32.78	45.97	-41.96	38.05	15.23	50.43	-27.67	31.59	3.68
100	OH09	54.11	-27.20	15.41	53.29	-45.49	12.37	18.56	53.01	-28.84	13.23	2.94
101	OH10	47.07	-44.71	3.39	34.12	-57.01	-5.99	20.17	45.58	-50.09	0.11	6.47
102	OH11	56.08	-19.93	-16.16	53.05	-31.26	-34.40	21.69	54.15	-22.82	-16.37	3.48
103	OH12	34.87	-6.04	-29.51	22.51	4.70	-51.29	27.25	33.76	-12.42	-31.11	6.67

ID#	Loc	L*	a*	b*	L*	a*	b*	ΔE	L*	a*	b*	ΔE
NUM												
104	0H13	40.33	9.49	-20.51	36.61	13.69	-42.63	22.82	39.79	8.61	-21.58	1.49
105	0I01	30.18	23.03	-3.01	19.01	19.46	-10.06	13.68	31.52	25.87	-3.38	3.16
106	0I02	45.99	22.54	0.80	46.70	30.22	-10.18	13.42	44.13	22.59	-0.24	2.13
107	0I03	62.47	15.34	1.90	71.90	20.71	-10.30	16.33	62.16	15.00	1.47	0.63
108	0I04	29.88	21.71	8.09	24.07	17.83	7.66	7.00	35.98	26.24	10.95	8.12
109	0I05	61.75	13.77	13.95	72.79	16.39	5.65	14.06	60.78	14.12	11.96	2.24
110	0I06	38.28	1.23	17.11	31.50	-5.73	19.12	9.92	40.73	2.30	17.77	2.75
111	0I07	55.22	0.82	22.32	58.61	-2.70	24.89	5.52	51.99	0.97	20.77	3.59
112	0I08	70.00	0.14	18.75	79.28	-0.18	11.39	11.85	67.35	0.90	16.24	3.73
113	0I09	70.75	1.84	5.03	83.04	3.18	-6.33	16.79	69.52	2.02	2.61	2.72
114	0I10	32.68	-19.04	6.71	23.74	-25.53	2.34	11.88	38.82	-23.38	7.99	7.63
115	0I11	47.82	-15.05	10.23	48.26	-30.63	5.86	16.19	46.66	-17.41	9.34	2.78
116	0I12	63.30	-9.49	8.47	72.47	-14.13	-0.62	13.72	62.00	-9.94	6.16	2.69
117	0I13	33.63	-15.45	-6.26	19.63	-18.86	-16.30	17.56	35.78	-21.44	-9.14	6.99
118	0J01	56.58	5.24	-7.39	65.98	6.12	-21.09	16.64	56.40	4.78	-7.37	0.49
119	0J02	25.29	3.03	-12.84	8.42	0.70	-12.13	17.04	27.36	3.58	-12.26	2.22
120	0J03	64.14	-7.21	-4.49	71.85	-10.63	-17.21	15.26	64.04	-7.54	-4.92	0.55
121	0J04	48.26	-11.97	-7.14	47.29	-22.34	-21.49	17.73	48.69	-13.80	-8.24	2.18
122	0J05	9.76	-0.95	-0.06	3.71	0.85	-2.22	6.67	7.05	0.47	-3.61	4.69
123	0J06	13.84	-3.21	-1.23	4.03	0.78	-2.53	10.67	10.94	-0.74	-3.22	4.30
124	0J07	17.36	-3.86	-2.08	4.72	0.40	-3.18	13.38	15.69	-2.59	-3.32	2.44
125	0J08	11.50	-0.76	-0.06	3.61	0.94	-2.37	8.40	8.78	0.11	-3.46	4.44
126	0J09	17.89	-2.92	-0.04	5.32	0.60	-3.29	13.45	14.92	-1.24	-2.88	4.44
127	0J10	23.33	-3.91	-0.35	9.51	-2.49	-5.42	14.79	23.01	-2.50	-2.08	2.25
128	0J11	28.26	-4.30	-1.18	17.76	-5.95	-7.12	12.18	31.90	-4.97	-1.44	3.71
129	0J12	13.30	-0.76	-0.04	3.67	0.92	-2.29	10.03	10.90	-0.23	-3.28	4.07
130	0J13	22.21	-2.33	0.02	7.89	-0.85	-4.40	15.06	20.58	-2.44	-1.91	2.53
131	0K01	29.82	-3.44	0.06	21.37	-6.02	-6.15	10.80	31.69	-3.34	-1.85	2.67
132	0K02	36.66	-4.14	-0.26	34.42	-9.34	-8.86	10.30	38.79	-5.05	-1.71	2.73
133	0K03	42.93	-4.58	-0.47	43.39	-10.87	-12.13	13.26	44.79	-5.00	-1.32	2.09
134	0K04	15.42	-0.54	-0.15	3.90	0.86	-2.36	11.81	14.19	0.14	-2.53	2.76
135	0K05	27.13	-2.37	-0.64	11.95	-1.53	-5.03	15.82	28.53	-1.53	-1.21	1.73
136	0K06	36.50	-3.10	-0.72	33.22	-5.83	-6.81	7.44	38.54	-3.71	-1.91	2.44
137	0K07	45.05	-3.57	-0.86	46.25	-6.82	-8.79	8.65	45.88	-4.02	-2.07	1.53
138	0K08	53.46	-3.74	-0.52	59.00	-5.67	-9.75	10.94	53.63	-3.94	-1.40	0.92
139	0K09	56.98	-4.09	-0.67	64.99	-6.34	-10.66	13.00	57.45	-4.09	-2.02	1.43
140	0K10	17.54	-0.07	0.34	3.91	0.87	-2.31	13.92	16.78	-0.26	-2.84	3.28
141	0K11	31.64	-1.32	-0.12	16.78	-2.61	-4.72	15.61	33.42	-2.67	-2.12	3.00
142	0K12	43.62	-1.91	-0.41	40.58	-4.53	-5.68	6.62	44.14	-2.77	-1.60	1.56
143	0K13	53.75	-2.20	-0.06	56.96	-3.08	-7.13	7.81	53.20	-3.04	-1.40	1.67
144	0L01	63.29	-2.33	-0.04	72.19	-1.10	-8.58	12.40	63.29	-2.77	-0.84	0.91
145	0L02	68.25	-2.07	0.47	78.95	-0.67	-9.86	14.94	68.35	-2.22	-0.70	1.18
146	0L03	18.75	0.27	0.67	3.69	0.88	-2.31	15.36	17.97	0.05	-2.58	3.35
147	0L04	33.60	-0.53	-0.01	20.20	-2.19	-4.26	14.16	36.07	-1.68	-0.35	2.75
148	0L05	46.60	-0.98	0.07	44.68	-2.88	-4.97	5.72	46.70	-2.97	-1.14	2.33
149	0L06	57.24	-1.26	0.28	62.05	-0.03	-6.08	8.07	58.00	-1.79	-1.53	2.03
150	0L07	68.44	-1.45	1.09	78.12	1.44	-7.76	13.43	68.42	-1.57	-0.30	1.40
151	0L08	74.00	-1.03	1.75	84.42	0.99	-7.57	14.13	74.97	-0.45	0.06	2.03
152	0L09	29.50	-7.40	-2.70	8.48	-4.35	-6.86	21.64	32.84	-10.95	-4.82	5.32
153	0L10	38.69	-5.45	-1.27	33.29	-15.63	-12.26	15.92	41.86	-8.40	-2.64	4.54
154	0L11	49.55	-3.98	-0.47	52.49	-11.48	-13.71	15.50	49.57	-6.25	-1.91	2.69
155	0L12	61.78	-3.94	-0.90	70.25	-5.90	-12.96	14.87	61.34	-3.91	-1.48	0.73
156	0L13	74.37	-2.17	0.69	84.49	-1.30	-9.68	14.52	73.99	-1.85	-0.63	1.41
157	0M01	80.18	-1.48	2.09	90.99	0.13	-7.95	14.84	80.51	-0.82	0.23	2.00
158	0M02	83.53	-0.86	2.70	93.59	1.10	-6.58	13.83	84.29	0.22	1.17	2.02
159	0M03	48.24	-32.71	-34.43	34.59	-28.87	-45.21	17.81	45.33	-40.94	-33.68	8.76
160	0M04	40.08	57.72	-5.10	37.87	63.85	1.50	9.27	36.59	57.34	-2.35	4.46
161	0M05	71.25	-6.36	66.95	66.49	5.90	75.48	15.68	68.21	-2.32	67.76	5.12
162	0M06	23.49	14.90	-35.86	16.37	20.88	-47.93	15.24	25.09	15.22	-36.85	1.91
163	0M07	45.13	-51.78	21.07	38.55	-60.28	17.72	11.26	46.17	-53.92	19.35	2.94



ID#	Loc	L*	a*	b*	L*	a*	b*	ΔE	L*	a*	b*	ΔE
NUM												
164	OM08	39.81	52.33	32.58	47.21	61.99	45.61	17.83	41.69	51.73	29.28	3.85
165	OM09	50.38	5.91	-16.41	55.04	8.62	-30.10	14.71	49.58	4.39	-16.09	1.75
166	OM10	61.11	-19.11	10.44	65.58	-26.89	4.43	10.80	59.64	-19.64	8.12	2.80
167	OM11	58.29	19.13	18.84	66.63	26.41	14.05	12.06	56.41	20.29	19.14	2.23
168	OM12	19.68	13.17	-30.72	14.44	10.55	-33.97	6.70	21.74	12.41	-30.50	2.21
169	OM13	38.13	-43.93	17.72	35.32	-51.52	13.78	9.00	40.92	-44.17	15.44	3.61
170	ON01	32.89	42.69	26.01	39.90	48.10	32.78	11.15	36.24	39.02	19.55	8.15
171	ON02	42.34	5.16	-14.13	42.86	4.74	-24.24	10.13	41.74	3.77	-14.53	1.57
172	ON03	51.17	-16.20	8.01	51.90	-24.41	4.26	9.06	49.52	-18.24	7.71	2.64
173	ON04	48.55	15.75	14.95	52.37	20.46	11.92	6.78	46.77	15.71	15.50	1.86
174	ON05	29.40	-20.61	-21.16	19.49	-18.98	-15.91	11.33	29.40	-24.53	-22.30	4.08
175	ON06	23.86	34.74	-4.21	19.08	19.92	-9.90	16.58	26.14	21.93	-2.66	13.10
176	ON07	41.61	-5.02	37.79	31.46	-5.34	18.73	21.60	39.65	-3.39	27.38	10.72
177	ON08	14.71	10.05	-21.84	8.67	1.17	-12.34	14.34	16.12	2.36	-14.15	10.97
178	ON09	27.90	-30.92	12.59	23.77	-25.58	2.29	12.32	35.10	-32.63	9.45	8.04
179	ON10	23.53	30.22	17.45	23.57	17.08	7.23	16.65	28.21	17.41	7.13	17.10
180	ON11	30.94	3.05	-9.81	23.43	-0.49	-11.20	8.42	31.46	2.27	-9.63	0.95
181	ON12	36.19	-11.80	5.31	31.32	-14.16	-0.39	7.86	39.64	-15.04	6.82	4.97
182	ON13	34.45	10.34	10.34	31.31	7.56	2.81	8.62	37.17	11.20	13.18	4.03

