

Paths Forward: Current International and US Initiatives to Support More Sustainable Options for Uranium Production

Michelle Rehmann
Tetra Tech
Denver, Colorado USA

Caitlin Rood
Tetra Tech
Denver, Colorado USA

Michael Keefe
Tetra Tech
Rockford, Illinois, USA

ABSTRACT

With the nuclear renaissance, the uranium mining industry has undergone a dramatic renaissance, as well. This has been evidenced in the past 2 years with forums such as those organized by the International Atomic Energy Agency (IAEA) and in the United States (US) the National Mining Association/Nuclear Regulatory Commission (NMA/NRC) workshops drawing record attendance by established and junior uranium mining firms. In addition, IAEA meetings, as well as meetings of the NMA, industry, and agencies have begun to focus, not only on site closure--but on the growing industry and plans for permitting new uranium recovery facilities. Finally, the International Forum on Sustainable Options for Uranium Production (IFSOU) has emerged to carry forward many recent cooperative dialogs and concepts developed in sustainability initiatives, bringing together industry, agencies and NGOs- with the view to developing more sustainable, socially-acceptable uranium recovery practices.

In this context, this paper will present current international and US initiatives which are intended to support more sustainable options for uranium production.

First, we will describe a new initiative for international cooperative dialogues, to build industry, agency and NGO cooperation for enhancing global sustainability in uranium production operations, and avoid the legacy issues found in past operations: the inaugural meeting of the International Forum on Sustainable Options for Uranium Production, or IFSOU. IFSOU will carry forward discussions of recent and present initiatives including the Global Mining Initiative; the Mining, Minerals, and Sustainable Development Initiative (MMSD); the International Council on Mining and Metals; and the sustainable development initiatives of the US National Mining Association. Consistent with the process of ensuring development of a sustainable uranium recovery industry, while factoring in stakeholder concerns, an initiative to promote strong regulation in a risk-informed, performance based manner for an important new segment of uranium production will be described. Specifically, an overview on development of the US Nuclear Regulatory Commission's Generic Environmental Impact Statement (GEIS) for in-situ uranium recovery (ISR) will be presented. In addition to diverse stakeholder inputs, the input of significant, important elements of the industry experience to this process, which is based upon more than 25 years of ISR operating experience and some 1,400 documents provided by industry, will be described.

INTRODUCTION

Modern uranium mining practices are both safer and more environmentally protective than those of the past -- a result largely of the industry's maturing and continuous efforts to improve. Responding to these trends in a forward-thinking manner is essential to ensuring a vibrant uranium recovery industry; assured

supplies of this important fuel for our energy and the global economy; and reasonable approaches to environmental protection.

Sustainability was defined in the Brundtland Report of the World Commission on Environment and Development [1] as “meeting the needs of the present without compromising the ability of future generations to meet their needs.” Sustainability incorporates a “triple bottom line” view of industrial processes. Triple bottom line accounting refers to expanding the traditional economic based reporting framework to take into account environmental and social performance in addition to financial performance.

Despite differences among specific definitions, a number of common principles are embedded in most sustainable development programs. These include [2]:

- Dealing transparently and systemically with risk, uncertainty and irreversibility.
- Ensuring appropriate valuation, appreciation and restoration of nature.
- Integration of environmental, social, human and economic goals in policies and activities.
- Equal opportunity and community participation/Sustainable community.
- Conservation of biodiversity and ecological integrity.
- Ensuring inter-generational equity.
- Recognizing the global integration of localities.
- A commitment to best practice.
- No net loss of human capital or natural capital.
- The principle of continuous improvement.
- The need for good governance.

The Mining, Minerals, and Sustainable Development Initiative (MMSD) developed a process for assessing the sustainability of mining and milling activities, referred to as the “Seven Questions to Sustainability”[3]. The seven questions are summarized in the Figure 1.



Fig. 1. Seven Questions to Sustainability [3]

RECENT IMPORTANT INITIATIVES

Several international mining stakeholder groups have addressed and focused on the subject of sustainability in the mining industry. A brief overview of some of these groups is discussed in this section.

Global Mining Initiative

In 1999, nine of the world's largest mining companies launched the Global Mining Initiative (GMI). GMI brought together many of the world's largest mining, metals and minerals companies. This leadership exercise aimed to ensure that an industry that is essential to the well-being of a changing world is responsive to global needs and challenges.

