SUMMARY OF SAFETY AND PROBABLE BENEFIT

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I. GENERAL INFORMATION

Device Generic Name:	Bronchial Valve
Device Trade Name:	IBV® Valve System
Applicant's Name and Address:	Spiration, Inc. 6675 - 185th Avenue NE Redmond, WA 98052 USA
Humanitarian Device Exemption Number:	H060002
Humanitarian Use Device Designation Number:	03-0127
Date of HUD Designation:	November 23, 2004
Date(s) of Panel Recommendation:	None
Date of Good Manufacturing Practice Inspection:	June 28, 2006
Date of Notice of Approval to Applicant:	October 24, 2008

II. INDICATIONS FOR USE

The Spiration IBV Valve System is a device to control prolonged air leaks of the lung, or significant air leaks that are likely to become prolonged air leaks, following lobectomy, segmentectomy, or lung volume reduction surgery (LVRS). An air leak present on post-operative day 7 is considered prolonged unless present only during forced exhalation or cough. An air leak present on day 5 should be considered for treatment if it is: 1) continuous, 2) present during normal inhalation phase of inspiration, or 3) present upon normal expiration and accompanied by subcutaneous emphysema or respiratory compromise. IBV Valve System use is limited to six weeks per prolonged air leak.

III. CONTRAINDICATIONS

Patient is unable to tolerate a flexible bronchoscopy procedure.

IV. WARNINGS AND PRECAUTIONS

See Warnings and Precautions in the final labeling (Instructions for Use).

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V. DEVICE DESCRIPTION

The IBV Valve System is a minimally invasive technology that consists of a proprietary intra-bronchial valve and deployment catheter. The small umbrella-shaped IBV Valve is a one-way valve, designed to be placed in selected regions of the bronchial tree using a flexible bronchoscope. The IBV Valve is deployed into the bronchial tree using the deployment catheter, which is passed through the working channel of a flexible bronchoscope with a diameter of $\geq$ 2.6 mm, to the target site. The IBV Valve is deployed in segmental or sub-segmental airways leading to the areas with air leaks.

The IBV Valve is designed to limit airflow to the portions of the lungs distal to an airway with a valve, while still allowing mucus and air movement in the proximal direction. The IBV Valve consists of a Nitinol (NiTi) frame covered with a polymer membrane. The IBV Valves are manufactured in sizes ranging from 5 mm to 7 mm in diameter to accommodate the different airway sizes found in the segmental and sub-segmental bronchi. The IBV Valve is also designed to be removable, using a flexible bronchoscope and standard bronchoscopy tools.

Each IBV Valve System is provided with one (1) IBV Valve contained inside a loading tool, which is attached to the distal tip of one (1) the Deployment Catheter. This assembly is packaged in a sealed tray. The IBV Valve System is provided 'STERILE' and is intended for single patient use.

The Airway Sizing Kit is an accessory that is used along with a commercially available balloon catheter to determine which airway(s) lead to an air leak and to measure target airway diameters for IBV Valve sizing. The Airway Sizing Kit consists of one (1) 500µl glass calibration syringe and a sizing gauge. These components are packaged in a sealed tray. The Airway Sizing Kit is provided 'STERILE' and is intended for single procedure use.

VI. ALTERNATIVE PRACTICES OR PROCEDURES

Alternative methods for treatment of prolonged air leaks of the lung include chest tube management (in-patient monitoring or discharge with Heimlich valve), pleurodesis, or re-operation.

VII. MARKETING HISTORY

The IBV Valve System is CE Marked for commercial distribution in member countries of the European Union (EU). To date, no IBV Valve Systems have been commercially distributed in EU countries. The IBV Valve System has not been marketed in the United States or any foreign country.