14.62                      Average ΔE                      3.63

Average ΔE - overprint color excluded

17.46	C	3.06
18.62	M	2.70
13.89	Y	3.98
11.39	K	2.00
12.29	Paper	2.37

Average ΔE - overprint color only

14.32                      3.95

## Appendix J



## Data for Hypothesis H2 Testing

		CGATS .6 TR-001			Method Two				Method Three			
ID#	Loc	SWOP Reference			Dupont/Epson w/cms default				Dupont/Epson w/cms default-to-SWOP			
NUM		L*	a*	b*	L*	a*	b*	ΔE	L*	a*	b*	ΔE
1	OA01	56.02	-37.58	-40.01	54.32	-41.98	-40.07	4.72	57.05	-39.53	-37.31	3.49
2	OA02	47.16	68.06	-3.95	46.18	71.88	2.45	7.52	46.55	63.38	-1.03	5.55
3	OA03	84.26	-5.79	84.33	85.87	-2.52	78.83	6.60	85.65	-2.77	76.65	8.37
4	OA04	26.57	17.60	-41.24	28.31	14.52	-41.10	3.54	28.50	15.38	-35.25	6.67
5	OA05	51.46	-61.59	26.08	51.61	-60.28	22.51	3.81	53.95	-58.11	20.30	7.19
6	OA06	46.94	62.21	41.81	48.56	63.60	38.15	4.24	47.20	53.84	27.20	16.84
7	OA07	24.84	-1.30	-0.51	27.01	0.92	-1.92	3.41	26.58	1.07	-1.70	3.17
8	OA08	40.62	12.83	-31.30	40.67	10.78	-30.40	2.24	45.11	10.93	-26.93	6.55
9	OA09	60.03	-39.96	18.66	59.84	-39.62	17.08	1.63	60.80	-39.47	17.38	1.57
10	OA10	56.79	43.06	34.90	56.39	44.88	33.27	2.48	56.57	44.85	32.51	2.99
11	OA11	57.63	8.39	-19.69	57.92	6.22	-19.33	2.22	58.03	6.58	-19.12	1.94
12	OA12	68.56	23.83	24.19	67.76	24.17	20.96	3.34	67.78	24.94	23.85	1.40
13	OA13	56.05	3.16	5.31	55.39	2.45	4.58	1.21	56.04	2.47	4.14	1.36
14	OB01	70.75	-23.01	13.70	69.82	-21.49	9.88	4.22	70.70	-21.05	10.25	3.97
15	OB02	71.24	4.10	-10.09	71.40	3.40	-9.26	1.10	72.21	2.71	-8.91	2.07
16	OB03	79.61	-11.20	9.24	78.21	-10.12	6.65	3.14	78.57	-10.30	6.49	3.07
17	OB04	77.85	11.27	15.09	76.79	11.25	12.02	3.25	77.61	11.77	13.25	1.92
18	OB05	13.54	-7.86	-8.18	13.54	-4.13	-5.45	4.62	13.85	-2.07	-3.84	7.24
19	OB06	11.05	13.74	0.04	11.42	1.42	-3.52	12.83	11.51	0.15	-4.15	14.23
20	OB07	16.97	-2.67	11.14	16.96	-0.99	-0.42	11.68	16.95	-0.84	-1.69	12.96
21	OB08	8.05	5.90	-7.57	8.01	0.55	-4.43	6.20	13.42	0.10	-3.74	8.78
22	OB09	13.66	-12.90	4.47	14.31	-4.69	-2.25	10.63	12.56	-1.92	-3.22	13.45
23	OB10	12.02	9.80	5.97	11.09	0.62	-3.42	13.16	11.62	-0.19	-3.61	13.85
24	OB11	9.06	-0.10	0.65	6.34	0.95	-3.16	4.80	8.51	0.35	-4.04	4.74
25	OB12	18.62	0.43	1.03	19.88	0.15	-2.07	3.36	19.18	0.05	-2.22	3.32
26	OB13	88.66	-0.33	3.64	88.04	0.72	1.61	2.37	88.25	0.94	1.95	2.15
27	OC01	57.98	-35.00	-37.48	56.18	-39.36	-37.68	4.72	59.33	-38.77	-35.83	4.33
28	OC02	60.86	-31.09	-33.48	59.63	-36.52	-34.04	5.60	61.50	-36.82	-32.82	5.80
29	OC03	63.58	-27.19	-29.78	62.00	-32.39	-30.87	5.54	64.33	-32.41	-29.69	5.27
30	OC04	66.80	-23.69	-25.74	64.91	-27.43	-24.83	4.29	66.92	-27.38	-25.51	3.70
31	OC05	69.75	-20.38	-21.79	68.24	-23.15	-21.39	3.18	69.67	-22.72	-20.41	2.72
32	OC06	73.21	-16.57	-17.18	71.07	-18.47	-17.34	2.87	72.58	-18.83	-16.32	2.50
33	OC07	76.68	-12.87	-12.60	74.94	-14.23	-12.42	2.22	75.90	-13.83	-13.31	1.43
34	OC08	78.72	-10.73	-9.86	77.29	-11.05	-10.29	1.53	78.60	-9.58	-10.12	1.19
35	OC09	80.67	-8.48	-7.19	79.69	-8.29	-7.08	1.00	80.21	-8.16	-8.07	1.04
36	OC10	82.35	-6.87	-4.88	82.15	-5.96	-6.12	1.55	82.47	-5.70	-5.85	1.52
37	OC11	84.31	-4.87	-2.23	84.24	-3.34	-2.92	1.68	84.39	-3.20	-2.60	1.71
38	OC12	85.29	-3.90	-0.99	85.28	-2.54	-1.56	1.47	85.23	-2.26	-1.87	1.86
39	OC13	86.76	-2.51	1.02	86.52	-0.49	-0.38	2.47	87.13	-0.70	-0.84	2.62
40	OD01	50.28	61.48	-4.25	48.37	65.26	-0.86	5.42	50.08	62.86	-1.89	2.74
41	OD02	54.17	53.97	-3.98	52.15	57.55	-1.80	4.65	53.86	56.82	-2.08	3.44
42	OD03	58.45	46.54	-3.57	55.77	49.43	-2.29	4.14	58.31	47.51	-2.01	1.84
43	OD04	61.83	40.27	-3.24	60.13	42.06	-2.44	2.60	61.96	40.49	-1.42	1.84

ID#	Loc	L*	a*	b*	L*	a*	b*	ΔE	L*	a*	b*	ΔE
NUM												
44	OD05	65.55	33.77	-2.85	64.03	34.17	-2.54	1.60	65.64	33.06	-1.42	1.60
45	OD06	69.90	26.59	-2.08	68.63	26.55	-1.81	1.30	69.40	26.25	-1.83	0.65
46	OD07	74.25	19.60	-1.16	72.74	20.39	-1.50	1.74	74.14	20.05	-0.67	0.67
47	OD08	76.65	16.46	-0.38	75.44	16.30	-1.16	1.45	77.55	14.33	-0.73	2.34
48	OD09	79.06	13.39	0.45	78.39	12.77	-0.76	1.52	79.11	11.90	-0.82	1.96
49	OD10	81.14	10.45	1.08	80.85	9.56	-0.69	2.00	81.90	9.18	-0.43	2.11
50	OD11	83.49	7.07	1.75	83.41	5.87	0.32	1.87	83.82	6.33	0.81	1.24
51	OD12	84.57	5.44	2.04	84.55	4.58	1.18	1.22	84.87	4.67	2.06	0.83
52	OD13	86.22	2.87	2.45	86.15	2.42	1.86	0.75	86.42	2.95	1.27	1.20
53	OE01	84.10	-6.31	76.60	85.88	-2.07	72.42	6.21	85.69	-2.84	68.15	9.27
54	OE02	84.39	-5.99	68.30	85.25	-2.57	64.81	4.96	85.55	-2.85	63.01	6.26
55	OE03	85.19	-5.21	59.44	84.91	-2.44	57.01	3.70	84.73	-2.48	54.46	5.70
56	OE04	85.48	-5.12	51.14	84.72	-2.36	46.47	5.48	84.91	-2.08	48.28	4.21
57	OE05	85.75	-4.93	43.39	84.91	-2.32	39.81	4.51	84.61	-2.23	41.72	3.37
58	OE06	86.28	-4.26	35.58	85.46	-1.91	32.01	4.35	85.32	-2.14	34.18	2.72
59	OE07	86.70	-3.60	27.15	86.19	-1.35	26.71	2.35	85.61	-0.66	26.16	3.29
60	OE08	87.06	-3.17	23.07	86.18	-1.16	22.64	2.24	86.27	-0.66	20.83	3.46
61	OE09	87.54	-2.44	20.12	86.66	-1.35	17.49	2.98	86.49	-1.17	17.55	3.05
62	OE10	87.73	-2.01	16.62	86.75	-1.16	14.31	2.65	86.75	-0.95	14.04	2.96
63	OE11	87.99	-1.63	12.53	87.39	-0.60	9.76	3.02	87.55	0.06	8.75	4.16
64	OE12	88.16	-1.38	10.50	87.29	-0.30	6.74	4.01	87.62	-0.07	7.44	3.37
65	OE13	88.24	-1.07	7.55	87.73	0.31	5.33	2.66	87.72	0.34	4.94	3.01
66	OF01	26.81	-0.14	0.45	30.01	-1.69	-0.86	3.79	30.10	-0.77	-1.05	3.67
67	OF02	35.01	-0.51	0.14	37.59	-1.00	-0.30	2.66	37.26	-1.03	-0.27	2.35
68	OF03	42.52	-0.52	0.22	43.22	-1.91	-0.54	1.73	43.73	-1.31	-0.07	1.47
69	OF04	48.70	-0.75	0.25	49.56	-1.50	-1.06	1.74	49.89	-0.70	-0.43	1.37
70	OF05	54.82	-0.84	0.51	56.08	-1.62	-0.08	1.60	56.22	-1.25	-0.55	1.80
71	OF06	61.32	-0.96	0.74	61.69	-0.94	-0.46	1.26	62.14	-1.13	-0.46	1.46
72	OF07	67.67	-1.03	1.03	68.02	-0.59	-0.09	1.25	68.64	-0.42	0.64	1.21
73	OF08	71.28	-0.86	1.45	71.25	-0.19	0.00	1.60	72.39	0.41	-0.82	2.83
74	OF09	74.67	-0.52	2.12	74.29	-0.23	0.22	1.96	74.61	-0.30	-0.03	2.16
75	OF10	77.55	-0.53	2.36	77.69	0.24	0.83	1.72	78.04	0.12	1.12	1.48
76	OF11	81.26	-0.48	2.70	81.14	0.15	1.00	1.82	81.37	0.33	1.23	1.68
77	OF12	82.58	-0.49	2.87	83.07	0.42	1.00	2.14	83.53	0.62	0.92	2.44
78	OF13	85.02	-0.55	3.02	85.54	0.40	2.16	1.38	86.09	0.68	2.36	1.76
79	OG01	38.06	45.61	-21.74	31.71	47.36	-20.36	6.73	34.87	41.07	-17.48	7.00
80	OG02	36.93	43.50	-3.21	33.31	43.96	-2.97	3.66	35.14	35.98	-4.01	7.77
81	OG03	47.20	65.02	15.16	45.74	69.31	19.50	6.27	46.27	59.10	12.32	6.63
82	OG04	36.40	39.62	20.77	39.15	41.65	20.85	3.42	38.62	31.94	12.75	11.32
83	OG05	66.77	22.16	61.58	62.98	27.74	62.33	6.79	65.64	26.40	57.93	5.71
84	OG06	54.37	-0.36	39.66	49.96	1.07	38.17	4.87	52.66	1.02	36.90	3.53
85	OG07	39.28	3.35	4.37	41.83	2.27	4.12	2.78	41.97	3.40	4.27	2.69
86	OG08	69.38	-26.43	56.40	66.23	-24.93	55.76	3.55	69.47	-20.55	47.85	10.38
87	OG09	40.77	-37.42	14.49	43.23	-38.97	13.59	3.04	43.01	-33.77	11.30	5.34
88	OG10	54.23	-50.24	-11.24	51.37	-54.91	-13.44	5.90	53.93	-49.47	-12.86	1.82
89	OG11	42.55	-27.75	-16.18	39.63	-33.35	-18.22	6.64	40.73	-29.34	-18.11	3.09
90	OG12	44.29	-16.71	-39.19	40.36	-22.79	-41.54	7.61	41.92	-19.35	-36.75	4.31
91	OG13	26.27	9.28	-23.90	28.09	7.36	-24.78	2.79	29.21	7.75	-22.21	3.72
92	OH01	30.82	29.83	-23.35	28.30	31.91	-22.44	3.39	31.03	26.82	-19.27	5.07
93	OH02	51.86	34.93	-1.19	49.03	37.59	-0.67	3.92	50.82	36.75	0.19	2.51
94	OH03	51.36	33.42	9.65	49.13	35.88	9.34	3.33	50.23	35.64	10.31	2.58
95	OH04	41.44	52.39	17.76	40.09	54.03	17.93	2.13	40.90	44.35	11.34	10.30
96	OH05	50.78	31.76	24.68	50.67	33.84	24.45	2.10	50.78	33.41	23.63	1.96
97	OH06	50.45	30.00	39.81	49.17	32.46	40.57	2.88	50.02	31.62	35.12	4.98
98	OH07	68.60	-1.82	38.52	64.77	0.32	35.89	5.12	66.57	0.81	37.01	3.65
99	OH08	53.27	-29.68	32.78	50.43	-27.67	31.59	3.68	54.20	-22.52	27.30	9.06
100	OH09	54.11	-27.20	15.41	53.01	-28.84	13.23	2.94	52.76	-28.76	13.78	2.63
101	OH10	47.07	-44.71	3.39	45.58	-50.09	0.11	6.47	46.45	-42.63	-0.07	4.08
102	OH11	56.08	-19.93	-16.16	54.15	-22.82	-16.37	3.48	55.23	-23.19	-16.30	3.37
103	OH12	34.87	-6.04	-29.51	33.76	-12.42	-31.11	6.67	34.56	-7.46	-28.74	1.64



