



## **UPDATE ON BERYLLIUM HEALTH AND SAFETY TOPICS FEBRUARY, 1999**

This communication summarizes various developments concerning beryllium health research, status of occupational standards, Chronic Beryllium Disease (CBD), and changes to Brush Wellman's programs for promoting the safe handling of Beryllium. For important health, safety, and environmental information on the use of specific beryllium containing materials, please see the product material safety data sheet (MSDS).

### **Definition of CBD, Then Versus Now**

In the late 1980's, the diagnosis of CBD changed with the development of more specific medical tests for sensitization to beryllium which can be performed on either blood or lung cells, and the general introduction of the fiberoptic bronchoscope for examination of the lungs. With these tools, it was recognized that persons could develop a granulomatous inflammation of the lungs without symptoms or other signs of illness such as changes in a chest x-ray or lung function tests. This changed the diagnostic criteria for CBD used by some doctors by requiring only evidence of this granulomatous lung inflammation and lung sensitization to beryllium. Therefore, since the late 1980's, individuals could be diagnosed as having CBD without having signs or symptoms of illness, x-ray changes, or functional evidence of disease. Before the 1980's, individuals similar to these would not have been identified because they did not display symptoms.

### **Future of Blood Lymphocyte Proliferation Testing**

The beryllium industry has long sought a practical and useful test which can reliably predict the small proportion of individuals who may be able to get Chronic Beryllium Disease (CBD). A specialized, specific, immunological blood test, the beryllium blood lymphocyte proliferation test (BLPT), is available on a limited basis to screen beryllium-exposed persons for beryllium reactions. It should be recognized that the BLPT, by itself, has limited sensitivity for chronic beryllium disease. Individuals who have an abnormal BLPT are normally referred to a lung specialist for additional specific tests to determine if chronic beryllium disease is present.

We know that not all persons with blood sensitivity to beryllium have CBD, and not all persons with CBD will demonstrate blood sensitivity. The rate of positive beryllium blood lymphocyte proliferation testing in persons who have never worked with beryllium is believed to be about 1%. It is known that surveying beryllium workers using only the blood test will not detect all cases of CBD. The percentage missed is unknown, and can vary with the survey methods used.

The future use by Brush Wellman of BLPT is based on the value of the information believed to be gained in conducting such tests. Brush Wellman makes such decisions based on input from the medical community and the Beryllium Industry Scientific Advisory Committee. Priority for testing is given to surveys in which medical test results can be combined and analyzed with information on work and exposure histories to identify work processes associated with higher rates of beryllium sensitization or CBD. Thus far, the use of such tests by customers of Brush

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Wellman has been limited. For further information about the test and its availability contact David Deubner, MD, Brush Wellman's Medical Director.

### **Emerging Concepts**

Based on the current findings of scientific research, it now appears that the rates of sensitization detected during blood testing may not relate to how long someone has worked in a beryllium operation. Some early results during testing of new employees working in beryllium oxide and extraction areas within Brush Wellman, where greater risk has been identified, are revealing that some new workers are demonstrating blood sensitization in as little time as several months. This suggests that if a susceptible person is in a "sensitizing environment", sensitization may occur right away. This also suggests that persons diagnosed with CBD may have been sensitized for as many years as they have worked in a beryllium operation. The problem is that, other than the previous results, we have no practical measure of what constitutes a "sensitizing environment".

### **Knowledge Gaps**

Many questions regarding this unique material remain unanswered. Brush Wellman and others are working to find answers. For example, we are pursuing information on how often, when, why, and how sensitization converts to a process which damages the lungs. We are also working to determine how continued exposure affects the process leading from sensitization to lung damage. Lastly, we are continuing to work on identifying a better measure of risk. Our current work focuses on studies such as particle number, chemistry, and shape.

At our request, Brush Wellman has been joined in this effort by the National Institute for Occupational Safety and Health (NIOSH) to partner with us in our continuing health studies at our Elmore, Ohio and Tucson, Arizona plants.

### **United States Department of Energy Beryllium Rulemaking**

During 1997, the Department of Energy (DOE) set in motion plans to issue a formal rulemaking on beryllium to establish Chronic Beryllium Disease Prevention Programs (CBDPP) within Department of Energy owned or operated facilities. The proposed rule will not apply to general industry. The CBDPP is designed to minimize the exposure and the potential for occupational exposure to beryllium, minimize the number of workers exposed, and establish medical surveillance protocols for early detection of chronic beryllium disease. The Department of Energy has stated that it is establishing a rule because it has experienced a significant increase in detection of CBD in their current and former work force. Their statement is based on studies using the new diagnostic criteria. They also are concerned that the current occupational standard for beryllium may not be protective. However, the DOE has publicly stated that "existing scientific data does not currently provide an adequate basis for determining an appropriate new DOE exposure limit".

