

The Strategic Importance of Beryllium to the European Union and the Negative Trade Impacts Prompted by Impractical Regulatory Initiatives

- ❖ The European Commission has recognized that regulatory initiatives regarding beryllium have not taken into account the best scientific data or proven workplace strategies. According to the Commission paper European Commission Critical Raw Materials for the EU - Report of the Ad-hoc Working Group on defining critical raw materials, 2010, “*The data that authorities rely on is not current and does not reflect the most recent scientific studies. In general, authorities are reluctant to break from the past and are not open to new scientific studies even if they are conducted in accord with OECD guidelines or originate from proven workplace strategies.*”
- ❖ Unrealistic and unattainable workplace exposure limits for beryllium-containing materials serve as trade barriers and inhibit the free movement of goods among industrialized nations.
- ❖ The EU lacks both a commercially viable domestic source of beryllium and the capability to process ores or raw materials of beryllium to beryllium metal or any of the alloys of beryllium. All beryllium-containing materials are imported from the United States, Kazakhstan, and Japan in semi-finished forms. These materials are then processed within the EU to make engineered components for eventual inclusion in the manufacturing of end-use products:
- ❖ **The EU:**
 - ▶ Uses over 56,000 Kg / year of beryllium in all forms
 - ▶ In over 500 SME and 40 larger enterprises
 - ▶ Employing over 10,000 employees
 - ▶ Of which, 3,000 use beryllium in the workplace
- ❖ Beryllium products that are of strategic importance to the EU:
 - ▶ Metallic beryllium and alloys containing >30% beryllium
 - ▶ Copper beryllium alloys containing 0.10 - 2.0% beryllium
 - ▶ Al, Cu and Ni master/casting alloys containing 1 - 15% beryllium
 - ▶ Beryllium oxide ceramics
- ❖ In the recent past and currently, several regulatory initiatives have emerged within the EU regarding beryllium that pose unnecessary burdens on industries that provide and use beryllium containing materials. Ireland and Spain have proposed lowering the current occupational exposure limit from 2.0 $\mu\text{g}/\text{m}^3$ to 0.05 $\mu\text{g}/\text{m}^3$. France has proposed lowering the limit to 0.01 $\mu\text{g}/\text{m}^3$, which stretches the limits of analytical detection.
- ❖ **Scientific studies have demonstrated that an OEL in the range of 0.2 $\mu\text{g}/\text{m}^3$ to 0.4 $\mu\text{g}/\text{m}^3$ effectively protects workers and can generally be achieved by European industries that rely on beryllium-containing materials to advance waste minimization, energy efficiency, product reliability, and reduced raw material utilization.** Lowering the current OEL to below 0.2 $\mu\text{g}/\text{m}^3$ would have a negative effect on availability of products, employment, SMEs, and current research activities. Lowering an OEL to below 0.2 $\mu\text{g}/\text{m}^3$ would severely impact the EU Strategic Materials Initiatives regarding beryllium and adversely affect the free movement of goods.
- ❖ The world producers of beryllium have been responsive to the EU REACH legislation that is designed to provide safety, health, environmental and use information about chemical substances to the European Chemicals Agency (ECHA). These producers have demonstrated through test results and research that the current harmonized classification of beryllium in the EU is inaccurate and should be modified.