ID#		L*	a*	b*	L*	a*	b*	$\Delta E$	L*	a*	b*	$\Delta E$
NUM												
104	0H13	40.33	9.49	-20.51	39.79	8.61	-21.58	<b>1.49</b>	41.27	9.22	-21.04	1.11
105	0I01	30.18	23.03	-3.01	31.52	25.87	-3.38	<b>3.16</b>	32.66	20.67	-3.76	3.50
106	0I02	45.99	22.54	0.80	44.13	22.59	-0.24	<b>2.13</b>	44.70	22.58	0.60	1.31
107	0I03	62.47	15.34	1.90	62.16	15.00	1.47	<b>0.63</b>	62.77	15.08	0.82	1.15
108	0I04	29.88	21.71	8.09	35.98	26.24	10.95	<b>8.12</b>	34.63	19.39	6.57	5.50
109	0I05	61.75	13.77	13.95	60.78	14.12	11.96	<b>2.24</b>	61.17	14.36	13.44	0.97
110	0I06	38.28	1.23	17.11	40.73	2.30	17.77	<b>2.75</b>	40.16	2.86	15.86	2.78
111	0I07	55.22	0.82	22.32	51.99	0.97	20.77	<b>3.59</b>	53.03	0.88	21.25	<b>2.44</b>
112	0I08	70.00	0.14	18.75	67.35	0.90	16.24	<b>3.73</b>	69.52	1.88	14.46	<b>4.65</b>
113	0I09	70.75	1.84	5.03	69.52	2.02	2.61	<b>2.72</b>	70.29	1.85	2.62	<b>2.45</b>
114	0I10	32.68	-19.04	6.71	38.82	-23.38	7.99	<b>7.63</b>	39.30	-18.22	5.85	<b>6.73</b>
115	0I11	47.82	-15.05	10.23	46.66	-17.41	9.34	<b>2.78</b>	47.19	-17.00	9.72	<b>2.11</b>
116	0I12	63.30	-9.49	8.47	62.00	-9.94	6.16	<b>2.69</b>	62.43	-10.28	7.09	<b>1.81</b>
117	0I13	33.63	-15.45	-6.26	35.78	-21.44	-9.14	<b>6.99</b>	36.27	-17.66	-7.54	<b>3.67</b>
118	0J01	56.58	5.24	-7.39	56.40	4.78	-7.37	<b>0.49</b>	57.42	4.71	-7.24	1.00
119	0J02	25.29	3.03	-12.84	27.36	3.58	-12.26	<b>2.22</b>	28.12	2.64	-11.17	3.31
120	0J03	64.14	-7.21	-4.49	64.04	-7.54	-4.92	<b>0.55</b>	64.65	-7.51	-5.06	<b>0.82</b>
121	0J04	48.26	-11.97	-7.14	48.69	-13.80	-8.24	<b>2.18</b>	48.64	-13.56	-7.86	1.79
122	0J05	9.76	-0.95	-0.06	7.05	0.47	-3.61	<b>4.69</b>	9.41	0.04	-3.76	<b>3.85</b>
123	0J06	13.84	-3.21	-1.23	10.94	-0.74	-3.22	<b>4.30</b>	12.12	-0.87	-3.30	3.57
124	0J07	17.36	-3.86	-2.08	15.69	-2.59	-3.32	<b>2.44</b>	16.24	-1.08	-2.97	3.13
125	0J08	11.50	-0.76	-0.06	8.78	0.11	-3.46	<b>4.44</b>	14.75	1.25	-3.65	5.24
126	0J09	17.89	-2.92	-0.04	14.92	-1.24	-2.88	<b>4.44</b>	16.08	-0.48	-2.48	3.90
127	0J10	23.33	-3.91	-0.35	23.01	-2.50	-2.08	<b>2.25</b>	23.11	-1.69	-2.36	3.00
128	0J11	28.26	-4.30	-1.18	31.90	-4.97	-1.44	<b>3.71</b>	30.43	-3.54	-1.60	<b>2.34</b>
129	0J12	13.30	-0.76	-0.04	10.90	-0.23	-3.28	<b>4.07</b>	11.93	-0.35	-3.51	3.75
130	0J13	22.21	-2.33	0.02	20.58	-2.44	-1.91	<b>2.53</b>	21.17	-1.57	-2.52	2.85
131	0K01	29.82	-3.44	0.06	31.69	-3.34	-1.85	<b>2.67</b>	31.07	-3.06	-1.73	2.22
132	0K02	36.66	-4.14	-0.26	38.79	-5.05	-1.71	<b>2.73</b>	37.73	-4.50	-1.29	1.53
133	0K03	42.93	-4.58	-0.47	44.79	-5.00	-1.32	<b>2.09</b>	45.07	-4.52	-0.84	2.17
134	0K04	15.42	-0.54	-0.15	14.19	0.14	-2.53	<b>2.76</b>	15.06	-0.35	-2.38	2.27
135	0K05	27.13	-2.37	-0.64	28.53	-1.53	-1.21	<b>1.73</b>	28.41	-1.75	-1.45	<b>1.64</b>
136	0K06	36.50	-3.10	-0.72	38.54	-3.71	-1.91	<b>2.44</b>	37.59	-3.59	-1.83	1.63
137	0K07	45.05	-3.57	-0.86	45.88	-4.02	-2.07	<b>1.53</b>	46.14	-3.68	-2.19	1.72
138	0K08	53.46	-3.74	-0.52	53.63	-3.94	-1.40	<b>0.92</b>	57.06	-0.93	-1.09	<b>4.60</b>
139	0K09	56.98	-4.09	-0.67	57.45	-4.09	-2.02	<b>1.43</b>	58.06	-3.89	-2.35	2.01
140	0K10	17.54	-0.07	0.34	16.78	-0.26	-2.84	<b>3.28</b>	18.12	0.00	-2.10	2.51
141	0K11	31.64	-1.32	-0.12	33.42	-2.67	-2.12	<b>3.00</b>	33.52	-1.57	-2.58	3.11
142	0K12	43.62	-1.91	-0.41	44.14	-2.77	-1.60	<b>1.56</b>	44.03	-2.41	-1.25	1.06
143	0K13	53.75	-2.20	-0.06	53.20	-3.04	-1.40	<b>1.67</b>	54.18	-2.68	-1.22	1.33
144	0L01	63.29	-2.33	-0.04	63.29	-2.77	-0.84	<b>0.91</b>	64.31	-3.03	-0.81	<b>1.46</b>
145	0L02	68.25	-2.07	0.47	68.35	-2.22	-0.70	<b>1.18</b>	68.58	-1.98	-0.40	<b>0.93</b>
146	0L03	18.75	0.27	0.67	17.97	0.05	-2.58	<b>3.35</b>	18.44	0.27	-1.88	2.57
147	0L04	33.60	-0.53	-0.01	36.07	-1.68	-0.35	<b>2.75</b>	35.42	-0.07	-1.44	2.36
148	0L05	46.60	-0.98	0.07	46.70	-2.97	-1.14	<b>2.33</b>	46.62	-2.42	-0.84	1.70
149	0L06	57.24	-1.26	0.28	58.00	-1.79	-1.53	<b>2.03</b>	57.93	-2.51	-1.64	2.39
150	0L07	68.44	-1.45	1.09	68.42	-1.57	-0.30	<b>1.40</b>	69.06	-1.53	-0.08	1.33
151	0L08	74.00	-1.03	1.75	74.97	-0.45	0.06	<b>2.03</b>	76.09	0.19	-0.55	3.34
152	0L09	29.50	-7.40	-2.70	32.84	-10.95	-4.82	<b>5.32</b>	32.25	-10.03	-4.55	<b>4.23</b>
153	0L10	38.69	-5.45	-1.27	41.86	-8.40	-2.64	<b>4.54</b>	41.88	-5.99	-1.49	3.24
154	0L11	49.55	-3.98	-0.47	49.57	-6.25	-1.91	<b>2.69</b>	50.21	-5.02	-1.95	1.93
155	0L12	61.78	-3.94	-0.90	61.34	-3.91	-1.48	<b>0.73</b>	61.67	-3.79	-1.07	0.25
156	0L13	74.37	-2.17	0.69	73.99	-1.85	-0.63	<b>1.41</b>	74.23	-1.37	-1.01	1.88
157	0M01	80.18	-1.48	2.09	80.51	-0.82	0.23	<b>2.00</b>	80.91	-0.74	0.39	1.99
158	0M02	83.53	-0.86	2.70	84.29	0.22	1.17	<b>2.02</b>	84.31	-0.09	1.18	1.87
159	0M03	48.24	-32.71	-34.43	45.33	-40.94	-33.68	<b>8.76</b>	47.44	-34.25	-30.96	3.88
160	0M04	40.08	57.72	-5.10	36.59	57.34	-2.35	<b>4.46</b>	37.65	45.48	-4.87	<b>12.48</b>
161	0M05	71.25	-6.36	66.95	68.21	-2.32	67.76	<b>5.12</b>	70.78	-2.98	63.65	<b>4.75</b>
162	0M06	23.49	14.90	-35.86	25.09	15.22	-36.85	<b>1.91</b>	25.71	11.25	-28.41	<b>8.59</b>
163	0M07	45.13	-51.78	21.07	46.17	-53.92	19.35	<b>2.94</b>	46.36	-42.68	13.48	11.91

