B131 Forensic Review Board Validation of the Complex Identification Procedure (CIP) Methodology for Identifying the Nature and Origins of Platinum Group Metal Production Materials

Robert D. Koons, PhD, Counterterrorism and Forensic Science Research Unit, Federal Bureau of Investigation Academy, 2501 Research Parkway, Quantico, VA 22135*

After attending this presentation, attendees will have an understanding of the precious metal manufacturing processes in Russia and South Africa and of the importance of efforts being made to identify the source of stolen platinum group element (PGE)-containing materials used in international money laundering schemes. This paper will give a brief overview of the CIP analysis procedure and will discuss a Forensic Review Board's experiences in an international effort to validate the procedure both analytically and forensically.

The results of attempts by an international panel of experts in evaluating methods developed in Russia to help them meet European legal requirements will be presented. In addition to assisting in tracing the source of PGE materials, this project provides experiences that will enable increased acceptance of protocols across international legal systems.

A number of leading Russian scientific research institutes (Mining and Metallurgical Company "Norilsk Nickel", Institute of Criminalistics of the Russian Federal Security Service, State Research Institute for Rare Metals, and Russian Federal Centre of Forensic Science) have developed a combined methodology, using bulk and particle SEM-EDX, ICP-OES, ICP-MS, and XRD to characterise intermediate materials from the beneficiation process of PGE-bearing ores. It has been claimed that this methodology provides such a high degree of discrimination that samples can be traced back to their specific point of origin in the beneficiation process. This "Complex Procedure for Identification of the Nature and Source of Origin of Precious Metal containing Products of Mining and Metallurgical Operations" is referred to as the Complex Identification Procedure, or CIP.

The CIP uses several diagnostic features to determine the nature and source of origin of an unknown PGE-bearing material:

- Bulk elemental composition of the substance, including impurities is measured first by SEM-EDX and then by ICP- OES and ICP-MS for 30 and 18 elements, respectively
- Phase composition of a substance, i.e. chemical composition of compounds present in this substance, is measured by XRD;
- Distribution of particle types in accordance with their elemental composition is determined using SEM-EDX for determination of particle compositions and morphologies.

Several legal actions have been initiated in Western Europe against companies suspected of dealing in stolen PGE materials. In order for the CIP results and expert opinions derived from them to be accepted in future court proceedings, it was thought to be necessary to have the method validated analytically and forensically by a well respected independent international body. A project was initiated under the auspices of ENFSI (European Network of Forensic Science Institutes) to this end with support from the Ministry of Justice of the Russian Federation and the International Platinum Association (IPA). The objectives of the project are twofold: to peer review the CIP in order for the CIP expert results to be accepted in court and to provide advice on possible improvements.

The Forensic Review Board consists of nine members from national forensic institutes in Great Britain, Germany, Sweden, The Netherlands, The United States, South Africa, and The Russian Federation. A non-forensic member of the Board is Prof Yuri Karpov, Deputy Director of the Russian Research and Projecting Institute of the Rare Metals Industry "GIREDMET" and member of the Russian Academy of Science. Tasks of the Board are to collect information, discuss and report results, make decisions, contribute to and comment on documents and (interim) reports as used by and produced in the project, advise on the methods used and ultimately decide whether the CIP set of methods are suitable for their intended forensic application. Six industrial and scientific advisers assist the Forensic Review Board by providing specialist information based on their specific knowledge, information and experience from the perspective of the PGM industry.

The Netherlands Organisation for Applied Scientific Research (TNO) has been contracted to perform the analytical verification of the CIP and their report will be an appendix to the final project report.

The Board has supervised TNO's analytical studies of the CIP, evaluated world-wide geological data pertinent to sourcing PGE-bearing ores, and performed their own collaborative analytical and statistical studies of the protocol and the reference database. Up-to-date results of Board activities will be presented. It is expected that this project will be completed at about the time of the AAFS meeting.

Platinum Group Elements, Method Validation, Forensic Review Board

 ** Presenting Author*