The Initiative had three main strands: creation of an industry association that could focus on sustainable development in the mining, metals and minerals industry; an independent analysis of the key issues facing these industries; and a global conference on mining, metals and sustainable development in May 2002. The conference was a significant contribution to the World Summit on Sustainable Development in Johannesburg in the fall of 2002, which marked the 10th anniversary of the Rio Earth Summit. The objective of all three strands was to reach a clearer understanding of the positive role the mining and minerals industry can play in making the transition to sustainable patterns of economic development.

In May 2002 - following publication of the final report of the Mining, Minerals and Sustainable Development project, the establishment of the International Council on Mining and Metals and the close of the global conference - the Global Mining Initiative ceased to exist as a separate entity.

Mining, Minerals, and Sustainable Development Initiative

The Mining, Minerals, and Sustainable Development, or MMSD project was an independent two-year process of consultation and research aimed at understanding how to maximize the contribution of the mining and minerals sector to sustainable development at the global, national, regional and local levels. Through this process, MMSD proposed a clear agenda for global change in the minerals sector - an agenda based on careful analysis, understood and supported by many key stakeholders, and with clear mechanisms for moving forward.

MMSD was managed by the International Institute for Environment and Development (IIED) in London, under contract to the World Business Council for Sustainable Development. The project began in April 2000 and was designed both to produce a final report and a series of working papers - and to create a dialogue process that could be carried forward into the future.

The general objectives of MMSD were as follows:

1. Assess global mining and minerals use in terms of the transition to sustainable development. This was to cover the current contribution – both positive and negative – to economic prosperity, human well-being, ecosystem health and accountable decision-making, as well as the track record of past practice.
2. Identify how the services provided by the minerals system could be delivered in accordance with sustainable development in the future.

3. Propose key elements of an action plan for improving the minerals system.
4. Build platforms of analysis and engagement for ongoing cooperation and networking among all stakeholders.

In a project limited in time and resources, these objectives had to be implemented realistically. MMSD did not exist to solve or even to address all the issues that will ever be faced by the mining and minerals industries. At best, it provided a starting point for identifying different concerns and getting processes under way, which in the long run should, it was hoped, move the world closer to solutions.

International Council on Mining and Metals

In October 2001, the members of the WBCSD's MMSD project formed the International Council on Mining and Metals (ICMM) to provide leadership for improving the global sustainable development performance of the industry. ICMM represents leading international mining and metals companies. ICMM created a Sustainable Development Framework comprised of three elements including a set of 10 Principles, public reporting, and independent assurance.

Global Reporting Initiative

Since its inception, the Global Reporting Initiative (GRI) has endeavored to formalize corporate environmental reporting in much the same manner as corporations report financial information. The GRI standardized reporting format addresses environmental, economic, and social performance indicators. GRI developed a Sector Supplement for Mining and Metals in pilot version February 2005 in cooperation with ICMM to provide the sector with more specific guidance on the industry's unique sustainability challenges. The pilot version of the Supplement was developed through a multi stakeholder Working Group with industry and stakeholder representation from across the globe. The pilot version of the supplement is available for use now.

The mining and metals sector consists of exploration, feasibility, construction, mining and metal processing (including metal fabrication and recycling), and closure.

US National Mining Association Sustainable Development Pledge and Principles

The US National Mining Association (NMA) recognizes that it represents an industry that is inherently involved in a net loss of natural capital. However, this is also an industry upon which modern American and industrialized society as a whole depend for energy, metals and minerals. With this in mind, NMA has created a sustainability pledge that demonstrates its commitment, along with that of its stakeholders, to allow mining to proceed in a way that balances social, economic and environmental considerations. NMA's sustainable development pledge reads:

“The members of the National Mining Association pledge to conduct their activities in a manner that recognizes the needs of society and the needs for economic prosperity, national security and a healthy environment. Accordingly, we are committed to integrating social, environmental, and economic principles in our mining operations from exploration through development, operation, reclamation, closure and post closure activities, and in operations associated with preparing our products for further use.”

NMA further expands on its pledge in three lists of more specific bullets related to environmental, social, and economic principles.

