

## ***Community Engagement and Mining – Mining’s Contribution to Sustainable Development***

***Dirk van Zyl, Mining Life-Cycle Center, University of Nevada, Reno***

### **Key Concept:**

Sustainable Development is a concept that can be applied to mining. Engagement is one of the most important aspects of applying it at a mine. It is up to all the communities of interest to make this work, not only the mining company.

### **Skills:**

- Observing, Recording, Investigating, Problem Solving

### **Time:**

- 75 minutes

### **Audience:**

- Teachers and Students, grades 9 to 12

### **Objective**

To understand the broad concepts of sustainable development and how it can be applied to help resolve controversial issues associated with mining.

## **Applicable Nevada State Science Standards (2005):**

### **Nature of Science**

- N.8 A.1:** Students know how to identify and critically evaluate information in data, tables and graphs.
- N.8 A.3:** Students know how different explanations can be given for the same evidence.
- N.12 A.1:** Students know tables, charts, illustrations and graphs can be used in making arguments and claims in oral and written presentations.
- N.8 B.1:** Students understand that consequences of technologies can cause resource depletion and environmental degradation, but technology can also increase resource availability, mitigate environmental degradation and make new resources economical.
- N.12 B.1:** Students know science, technology and society influenced one another in both positive and negative ways.
- N.12 B.2:** Students know consumption patterns, conservation efforts and cultural or social practices in countries have varying environmental impacts.
- N.12 B.4:** Students know scientific knowledge builds on previous information.

### **Life Science**

- L.12 C.3:** Students know the amount of living matter an environment can support is limited by the availability of matter, energy, and the ability of the ecosystem to recycle materials.

### **Earth Science**

- E.8 C.6:** Students know minerals have different properties and different distributions according to how they form.
- E.8 C.7:** Students know the characteristics, abundances, and location of renewable and nonrenewable resources found in Nevada.
- E.12 C.3:** Students know elements exist in fixed amounts and move through solid earth, oceans, atmosphere and living things as part of biogeochemical cycles.
- E.12 C.4:** Students know processes of obtaining, using, and recycling of renewable and non-renewable resources.

## Sustainable Development and Mine-Project Life Cycle

Brundtland Definition of Sustainable Development<sup>1</sup>:

*Development that meets the needs of the present without compromising the ability of future generations to meet their own needs.*

It is not an oxymoron to talk about mining and sustainable development in the same sentence. Metals and minerals are absolutely necessary for a sustainable future of everybody on the planet. Recycling and re-use of materials obviously play an important role in supplying metals and minerals to mankind. The issue is how mining can contribute to sustainable development, not how a mining project can be sustainable; all ore bodies and mining projects are finite.

Sustainability is:

- A concept of needs;
- An idea of limitations;
- A future oriented paradigm; and
- A process of change.

The three pillars (or three legs of the chair) of sustainable development are: social responsibility/equity; environmental protection; and economic prosperity. It is important that all three these aspects be considered when applying sustainable development principles. Having a stellar environmental profile alone without paying attention to social responsibility will not contribute to sustainable development.