NUM		L*	a*	b*	L*	a*	b*	$\Delta E$	L*	a*	b*	$\Delta E$
164	0M08	39.81	52.33	32.58	41.69	51.73	29.28	<b>3.85</b>	42.61	37.96	14.39	<b>23.35</b>
165	0M09	50.38	5.91	-16.41	49.58	4.39	-16.09	<b>1.75</b>	49.59	5.28	-16.45	<b>1.01</b>
166	0M10	61.11	-19.11	10.44	59.64	-19.64	8.12	<b>2.80</b>	60.12	-18.71	9.70	<b>1.30</b>
167	0M11	58.29	19.13	18.84	56.41	20.29	19.14	<b>2.23</b>	56.39	20.75	19.10	<b>2.51</b>
168	0M12	19.68	13.17	-30.72	21.74	12.41	-30.50	<b>2.21</b>	22.72	5.32	-16.46	<b>16.56</b>
169	0M13	38.13	-43.93	17.72	40.92	-44.17	15.44	<b>3.61</b>	41.43	-31.81	8.98	<b>15.30</b>
170	0N01	32.89	42.69	26.01	36.24	39.02	19.55	<b>8.15</b>	36.54	25.28	9.04	<b>24.58</b>
171	0N02	42.34	5.16	-14.13	41.74	3.77	-14.53	<b>1.57</b>	42.01	4.87	-14.95	<b>0.93</b>
172	0N03	51.17	-16.20	8.01	49.52	-18.24	7.71	<b>2.64</b>	49.27	-17.92	8.13	<b>2.57</b>
173	0N04	48.55	15.75	14.95	46.77	15.71	15.50	<b>1.86</b>	46.91	16.92	15.73	<b>2.16</b>
174	0N05	29.40	-20.61	-21.16	29.40	-24.53	-22.30	<b>4.08</b>	29.94	-12.28	-15.11	<b>10.31</b>
175	0N06	23.86	34.74	-4.21	26.14	21.93	-2.66	<b>13.10</b>	24.19	9.47	-3.27	<b>25.29</b>
176	0N07	41.61	-5.02	37.79	39.65	-3.39	27.38	<b>10.72</b>	41.09	-2.49	20.13	<b>17.85</b>
177	0N08	14.71	10.05	-21.84	16.12	2.36	-14.15	<b>10.97</b>	18.37	3.14	-4.98	<b>18.59</b>
178	0N09	27.90	-30.92	12.59	35.10	-32.63	9.45	<b>8.04</b>	31.49	-16.46	3.24	<b>17.59</b>
179	0N10	23.53	30.22	17.45	28.21	17.41	7.13	<b>17.10</b>	24.62	7.01	1.38	<b>28.25</b>
180	0N11	30.94	3.05	-9.81	31.46	2.27	-9.63	<b>0.95</b>	32.95	1.30	-10.13	<b>2.68</b>
181	0N12	36.19	-11.80	5.31	39.64	-15.04	6.82	<b>4.97</b>	38.90	-13.93	5.53	<b>3.45</b>
182	0N13	34.45	10.34	10.34	37.17	11.20	13.18	<b>4.03</b>	37.67	11.93	9.97	<b>3.61</b>

3.63      **Average  $\Delta E$**       4.51

**Average  $\Delta E$  - overprint color excluded**

3.06	C	2.80
2.70	M	2.00
3.98	Y	4.51
2.00	K	2.07
2.37	Paper	2.15

**Average  $\Delta E$  - overprint color only**

3.95      5.27



## Appendix K

## Soft Proofing, Profile Inspection, and Simulation under Photoshop 5.0.2 Environment

Photoshop 5.0.2 offers many new color management features which the version 4.0 does not. On-screen soft proofing is one of the most important ones. If a monitor is well calibrated and there is a precise built profile for the device, an image shown on the monitor can fairly match the final reproduction in certain expectancy. The following will introduce a proper way to work with this feature step by step:

0. Launch Photoshop 5.0.2
1. Select File/Color Settings (see Figure 1).

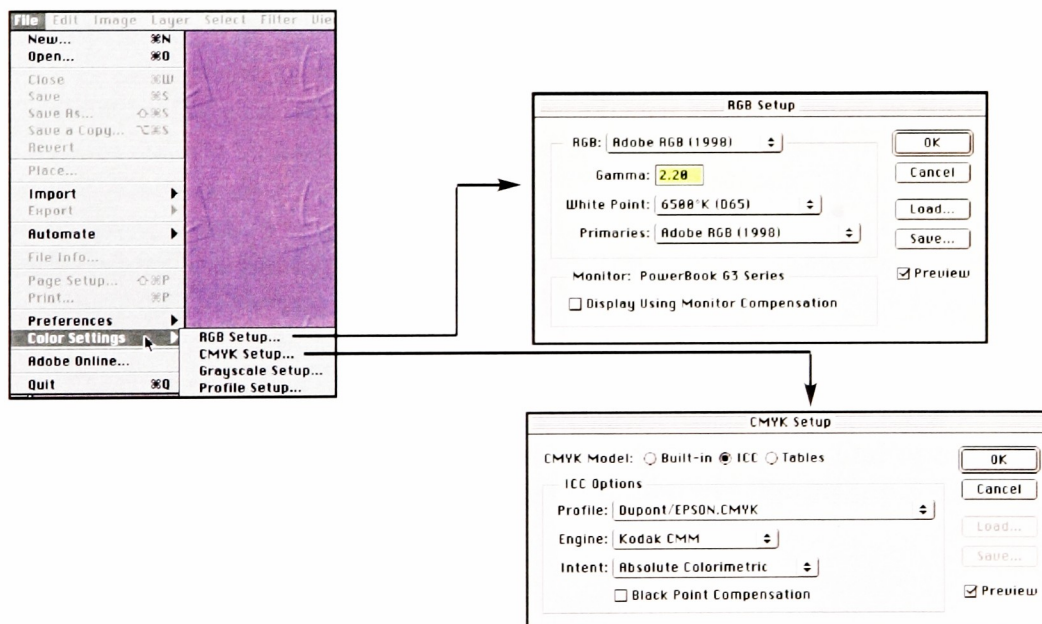


Figure 1 File/Color Settings/CMYK Setup windows

To work with RGB images: Go to **RGB Setup** window, select desired RGB color space from **RGB** pull-down bar. Define the setting as desired if **RGB/Custom** is selected. Make sure that **Monitor** is set to a correct profile.

**Important:** In order to accurately preview images when working in an RGB color space other than the monitor color space, enable **Display Using Monitor Compensation** since most of Photoshop 5.0.2's RGB color spaces don't match the gamut of the monitor.

To work with CMYK images: Go to **CMYK Setup** window, check **CMYK Mode/ICC. ICC Options** window appears; select desired output profile from **Profile** pull-down bar, desired CMM from **Engine** pull-down bar, and desired rendering method from **Intent** pull-down bar. Uncheck **Black Point Compensation** if colorimetric matching is selected. Click **OK**. From there, the monitor simulates the output device which the profile characterized to without modifying the data file.

**Important: Black Point Compensation** maps the darkest neutral of the source color space to the darkest neutral of the destination color space. If a CMYK-to-CMYK colorimetric rendering is chosen, this may cause serious problems in reproducing color accurately.

2. Open an RGB or CMYK image from **File/Open**. A Profile Mismatch Handling window may appear if the image does not have an embedded profile /or does have one but not the same as the one in current **Profile Setup**. **Convert** or **Don't Convert** as desired (see Color Management in Photoshop 5.0 from Adobe CustomerFirst Support for more details).

3. By now, there is an image opened in Photoshop 5.0.2. The image should fairly match the final reproduction which the profile, is selected in **File/Color Setting/CMYK Setup**, is characterized to.

### Profile Inspection via Photoshop 5.0.2

There were three SWOP ICC profiles provided by Kodak and DuPont for the thesis experiment. All three profiles were examined via Photoshop 5.0.2. Procedure and results are stated below:

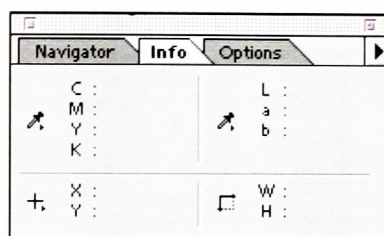
0. Launch Photoshop 5.0.2

1. Open a CMYK image (IT8.7/3 as an example for this study). Since the image is a legacy file with no profile tagged, click **Don't Convert** when **Profile Mismatch Handling** window appears.

2. Go to **File/Color Setting/CMYK Setup**, and then select a preferred profile, CMM, and rendering intent. The settings for the thesis study were:

**Profiles:** SWOP CMYK Output; ANSI/CGATS TR001-1993  
 DuPont/Epson.CMYK.icc  
 DuPont/Epson.CMYK4SWOP.icc  
**Engine:** Kodak CMM  
**Intent:** Absolute Colorimetric

3. Go to **Window/Show Info** to enable the function (Figure 2).



**Figure 2** Show Info windows

4. Move the cursor to selected color for CMYK or Lab information.

All CIELAB data has been recorded in Excel workbook with keyboard entry (see Table 1, 2, and 3).

