This guidance was written prior to the February 27, 1997 implementation of FDA's Good Guidance Practices, GGP's. It does not create or confer rights for or on any person and does not operate to bind FDA or the public. An alternative approach may be used if such approach satisfies the requirements of the applicable statute, regulations, or both. This guidance will be updated in the next revision to include the standard elements of GGP's

D R A F T

GUIDANCE ON THE CONTENT AND ORGANIZATION OF A PREMARKET NOTIFICATION FOR A MEDICAL LASER

OFFICE OF DEVICE EVALUATION
CENTER FOR DEVICES AND RADIOLOGICAL HEALTH

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I. INTRODUCTORY INFORMATION

A. Purpose of Guidance

1. to assist reviewers in the Office of Device Evaluation in the review and documentation of premarket notifications [510(k)s] for medical lasers;

2. to assist persons in the preparation of 510(k)s for medical lasers (e.g., manufacturers, distributors, or importers); and

3. to communicate agency expectations regarding data requirements for various indications for use, including general guidance on when specific indications for use may require premarket approval.

This document is not intended to help an applicant decide when to submit a 510(k). For guidance in this matter, please consult **DECIDING WHEN TO SUBMIT A 510(k)**, available from the Division of Small Manufacturers Assistance at (800) 638-2041.

B. Regulatory Background

Lasers intended for medical purposes have been marketed in the United States for more than 20 years. Carbon dioxide and argon lasers were among the earliest laser technologies used in medicine.

With the enactment of the Medical Device Amendments to the Federal Food, Drug, and Cosmetic Act (the act) in May 1976, all new devices, including new medical lasers, became subject to FDA premarket clearance. Devices marketed prior to May 1976 generally were allowed to remain on the market, but were classified into one of three classes (I,II,III). The class designated the level of regulatory control that would be applied to the device to ensure its safety and effectiveness. A device is classified into Class I when general controls are adequate to provide the necessary regulatory control of assuring the safety and effectiveness of the device. A device is classified into Class II when special controls are needed. A device is classified into Class III when a Premarket Approval (PMA) is necessary to demonstrate the safety and effectiveness of the device. Medical lasers commercially distributed prior to May 1976 were identified and classified. Page 3 provides a partial list of references to medical lasers found in the classification regulations.

A person who intends to market a medical laser today must first receive an order from FDA to permit the agent to enter the device into commercial distribution. There are two forms of premarket clearance procedures. The premarket notification (510(k)) procedure is principally used for those devices that are documented to be substantially equivalent to legally marketed Class I and Class II devices. The 510(k) procedure can also apply to devices which are substantially equivalent to a Class III device for which the effective date of the requirements for premarket approval has not yet been established. The premarket approval (PMA) process applies to devices in Class III.

A person intending to market a substantially equivalent device must submit a 510(k) to FDA at least 90 days prior to the intended marketing date. The information in the 510(k) establishes whether or not the device is substantially equivalent to a legally marketed device. If the device is found substantially equivalent, then it is placed into the same class as the legally marketed device, and the

CLASSIFIED SURGICAL LASERS

21 CFR	Surgical Device	Intended Use (All Class II unless otherwise noted)
874.4490	Argon laser for otology, rhinology, and laryngology	The argon laser device for use in otology, rhinology, and laryngology is an electro-optical device which produces coherent, electromagnetic radiation with principle wavelength peaks at 488 and 514 nanometers. In otology the device is used for the purpose of coagulating and vaporizing soft and fibrous tissues, including osseous tissue. In rhinology and laryngology, the device is used to coagulate and vaporize soft and fibrous tissues, but not including osseous tissues.
874.4500	Ear, nose, and throat microsurgical carbon dioxide laser	A device intended for the surgical excision of tissue from the ear, nose, and throat area. The device is used, for example, in microsurgical procedures to excise lesions and tumors of the vocal cords and adjacent areas.
878.4810	Laser surgical instrument for use in general and plastic surgery and in dermatology	(1) A carbon dioxide laser for use in general surgery and in dermatology is a laser device intended to cut, destroy, or remove tissue by light energy emitted by carbon dioxide. (2) An argon laser for use in dermatology is a laser device intended to destroy or coagulate tissue by light energy emitted by argon.
884.4550	Gynecological surgical laser	A continuous wave carbon dioxide laser designed to destroy tissue thermally or to remove tissue by radiant light energy. The device is used only in conjunction with a colposcope as part of a gynecological surgical instrument.
886.4390	Ophthalmic laser	An AC-powered device intended to coagulate or cut tissue in the eye, orbit, or surrounding skin by a laser beam.
886.4392	Nd:YAG laser for posterior capsulotomy	A mode-locked or Q-switched solid state Nd:YAG laser intended for posterior capsulotomy, which generates short pulse, low energy, high power, coherent optical radiation. When the laser output is combined with focusing optics, the high irradiance at the target causes tissue disruption via optical breakdown.

agent may proceed to market with the device. If not, the device is considered Class III by default, and requires clearance through the PMA process.

The exponential growth of medical laser technology and the disparity in labeling, particularly for Indications for Use, led FDA to develop a guidance document in 1990. Comments were solicited on the format and content from laser manufacturers and the American Society for Laser in Medicine and Surgery, and other professional organizations.

The April 1990 document, **Guidance for the Content and Organization of a Premarket Notification [510(k)] for a Medical Laser**, defined Indications for medical lasers primarily in terms of the medical specialty areas of use and their general functional capabilities. Manufacturers requested that specific examples of clinical applications be included in the **Guidance**; consequently, a subsection to Indications, entitled Applications, was added that included surgical procedures to illustrate the clinical use of the laser in the medical specialty area. A Bibliography section was also included to augment the Applications section. The 1990 **Guidance** stated that treatment of a disease condition may be a Class III intended use, requiring premarket approval.