VIII. POTENTIAL ADVERSE EFFECTS OF THE DEVICE ON HEALTH

Based on literature and multicenter clinical experience using the IBV Valve System to

treat severe emphysema, the following alphabetical list includes possible adverse events associated with implantation of IBV Valves:

- Atelectasis,
- Bleeding observed from an airway treated with an IBV Valve,
- Bronchitis,
- Damage in the airway and/or tissue near an IBV Valve,
- Death,
- Infection in the tissue distal to an IBV Valve,
- Local airway swelling or edema at site of IBV Valve implantation,
- Migration of the IBV Valve out of the lung or within the lung,
- Persistent cough,
- Pneumothorax,
- Shortness of breath, and
- Tissue hyperplasia or other reaction at site of IBV Valve implantation.

IX. SUMMARY OF PRECLINICAL STUDIES

The IBV Valve System has been subjected to a program of pre-clinical studies that included biocompatibility testing of the device materials, *ex vivo* lung studies, *in vivo* animal studies, *in vitro* bench testing, sterilization validation, and packaging and shelf life studies. The results of nonclinical testing show that the device system satisfies the safety and functional requirements as defined in the relevant product specifications and supports the safety and probable benefit of the system.

Biocompatibility Testing:

Biocompatibility testing was conducted on the IBV Valve and the Deployment Catheter, as these are the system components that make contact with bodily tissues or fluids. The biocompatibility test program was based on FDA General Program Memorandum #95-1 and the provisions of ISO 10993-1. Following the criteria established in ISO 10993-1, the IBV Valve is categorized as a permanent exposure implant (>30 days), tissue/bone contact. The deployment catheter is categorized as an externally communicating device, limited exposure (< 24 hours), tissue/bone contact. The ISO 10993-1 biocompatibility testing was conducted by qualified contract laboratories in accordance with the provisions of 21 CFR 58, Good Laboratory Practice for Nonclinical Laboratory Studies.

Table 1 provides a summary of the biocompatibility testing conducted on the IBV Valve materials. Table 2 provides a summary of the biocompatibility testing conducted for the deployment catheter. The results of all testing supported the biological safety of the device materials.

TABLE 1: IBV Valve Biocompatibility Testing and Results

Test	Test Method	Results
Cytotoxicity	ISO Elution (MEM Extract) ISO 10993-5:1999	Non-cytotoxic
Sensitization	ISO Maximization ISO 10993-10:1995	Non-sensitizer
Intracutaneous Reactivity	ISO Intracutaneous Reactivity ISO 10993-10:1995	Non-irritant
Acute Systemic Toxicity	USP Systemic Injection ISO 10993-11:1993	Non-toxic
Intramuscular Implantation (17 Weeks)	ISO Muscle Implantation ISO 10993-6:1995	Macroscopic findings unremarkable Histology findings - Slight irritant compared to control
Genotoxicity: Reverse Mutation (Ames)	Ames ISO 10993-3:1993	Non-mutagenic
Genotoxicity: Chromosomal Aberration	SCI and Polyethylene Glycol (PEG) Extracts ISO 10993-3:1993	Non-genotoxic
Genotoxicity: Mouse Lymphoma	Induction of Forward Mutation at the thymidine kinase ISO 10993-3:1993	Non-mutagenic
Material Mediated Pyrogen	ISO Rabbit Pyrogen ISO 10993-11:1993	Non-pyrogenic
Sub-Chronic Toxicity	Systemic Toxicity and Vaginal Mucosal Irritation ISO 10993-10:1995	Non-toxic

TABLE 2: Deployment Catheter Biocompatibility Testing and Results

Test	Test Method	Results
Cytotoxicity	ISO Elution (MEM Extract) ISO 10993-5:1999	Non-cytotoxic
Sensitization	ISO Maximization ISO 10993-10:1995	Non-sensitizer
Irritation	ISO Intracutaneous Reactivity ISO 10993-10:1995	Non-irritant
Acute Systemic Toxicity	USP Systemic Injection ISO 10993-11:1993	Non-toxic

***Ex Vivo* Lung Testing:**

Testing of the IBV Valve System in *ex vivo* human lung tissue has confirmed the ability to accurately measure the size of bronchial airways using the Airway Sizing

Kit, and also to deploy, position, and remove the IBV Valve.

