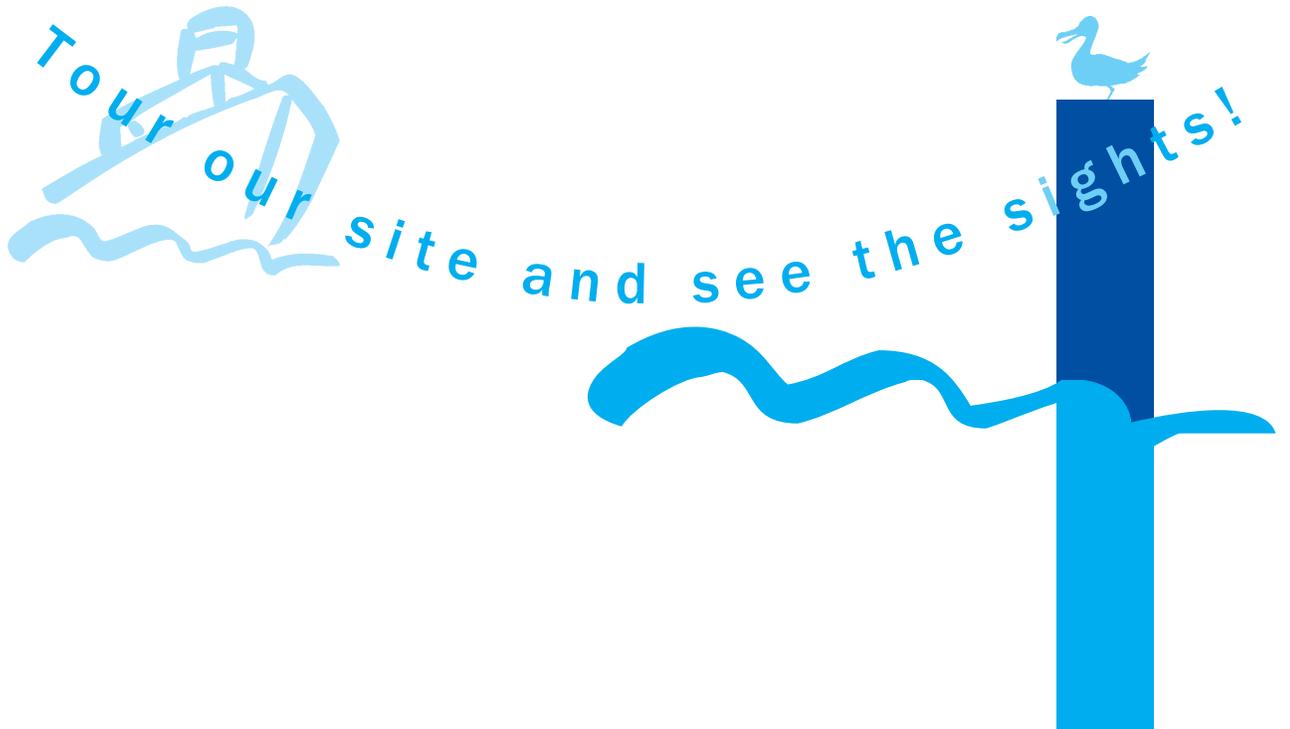


Local neighbours global partners

Kindergarten to Grade 12 School Program

Pacific Coast Terminals Company Ltd.
Port Moody, British Columbia



Local
neighbours
global
partners

Kindergarten to Grade 12 School Program



Pacific Coast Terminals Co. Ltd.

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Port Moody, British Columbia



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introduction



PACIFIC COAST TERMINALS Co. Ltd. (PCT) is the link between ship and shore for Western Canada's resource companies and their global markets. PCT is the largest sulphur export terminal in the world and also one of the largest bulk liquid export terminals in the Port of Vancouver. Originally founded in New Westminster in 1929, PCT today covers 108 acres at the head of the Burrard Inlet in Port Moody.

PCT is committed to maintaining a healthy and safe environment and to reaching out to the local community in support of arts and education. The terminal received the Burrard Inlet Environmental Action Program's "Award for Environmental Excellence" in 1997 and the ARC Arts Council's "Service in the Arts" award in recognition of its outstanding support, contribution and leadership in 1996.