C. Goal of the Revision to the 1990 Guidance

The 1990 **Guidance** was a significant step towards submission of better 510(k) applications and consistency in product evaluation. However, the following areas have become problematic:

- The "Applications" subsection of the device labeling has generated a great deal of confusion over the regulatory status of the specific procedures provided as examples of clinical use. These examples, although intended to serve as a demonstration of the functional use of the laser device, have often been promoted as clinical indications. As the list of examples has expanded, with little or no FDA involvement, it has become increasingly difficult to insure that each procedure is accompanied with adequate performance data.

- The inadequacy of agency control over labeled procedures has led to uncertainty regarding the amount of information, including clinical data, needed to support clearance of a pending 510(k) submission.

Thus, a key goal of this revision is to clarify specifically the labeling format, including the Indications for Use, and to provide direction on data requirements to support labeling statements. FDA intends to accomplish this without adding burdensome requirements and without impeding the progress of an important segment of the medical device industry.

To this end, the following changes should be noted in the revised **Guidance** document:

1. Inclusion of Definitions: **Intended Use** and **Indications for Use** are commonly confused terms. It's important to understand the differences in order to appreciate the basis of regulatory decision-making for the 510(k) process. These are presented in **Section III.A., LABELING - INDICATIONS FOR MEDICAL LASERS.** A full discussion of these terms may be found in **Premarket Notification: 510(k) Regulatory Requirements for Medical Devices**, an HHS Publication FDA 90-4158, that may be obtained from the Division of Small Manufacturers Assistance.

2. Deletion of **Applications** Subsection: Use of this subsection for surgical lasers has led to much confusion in the industry. FDA expects laser manufacturers to conform to labeling requirements applicable to all medical devices, thus eliminating the need for the Applications subsections. In this way, we will restore the agency's control over labeling and consider any example of proposed use provided in a 510(k) submission as an indication for use for the device.

3. Clarification of Regulatory Requirements for Clinical Investigations: Sponsors have noted confusion and have requested information about when an IDE is required. A detailed discussion is presented in **Section I.D.2.**

4. Addition of a Discussion on Clinical Investigations: The **Guidance** emphasizes the importance of clinical data to demonstrate equivalent safety and effectiveness when bench testing and animal performance data alone are not adequate to show the comparable safety and effectiveness of the device.

The Guidance is not intended to be rigid or static. Laser technology is advancing at a fast pace. The revised **Guidance** document will be modified as needed to accommodate changes in the state-of-the-art of laser technology and the regulatory environment. An important element of the revision process will continue to be participation of the laser community. There will also be increased and ongoing participation in the decision-making process by FDA advisory panel members.

D. Policy and Regulatory Requirements for Clinical Investigations of Lasers

1. Introduction

FDA is aware that there has been, and continues to be, a considerable amount of research activity in the medical laser arena. The number of studies reported in the literature for this device technology reflects a tremendous commitment to basic and clinical research.

Part 812 of Title 21 of the Code of Federal Regulations (21 CFR 812), the Investigational Device Exemptions (IDE) regulations, establishes the procedures for conducting clinical investigations of medical devices. The intent of the IDE regulations is to foster innovation and the advancement of scientific knowledge. As such, there is latitude in the statutes and the IDE regulations regarding how the regulations should be applied.

Institutional Review Board (IRB) approval is required of all IDE studies. Significant risk device investigations must also have FDA approval.

Manufacturers should coordinate/monitor the prospective studies with their cleared devices so as to optimize the usefulness of resultant clinical data in support of marketing applications for new indications for use. Retrospective studies and uncoordinated research activities may be of limited value in supporting an application for new indication for use.

2. Regulatory Summary and Policy

A manufacturer must obtain FDA clearance before it may market its device in the United States. The exception is prior approval of an exemption from the premarketing requirements for the purpose of distributing devices in order to conduct a clinical investigation. The IDE regulations, 21 CFR 812, provide the procedures for obtaining an approval to conduct such a clinical investigation. FDA and the local IRB approve clinical investigations of significant risk devices (as defined in the regulations), and FDA has delegated approval of investigations of nonsignificant risk devices to IRBs. In addition, all studies are subject to the informed consent regulations, under 21 CFR 50.

FDA considers a new surgical laser that is being clinically investigated to be a significant risk device that requires FDA approval of an IDE application. In addition, a legally marketed surgical laser that is being clinically investigated for a new indication for use is also considered a significant risk device that requires FDA approval of an IDE investigation. Thus, an IDE approval is required for each clinical investigation of a surgical laser that is not legally in commercial distribution in the United States. An IDE is also required for a legally marketed surgical laser for each clinical investigation of a new indication for use.

In order to facilitate clinical research of surgical lasers and to avoid overly burdensome regulatory requirements, 21 CFR 812.2 exempts from the IDE requirements an investigation of a device that is being investigated within previously cleared intended use or indications for use. Therefore, a clinical investigation involving a legally marketed surgical laser for an indication for use within the scope of the intended use or indications for use cleared by FDA does not require IDE approval. The **Indications for Use** for a device is stated in the labeling cleared by FDA, and is discussed further in Section III.

It should also be noted that, under 21 CFR 812.20 (a)(1), FDA reserves the right to require an IDE for an investigation when it believes an IDE is necessary.