- ❖ Examples of strategically critical applications that have been supplied to the EU with consistent reliability include:
 - ▶ Copper beryllium alloys in thin strip and rod form for the manufacture of electrically conductive terminals of e.g.:
 - * Relays used for telephone exchanges
 - * Relays used for controlling industrial, domestic and automobile electrical equipment
 - * Connectors for all electrical, electronic and telecommunications equipment and appliances
 - * Aircraft electrical and electronic connectors
 - * Pressure sensing diaphragms for aircraft altimeters, medical stethoscopes, barometers and automobile sensors
 - * Extremely long service life fire sprinkler water control valve springs
 - * Extreme reliability automobile connectors for air-bag crash sensor and deployment systems, anti-lock brake systems and many other high reliability applications
 - * Aircraft electrical and electronic connectors
 - * Household appliance temperature and other function controls
 - ▶ Copper beryllium alloys in thick plate, rod and tube form for the manufacture of e.g.:
 - * Non magnetic equipment components used in oil& gas exploration and production equipment; directional drilling equipment; coal and minerals mining equipment; mine detection and minesweeping
 - * Undersea cable signal amplification “repeater” housings
 - * Aircraft landing gear, control rod and wing aileron / flap bearing bushings
 - ▶ Beryllium-containing master/casting alloys in the form of ingots, shapes and granules for the manufacture of semi-finished billets, slabs and castings, widely used in the EU as input raw materials to produce semi-finished alloys; foundry castings; rods; thin strip etc. which are used by a multitude of leading EU companies to produce such products as:
 - * Aircraft components such as pitot tubes / low friction contact surfaces
 - * Space rocket components, e.g. as exhaust nozzles
 - * High reliability components e.g. brake parts (non-abrasive holders and clutches) in high speed trains
 - * Electrode holders and components of welding robots for automated automobile and appliance welding
 - * Property modifier for aluminium and magnesium casting alloys used to make components that are stronger, lighter and safer for applications like automobile and truck components while improving recyclability and helping to reduce carbon dioxide emissions
 - * Plastic and metal casting moulds that improve productivity and product tolerances that maintain the leadership of EU producers
 - ▶ Beryllium metal and alloys containing > 30% beryllium:
 - * X-Ray transparent windows used to control and focus X-Ray beams in all medical, scientific and analytical devices incorporating X-Ray sources
 - * Gyroscope gimbals and yokes for use in guidance, navigational and targeting systems used on aircraft, armoured vehicle and marine missile systems
 - * Satellite mounted directional devices for astronomical and other telescopes and instruments
 - * Satellite structural components
 - * Mirrors for terrestrial and space mounted astronomical telescopes

- * World leading EU science and technology programmes depend upon beryllium metal for critical components that cannot be substituted by any other material
 - * A prime example is the JET Joint European Torus reactor at Culham in the UK. This is the largest magnetic confinement plasma physics experiment worldwide currently in operation
 - * Beryllium is critical for the success of the large scale demonstrator ITER project located in Cadaraches, France that is designed to produce sustainable energy from non-radioactive nuclear fusion
 - * Medical isotope production nuclear reactors in Belgium, Holland and elsewhere in the EU produce critical isotopes for treatment of many types of cancer
- ▶ Beryllium Oxide Ceramics:
- * Beryllium Oxide raw materials are used by EU manufacturers to produce ceramic components with extremely high thermal conductivity while providing electrical insulation, a unique combination of properties exploited for use in the manufacture of such equipment as:
 - Substrates for mounting high powered electronics such as power amplifiers that need cooling to prevent self destruction
 - Laser beam focusing and control.
 - High power printed circuit substrates
 - Cell phone infrastructure electrical equipment
- ❖ The threat of disruption to the supply of beryllium to the EU and the global impact on trade is a real concern. If overly restrictive regulatory and legislative measures that do not embrace recent scientific data and proven industrial safety practices were to be applied, the likely result is a loss of value added high-end technology jobs both now and in the future.
- ❖ Virtually all of the employment related to beryllium is in Small and Medium Sized Enterprises (SME) who manufacture:
- ▶ Aerospace: Satellite structures and components, Aircraft landing gear and wing systems
 - ▶ Avionics: Aircraft / UAV and Satellite control systems
 - ▶ Oil & Gas exploration and production equipment
 - ▶ Mining and directional drilling equipment
 - ▶ Alternative energy equipment
 - ▶ Defence equipment

The need for beryllium has never been as evident as its need in the Galileo project, which is heavily reliant upon beryllium. According to the DG Enterprise & Industry “Galileo will underpin many sectors of the European economy through its services: electricity grids, fleet management companies, financial transactions, shipping industry, rescue operations, peace-keeping missions, all depend heavily on satellite navigation technology. Galileo will make Europe independent in a technology that is becoming critical, including for strategic areas such as electricity distribution and telecommunication networks. Galileo is expected to deliver EUR 60 billion to the European economy over a period of 20 years in terms of additional revenues for the industry and in terms of public and social benefits, not counting the benefit of independence.”