What Happens at PCT?

BULK SULPHUR AND LIQUID ETHYLENE glycol arrive by train and are then stored and/or sent to ports around the world via ships. PCT receives more than 150 ships and 48,000 rail cars annually. The terminal handles more than 3.5 million tonnes of sulphur and more than 700,000 tonnes of bulk liquid each year. (See Teacher Backgrounders on page 45 and Student Resources, *Web Sites* on page 57 for more information about sulphur and ethylene glycol.)

Although the materials handled at PCT are shipped around the world, the products they help produce play a role in our lives in BC. Most of the sulphur received at PCT is used in the production of fertilizers, which help to grow the food we eat. Ethylene glycol is a raw material important in the production of polyester fibres, plastic pop bottles, anti-freeze and many other products.



THE PCT SCHOOL PROGRAM invites teachers and their students to participate in guided field trips to the shipping terminal. Students will have opportunities to ask questions and explore the science, history, and future directions and markets for PCT's services. The program connects student learning to the BC curriculum in several subject areas. (See Curriculum Connections on page 14 for specific learning outcomes.)

Primary

Children in Kindergarten to Grade 3 will watch a video about PCT, then take a tour around the sulphur "hills" to see the Stakrake, shiploader and rail car unloader, and to have a "close encounter" with the huge ships stopping on their way around the globe. Students will learn about individual safety measures used by PCT workers, note the more than 2,000 trees planted by PCT on the terminal site and make journal entries and artworks based on these experiences.

Elementary

After watching a video about PCT and participating in a field trip to the site, students in Grades 5 and 6 will demonstrate their understanding of the importance of the PCT operations to the community and the rest of the world. They will focus on one Social Studies issue (e.g., the relationship between communities and the availability of natural resources, effects of technology on communities, and methods of resource distribution) to research and report on. Working in small groups, students will examine maps of BC and Alberta to trace the route of the cargo from the processing plants to Port Moody to all points on the globe.

Secondary

Students in Grades 8 to 12 will have several opportunities to investigate mechanical, administrative, computer, research, maintenance, construction and engineering careers and jobs at PCT. They may also explore the science behind the design of the facility and its environmental and safety controls, learn about its computer-controlled capabilities, and research the uses of sulphur and its global markets. They will watch PCT's online video to prepare for their site visits and interviews, and follow up with Internet research (see the *Web Sites* on page 57 for site suggestions) and written reports. Depending on students' areas of interest and the curriculum being addressed, students may also create presentations of their research for the rest of the class.

Field Trips

ELEMENTARY CLASSES IN GRADES K-3 AND 5-6 may tour the terminal site in a bus or van provided by the school. PCT will arrange a time and provide a guide for your tour.

Since PCT operates large, automated machinery and the site is ringed with rail cars, tracks and conveyor belts, it is important to prepare young students for visiting the site. The *Pacific Coast Terminals Fact Sheet* provided on page 47 outlines the purposes of the machinery and the safety precautions in place for workers and visitors.

The lesson plan procedures include outlines for a class discussion to direct student thinking about the learning purpose for the trip and the issues you will be addressing in class (e.g., safety and injury prevention, resources, occupations).

Students in Grades 4 to 7 should also be prepared to ask questions on their assigned topics, and to make notes and sketches in their journals for later use in group work, class presentations and follow-up activities.

Site Visits / Interviews

DIRECT SECONDARY STUDENTS TO DO THE field research independently or coordinate a site visit for the class as a whole, depending on the particular subject being studied and the planned follow-up activities, such as independent studies followed by a written report, or a group project followed by a class presentation. (See *Lesson Plan — Secondary* on page 41 for more information.)

Advise students that their site visits should include questions that focus on the particular curriculum being addressed. The secondary lesson plan provides sample questions linked to the BC secondary curriculum in several subject areas. The *Pacific Coast Terminals Fact Sheet* and *Web Sites* pages in the Teacher Backgrounders section on page 45 will also be helpful in preparing for visits and interviews.

Recording Observations

Making sketches and taking photographs leads students to observe details more carefully and strengthens their observation skills. Encourage students to keep records of their site visits and interviews in journals, notebooks or annotated sketchbooks.