E. General Principles Regarding Presentation of Data

1. Editorial Considerations: In addition to a careful review of the 510(k) for scientific content, the document should be conscientiously edited before it is submitted to FDA. It should be proofread to assure that all of the appropriate pages/sections are included, properly indicated, consecutively paginated, distinctly copied, and legible.

2. Abbreviations: Standard abbreviations, acceptable to a significant peer reviewed journal, should be used wherever possible. All other abbreviations should be identified at the beginning of each section in which they are used or in footnotes to tables and graphs.

3. Data Availability: This document outlines typical circumstances of data review. It is not possible to anticipate all situations that may require FDA review. Thus, those submitting applications should be aware that they may be asked to submit additional data, to present data in another format, or to provide more detailed explanations of the information already submitted, when required to establish equivalence.

   Applicants should keep data used for the 510(k) submission on file in a controlled and well-organized format. This will allow the applicant expeditiously to supply FDA with additional information or analysis when required. Errors in data that are identified by the applicant after submission to FDA should be brought to FDA's attention immediately.

4. Tables and Graphs: Well-constructed tables are fundamental to the application and essential to the evaluation of data. All tables should be clearly identified and captioned with symbols keyed to a footnote or accessible reference page that adequately indicates the nature of the data.

   Graphs should supplement, not replace, data tables. They should be clearly represented.

5. Published Literature: Published methods or data referenced in study reports should be appended to the study report. Reprints of other referenced published reports or data should be appended to the section in which they are referenced. All referenced reports and data should be summarized including an explanation of how it relates to the current submission. Reference citations should be complete (e.g., title, author, volume, page, year).

6. Protocols and Data Analysis: Test reports must include the protocol (objectives, precise description of materials, experimental methods, controls), observations, statistical methods and analyses, conclusions and comments. Do not submit raw data unless requested. Additional specific directions on protocols are included in sections that follow.

7. Reference to Submitted Data: In support of the 510(k), the applicant may reference any information previously submitted to FDA. If the applicant did not submit the referenced data, the applicant must provide to FDA, or have the submitter of the referenced data provide to FDA, a letter of authorization. Often, when the data are not extensive, resubmitting data in the 510(k) will facilitate the review of the document.

F. Supplementary Guidance

The following supplementary FDA guidance documents are available from the Division of Small Manufacturers Assistance at (800)638-2041 or (301)443-6597:

1. Tripartite Biocompatibility Guidance for Medical Devices

2. ODE Blue Book Memorandum #K90-1: 510(k) Sterility Review Guidance

3. ODE Blue Book Memorandum #G90-1: Consolidated Review of Submissions for Lasers and Accessories
4. ODE Blue Book Memorandum #G91-1: Device Labeling Guidance

II. CONTENT OF A PREMARKET NOTIFICATION FOR A MEDICAL LASER

A. Cover Letter

1. Device Name: Trade name or proprietary name of the laser, and the common name, usual name, or classification name.

2. Establishment Registration Number.

3. Class of the device and panel: If not classified, then provide a statement of the basis for that determination.

4. Performance standards: All medical lasers must meet the performance standard for light emitting products (21 CFR 1040.10 & 1040.11).

5. Submitter's name and address.

6. Contact person, telephone number and fax number.

7. Address of manufacturing facility/facilities and, where appropriate, sterilization site(s).

8. Reason for submission (e.g., new laser or accessory, new **Indication for Use**).

B. Table of Contents

Include a complete Table of Contents for the submission. Paginate and tabulate sections to facilitate the review.

C. Summary of the Basis for Substantial Equivalence

Include a brief introductory summary of the basis for substantial equivalence to facilitate review. Reference subsequent sections of the submission for more detailed information. The applicant may choose to include in the analysis of equivalence the "510(k) Substantial Equivalence Decision-Making Process" flowchart that is included in Blue Book Memorandum #86-3. The Blue Book document is available from the Division of Small Manufacturers Assistance.

D. Labeling

Labeling for a medical laser must meet the requirements of 21 CFR 801, Labeling, and 21 CFR 1040.10 & 1040.11, Performance Standard for Light Emitting Products. The following labeling must be submitted:

1. Labels

   Include the labels affixed to the device and its immediate package.

2. Labeling

Labeling on or within the package must include information for use of the laser. This information typically is in the form of a user manual. The user manual includes information on installation requirements and procedures, professional use instructions, and maintenance procedures. Detailed discussion on **LABELING - INDICATIONS FOR MEDICAL LASERS** is provided in Section III, and detailed recommendations on **LABELING - PROFESSIONAL INSTRUCTIONS FOR USE** is provided in Section IV.

User manuals may be extensive. In order to facilitate the review process, FDA is concerned particularly with those portions of the user manual that are modified from manuals previously cleared or legally acceptable (e.g., a pre-76 user manual). If the user manual has been submitted in a previous 510(k) submission, the applicant may reference the submission and provide a copy on the portions of the manual that are modified.

3. Promotional Literature

Provide available draft or final promotional literature for the subject medical laser. This will assist FDA in establishing the intended use or indication for use for the laser and any associated claims that are made for the device.

E. Standards

In addition to the Federal Standard for lasers (21 CFR 1040.10 and 1040.11), relevant standards that the device meets should be noted. Provide a complete name and identifying letters and numbers for the standard, including the year of the standards publication. The applicant may certify that the device meets the standard. The applicant is then obliged to meet the standard and maintain documentation attesting to this fact. Certification of meeting a standard may minimize the extent of the review needed by FDA.

