

MODULE ENM1020: NONRENEWABLE RESOURCES

Level: Introductory

Theme: Technology and Applications

Prerequisite: None

Module Description: Students examine general applications of exploration, recovery and production, refining, and reclamation technologies within a nonrenewable energy or mineral industry; and they identify related career opportunities. Potential areas of investigation include conventional crude oil, oil sands, natural gas, coal, nuclear fuels, metallic minerals, nonmetallic minerals and structural materials.

Module Parameters: Access to a science laboratory and a local energy/mineral industry.

Access to resource maps available from government agencies and professional associations (e.g., Natural Resources Canada, Alberta Geological Survey, Alberta Energy Utilities Board).

Access to community-based interpretive centres/museums (e.g., Energeum, Fort McMurray Oil Sands Interpretive Centre).

Off-campus learning may support the development of knowledge and skills in exploration, production, refining and/or reclamation practices; consultation with the work-site supervisor will ensure that relevant safety considerations are addressed.

See the *Off-Campus Education Guide for Administrators, Counsellors and Teachers* (Alberta Education) for further information regarding off-campus learning.

Supporting Module: CTR1210 Personal Safety (Management) [Career Transitions Strand]; recommended for off-campus learning

Note: Students must have a general knowledge of potential hazards and accepted safety practices relevant to specific exploration, recovery, refining and/or reclamation sites prior to engaging in off-campus learning experiences. See Planning for Instruction in Section C for further information regarding student safety.

MODULE ENM1020: NONRENEWABLE RESOURCES (continued)

Module Learner Expectations	Assessment Criteria and Conditions	Suggested Emphasis
<p><i>The student will:</i></p> <ul style="list-style-type: none"> • identify career opportunities relevant to a nonrenewable energy or mineral industry • demonstrate basic competencies. 	<p><i>Assessment of student achievement should be based on:</i></p> <ul style="list-style-type: none"> • through laboratory and/or field-based investigations, identifying principles of science and technology used in at least one area of industry exploration, production, refining or reclamation. <p><i>Assessment Tool</i> <i>Lab Investigations: Introductory Level, ENMLAB-1</i> <i>Observation Checklist for Field-based Investigations, ENMOBS</i></p> <p><i>Standard</i> <i>Conduct lab investigations to a standard of 1 on the rating scale <u>and/or</u> complete all sections of the observation checklist for field-based investigations</i></p> <ul style="list-style-type: none"> • given current resources on career opportunities in a nonrenewable energy or mineral sector, completing a research project on one or more related careers. <p><i>Assessment Tool</i> <i>Career Search: Introductory Level, ENMCAR-1</i></p> <p><i>Standard</i> <i>Conduct research to a standard of 1 on the rating scale</i></p> <ul style="list-style-type: none"> • observations of individual effort and interpersonal interaction during the learning process. <p><i>Assessment Tool</i> <i>Basic Competencies Reference Guide and any assessment tools noted above</i></p>	<p>10</p> <p>Integrated throughout</p>

MODULE ENM1020: NONRENEWABLE RESOURCES (continued)

Concept	Specific Learner Expectations	Notes
History, Formation and Use	<p><i>The student should:</i></p> <ul style="list-style-type: none"> • describe major historical events in the development of a nonrenewable energy or mineral resource in Alberta; e.g.: <ul style="list-style-type: none"> – logistics of exploration – problems/issues in development – boom and bust cycles – technological advances • show the resource on a map of Alberta • describe basic geological processes and structures responsible for resource formation • identify and describe products and by-products derived from the resource; e.g.: <ul style="list-style-type: none"> – fuel – nonfuel • explain how the resource has influenced both the people and the economy of Alberta; e.g.: <ul style="list-style-type: none"> – economic benefits – material products and services – employment • identify environmental issues resulting from the use of nonrenewable resources; e.g.: <ul style="list-style-type: none"> – greenhouse gases – acid deposition – resource depletion • research forecasts regarding future resource supply and demand, and options for ensuring a sustainable future; e.g.: <ul style="list-style-type: none"> – using less – finding alternative sources. 	<p>Discuss social, economic and environmental issues affecting resource development.</p> <p>Focus attention on:</p> <ul style="list-style-type: none"> • concept of geologic time • rock and mineral formation • important elements of Alberta geography • theory of plate tectonics. <p>Products and by-products may include:</p> <ul style="list-style-type: none"> • space and water heating • heat for industrial purposes • fuels for transportation • electricity • petrochemicals • metallic/nonmetallic materials. <p>Discuss resource ownership/royalties and subsequent benefits to society.</p> <p>Involve students in high interest research activities; e.g.:</p> <ul style="list-style-type: none"> • gold panning/slucing • rock/mineral collecting • potential cottage industry.
Nonrenewable Resource Technology	<ul style="list-style-type: none"> • describe basic exploration techniques used within a nonrenewable energy or mineral industry in Alberta; e.g.: <ul style="list-style-type: none"> – topographical features – drilling techniques – seismic operations 	<p>Plan field trips into the community.</p> <p>Involve knowledgeable persons from local business and industry.</p>

MODULE ENM1020: NONRENEWABLE RESOURCES (continued)

Concept	Specific Learner Expectations	Notes
<p>Nonrenewable Resource Technology (continued)</p>	<p><i>The student should:</i></p> <ul style="list-style-type: none"> • describe basic recovery and production technologies used within the industry; e.g.: <ul style="list-style-type: none"> – service rigs – chemical processes – strip mining • describe basic refining and manufacturing techniques used within the industry; e.g.: <ul style="list-style-type: none"> – cracking and fractionating – smelting and milling • describe basic reclamation technologies used within the industry; e.g.: <ul style="list-style-type: none"> – exploration/process area restoration – strip mine restoration. 	<p>Describe current techniques used to prevent/minimize environmental impact:</p> <ul style="list-style-type: none"> • H₂S gathering and storage • cooling pits for waste water • liners for storage tanks. <p>Identify strategies used to recover a nonrenewable resource in the most effective, efficient and beneficial manner.</p>
<p>Career Opportunities</p>	<ul style="list-style-type: none"> • research career opportunities associated with the development of a nonrenewable energy or mineral resource; e.g.: <ul style="list-style-type: none"> – resource exploration – recovery and production – refining and manufacturing – reclamation • interpret employment statistics within one or more employment sectors; e.g.: <ul style="list-style-type: none"> – type of careers – number of workers – employment trends • predict career opportunities and trends from employment statistics • research education and training requirements for employment within one or more career areas. 	<p>Contact the “Career Information Hotline” (Alberta Advanced Education and Career Development).</p> <p>See the National Occupational Classification System (NOC) in Section H: Linkages/Transitions.</p> <p>Invite local business/industry representatives to explain:</p> <ul style="list-style-type: none"> • the human resource/personnel structure of a resource company • service departments and related occupations. <p>Predict future industry trends and career opportunities</p> <p>Assess current employment opportunities in a chosen field.</p> <p>Arrange/facilitate:</p> <ul style="list-style-type: none"> • information interviews • work study/work experience • job shadowing.