***In Vivo* Animal Testing:**

The IBV Valve System has been the focus of a series of *in vivo* animal studies in non-diseased animals of three (3) species to evaluate airway sizing, acute deliverability and chronic safety of the IBV Valve. Removability of the IBV Valve at various time periods following implantation was also evaluated. These studies were conducted over a period of three (3) years to confirm the safety of the device design and of the configuration of each component of the IBV Valve System. The early animal studies used prototype devices. Later studies used the current IBV Valve System design. The animal species were chosen to approximate, as closely as possible, the intended clinical use of the device.

In these animal studies the IBV Valve was chronically implanted in a total of 64 animals - swine, canine and ovine - to assess the safety and potential effectiveness of the IBV Valve System. A total of 634 devices were implanted in these studies, with durations of up to 13 months. To test removability, 263 of the 634 devices were removed without complications at various time intervals ranging from two (2) weeks to 12 months.

***In Vitro* Performance Testing:**

The components of the IBV Valve System have been subjected to a program of theoretical modeling studies and *in vitro* bench testing to verify that the device components satisfy performance requirements, as implemented in the Product Specification. The testing included theoretical modeling (Finite Element Analysis, Goodman Analysis) and *in vitro* bench testing of the IBV Valve and Deployment Catheter System.

The results of the mechanical testing verified that the IBV Valve System components satisfy functional and mechanical performance requirements as established in the product specification documents.

The test programs for the implantable IBV Valve and the Deployment Catheter are summarized in Tables 3 and 4.

Additionally, the Airway Sizing Kit has been subjected to calibration studies with the two (2) balloon catheters identified for use with the Airway Sizing Kit in the Airway Sizing Kit Instructions for Use (IFU). These studies have demonstrated consistent and accurate measurement of the balloon diameter throughout the range of diameters to be treated.

TABLE 3: IBV Valve Performance Testing

Test Performed	Test Results (Pass/Fail)
Nitinol Mechanical Properties • Frame Superelastic Characteristics • Frame Ultimate Tensile Strength/Elongation • Removal Rod • Finite Element Analysis – Nitinol Frame • Goodman Fatigue Analysis – Nitinol Frame • Accelerated Radial Fatigue	**PASS** The valve frame and removal rod were shown to perform adequately with respect to superelastic characteristics, tensile strength, and fatigue properties.
Corrosion Testing	**PASS** The valve was shown to have a corrosion resistance that is greater than or equal to another FDA approved permanent implant device.
Valve Mechanical Testing: • Radial Force – Anchor Strut • Radial Force – Membrane Strut • Slip Resistance • Valve Resistance (Functionality) • Elastic Recoil • Removal Rod-to-Frame Tensile Strength	**PASS** The valve was shown to perform adequately with respect to radial forces, slip resistance, valve resistance to airflow, recoil, and tensile strength.
Drug Compatibility Testing	**PASS** The valve was shown to be compatible with common pulmonary drugs.
Instrument Compatibility Testing	**PASS** The valve was shown to be removable through a standard Endotracheal tube using biopsy forceps.

TABLE 4: Deployment Catheter Performance Testing

Test Performed	Test Results (Pass/Fail)
Loader Tool Functionality • Transfer Force to Valve • User Force • Holding Force	**PASS** The loader tool was shown to apply a force that will not damage the valve, and to require actuation forces that the user is able to apply.
Catheter Mechanical Testing • Valve Deployment Force from Catheter • Catheter to Bronchoscope Insertion Force • Peak Force Transmitted to Stabilization Wire Tip During Valve Deployment	**PASS** The catheter was shown to supply sufficient force to deliver the valve yet prevent accidental deployment, without damage to the catheter.
Catheter Joints Tensile Strength • Catheter Sheath to Slider Sleeve • Stabilization Wire to Stabilization Wire Tip • Strain Relief to Slide Housing • Stabilization Wire Cap Joint • Stabilization Rod Wire to Guide Wire Crimp Hub • Catheter Sheath to Metal Tip • Catheter Sheath Composite Lap Joint	**PASS** The mechanical joints of the catheter system were shown to withstand the forces associated with normal use.