F. Device Description

The applicant must submit a complete description of the device, that includes all models, styles, variations, and accessories, including the following:

1. a representation of the laser system in sufficient detail to enable an analysis of the system (e.g., detailed drawings or photographs, information from the user manual);

2. the intended use(s) for the laser system and the indications for use to appear in the labeling;

3. the specifications for the laser system; and

4. a complete listing of all materials of the delivery system that may directly or indirectly contact the patient.

G. Side by Side Comparison to a Legally Marketed Device

The applicant must compare and contrast the new laser to at least one legally marketed device for purposes of establishing substantial equivalence. The applicant should include, whenever possible, the 510(k) number(s) of the predicate device(s) to facilitate the review process. Include a comparison of design characteristics, specifications, intended use and labeled indications for use, accessories, etc. The information should not be limited solely to the laser source but should include technical descriptions of the system itself, including articulated arms, fiber optics, tips or laser scalpels, etc., for both predicate laser and proposed laser. A listing of examples of comparative features is included as Attachment C.

Such a listing is for illustrative purposes only, and may not be considered exhaustive because situations may vary. Devices other than lasers may serve as candidates to establish substantial equivalence (SE). In order to optimize the likelihood of receiving an SE decision, the emphasis should be on similar technology.

H. Performance Data

Performance data will be required when descriptive comparisons and information alone are insufficient to support a finding of substantial equivalence. The recommendations in Section I.F. of this **Guidance** will assist the applicant in assembling performance data. When performance data are necessary, the applicant should justify the submission of only bench or nonclinical data. The following is general information on these data:

1. Bench Data

   This includes bench tests of the laser system, including delivery system and other accessories, to validate its specifications, and to provide a comparison of the operating characteristics to a legally marketed device system.

2. In Vitro Data

   This could include both cell culture information as well as evaluation of tissue effects from animals including cadaver tissue comparing the similarity of effects between the proposed device and the legally marketed device.

3. In Vivo Data

   This includes evaluation of the tissue effects in live animals, including histopathology, comparing the similarity of effects between the proposed device and the legally marketed device.

4. Clinical Data

   Clinical data are necessary to demonstrate the equivalent safety and effectiveness of a new laser or new indication for use to a legally marketed device when bench and animal tissue performance data alone cannot adequately predict the comparable safety and effectiveness of the new device or new indication for use. Clinical data demonstrate that the proposed laser and its accessories, when used according to the instructions for use, (1) allow the surgeon to reach the intended site, (2) operate in a controlled manner, and (3) achieve the intended surgical effect and patient outcome at least as safely and effectively as the claimed legally marketed predicate device.

Applicants frequently ask FDA for the type of clinical data that are needed, the study design that is required, and the study parameters that must be included, such as sample size. This **Guidance** is not intended to provide a discourse on clinical study design. There is ample guidance on this subject in the literature and in other FDA publications, such as the Premarket Approval (PMA) Manual, FDA 93-4214. The type of study and the parameters will vary depending on the nature of the clinical questions that must be answered. Applicants should obtain clinical and statistical expertise to help determine and obtain the type of data needed. FDA will provide further guidance on a case by case basis regarding specific requirements for certain indications for use for lasers.

I. Laser Accessories

The applicant should identify and completely describe all accessories provided by the manufacturer for use with the laser. These may include fiber optics, contact tips or scalpels, micromanipulators, etc. If these have been the subjects of previous applications, this should be stated, referencing 51O(k) file numbers when available, so that redundant reviews will not be done.

J. Sterilization Information

For a component or accessory of a laser sold sterile, provide the following information:

1. Sterilization method to be used.

2. A description of the method that will be used to validate the sterilization cycle, but not the validation data itself. Reference to a standard method (e.g., AAMI Radiation Standard) usually is sufficient.

3. The sterility assurance level (SAL) for the device that the firm intends to meet. An SAL of 10^{-6} is required for devices which contact normally sterile areas of the body.

4. A description of the packaging to maintain the device's sterility (this is not to include packaging integrity testing data).

5. If sterilization involves EtO, the maximum levels of residues of ethylene oxide, ethylene chlorohydrin, and ethylene glycol which remain on the device. The levels should be consistent with the draft Federal Register Notice on EtO limits.

6. Whether the product is "pyrogen free" and an identification of the method used to make that determination.

7. The radiation dose, in the event radiation sterilization is to be used, and whether it has been determined. Otherwise, amend the 510(k) file at FDA when the dose has been determined.

K. 510(k) Summary or Statement

As required by the 1990 amendments to the act, all persons submitting a 510(k) must include either a summary of safety and effectiveness information in the 510(k) upon which an equivalence determination could be based, OR a statement that safety and effectiveness information about the device will be made available to any interested person upon request, and that the information includes no patient identifiers. Safety and effectiveness information refers to adverse safety and effectiveness information, descriptive information about the new and predicate devices, and performance/clinical testing information.

If the summary option is selected, it should be included on a separate page and identified as the 510(k) Summary.

If the statement option is selected, entitle it the 510(k) Statement.

L. Software Validation Information

If the device is software controlled, then the submission must include information on software outlined in the **FDA Reviewer Guidance of Software Evaluation**. This document is available from the Division of Small Manufacturers Assistance at (800) 638-2041.

III. LABELING - INDICATIONS FOR MEDICAL LASERS

A. Background on Intended Use and Indications for Use of Surgical Instruments

As noted in **I.C.**, **Goal of the Revision to the 1990 Guidance**, **Intended Use** and **Indications for Use** are commonly confused terms, the meanings of which must be clearly understood in order to follow the objectives of labeling for medical lasers. The definitions, as applied to 510(k) decision-making, are provided here:

> Intended Use: This refers to the general functional use of the device, i.e., the principal effect of the radiation/tissue interaction which represents a broad or general indication for use of the device.
>
> Indication for Use: This refers to the specific surgical, therapeutic or diagnostic use, or group of similar uses, of the device, i.e., the disease, condition, or pathology for which the principal effect of the device is used to prevent, treat, cure, mitigate, or diagnose.