Other Recent Initiatives – And the Demand for Sustainable Options for Uranium Production Today

Forward-thinking members of industry such as Cameco and Rio Tinto have developed and practiced sustainable development in approaches appropriate for their locations and societal requirements. In addition, the US Bureau of Land Management, which is often involved in mining permitting decisions, supports industry efforts to build more sustainable reclamation and operational practices.

Cameco

Cameco, an international uranium recovery industry leader, has taken a strong proactive stance promoted by corporate governance to building sustainability into its culture and practices. Defining sustainable development as: "meeting the needs of our stakeholders today, while preserving choices for future generations to meet their needs", the company notes further that while "most theories on sustainable development refer to economic, environmental and social responsibilities" Cameco has "personalized" these into governance and management, and has defined four measures of success in meeting goals of sustainable development. These are:

- a safe, healthy and rewarding workplace;
- a clean environment;
- supportive communities; and
- outstanding financial performance [5].

Cameco will participate in the inaugural meeting of IFSOUP to share its plans for sustainable development with participants; and to gain insights into plans of others for such development.

Rio Tinto

Rio Tinto's web site includes a section related to sustainable development. Rio Tinto's sustainable development portion of their web site addresses sustainability in terms of their performance, strategy, economic impact, environmental impact, social impact, and governance.

Rio Tinto wrote a 40-page Sustainable Development Review in 2006 [5] that provides an overview of Rio Tinto's, economic, social and environmental contribution to sustainable development today and looks at challenges and opportunities it expects to face in the future.

Bureau of Land Management

Beginning in 2003, the Bureau of Land Management (BLM) created a set of Reclamation and Sustainable Mineral Development Awards. The awards recognize the efforts made in implementing the principles of sustainable development. The awards are in four categories:

- The **BLM Hardrock Mineral Environmental Award** highlights the component of sustainable development that relates to environmental stewardship. The award acknowledges operators with exceptional track records of meeting or exceeding Federal, state, or local reclamation requirements.
- The **BLM Hardrock Mineral Community Outreach and Economic Security Award** highlights the component of sustainable development that relates to concern shown for community responsibilities and the economic benefits of mineral development, with an emphasis on successful coordination with local and regional stakeholders.

- The **BLM Small Operator Award** recognizes achievements in environmental stewardship of operators with less than 15 employees. Like the BLM Hardrock Mineral Environmental Award, this award recognizes operators who have demonstrated continuous or repeated efforts to successfully meet or exceed Federal, state or local reclamation requirements.
- The **BLM Hardrock Mineral Director's Award** may be presented in recognition of outstanding achievement in a particular area of sustainable development.

For 2007, the BLM awarded prizes in two of the four award categories. The 2007 Hardrock Mineral Environmental Award winners are the Kennecott Nevada Copper Reclamation Project and the Clarkdale Tailing Reclamation Project by Phelps Dodge Corporation, a subsidiary of Freeport-McMoRan Copper & Gold Inc. The 2007 Hardrock Mineral Community Outreach and Economic Security Award winner is the Northern Nevada Partnership Group, which includes mining companies, educational institutions, several Nevada counties, and the members of the Northeastern Nevada Stewardship Group.

The International Forum on Sustainable Options for Uranium Production

The upcoming inaugural meeting of the International Forum on Sustainable Options for Uranium Production (IFSOU) will be held as a separate forum, but during WM2008, which will take place in Phoenix, Arizona USA on Tuesday, 26 February 2008. IFSOU is expected to foster discussion and development of safe, environmentally protective, sustainable uranium production practices, drawing upon and reinvigorating the recent discussions described above into a dynamic means to apply sustainable practices to uranium production. With this focus, IFSOU complements other initiatives aimed at improving environmental performance of uranium production centres. It is being facilitated by Dr. W. Eberhard Falck, JRC-IE (EC); and Ms. Michelle Rehmann, WMSymposia, Inc.; and receives support of many others involved in uranium matters.