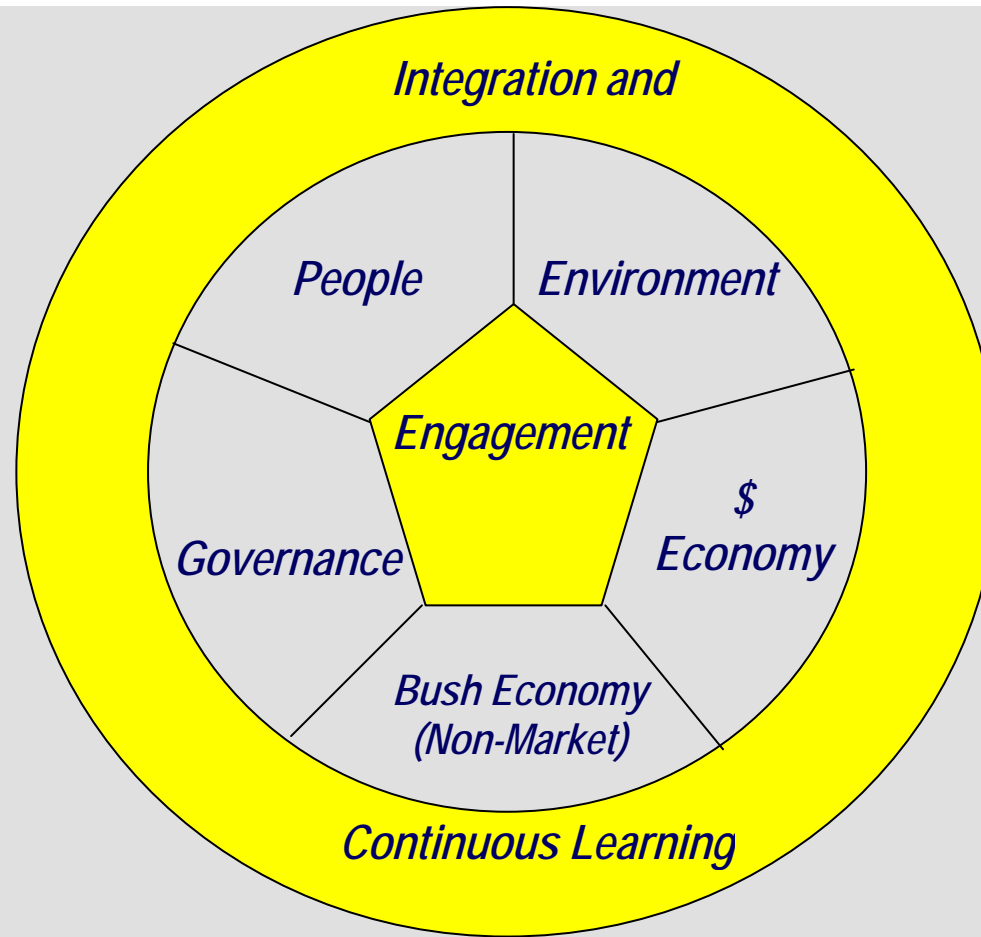
These ideas are good in concept, however very difficult to apply in practice for a specific mining project. During the last two years a broad group of participants from the mining industry, academia, federal and state agencies, consultants, environmental non-governmental organizations (ENGO's) and others were part of the Mining, Minerals and Sustainable Development project in North America that compiled an approach known as the Seven Questions to Sustainability<sup>2</sup>. This approach is meant to take the concept of Sustainable Development and make it applicable on the project scale.

A very useful schematic of the Seven Questions resulted from the work of Ian Thomson with On Common Ground, Inc., a Vancouver-based consulting group. This schematic is shown in Figure 1 on the next page and further details of the Seven Questions are given in Table 1. The key aspect is to realize that community engagement is central to implementing sustainable development principles at a mine site. Figure 1 clearly shows the centrality of this concept.

---

<sup>1</sup> World Commission on Environment and Development (1987) *Our Common Future*, Oxford University Press.