These terms complement one another. They are used to demonstrate the objective intent of the persons responsible for the marketing of the device. When these terms are used together or separately in a 510(k) submission, they must clearly and consistently reflect the objective intent for the use of the device as compared with the predicate. It is important to note that the functional use of a laser may be implied in a specific indication. Therefore, if the specifics of a new indication for use of the laser alter the intended use of the predicate device, it may have a new intended use. If the laser is found not to have the same intended use as the predicate or new technological characteristics raise new types of safety or effectiveness questions, then the device is Not Substantially Equivalent (NSE) and must be evaluated through the premarket approval (PMA) process.

Medical lasers are instruments that apply thermal, acoustic or photon energy to human tissue to either effect a desired change in the structure of the tissue or elicit responses for diagnostic purposes. The energy is transmitted from the energy source through a delivery mechanism to the target tissue. The energy is applied either by a radiated beam of energy from the delivery mechanism to the target tissue (free beam mode) or transmitted by a probe that is in contact with the tissue (contact mode). For surgical procedures, depending on the mode used and the energy applied, the effect of the energy is the creation of a cut, coagulation, vaporization, ablation, photodisruption, or photo-chemical reaction of the tissue. These tissue effects constitute the intended uses for surgical lasers.

There are a number of variables that determine the effect of the laser energy on tissue. The output characteristics of the laser can vary (e.g., power, wavelength, spot size, and mode of delivery). The unique characteristics of lasers and their delivery mechanisms have created surgical opportunities that heretofore have not existed. Tissue-related variables include, for example, tissue composition, color, density, and vascularity. The manner in which the laser energy is introduced to the site of use and applied by the user is also important. The expertise and skill of the physician is vital to the safe and effective use of any surgical instrument.

Indications for Use statements in labeling for the marketed, non-laser surgical instruments vary. They are either (1) not stated because they are commonly understood (e.g., stainless steel surgical scalpels), (2) generally stated as functional capabilities within medical specialty areas (e.g., "general surgical procedures, including incision or excision of soft tissue"), or (3) specifically stated with regard to a procedure, treatment of disease symptoms (e.g., "urethral stricture"), or treatment of a preexisting condition (e.g., "excision of a congenital feature"). In some cases general functional capabilities are subcategorized with specific indications for use.

Listings of specific procedures, diseases and conditions are evident in pre-1976 labeling for lasers. Lasers marketed before 1990 also include a mix of general and specific indications for use. Labeling for lasers cleared after 1990 generally are a variation of the format recommended in the 1990 Laser Guidance with a general use statement along with "examples" of applications. The format and content of the indications for use for medical lasers in this proposed guidance document may be flexible, but should no longer contain a separate subsection on applications.

B. Principles of Indications for Use or Intended Use of Medical Lasers

Certain principles will apply to the acceptable content, basis, regulation, and interpretation of Indications for Use or Intended Use of medical lasers.

1. The determination of SE of a proposed use of a device must be based on an analysis as required by the act, and as clarified in FDA guidance (e.g., Attachment A). The impact of technology, similarity of analytical criteria, and results of performance data are factored into the decision on equivalence of a proposed use.

2. The Indications for Use or Intended Use section is the place to provide a clear statement of the use of the device. The following are illustrative unacceptable practices unless cleared in a marketing application: examples of clinical applications, extrapolations, restatements, and interpretations of the cleared indications that may represent a new indication for use or intended use of the device.

3. New **Indications for Use** require a 510(k) submission and must be based upon valid scientific evidence that provides reasonable assurance of safety and effectiveness of the laser for the proposed use as compared with a predicate device.

C. Content of Indications for Use or Intended Use Statement

The Indications for Use or Intended Use section should state the following:

- whether the laser has general **Intended Uses**, i.e., functional capabilities, or has specific uses;
- the intended medical specialty area(s);
- the types of target tissues;
- procedural parameters; and
- other factors.

1. First Criterion: General vs Specific Indication for Use

   Certain lasers have a broad range of surgical utility in some medical specialty areas. For these lasers the indications can be stated as a general indication for use. The criteria for the allowable general indication for use claims are presented in addenda to this guidance. The Section IV B. on labeling format will describe the scientific and medical foundation for the general indication for use claim.

Certain other lasers are dedicated to specific indication for use or there may be insufficient knowledge or data to establish a general indication for use claim in a medical specialty area. Under these circumstances specific indication for use must be noted in labeling. When appropriate, the specific disease may be indicated.

2. Second Criterion: Surgical or Medical Specialty Area(s)

The surgical or medical specialty area(s) for the laser are stated for general and specific indication for use lasers. Depending on the extent of the indications for use, the indications for use may be categorized under the specialty areas in the labeling.

3. Third Criterion: Target Tissue(s)

The Indications for Use section for general use lasers should describe, in aggregate terms, the type of target tissue(s). The Section IV B. on labeling format describes in greater detail the supportive data regarding tissue interactions.

4. Fourth Criterion: Procedural Parameters

The Indications for Use must include the procedural parameters in sufficient detail to characterize the conditions of safe and effective use supported by the data. These terms should include those related to mode (contact or free-beam), surgical approach (open or closed), associated instrumentation, and operational conditions.

5. Other Factors

A laser may have both a general indication for use in one specialty area and a specific indication for use in another specialty area.