**Note:** Only paper, CMY single color ramps, and RGB solid printed patches were examined. The best build profile with the least discrepancy was, therefore, chosen for the entire thesis study.



Table 1 SWOP profile inspection 1

CGATS.6 TR-001										Profile:			
SWOP Reference										SWOP CMYK Output; ANSI/CGATS TR001-1993			
# ID	Loc	C	M	Y	K	L*	a*	b*	L*	a*	b*	$\Delta E$	
1	0A01	100	0	0	0	56.02	-37.58	-40.01	56	-38	-40	0.15	
2	0A02	0	100	0	0	47.16	68.06	-3.95	47	71	-3	2.89	
3	0A03	0	0	100	0	84.26	-5.79	84.33	85	-5	86	2.09	
4	0A04	100	100	0	0	26.57	17.60	-41.24	26	19	-43	2.32	
5	0A05	100	0	100	0	51.46	-61.59	26.08	51	-62	26	0.62	
6	0A06	0	100	100	0	46.94	62.21	41.81	46	63	43	1.71	
26	0B13	paper				88.66	-0.33	3.64	89	1	5	1.89	
27	0C01	90	0	0	0	57.98	-35.00	-37.48	59	-34	-37	1.69	
28	0C02	80	0	0	0	60.86	-31.09	-33.48	61	-30	-33	1.57	
29	0C03	70	0	0	0	63.58	-27.19	-29.78	64	-26	-29	1.45	
30	0C04	60	0	0	0	66.80	-23.69	-25.74	67	-23	-25	1.01	
31	0C05	50	0	0	0	69.75	-20.38	-21.79	70	-20	-21	1.19	
32	0C06	40	0	0	0	73.21	-16.57	-17.18	73	-16	-17	0.80	
33	0C07	30	0	0	0	76.68	-12.87	-12.60	77	-12	-12	0.84	
34	0C08	25	0	0	0	78.72	-10.73	-9.86	79	-10	-10	0.76	
35	0C09	20	0	0	0	80.67	-8.48	-7.19	81	-8	-7	0.33	
36	0C10	15	0	0	0	82.35	-6.87	-4.88	83	-6	-4	1.05	
37	0C11	10	0	0	0	84.31	-4.87	-2.23	85	-4	-2	1.23	
38	0C12	7	0	0	0	85.29	-3.90	-0.99	86	-3	0	1.91	
39	0C13	3	0	0	0	86.76	-2.51	1.02	88	-1	3	2.73	
40	0D01	0	90	0	0	50.28	61.48	-4.25	51	63	-3	2.12	
41	0D02	0	80	0	0	54.17	53.97	-3.98	55	56	-3	2.02	
42	0D03	0	70	0	0	58.45	46.54	-3.57	58	49	-3	2.21	
43	0D04	0	60	0	0	61.83	40.27	-3.24	62	42	-3	2.11	
44	0D05	0	50	0	0	65.55	33.77	-2.85	66	36	-2	2.00	
45	0D06	0	40	0	0	69.90	26.59	-2.08	70	28	-1	2.16	
46	0D07	0	30	0	0	74.25	19.60	-1.16	74	22	0	2.58	
47	0D08	0	25	0	0	76.65	16.46	-0.38	77	18	0	2.09	
48	0D09	0	20	0	0	79.06	13.39	0.45	79	15	1	1.96	
49	0D10	0	15	0	0	81.14	10.45	1.08	81	12	2	1.68	
50	0D11	0	10	0	0	83.49	7.07	1.75	84	8	3	1.77	
51	0D12	0	7	0	0	84.57	5.44	2.04	86	6	3	1.82	
52	0D13	0	3	0	0	86.22	2.87	2.45	88	3	4	2.23	
53	0E01	0	0	90	0	84.10	-6.31	76.60	85	-5	77	1.66	
54	0E02	0	0	80	0	84.39	-5.99	68.30	86	-5	69	1.89	
55	0E03	0	0	70	0	85.19	-5.21	59.44	86	-5	61	1.81	
56	0E04	0	0	60	0	85.48	-5.12	51.14	86	-4	53	2.29	
57	0E05	0	0	50	0	85.75	-4.93	43.39	87	-4	45	2.62	
58	0E06	0	0	40	0	86.28	-4.26	35.58	87	-3	38	2.56	
59	0E07	0	0	30	0	86.70	-3.60	27.15	88	-3	30	3.22	
60	0E08	0	0	25	0	87.06	-3.17	23.07	88	-2	26	3.26	
61	0E09	0	0	20	0	87.54	-2.44	20.12	88	-2	22	2.20	
62	0E10	0	0	15	0	87.73	-2.01	16.62	89	-1	18	1.73	
63	0E11	0	0	10	0	87.99	-1.63	12.53	89	0	13	1.84	
64	0E12	0	0	7	0	88.16	-1.38	10.50	89	0	11	1.76	
65	0E13	0	0	3	0	88.24	-1.07	7.55	89	1	7	1.92	
Average												1.82	

Table 2 SWOP profile inspection 2

CGATS 6 TR-001										Profile:			
SWOP Reference										SWOP_STD			
# ID	Loc	C	M	Y	K	L*	a*	b*	L*	a*	b*	$\Delta E$	
1	0A01	100	0	0	0	56.02	-37.58	-40.01	49	-34	-34	9.91	
2	0A02	0	100	0	0	47.16	68.06	-3.95	41	62	-1	9.13	
3	0A03	0	0	100	0	84.26	-5.79	84.33	75	-6	76	12.46	
4	0A04	100	100	0	0	26.57	17.60	-41.24	22	16	-35	7.90	
5	0A05	100	0	100	0	51.46	-61.59	26.08	45	-55	26	9.23	
6	0A06	0	100	100	0	46.94	62.21	41.81	41	57	39	8.39	
26	0B13	paper				88.66	-0.33	3.64	79	0	7	10.23	
27	0C01	90	0	0	0	57.98	-35.00	-37.48	51	-31	30	67.96	
28	0C02	80	0	0	0	60.86	-31.09	-33.48	53	-28	-27	10.65	
29	0C03	70	0	0	0	63.58	-27.19	-29.78	56	-25	-24	9.78	
30	0C04	60	0	0	0	66.80	-23.69	-25.74	59	-22	-20	9.83	
31	0C05	50	0	0	0	69.75	-20.38	-21.79	62	-18	-16	9.96	
32	0C06	40	0	0	0	73.21	-16.57	-17.18	65	-15	-13	9.35	
33	0C07	30	0	0	0	76.68	-12.87	-12.60	68	-12	-8	9.86	
34	0C08	25	0	0	0	78.72	-10.73	-9.86	69	-10	-6	10.48	
35	0C09	20	0	0	0	80.67	-8.48	-7.19	71	-8	-4	10.19	
36	0C10	15	0	0	0	82.35	-6.87	-4.88	73	-6	-2	9.82	
37	0C11	10	0	0	0	84.31	-4.87	-2.23	75	-4	1	9.89	
38	0C12	7	0	0	0	85.29	-3.90	-0.99	76	-3	3	10.15	
39	0C13	3	0	0	0	86.76	-2.51	1.02	77	-1	5	10.65	
40	0D01	0	90	0	0	50.28	61.48	-4.25	44	56	-1	8.95	
41	0D02	0	80	0	0	54.17	53.97	-3.98	47	50	-1	8.72	
42	0D03	0	70	0	0	58.45	46.54	-3.57	51	43	-1	8.64	
43	0D04	0	60	0	0	61.83	40.27	-3.24	54	37	0	9.08	
44	0D05	0	50	0	0	65.55	33.77	-2.85	58	31	1	8.92	
45	0D06	0	40	0	0	69.90	26.59	-2.08	61	25	1	9.55	
46	0D07	0	30	0	0	74.25	19.60	-1.16	65	19	3	10.16	
47	0D08	0	25	0	0	76.65	16.46	-0.38	67	16	3	10.24	
48	0D09	0	20	0	0	79.06	13.39	0.45	69	12	3	10.47	
49	0D10	0	15	0	0	81.14	10.45	1.08	71	10	4	10.56	
50	0D11	0	10	0	0	83.49	7.07	1.75	74	6	5	10.09	
51	0D12	0	7	0	0	84.57	5.44	2.04	75	4	5	10.12	
52	0D13	0	3	0	0	86.22	2.87	2.45	77	2	6	9.92	
53	0E01	0	0	90	0	84.10	-6.31	76.60	75	-5	69	11.93	
54	0E02	0	0	80	0	84.39	-5.99	68.30	75	-5	63	10.83	
55	0E03	0	0	70	0	85.19	-5.21	59.44	76	-5	56	9.81	
56	0E04	0	0	60	0	85.48	-5.12	51.14	76	-5	49	9.72	
57	0E05	0	0	50	0	85.75	-4.93	43.39	76	-4	42	9.89	
58	0E06	0	0	40	0	86.28	-4.26	35.58	76	-4	35	10.30	
59	0E07	0	0	30	0	86.70	-3.60	27.15	77	-3	28	9.76	
60	0E08	0	0	25	0	87.06	-3.17	23.07	77	-3	25	10.24	
61	0E09	0	0	20	0	87.54	-2.44	20.12	78	-2	21	9.59	
62	0E10	0	0	15	0	87.73	-2.01	16.62	78	-2	18	9.83	
63	0E11	0	0	10	0	87.99	-1.63	12.53	78	-1	14	10.12	
64	0E12	0	0	7	0	88.16	-1.38	10.50	78	-1	12	10.28	
65	0E13	0	0	3	0	88.24	-1.07	7.55	78	0	9	10.40	
Average												11.17	



### Simulation via Photoshop 5.0.2

Since color has been defined as a three dimensional space by CIELAB system and an  $a^*b^*$  hexagon can only provide a two dimensional aspect, there was a need for plotting  $L^*-C^*$  slices of RGB and CMY to verify printable color spaces of the SWOP reference, Epson SC3000 in default condition, and the refined calibration (default-to-SWOP) for another aspect. As Photoshop 5.0.2 has offered soft proofing feature, a series of simulations for plotting the  $L^*-C^*$  diagrams have been done. As already mentioned that the  $L^*-C^*$  diagrams were not generated from measuring real printed samples, but were simulated with ICC profiles via Photoshop 5.0.2. This method can only offer a best estimate of the printable color space of each condition based upon the ICC profiles. Discrepancy and noise from the color management system will not be discussed at this time.