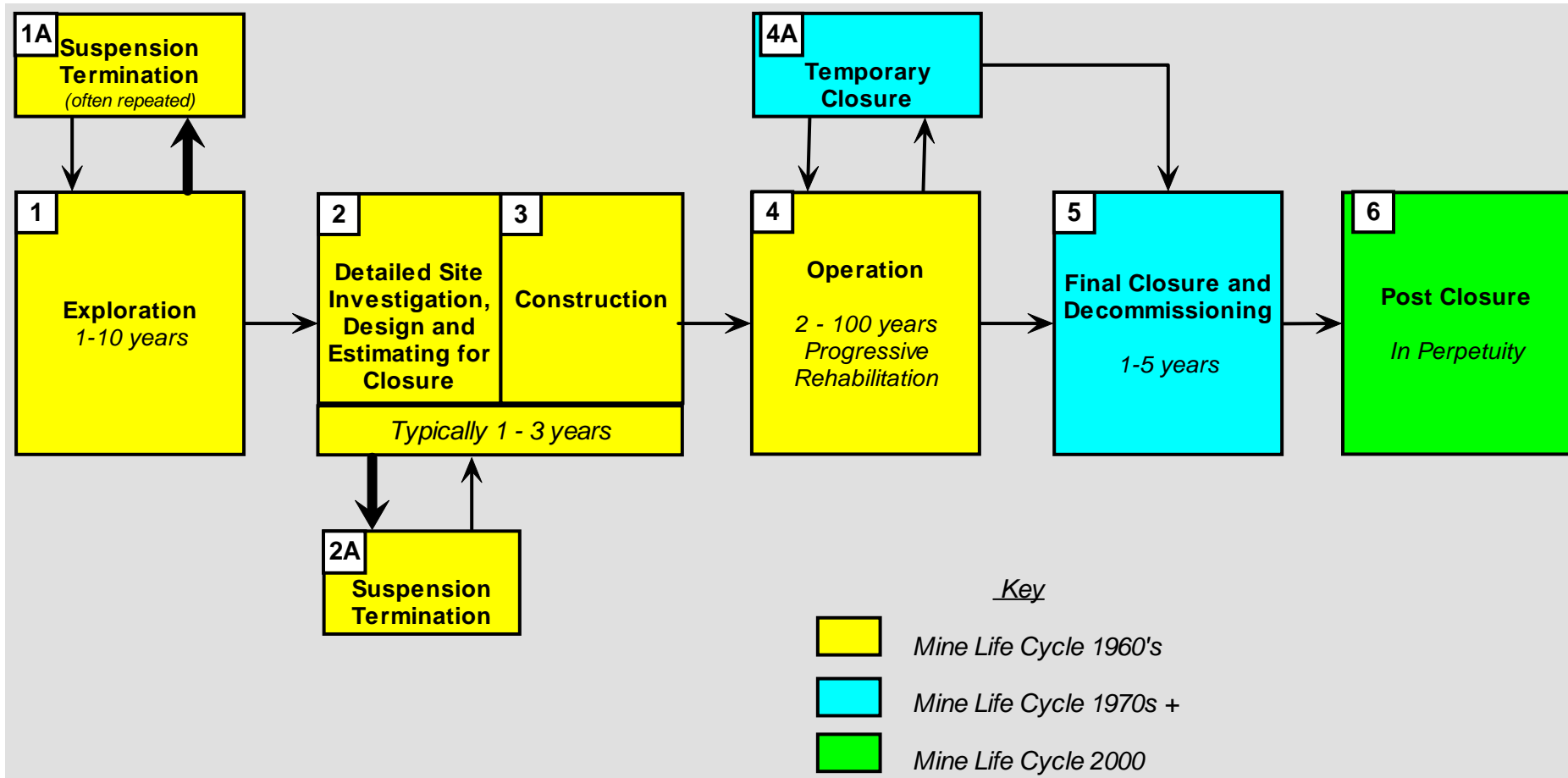
<sup>2</sup> International Institute for Sustainable Development (2002) *Seven Questions to Sustainability*, 54 pp (available on [www.iisd.org/mmsd](http://www.iisd.org/mmsd))



**Figure 1. Seven Questions to Sustainability (after Ian Thompson, 2003, On Common Ground Consulting, Vancouver, BC)**

**Table 1**  
**THE SEVEN QUESTIONS IN DETAIL**

<i>Question</i>	<i>Sub-elements</i>
<p><b>1. Engagement.</b> Are processes of engagement committed to, designed, and implemented that:</p> <ul style="list-style-type: none"> <li>• ensure all affected communities of interest (including vulnerable or disadvantaged sub-populations by reason of, for example, minority status, gender, ethnicity, or poverty) have the opportunity to participate in the decisions that influence their own future; and</li> <li>• are understood, agreed upon by implicated communities of interest and consistent with the legal, institutional, and cultural characteristics of the community and country where the project is located?</li> </ul>	<p>1.1 Engagement processes 1.2 Dispute Resolution Mechanism 1.3 Reporting and Verification 1.4 Adequate Resources 1.5 Informed and Voluntary Consent</p>
<p><b>2. People:</b> Will the project/operation lead directly or indirectly to maintenance of people's well being (preferably an improvement):</p> <ul style="list-style-type: none"> <li>• during the life of the project or operation?</li> <li>• In post-closure?</li> </ul>	<p>2.1 Community Organizational Capacity 2.2 Social/Cultural Integrity 2.3 Worker and Population Health 2.4 Availability of Basic Infrastructure 2.5 Direct, Indirect and Induced Effects 2.6 Full Social/Cultural Costs, Benefits, Risks 2.7 Responsibilities and Sureties 2.8 Distribution of Costs, Benefits, and Risks 2.9 Social/Cultural Stress and Restoration</p>
<p><b>3. Environment.</b> Will the project/operation lead directly or indirectly, to the maintenance or strengthening of the integrity of biophysical systems so that they can continue in post closure to provide the needed support for the well-being of people and other life forms?</p>	<p>3.1 Ecosystem Function, Resilience, and Self-organizing capacity 3.2 Ecological Entitlement 3.3 Full Ecosystem Costs, Benefits, Risks 3.4 Responsibilities and Sureties 3.5 Environmental Stress and Action to Ensure Ecosystem Integrity</p>
<p><b>4. Economy:</b> Is the financial health of the project/operation assured and will the project or operation contribute (through planning, evaluation, decision-making and action) to the long-term viability of the local and regional economy in ways that will help ensure sufficiency for all and provide specific opportunities for the less advantaged?</p>	<p>4.1 Project or Operation Economics 4.2 Operational Efficiencies 4.3 Economic Contributions 4.4 Community/Regional Economies 4.5 Government and Broader Society Economies</p>
<p><b>5. Traditional and Non-market Activities.</b> Will the project/operation contribute to the long-term viability of traditional and non-market activities in the implicated community and region?</p>	<p>5.1 Activity/Use levels 5.2 Traditional/Cultural Attributes</p>
<p><b>6. Institutional Arrangements and Governance:</b> Are the institutional arrangements and systems of governance in place to provide a reasonable degree of confidence that the capacity to address project or operation consequences will continue to exist through the full life-cycle including post closure?</p>	<p>6.1 Efficiency and Effectiveness in the Mix of Legislated Rules, Voluntary Programs, Market Incentives, and Unspoken Cultural Norms 6.2 Capacity to Address Operational Consequences 6.3 Bridging to Post Closure Conditions 6.4 Overall Confidence that Commitments Made Will be Fulfilled</p>
<p><b>7. Synthesis and Continuous Learning:</b> Has an overall evaluation been made and is a system in place for periodic evaluation based on:</p> <ul style="list-style-type: none"> <li>• Consideration of all reasonable alternative configurations and designs at the project level (including the no-go option in the initial evaluation)</li> <li>• Consideration of all reasonable alternatives at the overarching strategic level for supplying the commodity and the services it provides for meeting society's needs</li> <li>• A synthesis of all the factors raised in this list of questions, leading to an overall judgement that the contribution to people and ecosystems will be net positive over the long term?</li> </ul>	<p>7.1 Project Level Alternatives 7.2 Strategic Level Alternatives 7.3 Overall Synthesis 7.4 Continuous Learning and Improvement</p>