### **Beryllium Program Changes and ALARA**

Brush Wellman is experimenting with changes in the way it manages the health and safety programs for handling beryllium inside its own manufacturing plants. These changes are primarily targeted towards operations where a statistically greater risk has been identified through scientific research. Thus far, two such operations have been identified. They are the beryllium oxide ceramics operations at our Tucson, Arizona plant and the beryllium extraction operation involving the use and processing of beryllium fluoride at our Elmore, Ohio facility.

The mission of the Beryllium Program Changes effort is:

“to create a work environment which lowers airborne beryllium exposures and surface/personal contamination based on the principles of ALARA (as low as reasonably achievable)”.

It remains the best practice to maintain concentrations of all atmospheric contaminants as low as feasible, and continue to work to improve exposure control practices and procedures.

### **American Conference of Governmental Industrial Hygienists Changes to the Threshold Limit Value for Beryllium**

Because airborne fine particles containing beryllium are the form involving the greatest potential risk, users of materials containing beryllium must be concerned with exposure to that potential risk. In 1997, the American Conference of Governmental Industrial Hygienists (ACGIH) published a revision to their occupational exposure standard for beryllium, which they refer to as a Threshold Limit Value (TLV). The ACGIH defines a threshold limit value (standard) as follows:

"Threshold Limit Values refer to airborne concentrations of substances and represent conditions under which it is believed that nearly all workers may be repeatedly exposed day after day without adverse health effects. Because of wide variation in individual susceptibility, however, a small percentage of workers may experience discomfort from some substances at concentrations at or below the threshold limit; a smaller percentage may be affected more seriously by aggravation of a pre-existing condition or by development of an occupational illness."

The ACGIH further acknowledges that:

"Individuals may also be hypersusceptible or otherwise unusually responsive to some industrial chemicals because of genetic factors, age, personal habits (smoking, alcohol, or other drugs), medication, or previous exposures. Such workers may not be adequately protected from adverse health effects from certain chemicals at concentrations at or below the threshold limits."

The ACGIH revision can be summarized as follows. First, ACGIH kept the 8-hour TLV of 2 micrograms per cubic meter of air which is the same as the current OSHA standard. Second, it has adopted a 15-minute Short Term Exposure Limit (STEL) of 10 micrograms per cubic meter. This is a new value derived primarily by using the ACGIH's existing practice of setting STEL's at five times the TLV 8-hour value. Lastly, it has changed its cancer ranking for beryllium from "suspected human carcinogen" to "confirmed human carcinogen."

In commenting on the change in carcinogenicity classification ACGIH states, "nevertheless, ACGIH feels that the weight of the evidence supports the view that beryllium is a confirmed human carcinogen but is of such low potency that only persons exposed at levels similar to

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those that existed in the Lorain (Brush Wellman) and Reading (Beryllium Corporation of America) plants in the 1940's would be at significant risk of developing lung cancer.”

Note: Levels in the 1940's ranged from about 100 to 10,000 times higher than the levels typically experienced today.

**Brush Wellman takes exception with the ACGIH's change in cancer ranking for beryllium and still believes the scientific evidence at best supports a ranking of potential human carcinogen. The ACGIH's comment does at least confirm that beryllium carcinogenicity is not a significant modern day health issue.**

Merril Eisenbud, a leading authority on beryllium health and safety, and one of the two persons who recommended the original occupational exposure standard for beryllium back in 1949, shared his thoughts and views on the current status of the occupational exposure standard for beryllium in an article published in 1998. A copy of the article is available upon request.

### **Brush Wellman on the Web**

Brush Wellman's entry onto the World Wide Web occurred in January of 1997. The original entry included our Health, Safety and Environmental Corporate Policies. Since then, we have added our Material Safety Data Sheets for beryllium-containing products. We will continue to add health, safety and environmental information to our web site to better serve our customers and those interested in understanding more about beryllium-containing products. You can access our web page at <http://www.brushwellman.com>

### **Have Questions or Want Additional Information?**

Please contact David Deubner, MD, the Brush Wellman Medical Director, at (419) 862-4391 or Marc Corbett, CIH, Manager of Product Stewardship, at (419) 862-4430 if you have any questions regarding the information provided. If you would like a copy of any of the documents listed below, please contact Nancy McNutt at (419) 862-4117:

1. Material Safety Data Sheets.
2. BWI comments to the Department of Energy.
3. BWI comments to the American Conference of Governmental Industrial Hygienists.
4. Merrill Eisenbud article.
5. As available, any articles or documents referenced in the above documents.