Air Leak Reduction Bench Testing:

Testing was performed in 7 *ex vivo* calf and human lungs, in which severe air leaks were created by direct tissue trauma resulting in an average leak rate of 256 ± 197 cc/breath. This average leak rate was reduced to approximately 26 ± 5 cc/breath, for an average reduction of 90% +/- 16%, with the placement of a single valve. The best result noted for one of the *ex vivo* lungs was a reduction to a final leak rate of 18 ± 23 cc/breath.

Sterilization Validation:

The IBV Valve System is sterilized by Ethylene Oxide gas. The sterilization cycle was validated to a sterility assurance level (SAL) of 10-6 in accordance with ISO 11135:1994 *"Medical devices – Validation and routine control of ethylene oxide sterilization."*

The level of sterilant residues remaining on the device following sterilization was verified to satisfy the requirements of ISO 10993-7. The level of bacterial endotoxins was verified to be within the specifications for the device system and in conformance with ISO 10993 Guidelines at less than 20 EU/valve.

Packaging, Shipping and Shelf Life Testing:

Studies have been conducted to verify that the packaging for the IBV Valve System and the Airway Sizing Kit maintains a sterile barrier and adequately protects the device components through the expiration date on the package label. The shelf life studies included exposing packaged devices to conditions that may be encountered during transport and storage of the device per relevant International Safe Transit Association (ISTA) procedures.

The currently established expiration date is two (2) years from the date of sterilization for the IBV Valve/Deployment Catheter and for the Airway Sizing Kit.

Magnetic Resonance Imaging (MRI) Compatibility:

The IBV® Valve was determined to be MR-Conditional according to the terminology specified in the American Society for Testing and Materials (ASTM) International, Designation: F2503-05 – *"Standard Practice for Marking Medical Devices and Other Items for Safety in the Magnetic Resonance Environment"* (ASTM International, 100 Barr Harbor Drive, PO Box C700, West Conshohocken, Pennsylvania, 2005).

Non-clinical testing has demonstrated that the IBV Valve is MR Conditional. A patient with this implant can be scanned safely immediately after placement under the following conditions:

- Static magnetic field of 3-Tesla or less,
- Spatial magnetic gradient field of 720-Gauss/cm or less, and
- Maximum MR system reported whole body-averaged specific absorption rate (SAR) of 3-W/kg for 15 minutes of scanning.

In non-clinical testing the IBV Valve produced a temperature rise of less than or equal to 0.5° C at a maximum MR system reported whole-body-averaged specific absorption rate (SAR) of 3-W/kg for 15 minutes of MR scanning in a 3-Tesla MR system (Excite, Software G3.0-052B, General Electric Healthcare, Milwaukee, WI).

MR image quality may be compromised if the area of interest is in the exact same area or relatively close to the position of the IBV® Valve. Optimization of MR imaging parameters is recommended.

X. SUMMARY OF CLINICAL INFORMATION

The clinical performance of the IBV Valve System was evaluated through compassionate use in four prolonged air leak patients and through a clinical trial in 58 patients with advanced emphysema.

Treatment of Prolonged Air Leaks:

The IBV Valve System has been used to treat four patients with post-operative prolonged air leaks under the compassionate use (CU) regulations. All four patients had complex clinical conditions justifying compassionate use and the post-operative air leaks remained a clinical problem after standard measures were exhausted.

