BIRDSEED MINING ACTIVITY

	N.5.A.2	N.5.A.5	N.5.A.6	N.5.B.1	P.5.A.3	E.5.C.3
Grades 4-5 NMA Activities, Nevada State Science Education Standard Correlation. Referencing Science Standards 2005 http://www.doe.nv.gov/standards/standscience.html						
Birdseed Mining	X	X	X	X	X	X

PURPOSE: Mining is a complex process in which relatively small amounts of valuable or useful minerals or metals (ores) are extracted from very large masses of rock. This activity will illustrate how this "needle in a haystack" process works.

OBJECTIVE: Students will be able to experience "hands-on" the difficulty that miners face in locating valuable mineral deposits. They will also learn a simple lesson in economics--a less valuable commodity may be more profitable because it is more abundant. Students will be shown the importance of clean, environmentally conscious mining, and that all mining operations must perform work to reclaim the land when mining is completed.

ITEMS NEEDED:
• **Wild Bird Food** - any commercial birdseed mix with sunflower seeds and other seed varieties.
• **Shallow pans** (inexpensive plastic paint pans work well).
• **Paper plates or bowls**
• **Small beads** (approximately 2mm) in colors of blue, gold and silver.
• **Medium beads** (approximately 4-6mm) white color.
• **Birdseed Mining Spreadsheet** (found at the back of the activity instructions)

INSTRUCTIONS:
1. Divide students into groups of 4 to 6. Assign each group a number or have the students decide on a name for their mining "company".

2. Pour approximately 1-1/2 pounds of birdseed into each pan.

3. Add 2 gold beads, 4 silver beads, 8 blue beads, and 3 white beads to each pan - mix into birdseed.

4. The beads represent the following:
   a. Gold beads   =   Gold
   b. Silver beads   =   Silver
   c. Blue beads   =   Copper
   d. All the birdseed =   Waste
   e. White beads   =   The white beads represent incentives or rebates that will be deducted from the cost of Reclamation. In the mining world, these might represent the refund of a portion of a reclamation bond as a result of concurrent reclamation or a cost reduction for some type of environmental mitigation service performed by the company.   (See 7.)

5. Students search through the seed mixture and remove the beads they find to a bowl or plate. Allow 5-10 minutes for the mining activity.

NOTE: The instructor should hint to the students that they should mine NEATLY, not mixing waste seeds with their beads, sunflower seeds and not scattering seeds all over the area. The instructor can have the option of examining the work of each group, or assigning a helper to monitor each group to see how cleanly the "mining" is being done. Instructor or helper may assign an arbitrary "fine" to cover costs for "environmental damage" at the messy tables. Environmental damage fines should be recorded on the "Birdseed Mining Spreadsheet" in the appropriate space.

6. Assign a value for each type of bead or seed.
    <u>Example</u> follows:

Gold bead	=	Gold	=	$ 5.00 each
Silver bead	=	Silver	=	$ 4.00 each
Blue bead	=	Copper	=	$ 3.00 each
All other seeds	=	Waste	=	$ 0.00
White beads	=	Reclamation incentive	=	$10.00 each

    NOTE: Depending on the math ability of a particular group, these values can be changed to suit the instructor's needs. For example, the value assigned for each commodity could be based on the current actual market price which can usually be found in the business section of your newspaper. Four "Birdseed Mining Spreadsheets" are included with this activity that range from elementary for the very young students to advanced for the older ones. Select the one that best fits your students' mathematical abilities.

7. Have the students count up the number of gold, silver, blue and white beads and record them in the proper spaces on the "Birdseed Mining Spreadsheet". Students should also note the amount of any environmental damage fines on the spreadsheet. The environmental damage fine is subtracted from the Total Product Value. There is a space on the spreadsheet for the Cost of Mined Land Reclamation. That number can be determined by the teacher in advance and based on a value of 10-15% of the total product value of the "ore" beads. That amount should be recorded on the <u>Cost of Mined Land Reclamation</u> line of the spreadsheet and the amount subtracted from the Total Product Value minus Cost of Environmental Damage Fines. Students should count the number of white beads they collected and record that number in the appropriate space on the spreadsheet. The number found is multiplied by the "Reclamation Rebate" factor which is determined in advance by the teacher, and the total is recorded in the appropriate space on the spreadsheet. The "Reclamation Rebate" is ADDED to the Subtotal of Total Product Value minus Environmental Damage Fines minus Cost of Mined Land Reclamation. The GRAND TOTAL is the profit (+) or loss (-) made by the "birdseed mining" company.