A general intended use or indication for use claim in a surgical or medical specialty, e.g., general surgery, is acceptable, whenever appropriate, since it provides the greatest flexibility.

Cardiovascular lasers involve new intended use for surgical lasers and are subject to premarket approval.

IV. LABELING - PROFESSIONAL INSTRUCTIONS FOR USE

A. Introduction

The level of details in the Instructions for Use section should be appropriate for the degree of complexity of the laser system. The objectives of effective labeling include

1. an adequate characterization of the laser itself;

2. a presentation of adequate information on tissue interactions;

3. information on precautions, warnings, complications, and other safety related statements to assure compliance with OSHA, EPA and other national safety standards; and

4. adequate directions for use, including directions for preventative maintenance, calibration, and safety testing.

The instructions for use apply to the laser system as a whole, which usually consists of the laser source with appropriate accessories. The accessories include the transfer or delivery element (wave guide, articulated arm, fiber optic, etc.), as well as the method used to deliver the energy to the tissue (free beam, contact tip or scalpel, etc.). It is the system that is documented for use in clinical settings and, therefore, is the focus of the instructions for use. Accessories cleared under 510(k)s are not labeled for specific indications for use but refer the user to the professional instructions for use which is provided with the laser system.

A generalized format for the presentation of professional use labeling benefits all parties. It benefits CDRH reviewers in documenting their reviews of 510(k)s and enhances the consistency of decisions on these notifications. Manufacturers also benefit from guidance when preparing 51O(k)s for medical lasers. Guidance results in fewer requests for additional information or modifications, and fewer delays in the process of evaluating the notification. Comprehensive and consistent professional labeling aids the clinician in selecting lasers and in their safe and effective use.

B. Generalized Labeling Format

The generalized labeling format for medical lasers is guidance which will be used by CDRH reviewers in conducting and documenting their reviews. The headings and style of the format are analogous to the package inserts that accompany prescription drugs and some medical devices. Manufacturers are encouraged to include the information outlined in this labeling format in a special section in the user manual that is supplied with each medical laser.

The following labeling headings and descriptive comments complement ODE Blue Book Memorandum #G91-1:

1. Description of the Medical Laser Product

A brief description of the laser, including Model number or other designation, principle of operation, design feature, performance specifications, and other similar information should be included in this section.

2. General Biological and Physical Characteristics

The "General Characteristics" section includes the unique characteristics of the laser in terms of its physics, and biological effects on tissue. The information must be sufficient for the user to anticipate the clinical effect, understand aberrations, and to compare one laser to another.

The information may be presented as tables or in some other format that clearly and concisely conveys the information. The information may be presented by category, such as non-contact beam or contact (tip/scalpel). It may include abstracted clinical information to provide a framework of information for the user.

Lasers with general surgical use in specialty areas, such as lasers for use as surgical tools in General Surgery, Dermatology, Neurology, etc. must be as safe and effectivey as the comparable predicate device for the broad range of potential uses in the general use area. In order for a specific laser to be eligible for a general intended use in a specialty area, the applicant must provide data demonstrating that the laser meets a specified performance profile for that general intended use. Performance profiles are included under Attachment D. The profiles may be amended periodically to reflect current information.

3. Indications for Use

The Indications for Use section should meet the criteria set forth in Section **III.C.** above.

4. Contraindications

This section is intended to identify situations in which the laser should not be used because the risk clearly outweighs the possible benefits. Laser use may be contraindicated, for example, when there are unacceptable risks to tissues adjacent to the target, such as critical nerves or vessels that could be irreversibly damaged by thermal or acoustic effects of the laser, when the patient has medical conditions which make the risks of using the laser unacceptable, or when some characteristic of the laser itself presents an unacceptable risk in some settings. There may be medical conditions, such as invasive cancer, which preclude the use of the laser in selected situations, or accessories (endoscopes etc.) which may present unacceptable problems to the use of the laser. Finally, there may be unavoidable risks of fire or explosion if a laser were to be used.

Contraindications may be general or may be limited to a specific surgical situation. Known hazards and not theoretical possibilities are to be listed. If there are no known contraindications then the section should state "None known."

5. Warnings (include demonstrated concerns)

This section describes serious adverse reactions and potential safety hazards, limitations in use imposed by them, and steps that should be taken should they occur. Include any warning when there is reasonable evidence of an association of a serious hazard with the use of the device. A causal relationship need not be proven.

Examples might include the risks of igniting methane gas during rectal procedures; the risks of air (gas) emboli if coaxial gas is used during certain procedures; or risks of electrolyte imbalance during prolonged procedures with liquid distention. It is also appropriate to warn the user that the laser is not an effective coagulator or that a vein greater than X mm in diameter may not be successfully coagulated by the laser.

6. Precautions (Include theoretical concerns)

This section includes information concerning situations or conditions requiring special care, or information intended to protect the physician or operating room personnel as well as the patient. The information may include the need for protective clothing or glasses and for smoke aerosol evacuation. It should include a statement on the need for the physician to be properly trained in the use of the laser. It may include statements concerning the use of wetted packing to reduce the risk of fires and tissue damage. It may be appropriate, and necessary, to caution surgeons about the depth of penetration of a laser (non-contact beam) in comparison to other lasers or in comparing non-contact beam and tip/scalpel uses. Also, there should be a precaution about the maximum power which can be used to avoid melting tips which may be used with fiber optics.

7. Adverse Effects

This section should identify undesirable effects reasonably associated with the use of the device that may occur as part of the effect of the device or may be unpredictable in its occurrence. The section includes ALL adverse reactions reasonably associated with the use of the laser, including those mentioned in the Contraindications, Warnings, and Precautions sections. Follow the adverse effects listing with statements directing the reader to other sections of the labeling for additional information regarding these effects and any steps that should be taken.