1. Open IT8.7/3 basic target, click **Don't Convert** when **Profile Mismatch Handling** window appears.

2. Go to **File/Color Setting/CMYK Setup**, and then select a preferred profile, CMM, and rendering intent. The settings for the thesis study were:

**Profiles:** SWOP CMYK Output; ANSI/CGATS TR001-1993

DuPont/Epson.CMYK.icc

DuPont/Epson.CMYK4SWOP.icc

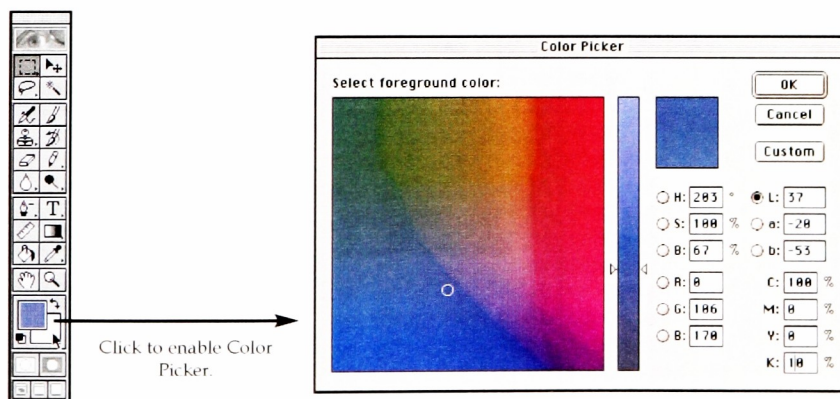
**Engine:** Kodak CMM

**Intent:** Absolute Colorimetric

3. Go to **Window/Show Info** to enable the function.

4. Move the cursor to selected color for CMYK or Lab information.

However, to generate  $L^*-C^*$  diagrams needs a lot more information than what the IT8.7/3 can offer. Therefore, a series of simulation is following up via **Foreground Color**, **Background Color**.



**Figure 3** Foreground Color, Background Color tool and Color Picker window



5.0 Use key board to enter desired CMYK percentage, and CIELAB values change instantly following the data entries (Figure 3). All data derived from the simulation has been recorded in Excel workbook (see Table 4, 5, and 6).

**Table 4** Data simulated for the SWOP reference

TR001	L*	a*	b*	C*	TR001	L*	a*	b*	C*	TR001	L*	a*	b*	C*
3C	87	-2	1	2.24	3M	87	2	3	3.61	3Y	89	0	6	6.00
7C	85	-4	-1	4.12	7M	85	5	2	5.39	7Y	88	-1	9	9.06
10C	84	-5	-3	5.83	10M	83	7	2	7.28	10Y	88	-1	12	12.04
15C	82	-8	-6	10.00	15M	81	10	1	10.05	15Y	88	-2	16	16.12
20C	80	-10	-8	12.81	20M	78	14	0	14.00	20Y	87	-3	29	29.15
25C	78	-12	-10	15.62	25M	76	17	-1	17.03	25Y	87	-4	25	25.32
30C	76	-13	-13	18.38	30M	74	20	-1	20.02	30Y	87	-4	28	28.28
40C	73	-17	-18	24.76	40M	69	27	-2	27.07	40Y	86	-4	36	36.22
50C	69	-21	-22	30.41	50M	65	33	-3	33.14	50Y	86	-5	43	43.29
60C	66	-24	-26	35.38	60M	62	40	-4	40.20	60Y	85	-6	51	51.35
70C	64	-27	-30	40.36	70M	58	47	-4	47.17	70Y	85	-6	58	58.31
80C	61	-31	-34	46.01	80M	54	54	-4	54.15	80Y	85	-6	67	67.27
90C	58	-35	-37	50.93	90M	51	60	-4	60.13	90Y	84	-6	75	75.24
100C	56	-39	-41	56.59	100M	47	69	-4	69.12	100Y	84	-6	84	84.21
100C+10K	52	-37	-38	53.04	100M+10K	43	65	-5	65.19	100Y+10K	78	-7	77	77.32
100C+20K	47	-33	-35	48.10	100M+20K	39	59	-5	59.21	100Y+20K	71	-7	69	69.35
100C+30K	44	-32	-32	45.25	100M+30K	36	55	-5	55.23	100Y+30K	65	-7	64	64.38
100C+40K	40	-29	-30	41.73	100M+40K	32	51	-5	51.24	100Y+40K	58	-7	57	57.43
100C+50K	36	-27	-27	38.18	100M+50K	29	46	-5	46.27	100Y+50K	52	-7	50	50.49
100C+60K	31	-23	-24	33.24	100M+60K	25	40	-5	40.31	100Y+60K	46	-6	43	43.42
100C+70K	27	-22	-21	30.41	100M+70K	22	35	-4	35.23	100Y+70K	39	-6	38	38.47
100C+80K	22	-17	-18	24.76	100M+80K	18	28	-3	28.16	100Y+80K	32	-5	30	30.41
100C+90K	18	-16	-15	21.93	100M+90K	15	23	-2	23.09	100Y+90K	24	-4	23	23.35
100C+100K	13	-13	-9	15.81	100M+100K	11	14	1	14.04	100Y+100K	16	-6	14	15.23

TR001	L*	a*	b*	C*	TR001	L*	a*	b*	C*	TR001	L*	a*	b*	C*
3MY	87	2	5	5.39	3CY	87	-2	4	4.47	3CM	85	0	1	1.00
7MY	84	4	8	8.94	7CY	85	-5	5	7.07	7CM	82	1	-2	2.24
10MY	83	5	10	11.18	10CY	84	-6	6	8.49	10CM	79	2	-4	4.47
15MY	80	8	13	15.26	15CY	81	-9	7	11.40	15CM	75	2	-8	8.25
20MY	77	12	15	19.21	20CY	79	-12	9	15.00	20CM	71	4	-10	10.77
25MY	75	14	17	22.02	25CY	77	-15	10	18.03	25CM	67	5	-13	13.93
30MY	73	17	20	26.25	30CY	75	-17	11	20.25	30CM	64	6	-15	16.16
40MY	68	24	24	33.94	40CY	71	-23	13	26.42	40CM	57	8	-20	21.54
50MY	64	30	27	40.36	50CY	67	-28	15	31.76	50CM	51	9	-24	25.63
60MY	60	36	32	48.17	60CY	64	-34	18	38.47	60CM	45	11	-28	30.08
70MY	56	43	35	55.44	70CY	60	-40	20	44.72	70CM	40	13	-32	34.54
80MY	53	49	37	61.40	80CY	57	-47	22	51.89	80CM	35	14	-35	37.70
90MY	49	56	40	68.82	90CY	54	-54	24	59.09	90CM	30	16	-39	42.15
100MY	46	63	43	76.28	100CY	51	-62	26	67.23	100CM	26	19	-43	47.01
100MY+10K	42	59	39	70.72	100CY+10K	48	-58	25	63.16	100CM+10K	24	18	-40	43.86
100MY+20K	39	53	34	62.97	100CY+20K	44	-54	22	58.31	100CM+20K	22	16	-37	40.31
100MY+30K	35	50	32	59.36	100CY+30K	41	-49	21	53.31	100CM+30K	20	16	-34	37.58
100MY+40K	31	45	27	52.48	100CY+40K	37	-45	18	48.47	100CM+40K	18	14	-32	34.93
100MY+50K	28	39	26	46.87	100CY+50K	33	-41	17	44.38	100CM+50K	16	15	-30	33.54
100MY+60K	25	34	22	40.50	100CY+60K	29	-37	14	39.56	100CM+60K	15	13	-26	29.07
100MY+70K	21	30	19	35.51	100CY+70K	26	-33	13	35.47	100CM+70K	13	10	-23	25.08
100MY+80K	17	23	14	26.93	100CY+80K	22	-30	11	31.95	100CM+80K	10	10	-20	22.36
100MY+90K	14	16	12	20.00	100CY+90K	17	-24	8	25.30	100CM+90K	9	7	-15	16.55
100MY+100K	10	11	6	12.53	100CY+100K	12	-18	7	19.31	100CM+100K	7	6	-9	10.82

Table 5 Data simulated for Epson SC3000 in default condition

Default	L*	a*	b*	C*	Default	L*	a*	b*	C*	Default	L*	a*	b*	C*
3C	95	1	-9	9.06	3M	95	5	-8	9.43	3Y	96	2	-5	5.39
7C	94	-1	-11	11.05	7M	94	8	-9	12.04	7Y	96	1	-2	2.24
10C	93	-2	-13	13.15	10M	93	10	-10	14.14	10Y	96	1	1	1.41
15C	91	-5	-16	16.76	15M	91	14	-11	17.80	15Y	95	0	5	5.00
20C	89	-8	-19	20.62	20M	89	19	-13	23.02	20Y	95	-1	10	10.05
25C	86	-10	-22	24.17	25M	87	24	-14	27.78	25Y	94	-3	15	15.30
30C	84	-13	-25	28.18	30M	84	28	-15	31.76	30Y	94	-3	21	21.21
40C	78	-19	-31	36.36	40M	79	37	-17	40.72	40Y	93	-5	33	33.38
50C	73	-23	-37	43.57	50M	73	46	-17	49.04	50Y	91	-6	45	45.40
60C	66	-26	-43	50.25	60M	67	56	-18	58.82	60Y	89	-6	58	58.31
70C	60	-28	-47	54.71	70M	61	64	-16	65.97	70Y	87	-6	70	70.26
80C	53	-28	-52	59.06	80M	55	72	-13	73.16	80Y	85	-3	83	83.05
90C	45	-25	-56	61.33	90M	50	77	-6	77.23	90Y	82	0	93	93.00
100C	39	-19	-59	61.98	100M	45	80	3	80.06	100Y	79	5	104	104.12
100C+10K	37	-20	-53	56.65	100M+10K	43	74	0	74.00	100Y+10K	74	4	93	93.09
100C+20K	35	-23	-47	52.33	100M+20K	40	66	-2	66.03	100Y+20K	68	2	82	82.02
100C+30K	33	-23	-41	47.01	100M+30K	36	58	-4	58.14	100Y+30K	62	1	71	71.01
100C+40K	30	-24	-34	41.62	100M+40K	33	49	-6	49.37	100Y+40K	55	-1	58	58.01
100C+50K	26	-22	-27	34.83	100M+50K	28	38	-7	38.64	100Y+50K	47	-3	45	45.10
100C+60K	21	-18	-21	27.66	100M+60K	23	27	-8	28.16	100Y+60K	38	-5	31	31.40
100C+70K	16	-14	-15	20.52	100M+70K	17	16	-8	17.89	100Y+70K	28	-6	18	18.97
100C+80K	11	-8	-10	12.81	100M+80K	11	8	-8	11.31	100Y+80K	19	-4	7	8.06
100C+90K	7	-3	-7	7.62	100M+90K	7	4	-6	7.21	100Y+90K	11	-2	2	2.83
100C+100K	4	0	-5	5.00	100M+100K	4	0	-2	2.00	100Y+100K	5	0	-2	2.00