The four patients consisted of two men and two women. The age range was 17 to 60 years. One patient with severe COPD developed a persistent air leak after a spontaneous pneumothorax. A surgical attempt at closure of the leak was unsuccessful. The patient remained dyspneic at rest with subcutaneous emphysema and continuous suction on the chest tube. The patient was considered high risk for a second surgical procedure. The second patient developed a persistent air leak after lung cancer surgery and a surgical attempt to repair the leak failed. The patient had severe subcutaneous emphysema and required mechanical ventilation. The air leak in the third patient resulted from a spontaneous pneumothorax related to severe emphysema. Surgical pleurodesis was unsuccessful at closing the leak and the patient required continuous suction to keep the lung expanded. The fourth patient had undergone complex spinal surgery and a related lower lobe lobectomy, resulting in a bronchopleural-cutaneous fistula. This patient underwent valve implantation and was able to be discharged home, but the air leak increased after a second spinal surgery requiring additional valve implantation.

Resolution of Air Leaks:

All four patients (total 5 treatments) experienced an immediate decrease or complete elimination of air leak. Valves were removed without complications in 3 of the 4

patients. The patient with 2 valve placement procedures had not yet had IBV Valves removed at the time of amendment submission.

TABLE 5: Summary of Four Prolonged Air Leak Patients

Patient No.	IBV Valve Treatment (Yes/No)	Air Leak Resolved or Improved (Yes/No)	IBV Valves Removed (Yes/No)
1	Yes	Yes	Yes
2	Yes	Yes	Yes
3	Yes	Yes	Yes
4 (Treatment #1)	Yes	Yes	No
4 (Treatment #2)	Yes	Yes	No
4 Total Treated Patients	**5 IBV Valve Treatments**	**5 Air Leak Resolutions**	**3 Total IBV Valve Removals (in 3 Patients)**

Safety Summary:

There were no reported device-related adverse events and no reports of migration, expectoration, or erosion. A summary of other adverse events is in the table below.

TABLE 6: Adverse Events in Prolonged Air Leak Patients

Patient No.	Adverse Event	Comments
1	Granulation tissue	During procedure to remove all valves, minimal airway granulation tissue was observed.
2	None	None
3	Ventilatory support	Post-procedure, patient required mechanical ventilation <24 hours.
4 (Procedure 1)	None	None
4 (Procedure 2)	Radiologic Observation	Post - procedure CXR showed segmental consolidation/atelectasis in the posterior segment of the LUL corresponding to a segment treatment with a valve.

Treatment of Severe Emphysema:

The IBV Valve System is also being used in a clinical study for the treatment of advanced emphysema. This use is distinctively different from treating air leaks. In emphysema, the goal is palliative therapy with improvement in disease-related health status. The endpoints in the IBV Valve Pilot clinical study for the treatment of advanced emphysema were selected with the primary goal to evaluate the safety of the device and the secondary goal to evaluate effectiveness.

A total of 423 IBV Valves ranging in size from 4 mm-9 mm were implanted in the 58 patients (mean of 6.5 valves per patient; range 3-11 valves).

There are important safety results from the Pilot clinical study for the treatment of advanced emphysema that are relevant to understanding the use of valve implants for control of air leaks (see below).

Adverse Events in Clinical Study for Treatment of Severe Emphysema:

The adverse events observed in the first 58 subjects in the ongoing clinical study for use of the IBV Valve System for treatment of severe emphysema were reported from January 2004 through September 2005. During that time, the safety of the device was primarily evaluated by analyzing the rate of observed migration, erosion and/or infection definitely related to the IBV Valve. These occurrences of procedural complications and adverse events were also assessed during the study, with investigators noting the severity level and relationship of each adverse event to the device. As of September 2005, there were 58 subjects and 11 (19.0%) had no reported Adverse Events (AEs). Of the 47 subjects with reported AEs, 14 (29.8%) had no AEs that were judged definitely, probably, or possibly related to the IBV® Valve. There was no migration or tissue erosion noted during the observation period. The adverse events observed (regardless of relationship to the device) were: COPD flares or exacerbations (31), arrhythmias/cardiovascular events/blood pressure problems (13), bronchitis (11), pneumonia (9), bronchospasm (8), hemoptysis (8), pneumothorax (7), dyspnea (7), thorax pain (6), infection (5), altered ABG (3), bronchial injury (2), death (2), prolonged air leaks (1), respiratory failure (1) as well as 38 incidents considered miscellaneous in nature.