US Nuclear Regulatory Commission Generic Environmental Impact Statement (GEIS) for In Situ Uranium Recovery Operations

In terms of demand, multiple countries all over the world are currently operating nuclear reactors and are seeking to expand that capacity while many other countries are seeking to develop new nuclear power generating capacity. Nuclear power currently produces 16 percent of the world's electricity and approximately 18 percent of the electricity generated in the U.S. The US currently has 103 nuclear reactors and the prevailing national policy is that such capacity should be expanded considerably (the NRC anticipates the receipt of applications for up to 30 new nuclear reactors over the next 15 years). The average 1,000 MW nuclear reactor uses approximately 500,000 pounds of uranium per year and requires approximately 2 million pounds for initial startup.

In terms of uranium supply to meet the growing demand, in 2006, all uranium producing countries produced an estimated 103 million pounds of uranium (58 percent from primary production and 42 percent from secondary production; in terms of process, 9 percent using byproduct recovery, 25 percent using in situ recovery, and 66 percent using conventional mining). On an international basis, this level of production would result in a future shortfall of uranium supply of approximately 74 million pounds annually. The US produced 4 million pounds of uranium in 2006 and therefore, domestic nuclear reactors have been forced to obtain uranium from foreign producers, resulting in a significant U.S. dependence on foreign energy sources in a tighter international market. The current market has caused a dramatic increase in the price of uranium from \$7-8 per pound (2002) to \$80-130 per pound (2007).

In the US, the NRC must prepare for and respond to the current world wide market demands for new production of uranium and the current market conditions, which are driving a growing industry in the US and in other countries. The current international market, the need to counter dependence on foreign

energy sources, and the high prices paid for uranium are driving a rapidly expanding industry in the US, which the NRC anticipates will result in a significant number of new applications for ISR uranium recovery licenses in the coming years. In order to prepare for and respond to the changing and growing market, the NRC is taking proactive steps to simultaneously maximize the amount of uranium recovered using ISR uranium recovery while minimizing impacts to human health and the environment.

Below are presented detailed discussions of the recent initiatives to develop more sustainable mining operations; followed by the NRC's initiative to produce timely guidance that will streamline the regulatory process, while safeguarding public health and safety, in issuing licenses for ISR uranium recovery facilities.

DETAILED DISCUSSIONS OF RECENT INITIATIVES TO ENHANCE SUSTAINABLE PRACTICES IN MINING

The following detailed discussions describe the outcomes of recent initiative by mining industry to develop more sustainable, socially-acceptable mineral recovery practices in this vital industry. These practices can, and in the view of the authors, must be adapted for and adopted by the uranium mining industry in order to produce the fuel demanded to support the global nuclear energy renaissance in support of global energy demands. It is believed that these initiatives provide extremely valuable insights to be discussed in the context of a new International Forum on Sustainable Options for Uranium Production, which will assist this industry in building improved public acceptance and market growth.

Mining, Minerals, and Sustainable Development

The MMSD released its first results in 2002 in its report: "Breaking New Ground: Mining, Minerals, and Sustainable Development"[6] and made clear recommendations for all the actors involved: governments, international institutions and NGOs, society, labor federations and business. It outlined boundaries of responsibility and called for transparent and accountable processes. The report includes an agenda for change and outlines nine key sustainable development challenges facing the sector:

1. Ensuring the long-term viability of the minerals industry
2. Control, use, and management of land
3. Using minerals to assist with economic development
4. Making a positive impact on local communities
5. Managing the environmental impact of mines
6. Integrating the approach to using minerals so as to reduce waste and inefficiency
7. Giving stakeholders access to information to build trust and cooperation
8. Managing the relationship between large companies and small-scale mining
9. Sector governance: clearly defining the roles, responsibilities, and instruments for change expected of all stakeholders.

The report also advised firms to develop a consistent system of reporting guidelines to ensure that key aspects of company practices and performance are publicly reported and verified.

MMSD had both global and regional components. MMSD Global was a project of the International Institute of Environment and Development (London). Independent regional teams were convened in North America as well as Australia, Europe, Indonesia and the Philippines, Latin America, and Southern Africa.

The International Institute for Sustainable Development (IISD) served as the North American regional partner. It was assisted in this task by the Mining Life-Cycle Centre, Mackay School of Mines, University of Nevada Reno.

The final report of MMSD, "Breaking New Ground", [6] was presented to the Global Mining Initiative Conference held in Toronto in May 2002. MMSD – North America released its final report "Towards Change" [3] to the 2002 Annual Meeting of the Mines Ministers of Canada held in Winnipeg in September 2002.