The adverse effects should be listed in descending order according to their clinical significance as determined by their severity and frequency. Supporting data should be based upon valid scientific evidence.

8. Directions for Use

This section provides key or important use information. For a general intended use, the information should not constrain the surgeon nor restrict medical judgment and is not intended to impinge upon the practice of medicine. It is, instead, intended to augment the professional skills of the surgeon and to serve as a ready reference source. The attached example (Attachment B) demonstrates how the information may provide special instructions for probes, optical fiber tips, or attachments. It may also include some general information intended to aid the physician as he or she becomes familiar with the laser. For specific intended uses, the Direction for Use will provide precise use instructions.

9. Bibliography

This section is intended to support the labeling by providing the surgeon a ready reference to the

literature supporting the labeling statements. Therefore, literature on uses not cleared in the device labeling should not be included.

If a multi-specialty insert is used, the "Bibliography" could be divided by surgical specialty as a convenience to the surgeon who wishes to identify articles of particular interest. If individual inserts are used for each surgical specialty, the bibliography would pertain only to that specialty and the intended use.

C. Labeling of Accessories/Components

The information in the labeling is derived from data on the laser system as a whole and is intended to provide professional use instructions on the system. Accessories to or components of the laser system (fiber optics, wave guides, surgical tips, micromanipulators, software, hardware, etc.) may be offered as replacements or as separate devices, but should be labeled to advise the user to refer to the user manual which is supplied with the laser for full clinical use information.

The labeling of the accessory must not add to or modify the labeling (clinical indications, contraindications, warnings, precautions, etc.) of the laser system which must be provided in the user's manual. An exception may be a situation in which an accessory affects the nominal power required for use or limits the amount of power which may be used without risk to the equipment or patient.

The labeling of components or accessories should provide sufficiently precise specifications or performance data to allow comparisons to original components or accessories and to allow the user to determine whether the component or accessory is compatible with the laser system with which it is included. The information in Attachment C may provide an idea for the specifications which should be included in the label for a component or an accessory.

An accessory that is dedicated to treatment of a specific disease, condition, or procedure may require a PMA.

ATTACHMENT A

Flowchart for Substantial Equivalence Decisions

ATTACHMENT B

Example of Professional Instructions for Use

DESCRIPTION

The Acme Laser is a Holmium Laser System consisting of a laser console, a power supply, and a fiber-optic delivery system. The Holmium Laser uses a holmium-doped crystal rod of yttrium aluminum garnet (Ho:YAG) as an active medium placed in an optical cavity to produce an amplified coherent beam at the wavelength of 2.1 micron. A microprocessor is used to control electronics for the front panel. The Ho:YAG laser beam is combined optically with a helium-neon beam and focused into an optical fiber. A self-contained water cooling system is built into the power supply unit. The holmium laser operates in a pulsed mode with a fixed pulse width and a fixed pulse duration of the pulse train. The number of pulses, however, can be adjusted within the preset range. Refer to the manual for details on device specifications, delivery system, optical system, cooling system, electronics system, safety features, and the control and operation of the laser device.

GENERAL CHARACTERISTICS

Tables etc.

Focal spot vs energy information: Energy vs cut/photocoagulation rate, energy vs effect, or energy vs depth of penetration, etc. in animal tissue or from clinical experience

Relevant clinical information from clinical studies conducted by investigators abstracted with references to Bibliography

Performance Profile (if needed)

INDICATIONS FOR USE

Example of a Specific Indication for Use:

The Acme Laser is intended for percutaneous laser disc decompression (PLDD).

Example of a General Indication for Use:

The Acme Laser is a general surgical instrument used in the free beam mode to photocoagulate, vaporize/ablate soft tissue (muscle, connective tissue, organs), or for cutting, excision, incision, and coagulation of soft tissue in the contact mode in open/closed surgical procedures in general surgery.

CONTRAINDICATIONS

Specific Indication for use: The Acme Laser is contraindicated in patients with spinal stenosis, peripheral neuropathy, unstable angina, and congestive heart failure.

General Intended Use: Contraindicated for patients who are ineligible for surgery or are intolerable to anesthesia.

WARNINGS and PRECAUTIONS

Examples:

Flammable or explosive anesthetic gases etc.;

High oxygen concentrations where there is a risk of igniting flammable accessories or equipment (bronchoscopes, surgical drapes absorbent packing, etc.);

Gas emboli (particularly important where documented or highly likely);

Electrolyte imbalance during extended procedures with liquid distention;

Stray radiation or reflected laser beams/energies during surgery;

Risks to tissues or organs which may be adversely affected if struck by stray or scattered laser radiation during surgery; and

Patient-related concerns and steps which should be taken to protect patients from stray laser radiation.

ADVERSE EFFECTS

List ALL effects.

DIRECTIONS FOR USE OR SPECIAL INSTRUCTIONS

Directions may include advice to the surgeon to start with lower energies and with shorter bursts and to gradually increase these as needed.

For a laser with specific indications for use, it may be desirable to provide some general information concerning power settings which are used for the intended use. These may be provided in different forms in subsequent sections of the labeling.

They may be directed to specific equipment, tips/scalpels, attachments/adjuncts, etc.