The investigators judged a total of 6 adverse events (AEs) as *definitely* related to the device. These 6 events occurred in 4 of the 58 subjects and consisted of:

- 3 episodes of pneumothorax
- 1 bronchial injury resulting from improper device placement
- 1 bronchospasm
- 1 death, from tension pneumothorax

The bronchial injury occurred with inadvertent placement of a device well beyond the target location. Analysis indicated the responsible technique factor was impairment of

visual guidance by secretions on the lens of the bronchoscope. The valve was left in place, healing occurred and complete valve treatment was accomplished at a later date.

***Serious Adverse Events*:**

There were a total of 8 adverse events judged by the investigators to be serious. Three of these occurred in one subject: respiratory distress, bronchospasm and cardiopulmonary arrest. The first two were judged possibly related and the third was determined by the investigator to be definitely not related.

The other 5 serious adverse events included:

- separate episodes of COPD exacerbation occurring in 1 subject (possibly related),
- 1 tension pneumothorax/death occurring 4 days after treatment (also mentioned above in the section on device-related adverse events; same subject),
- 1 ruptured spleen considered to be probably not related, and
- 1 episode of pneumothorax and respiratory failure (both considered to be probably related) occurred nearly 4 months after treatment (valve still in place at the time). Both events resolved, but recurred with other complications that eventually resulted in death. The death was judged probably related.

Six of 58 subjects have experienced pneumothoraces (10.3%). One subject experienced a second right-sided pneumothorax after intubation and ventilation, so there are a total of 7 episodes. The investigators judged 3 of the 7 episodes as definitely device related while the rest were considered as probably related. Three of the subjects had the onset of pneumothorax in hospital after initial treatment and were treated with chest tubes. One had the pneumothorax worsen after discharge and then received chest tube treatment. The 2 subjects with delayed-onset pneumothorax had occurrence at 4 days and 4 months after treatment. An analysis of pneumothorax showed that 5 of 6 or 83% of these events occurred on the left side and in subjects who had treatment of the lingula in addition to the upper lobes. Subjects who are candidates for the IBV Valve treatment for post-operative air leaks will already have chest tubes in place since these are routinely used for patients having lobectomy, segmentectomy, or lung volume reduction surgery. Since the patients being treated for persistent air leaks already have a chest tube in place, creation of a pneumothorax will not be possible

Functional Data:

The functional data also provide assurance of safety since there were no statistically significant, sustained group changes or variations on the traditional functional parameters (FEV1, RV, TLC, etc) and the majority of subjects reported improvement in health status. This data indicates that using valves for the treatment of air leaks is unlikely to have a negative impact on traditional measures of pulmonary function or symptoms.

Clinical Evidence Supportive of use for Prolonged Air Leaks:

Valve Placement:

In the information evaluated from the 58 subjects receiving the IBV® Valve for the treatment of advanced emphysema, the average implant procedure duration was 62 ± 35 minutes, with a mean of 6.5 valves implanted per patient.

This average time for the implant procedure duration includes performing the following steps:

- Inserting the bronchoscope into the airways,
- Making airway size measurements with the balloon catheter,
- Implanting the valve devices,
- Performing a final visual inspection, and
- Removing the bronchoscope and instruments.

Based on the Pilot clinical study data, the average implant procedure duration for the treatment of air leaks, including localization of air leaks and sizing, should be approximately half of the time reported for the emphysema study. This is because the number of device implants for the air leak indication is limited to no more than 3 valves.