**Figure 2. The Mine-Project Life Cycle (after Tony Hodge, 2003, Anthony Hodge Consulting, Inc. Mont Joli, Quebec))**

It is important that all seven questions be addressed throughout the Mine-Project Life Cycle to enhance the mine's contribution to sustainable development. Note that Figure 2 indicates that the approach until the 1960's was to walk away after the operation of a mine without being concerned about reclamation. Closure, decommissioning and reclamation are concepts that developed in the 1970's. The new concept is that the mine is a bridge between the pre-mining and post closure conditions of the ecosystem and the communities; the mine must ultimately contribute to their well-being. We have moved away from an approach where impacts are mitigated to an approach where the project should make a contribution.

## **New State Resources Gold Mine**

New State Resources, an Irish company, has been operating a Gold Mine in the U.S. for the last 8 years. The mine is located 10 miles north of Bravo, a town with about 2,000 inhabitants. The mine employs 200 people, living in Bravo and the surrounding area. Agriculture, mostly grazing and some irrigation, make up the rest of the local economy.

New State Resources have been mostly in regulatory compliance since it opened the mine, according to the State Regulatory Agency. There have been a few cyanide spills when pipes to the heap leach facility broke. The public in Bravo only heard about these when employees (who were instructed by the mine not to talk) told their neighbors about it. There has been a number of General Managers at the mine since it opened, they were sometimes from the U.S. but the last two (over the last three years) have been a Canadian and Australian. They often kept to themselves and did not share much information about the mine with the public in Bravo. The environmental manager at the mine, Tom Dickson, has been at the mine since it opened. He has served on the Bravo city council and has been a baseball coach. Ongoing exploration at the mine has resulted in a new prospect that may extend the mine life by 20 years.

Four members of the six-member Bravo town council have been on the council for the last 20 years. There have been rumors that the New State Resources Gold Mine may close in the next two years if they cannot get the extension permitted. The mine built a new baseball field for Bravo three years ago and it has added much to the town's prestige as they can now host regional tournaments. The town council has requested funding from the new mine manager for lights for the baseball field.

Tim Troy, who grew up in Bravo and went to Europe for some undergraduate studies, recently returned to town and started working with an ENGO on mining related issues. The ENGO is headquartered in the neighboring state and one or two of its members have been seen in town. Tim has been protesting the potential further developments at the mine on the basis that the mine has not been honest about all the environmental problems, including the cyanide spills. He is not popular with many of the town's people and the mine employees feel betrayed by one of their own.

### **Assignment:**

- Class to divide into three groups, one representing the mine, the others representing the Bravo public and the ENGO respectively. Each group should list the issues facing them. Consider the elements of the seven questions. Each group must select a spokes person to report the result of the discussions.
- What can each group do to become part of the solution for the future of the mine, the public in Bravo and the ENGO?
- What actions must be taken to start the process?