8. NOTE: List the group numbers or company names on a blackboard and compare the results of each companies mining ability. Let them know how many beads were actually in the birdseed mix and show them the maximum amount that could be made if all were found and no environmental damage fines were incurred.

9. Prizes such as rock or mineral samples or candy may be awarded to the best table of "miners".

Birdseed Mining Spreadsheet - Beginning

Gold Bead equals GOLD:

Number of Beads _____ x _____ = _____
                              price   value

Silver Bead equals SILVER:

Number of Beads _____ x _____ = _____
                              price   value

Blue Bead equals COPPER:

Number of Beads _____ x _____ = _____
                              price   value

TOTAL Product Value = _____

SUBTRACT Cost of Environmental Damage Fines = - _____

SUBTOTAL = _____

COST of Mined Land Reclamation = - _____

SUBTOTAL AFTER RECLAMATION COST = _____

Number of WHITE Beads _____ x _____ = + _____
(Reclamation Rebate)   value

GRAND TOTAL _____
($ Profit(+) / Loss (-))

Birdseed Mining Spreadsheet - Intermediate

Each Gold Bead = 10 ozs. of GOLD:

Number of Beads _____ x 10 ozs. x _____ = _____
                                          price   value

Each Silver Bead = 10 ozs. of SILVER:

Number of Beads _____ x 10 ozs. x _____ = _____
                                          price   value

Each Blue Bead = 100 lbs. of COPPER:

Number of Beads _____ x 100 lbs. x _____ = _____
                                           price   value

TOTAL Product Value = _____

SUBTRACT Cost of Environmental Damage Fines = - _____

SUBTOTAL = _____

COST of Mined Land Reclamation = - _____

SUBTOTAL AFTER RECLAMATION COST = _____

Number of WHITE Beads _____ x _____ = + _____
(Reclamation Rebate)   value

GRAND TOTAL _____
($ Profit(+) / Loss (-))

Birdseed Mining Spreadsheet - Advanced

Each Gold Bead = 100 ozs. of GOLD:

    Number of Beads   _____ x 100 ozs. x _____ = _____
                                                           price   value

Each Silver Bead = 100 ozs. of SILVER:

    Number of Beads   _____ x 100 ozs. x _____ = _____
                                                           price   value

Each Blue Bead = 1 ton (2,000 lbs.) of COPPER:

    Number of Beads   _____ x 2,000 lbs. x _____ = _____
                                                           price   value

TOTAL Product Value = _____

SUBTRACT Cost of Environmental Damage Fines = **-** _____

SUBTOTAL = _____

COST of Mined Land Reclamation = **-** _____

SUBTOTAL AFTER RECLAMATION COST = _____

Number of WHITE Beads _____ x _____ = **+** _____
    (Reclamation Rebate)   value

GRAND TOTAL _____

($ Profit(+) / Loss (-))

Birdseed Mining Spreadsheet
Bead Spreadsheet

Gold bead equals GOLD: Number of Gold beads found: _____

Silver bead equals SILVER: Number of Silver beads found: _____

Blue bead equals COPPER: Number of Blue beads found: _____

White bead equals GYPSUM: Number of White beads found: _____

TOTAL NUMBER OF BEADS FOUND: _____

Crusty Facts

Some information about the composition of the earth's crust:

70.0%	**-**	**Silicates - quartz, feldspar, mica**
5.0%	**-**	**Iron**
.02%	**-**	**Nickel**
.01%	**-**	**Copper**
.004%	**-**	**Zinc**
.002%	**-**	**Lead**
.0001%	**-**	**Molybdenum**
.0001%	**-**	**Mercury**
.00001%	**-**	**Silver**
.0000001%	**-**	**Gold**