International Council on Mining and Metals

ICMM created a Sustainable Development Framework comprised of three elements including a set of 10 Principles, public reporting and independent assurance. The Sustainable Development Framework was developed systematically since the formation of ICMM in 2001, with its foundations in the MMSD project.

ICMM members have adopted the ICMM Sustainable Development Framework including a number of position statements:

- Extractive Industries Transparency Initiative (compliments Principle 1) – 16 June 2003
- Extractive Industries Transparency Initiative (compliments Principle 1) – 17 March 2005
- Mineral Resources and Economic Development (compliments Principle 9) – 20 October 2004
- Mining and Protected Areas (compliments Principles 6 and 7) – 20 August 2003
- Climate Change (compliments Principles 6, 8 and 9) – 10 May 2006

More information on our Sustainable Development Framework can be found in ICMM brochure, Working Together to Improve Industry Performance. [7]

10 Principles for sustainable development performance [8]

In May 2003, ICMM's CEO-led Council committed corporate members to implement and measure their performance against 10 Principles. The Principles are based upon the issues identified in the MMSD project - a 2-year consultation process with stakeholders to identify the issues relating to sustainable development in the mining and minerals sector.

The ICMM Principles are:

1. Implement and maintain ethical business practices and sound systems of corporate governance.
2. Integrate sustainable development considerations within the corporate decision-making process.
3. Uphold fundamental human rights and respect cultures, customs and values in dealings with employees and others who are affected by our activities.
4. Implement risk management strategies based on valid data and sound science.
5. Seek continual improvement of our health and safety performance.
6. Seek continual improvement of our environmental performance.
7. Contribute to conservation of biodiversity and integrated approaches to land use planning.
8. Facilitate and encourage responsible product design, use, re-use, recycling and disposal of our products.
9. Contribute to the social, economic and institutional development of the communities in which we operate.

10. Implement effective and transparent engagement, communication and independently verified reporting arrangements with our stakeholders.

During 2006, ICMM launched an assurance procedure to validate members' compliance with 10 sustainable development principles. It also released new guidance publications on materials stewardship and biodiversity protection, and a toolkit for enhancing socio-economic outcomes of mining investments.

In 2006, ICMM also prepared an Annual Review: "Setting the Standards to Meet the Challenge of Sustainable Development"[9]. The report records how its activities provide a benchmark for sustainable development performance in the mining and metals sector.

Global Reporting Initiative

GRI and ICMM developed a pilot sector supplement for the mining and metals sector. Sector supplements are a key part of the GRI reporting framework. The supplement is designed to complement and be used in addition to the GRI Guidelines. In terms of overarching policies and management systems, the mining and metals supplement calls for highlighting materials stewardship activities. In addition, thirteen supplementary indicators, as well as commentary to the GRI guidelines, have been developed to address economic, environmental and social aspects of Mining and Metals companies.[10]

Recently GRI and ICMM created a survey regarding the pilot mining and metals sector supplement. Respondents were invited opinion and experience with its use. GRI and ICMM will use input from the survey to update and finalize the pilot version.

International Forum on Sustainable Options for Uranium Production

IFSOU will serve as a focal point for industry, regulators, and NGOs to discuss relevant issues on environmental and socio-economic aspects of uranium production and to disseminate, through panels, workshops and other means, good production practices. It will also serve as a vehicle to lead industry, regulatory bodies and NGOs to find consensus on mechanisms to assure the sustainability of uranium production. Topics will focus on existing and new uranium projects in order to prevent the generation of legacies, i.e., working on the basis of a life-cycle assessment.

IFSOU will build upon results from former initiative and endeavor to fill gaps in scope of other initiatives. With a goal of providing concrete guidance, focusing on deployment of technologies, the outcome of IFSOU is to encourage operators to develop good operations – with a view that compliance with applicable national and international regulatory/safety guidance would be a minimum requisite. The challenge remains for operators to do so in an economically feasible way. It is also recognized that sustainability in a comprehensive sense (economic, environmental, societal) can only be achieved by involving all stakeholders.