Default	L*	a*	b*	C*	Default	L*	a*	b*	C*	Default	L*	a*	b*	C*
3MY	95	4	-6	7.21	3CY	95	0	-7	7.00	3CM	94	3	-10	10.44
7MY	93	6	-4	7.21	7CY	93	-2	-6	6.32	7CM	91	4	-13	13.60
10MY	92	8	-2	8.25	10CY	92	-5	-5	7.07	10CM	89	5	-16	16.76
15MY	90	11	1	11.05	15CY	90	-9	-3	9.49	15CM	86	7	-19	20.25
20MY	88	15	5	15.81	20CY	87	-13	-1	13.04	20CM	82	9	-24	25.63
25MY	85	19	8	20.62	25CY	85	-18	1	18.03	25CM	78	10	-28	29.73
30MY	83	22	12	25.06	30CY	83	-22	3	22.20	30CM	74	11	-31	32.89
40MY	78	30	19	35.51	40CY	77	-31	8	32.02	40CM	65	15	-39	41.79
50MY	73	38	27	46.62	50CY	71	-40	12	41.76	50CM	55	19	-46	49.77
60MY	67	47	35	58.60	60CY	65	-49	17	51.87	60CM	46	23	-53	57.78
70MY	62	55	43	69.81	70CY	58	-57	21	60.75	70CM	36	26	-58	63.56
80MY	56	64	51	81.84	80CY	51	-63	24	67.42	80CM	28	30	-61	67.98
90MY	52	70	57	90.27	90CY	45	-67	26	71.87	90CM	20	34	-63	71.59
100MY	47	75	64	98.60	100CY	39	-67	26	71.87	100CM	15	39	-63	74.09
100MY+10K	45	68	57	88.73	100CY+10K	37	-66	25	70.58	100CM+10K	13	33	-57	65.86
100MY+20K	42	61	49	78.24	100CY+20K	35	-63	22	66.73	100CM+20K	12	28	-51	58.18
100MY+30K	38	53	41	67.01	100CY+30K	33	-57	19	60.08	100CM+30K	11	23	-45	50.54
100MY+40K	34	44	32	54.41	100CY+40K	30	-50	16	52.50	100CM+40K	9	17	-37	40.72
100MY+50K	29	34	23	41.05	100CY+50K	26	-43	13	44.92	100CM+50K	8	12	-30	32.31
100MY+60K	23	23	14	26.93	100CY+60K	21	-31	8	32.02	100CM+60K	7	7	-21	22.14
100MY+70K	17	14	7	15.65	100CY+70K	16	-20	4	20.40	100CM+70K	6	3	-13	13.34
100MY+80K	11	4	1	4.12	100CY+80K	11	-10	-1	10.05	100CM+80K	5	0	-7	7.00
100MY+90K	6	2	-2	2.83	100CY+90K	7	-3	-3	4.24	100CM+90K	4	0	-5	5.00
100MY+100K	3	6	-4	7.21	100CY+100K	4	0	-2	2.00	100CM+100K	3	0	-4	4.00



Table 6 Data simulated for Epson SC3000 in refined calibration

Refined cali.	L*	a*	b*	C*	Refined cali.	L*	a*	b*	C*	Refined cali.	L*	a*	b*	C*
3C	95	1	-9	9.06	3M	95	5	-9	10.30	3Y	96	2	-6	6.32
7C	94	-1	-11	11.05	7M	93	8	-10	12.81	7Y	96	1	-3	3.16
10C	93	-2	-12	12.17	10M	92	11	-11	15.56	10Y	96	1	0	1.00
15C	91	-4	-15	15.52	15M	90	15	-12	19.21	15Y	95	0	5	5.00
20C	89	-6	-17	18.03	20M	87	20	-14	24.41	20Y	95	-2	11	11.18
25C	87	-8	-19	20.62	25M	84	25	-15	29.15	25Y	95	-3	16	16.28
30C	85	-10	-21	23.26	30M	82	30	-16	34.00	30Y	94	-4	22	22.36
40C	81	-14	-26	29.53	40M	76	40	-18	43.86	40Y	93	-5	34	34.37
50C	77	-17	-30	34.48	50M	72	47	-18	50.33	50Y	93	-6	44	44.41
60C	72	-21	-35	40.82	60M	68	53	-18	55.97	60Y	92	-7	54	54.45
70C	68	-24	-39	45.79	70M	65	57	-18	59.77	70Y	91	-7	62	62.39
80C	63	-27	-44	51.62	80M	62	63	-17	65.25	80Y	90	-6	71	71.25
90C	58	-28	-48	55.57	90M	58	69	-15	70.61	90Y	89	-4	82	82.10
100C	54	-29	-52	59.54	100M	53	77	-8	77.41	100Y	86	-1	96	96.01
100C+10K	51	-29	-48	56.08	100M+10K	49	71	-9	71.57	100Y+10K	80	-1	86	86.01
100C+20K	47	-30	-42	51.61	100M+20K	44	65	-10	65.76	100Y+20K	71	-2	76	76.03
100C+30K	44	-30	-38	48.41	100M+30K	40	59	-10	59.84	100Y+30K	65	-2	66	66.03
100C+40K	40	-28	-32	42.52	100M+40K	36	51	-11	52.17	100Y+40K	58	-3	56	56.08
100C+50K	37	-26	-28	38.21	100M+50K	33	44	-11	45.35	100Y+50K	51	-4	46	46.17
100C+60K	33	-24	-23	33.24	100M+60K	30	35	-11	36.69	100Y+60K	45	-5	37	37.34
100C+70K	29	-22	-19	29.07	100M+70K	26	27	-11	29.15	100Y+70K	39	-6	28	28.64
100C+80K	25	-18	-14	22.80	100M+80K	22	19	-11	21.95	100Y+80K	32	-6	19	19.92
100C+90K	18	-14	-11	17.80	100M+90K	16	12	-10	15.62	100Y+90K	24	-6	9	10.82
100C+100K	9	-4	-7	8.06	100M+100K	8	6	-7	9.22	100Y+100K	11	-4	1	4.12

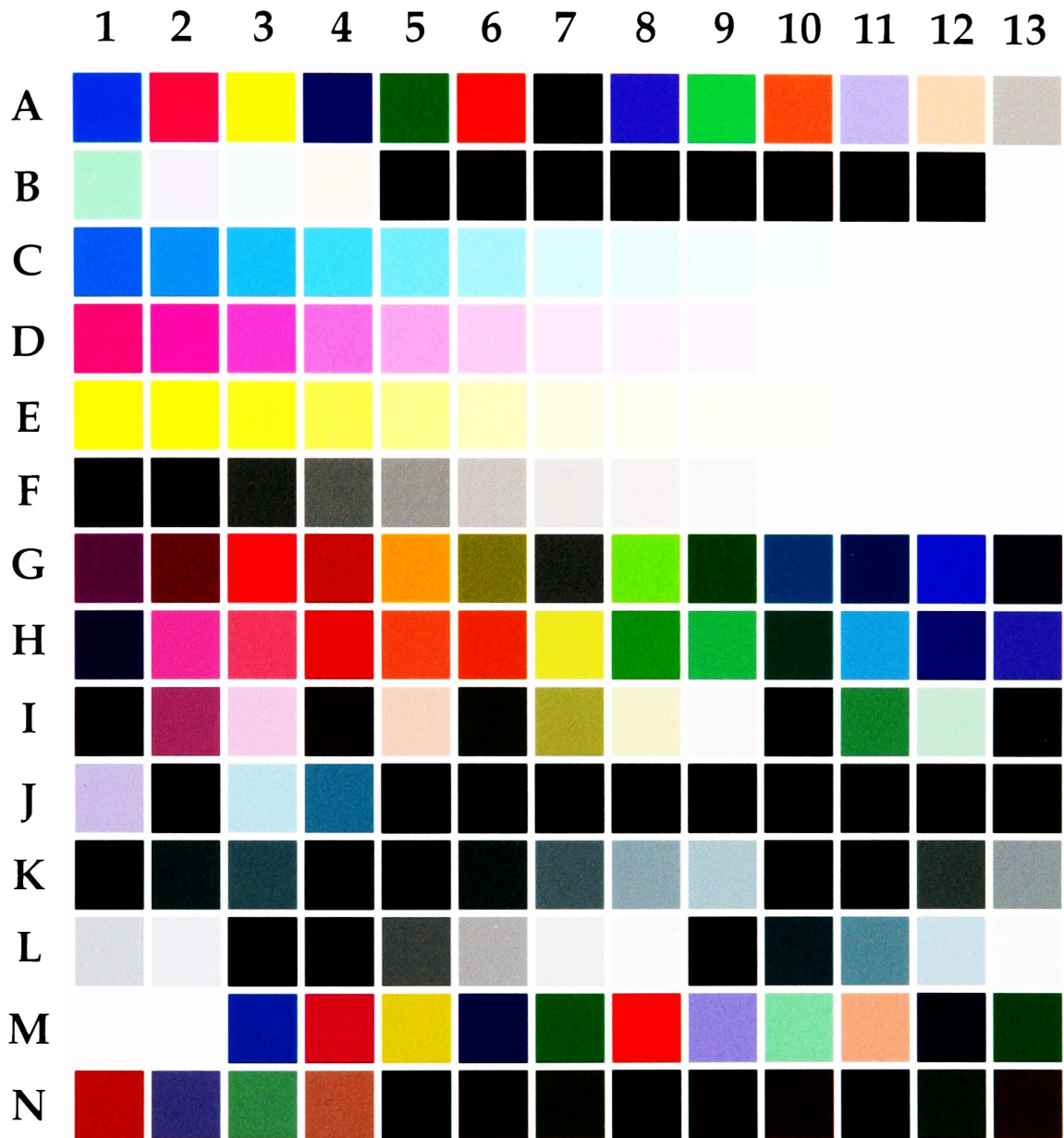
Refined cali.	L*	a*	b*	C*	Refined cali.	L*	a*	b*	C*	Refined cali.	L*	a*	b*	C*
3MY	95	4	-7	8.06	3CY	95	0	-7	7.00	3CM	94	3	-10	10.44
7MY	93	7	-5	8.60	7CY	94	-2	-6	6.32	7CM	91	5	-12	13.00
10MY	92	9	-3	9.49	10CY	93	-4	-5	6.40	10CM	89	6	-14	15.23
15MY	89	12	0	12.00	15CY	90	-7	-2	7.28	15CM	86	9	-18	20.12
20MY	86	16	3	16.28	20CY	88	-11	1	11.05	20CM	82	11	-22	24.60
25MY	84	19	7	20.25	25CY	86	-14	4	14.56	25CM	78	13	-25	28.18
30MY	81	22	10	24.17	30CY	84	-17	7	18.38	30CM	75	16	-28	32.25
40MY	76	30	18	34.99	40CY	80	-24	14	27.78	40CM	67	20	-34	39.45
50MY	73	36	25	43.83	50CY	76	-31	18	35.85	50CM	61	22	-39	44.78
60MY	69	40	30	50.00	60CY	71	-38	22	43.91	60CM	55	23	-44	49.65
70MY	67	45	36	57.63	70CY	67	-44	24	50.12	70CM	49	25	-48	54.12
80MY	64	50	41	64.66	80CY	62	-51	26	57.25	80CM	43	27	-53	59.48
90MY	60	57	47	73.88	90CY	56	-56	29	63.06	90CM	36	31	-57	64.88
100MY	54	64	53	83.10	100CY	51	-60	34	68.96	100CM	27	38	-59	70.18
100MY+10K	51	61	50	78.87	100CY+10K	48	-58	32	66.24	100CM+10K	25	34	-56	65.51
100MY+20K	47	55	44	70.43	100CY+20K	45	-56	29	63.06	100CM+20K	22	30	-51	59.17
100MY+30K	43	49	39	62.63	100CY+30K	42	-52	26	58.14	100CM+30K	19	25	-45	51.48
100MY+40K	39	43	33	54.20	100CY+40K	39	-47	22	51.89	100CM+40K	17	19	-39	43.38
100MY+50K	35	37	27	45.80	100CY+50K	36	-42	19	46.10	100CM+50K	15	14	-33	35.85
100MY+60K	31	29	21	35.81	100CY+60K	33	-36	15	39.00	100CM+60K	14	8	-26	27.20
100MY+70K	27	21	15	25.81	100CY+70K	29	-31	12	33.24	100CM+70K	13	4	-19	19.42
100MY+80K	22	14	9	16.64	100CY+80K	24	-24	7	25.00	100CM+80K	11	1	-13	13.04
100MY+90K	15	8	2	8.25	100CY+90K	17	-16	2	16.12	100CM+90K	8	1	-10	10.05
100MY+100K	7	1	-3	3.16	100CY+100K	8	-4	-3	5.00	100CM+100K	5	0	-5	5.00