Valve Removal:

All IBV Valves are to be removed when used for the treatment of air leaks. The instructions specify that all valves are to be removed no longer than 6 weeks after implant. The IBV Valve has design features (Removal Rod and Removal Rod Tip) to aid removal using standard bronchoscopic techniques.

The IBV Valve removal experience in the Pilot study confirms simple and reliable valve removal when using standard bronchoscopic techniques and biopsy forceps. The 58 subjects receiving the IBV Valves for the treatment of advanced emphysema had 102 of 103 valves removed in 26 subjects at periods up to 12 months.

XI. RISK - PROBABLE BENEFIT ANALYSIS

Air leaks are common after lung resection surgery but most are small volume and self-limited. Large volume and prolonged air leaks contribute to significant morbidity and mortality after thoracic surgery. To prevent lung collapse and promote lung expansion, chest tubes are inserted into the pleural space to vent air. Generally, patients remain with the chest tubes in place, and hospitalized, until the air leaks resolve. Prolonged air leak is the primary reason for increased length of stay following surgical lung resection.

Management of air leaks commonly includes chest tubes placed during surgery and then waiting for spontaneous resolution. If spontaneous resolution occurs promptly after surgery then chest tube management alone is the best treatment method and the IBV

Valve System is not likely to have benefit. Likewise, if the air leak can be managed and the patient discharged with Heimlich valves then the IBV Valve System is not likely to have probable benefit.

The clinical situation where the IBV Valve System is likely to have probable benefit is with air leaks that are prolonged as an alternative to more invasive procedures. Prolonged air leaks treated with only continued chest tube drainage are associated with increased complications such as empyema, and wound infection. The pain of the chest tube prolongs the requirements for medications, contributing to respiratory depression and inactivity. The inactivity and restricted ambulation increases risk for pneumonia, venous thrombosis and thromboembolism. The alternative management strategies are: pleurodesis, and re-operation. Pleurodesis requires local or regional anesthesia, pain medication, and the benefit of this procedure for air leak has not been proven. Re-operations for air leak require general anesthesia, invasive surgical procedures and are affiliated with the attendant risks of major surgery, which include increased risk of bleeding, infection and new air leaks.

The IBV Valve System has been used in a clinical trial for patients with emphysema and through compassionate use in four patients with prolonged air leaks. The clinical results indicate the IBV Valve can be deployed in the intended airway reasonably safely with a minimally invasive bronchoscopy procedure. There have been a limited number of device complications and no occurrences of device erosion or migration. The IBV Valve can be removed using a bronchoscope. Laboratory results indicate that the IBV Valve significantly reduces airflow to the lung tissue beyond the treated airway. A significant reduction in distal airflow is anticipated to augment the resolution of air leaks of the lung. Therefore, it is reasonable to conclude that the probable benefit to health from using the device for the target population outweighs the risk of illness or injuries, taking into account the probable risks and benefits of currently available devices or alternative forms of treatment when used as indicated in accordance with the directions for use.

XII. PANEL RECOMMENDATION

This HDE application was not taken to a meeting of the General and Plastic Surgery Devices Panel since it was determined that the preclinical and clinical issues raised by the HDE did not require panel review for the proposed device indication.

XIII. CDRH DECISION

CDRH has determined that, based on the data submitted in the HDE application, that the IBV Valve System will not expose patients to an unreasonable or significant risk of illness or injury, and the probable benefit to health from using the IBV Valve System to treat prolonged air leaks of the lung following lobectomy, segmentectomy, or lung volume reduction surgery (LVRS) outweighs the risks of illness or injury. CDRH issued an approval order on October 24, 2008.

XIV. APPROVAL SPECIFICATIONS

Directions for use: See the Physician's Labeling.

Hazards to Health from Use of the Device: See Indications, Contraindications, Warnings, Precautions and Adverse Events in the labeling.

Postapproval Requirements and Restrictions: See Approval Order.