Examples:

Endoscope/hysteroscope/laparoscope

Slit Lamp

Fiber optic (contact versus non-contact) Bend radius, handling, sterilization, maximum power

Wave guide

Other
(As an example, does the use of a tip or other attachment affect the maximum laser power settings which can be used)

Calibration procedures

Special characteristics or use instructions

This could include information about the usual energy ranges, pulse duration or number of bursts etc. which are generally used. Depending on the intended use these may be by specific procedure or by surgical specialty and may be for non-contact (free beam) or tip/scalpel.

Accessories and attachments sold separately from a laser system are not labeled with specific indications. Instead, labeling should direct the user to the system manual for specific instruction. See ACCESSORIES/COMPONENTS.

BIBLIOGRAPHY

May be organized by surgical specialty if only one document (GENERALIZED LABELING FORMAT) is used for a laser.

OTHER

As appropriate

REVISION DATE:

Example of Accessory Labeling

The following guidance may be useful for reviewing the labeling of components or accessories from the original supplier or from other suppliers:

Model Number

Physical Specifications (selected examples - not exhaustive)

fiber optics: length, diameter,. material, transmission at specific wavelengths, divergence angle, max power transmissible, etc.

tips/scalpels: materials, dimensions, maximum operating temperatures, diagrams or pictures of shapes, etc.

required coupler: to couple to a laser source or to attach tips/scalpels

hardware/software compatibility information

Models or a general descriptive statement concerning lasers with which the component or accessory is compatible.

Specific information concerning lasers or systems with which the accessory or component is not compatible.

Revision Date

ATTACHMENT C

Examples of Specifications for Use
in Establishing the Substantial
Equivalence of Lasers

The following examples are not intended to be all-inclusive and may not be needed for all lasers or may be inappropriate for some lasers.

LASER OUTPUT CHARACTERISTICS

QUANTITY	UNITS
Power (CW lasers)	W, mW, etc.
Increments of power available	W, mW, etc.
Energy (pulse and superpulse)	J, mJ, etc.
IF pulsed, how is this done	Q-switched, mode-locked, shutter, etc.
Length of pulse	s, ms, µs, ns, etc.
Frequency of pulse	Hz, kHz, etc.
Pulse train duration	s, ms, µs, etc.
Beam diameter	µm, mm, cm, etc. at exit (fiber optic, slit lamp, etc.)
Spot size at target	mm^2, μm^2, etc.
Wavelength	nm, µm, A, etc.
Beam Mode	Multimode, low order, TEM_{00}, etc.
Beam Divergence Angle	0^o
Duty Cycle	no units

LASER CHARACTERISTICS

Aiming beam (type, wavelength, accuracy, coaxial with treatment beam, etc.)
Controls (describe power, readouts, etc.)
Laser medium
Energy source
Cooling method(s)
Display (control panel, printouts, etc.)
Power calibration
Software (description, specifications, etc.) ODE reviewer guidance is available from the Division of Small Manufacturers Assistance)
Hardware (description, specifications, etc.)

ACCESSORIES AND OTHER INFORMATION

1. fixed mirror articulating arm*

   Description/diagram, how alignment is maintained, specifications of material(s), description of the beam as it exits the arm (diameter, divergence, etc.)

2. fiber optics*

   Material, length, transmission through various lengths, maximum power which may be transmitted, toxicity, sterilization, special handling requirements, description of coupling to laser and to tips etc., coaxial capability (if any), cladding (if any), lens configuration, if any, on the distal end of the fiber optic (spot size, focal distance) etc.

3. Contact tips/scalpels*

   Material(s) and characteristics, thermal limitations (if any), power limits imposed on laser source (if any), description (dimensions, diagram of each offered) etc.

4. Handpieces*

   Material(s)/diagrams, limitations on diameters of acceptable fiberoptics or wave guides etc.

5. Micromanipulators*

   Description and picture/diagram, input power, spot size(s), beam alignment, beam control, defocus, description of attachment to laser source or fiber optic, etc.

6. Endoscopes, bronchoscopes, etc.

If these are integral to the use of the laser, critical specifications should be included as appropriate, e.g., limitations such as the diameter of the laser fiber optic or wave guide which can be used, the number of channels which are available for use, etc.

* The labeling for fiber optics, contact tips/scalpels, and micromanipulators should include sufficient information to guide users in selecting accessories which are compatible with their laser.

If the technical specifications of the lasers are not similar, the applicant must provide sufficient data to demonstrate that these differences in characteristics do not affect the performance (clinical use, suitability, etc.) and must provide adequate instructions for use to guide the surgeon in selecting-and using the laser (see labeling format).

ATTACHMENT D

GENERAL MEDICAL SPECIALTY PERFORMANCE PROFILE

THIS IS FILLED IN BY FDA AFTER ADVISORY PANEL INPUT AND OTHER PRESENTATIONS TO FDA.

IF A GENERAL PROFILE CANNOT BE ESTABLISHED THEN THE GENERAL CLAIM IS NOT ACCEPTABLE AND A SPECIFIC USE APPROACH MUST BE USED. FOR EXAMPLE, IS THERE A SIGNIFICANT AREA OF CLINICAL USE THAT IS INVESTIGATIONAL, EFFECT ON A MAJOR TISSUE TYPE HAS NOT BEEN EVALUATED, ACCESS IS NOT YET TECHNOLOGICALLY FEASIBLE, OR SAFETY HAS NOT BEEN ESTABLISHED.

GENERAL SURGERY

INCLUDE SUCH INFORMATION AS:

Physical characteristics of the laser

Delivery mechanisms available

General tissue types within the specialty area

Laser effects on the tissue

Validation of acceptability for general specialty use including data from in vitro, in vivo, and clinical data

OTHER PROFILE CANDIDATES

UROLOGY

DERMATOLOGY

ORTHOPEDICS

NEUROLOGY