## Appendix L



Output date & time: 03/01/98 02:44



IT8.7/3 Basic Color Characterization Target (182 color patches)

**Application:** QuarkXPress 3.32

**Printer:** EPSON Stylus COLOR 3000

**Printer Driver:** EPSON StylusRIP

**Page Setup/Resolution:** 1440 dpi

**Print/Options:** PQ Glossy paper 1440 dpi

**Image:** IT8.7/3

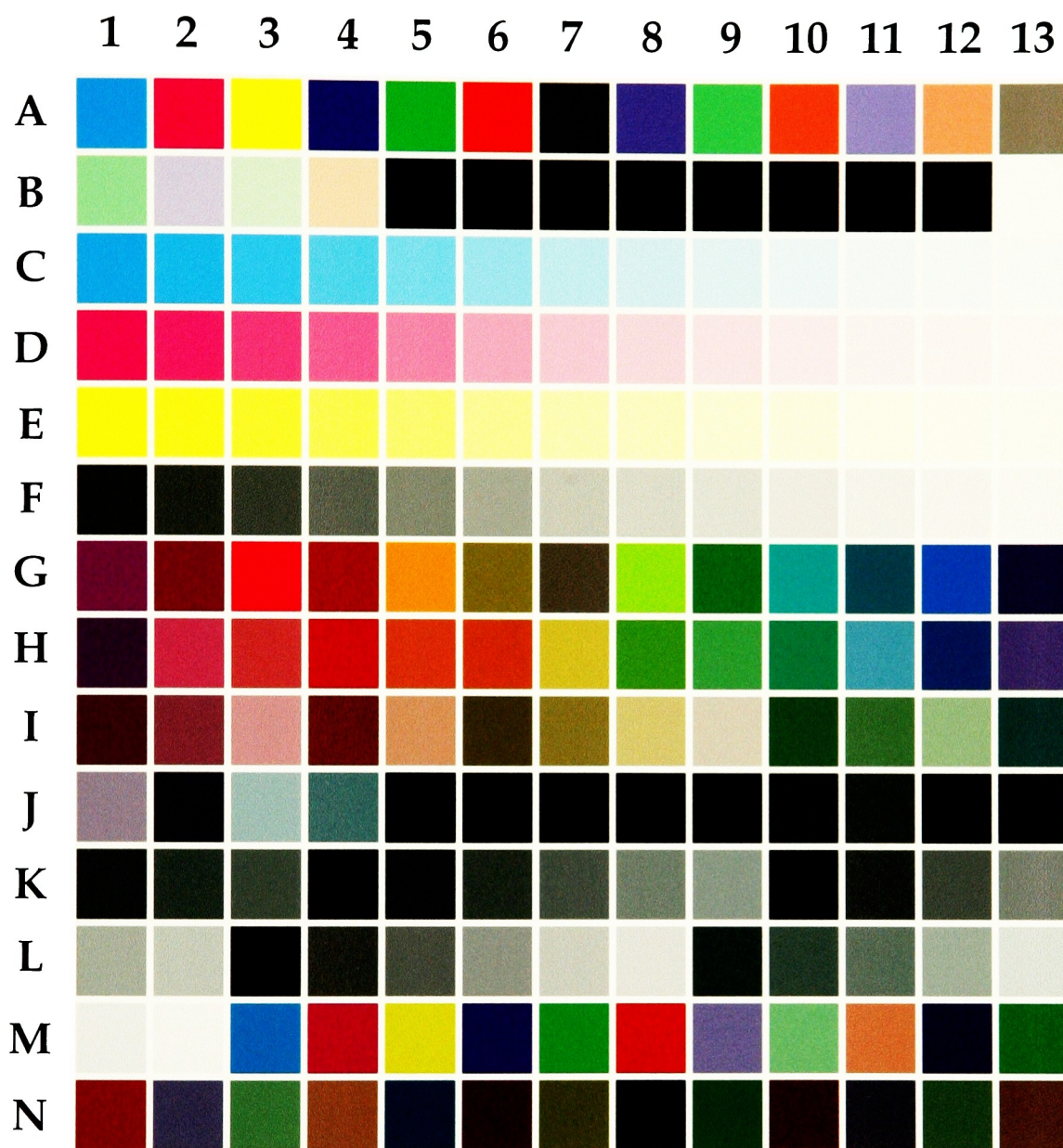
**Source profile:** None

**Output profile:** None

**Engine:** None

**Rendering intent:** None

Output date & time: 03/01/98 02:44



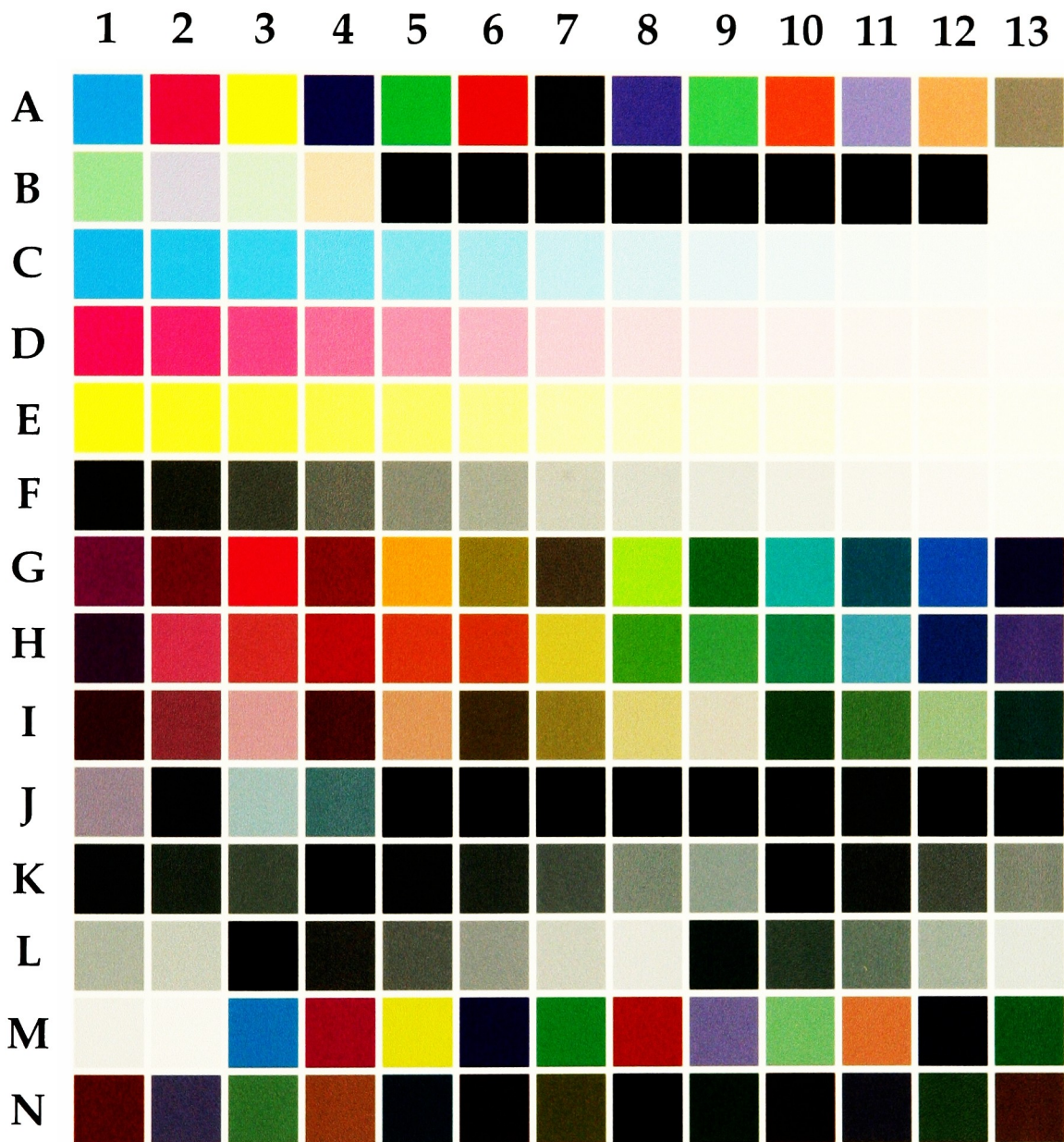
IT8.7/3 Basic Color Characterization Target (182 color patches)

**Application:** QuarkXPress 3.32  
**Printer:** EPSON Stylus COLOR 3000  
**Printer Driver:** EPSON StylusRIP  
**Page Setup/Resolution:** 1440 dpi  
**Print/Options:** PQ Glossy paper 1440 dpi

**Image:** IT8.7/3  
**Source profile:** TR001  
**Output profile:** Dupont/Epson.cmyk  
**Engine:** Kodak CMM  
**Rendering intent:** Absolute



Output date & time: 03/08/98 10:15



IT8.7/3 Basic Color Characterization Target (182 color patches)

**Application:** QuarkXPress 3.32  
**Printer:** EPSON Stylus COLOR 3000  
**Printer Driver:** EPSON StylusRIP  
**Page Setup/Resolution:** 1440 dpi  
**Print/Options:** PQ Glossy paper 1440 dpi

**Image:** IT8.7/3  
**Source profile:** TR001  
**Output profile:** Dupont/Epson.cmyk  
4SWOP.icc  
**Engine:** Kodak CMM  
**Rendering intent:** Absolute