Invitations to participate in IFSOU have been extended to industry, regulators, and NGOs. As of this writing, organizations including the IAEA, the World Nuclear Association, the US National Mining Association, the US Nuclear Regulatory Commission, the CNEA, Cameco Uranium Mining Corp., and others are committed to participate. With support of committed corporate hosts, IFSOU is able to welcome participants not only from countries with developed programs, but also those with newer programs in Latin America, and those with more currently developing programs, such as the countries in Asia, Central Asia, and Africa--who will be key players in the nuclear renaissance.

IFSOU will conclude with a discussion of key topics, and a collection of conclusions in a closing panel. Meeting summaries will be prepared for IFSOU participants.

Following the initial meeting in Phoenix, it is envisioned and anticipated that IFSOUP will, in cooperation with other industry initiatives, continue to organize meetings and discussions to actively develop and promote more sustainable operations in the uranium recovery industry.

NMA GEIS for ISR Uranium Recovery – Inclusion of Significant Stakeholder and Industry Input

As noted above, in order to prepare for and respond to the changing and growing demand for uranium production, the NRC is taking proactive steps to simultaneously maximize the amount of uranium recovered using ISR uranium recovery while minimizing impacts to human health and the environment. The purpose of NRC's development of a GEIS for ISR uranium recovery is to license and regulate industry's proposals to construct, operate, and decommission facilities for ISR uranium recovery, in order to recover uranium (contributing to US uranium production) while minimizing environmental and social impacts. The NRC's need for action is to fulfill its statutory responsibility to protect public health and safety and the environment in matters related to source nuclear material (AEA, as amended).

Specifically, under the Atomic Energy Act of 1954, as amended (AEA), the NRC has statutory responsibility for the protection of public health and safety and the environment related to source nuclear materials (defined as uranium and/or thorium). One portion of NRC's responsibility is to issue source material licenses to "receive title to, receive, possess, use, transfer, or deliver any source material after removal from its place of deposit in nature" (10 Code of Federal Regulations [CFR] Parts 40.1 and 40.3).

The National Environmental Policy Act (NEPA) of 1969 requires all Federal agencies, including the NRC, to assess the potential environmental, social, and economic impacts resulting from various alternative courses of action during the planning stages of projects, plans, policies, and programs. The analyses help inform Federal decision-makers of the impacts that could result from the selection of one of various alternatives. NRC intends to develop a GEIS under NEPA that will address general impacts on human health and the environment resulting from ISR uranium recovery licensing and operations and that the GEIS will serve as a programmatic document on which site-specific studies, investigations, and compliance documentation will be based. This will allow documentation to ensure compliance with NEPA to be tiered to the NRC GEIS in accordance with applicable regulations.

During the scoping period for development of the NRC's GEIS, the NRC gathered significant stakeholder inputs. Indeed, after holding two public meetings (one each in Wyoming and in New Mexico), the NRC scheduled a third scoping meeting to allow for still further stakeholder inputs. In addition, during this process, the National Mining Association (NMA) and member companies compiled more than 1,400 documents to support industry development of a Generic Environmental Report (GER) to submit to the NRC in support of NRC's development of a Generic GEIS by the NRC on the licensing, construction, operation, and decommissioning (e.g., the lifecycle) of in situ leach uranium recovery (ISR uranium recovery) facilities.

The GER was prepared to conform to NEPA (42 United States Code [U.S.C.] 4321), applicable Council on Environmental Quality (CEQ) regulations (40 CFR Parts 1500-1508), applicable NRC regulations (10 CFR Parts 40 and 51), the following primary guidance documents, and many others:

- Standard Review Plan for In Situ Leach Uranium Extraction License Applications, Final Report (NUREG-1569), NRC, June 2003.
- A Baseline Risk-Informed, Performance-Based Approach for In Situ Leach Uranium Extraction Licenses (NUREG/CR-6733), NRC, September 2001.

- Environmental Review Guidance for Licensing Actions Associated with NMSS Programs, Final Report (NUREG-1748), NRC, August 2003.
- Guidebook on Environmental Impact Assessment for In Situ Leach Mining Projects (IAEA-TECDOC-1428), International Atomic Energy Agency, May 2005.

