

THE INTERNATIONAL MAGNESIUM ASSOCIATION & SF₆

EPA Conference on SF₆ and the Environment

Byron Clow, IMA, Executive VP

**James Hillis, Noranda Magnesium,
IMA Char. SF₆ Alternatives**

Ad Hoc Committee on SF₆

- **Eli Aghion**, Dead Sea Magnesium Ltd.
- **Pete Bowman**, IMA, Legal
- **Byron Clow**, IMA, Executive VP
- **Gerald Cole**, Ford Motor Co.
- **Jim Hillis**, Char., Noranda Magnesium
- **John King**, Magnesium Elektron Inc.
- **Thorvald Mellerud**, Norsk Hydro
- **Bill Moore**, Spectrulite Consortium Inc.
- **Doug Taylor**, Del Mar Industries
- **Tom Trip**, Magnesium Corporation of America

SF₆ Contract Research Initiative

- **Spring of '99**—SF₆ Committee organized
- **June, IMA Rome Mtg.**—Committee committed to seek research proposals with board support
- **August**—published request for proposals
- **December/January**—request period closed & detailed proposal requested from top candidates
- **May, 2000, IMA Vancouver**—oral review of proposals heard; SINTEF—selected for funding in fall 2000

SINTEF/MATERIALS TECHNOLOGY at NTNU

SINTEF—The Foundation of Scientific and Industrial Research
at NTNU—Norwegian University of Science and Technology

- Located in Trondheim, Norway, on NTNU campus
 - Shares facilities, equipment, and staff with NTNU
 - 4th largest science & research organization in Europe, more than 1,800 employees in Trondheim and Oslo
 - Conducts contract R&D for industry and the public sector in field of natural science and technology
 - Long history of research and technology development for the light metals industry...& experience with SF₆ alternative R&D
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SINTEF/MATERIALS TECHNOLOGY & NTNU—*the Research Team*

- **Knut Bech**, PhD, Res. Scientist, SINTEF/MT
- **Thorvald Engh**, PhD, Professor, NTNU
- **Gunnar Pettersen**, PhD, Res. Scientist, SINTEF/MT
- **Gabriella Tranell**, PhD, Res. Scientist, SINTEF/MT
- **Eivind Øvrelid**, PhD, Res. Scientist, SINTEF/MT
- **Kari Aarstad**, MSc, PhD Student, NTNU

Proposed Activities

- Evaluate performance characteristics of recently proposed alternatives
 - Hatch system— BF_3 (from KBF_4) + air
 - Australian CAST—HFC-134a + air
 - Brochot—Inert gas blend + carbon dioxide
- Seek out and test new sulfur- and fluorine-bearing molecules of low environmental impact and low toxicity

Proposed Activities

- Measure solubility/diffusivity of sulfur and fluorine in oxide and molten metal phase
- Evaluate effects of minor alloy additions on protective film formation (e.g., Be, Ce, etc.)

Proposed Activities

- Evaluate film growth rates as a function of gas composition using specialized high temperature equipment
- Employ computational fluid dynamics to optimize delivery of most promising alternatives

Reporting

- R&D progress at SINTEF will be shared openly for the benefit of the magnesium industry
- Quarterly, SINTEF will report to the IMA SF₆ Committee
- Annually, a detailed report will be presented at annual World Magnesium Conference of IMA

Summary

- Through financial and technical support of the research and development program at SINTEF, IMA and its members hope to identify the best available alternatives—economically, environmentally and toxicologically—for the replacement of SF₆ gas mixtures in the near future