ISR uranium recovery facilities recover uranium from low grade ores that may not be economically recoverable by other methods. In this process, a leaching agent, such as oxygen with sodium bicarbonate, is added to native ground water for injection through wells into the subsurface ore body to dissolve the uranium. The leach solution, containing the dissolved uranium, is pumped back to the surface and sent to the processing plant, where ion exchange is used to separate the uranium from the solution. The underground leaching of the uranium may also liberate other metals and minerals from the host rock. Operators of ISR uranium recovery facilities are required to restore the ground water affected by the mining operations to the pre-mining class of use. The milling process concentrates the recovered uranium into the product known as “yellowcake” (U₃O₈). The yellowcake is then shipped to uranium conversion facilities for further processing in the overall uranium fuel cycle (IAEA, 2005). Drawing upon more than 25 years of industry experience and data, detailed descriptions of ISR uranium recovery facilities, processes, and technical approaches currently used by industry, as well as those that could be used in the future, are presented in the GER. The GER was submitted to NRC during the scoping period for development of the GEIS.

SUMMARY AND CONCLUSIONS

The uranium mining industry is poised to begin the serious and complex process of defining what sustainability means to the industry and how to achieve it. Four important recent initiatives have provided the framework for a path forward. First, the NMA sustainable development pledge provides a broadly acceptable commitment to sustainability. Consistent with development of a sustainable industry that recognizes social and economic factors is the US NRC’s development of a GEIS for ISR Uranium Recovery. The NMA has cooperatively compiled and submitted to NRC more than 25 years of industry experience to enable the NRC to build on this experience while also considering scoping comments from a large pool of stakeholders in this process. Second, MMSD outlined nine key sustainable development challenges facing the mining sector as well as the Seven Questions to Sustainability to use in setting a path forward. Third, ICMM developed 10 performance principles for sustainable development. And finally, the Global Reporting Initiative developed a pilot sector supplement for the mining and metals sector sustainable reporting. Together, these efforts, led mostly by industry, laid a solid groundwork for the mining industry to begin implementing sustainable development practices. Building from these stepping stones, and the recent increase in public awareness and concern regarding sustainable development, the time has come for the uranium industry to begin taking steps toward sustainable operations. IFSOUP is meeting to enhance international cooperative dialogues and to build industry, agency and NGO cooperation for enhancing global sustainability in uranium production operations, with an eye to avoiding legacy issues found in past operations

REFERENCES

1. “Our Common Future, Report of the World Commission on Environment and Development”, World Commission on Environment and Development, 1987. Published as Annex to General Assembly document A/42/427, Development and International Co-operation: Environment August 2, 1987.
2. Hargroves, K. and M. Smith (Eds.) 2005. “The Natural Advantage of Nations: Business Opportunities, Innovation and Governance in the 21st Century”. ISBN 1-84407-121-9, 525 pages. Earthscan/James&James. Online companion at www.thenaturaladvantage.info

3. MMSD. *Toward Change. The Work and Results of MMSD-North America.* September 2002. Available online at http://www.iisd.org/pdf/2002/mmsd_mining_toward_change.pdf
4. U.S. National Mining Association web page – NMA Sustainable Development Principles http://www.nma.org/policy/sustainable_dev.asp
5. Cameco. “Sustainable Development Business Case.” 2007. Available online at http://www.cameco.com/sustainable_development/about/
6. Rio Tinto. “Sustainable Development Review.” 2006. Available online at http://www.riotinto.com/documents/ReportsPublications/riotinto_2006_sustainable_development_review.pdf
7. MMSD. “Breaking New Ground: Mining, Minerals, and Sustainable Development.” May 2002. Available online at <http://www.wbcsd.org/DocRoot/ev8jEJvTiMYd4mJhGGHQ/finalmmsdreport.pdf>
8. ICMM. “Working Together to Improve Industry Performance.” Available online at: http://www.icmm.com/uploads/1677ICMM_SDF_Final.pdf
9. ICMM. “ICMM Principles.” Available on line at: http://www.icmm.com/publications/ICMM_Principles_en.pdf
10. ICMM. “Setting the Standards to Meet the Challenge of Sustainable Development.” Available online at <http://www.icmm.com/publications/1567ICMMAR06.pdf>
11. GRI. “GRI Mining and Metals Section Supplement. Pilot Version 1.0.” February 2005. Available online at: http://www.globalreporting.org/NR/rdonlyres/25EEF0C7-F050-48CA-9FF5-C79F359D9976/0/SS_MiningMetals_ENG.pdf