Planning Presentations

Notes and illustrations of points of interest, photographs, and/or videotapes form the basis for researching and creating final presentations. These can be produced within each student's individual skill range, from simple, labeled drawings to computer-aided 3D models. Students could choose to set up photo displays, create photo essays, make illustrated posters, or create video or computer-based presentations.

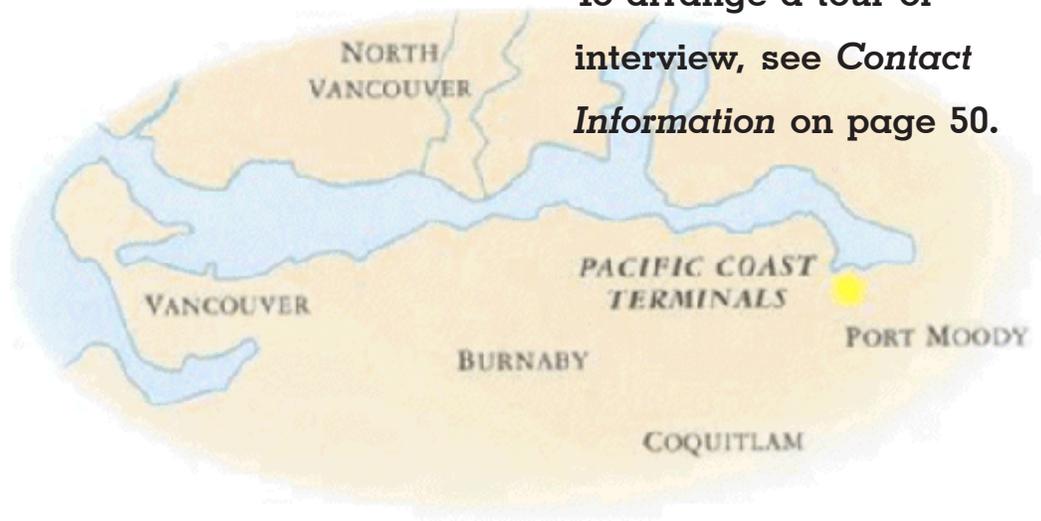
Tips for Interviewing

The type of interviewing strategy appropriate for this resource is similar to the "information interview" conducted in a job search. In planning, conducting and following up on the interview, the student should be reminded to:

- choose the interviewee based on which career or occupation he or she wants to investigate
- prepare questions and check them with the teacher in advance of the interview

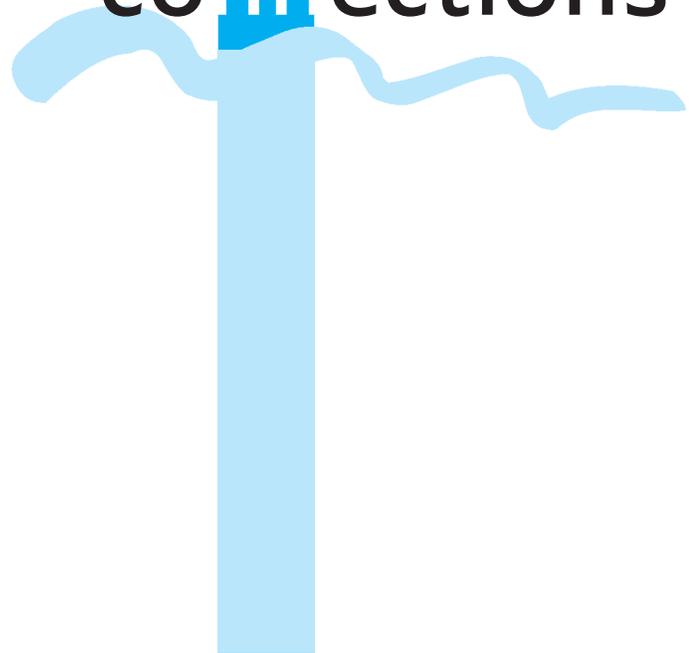
- obtain permission in advance from the interviewee if intending to make a video tape or audio record of the interview
- arrange for transportation to the site well in advance, using maps and bus routes as necessary
- confirm time, date, and place and follow up with a note of thanks.

To arrange a tour or interview, see *Contact Information* on page 50.





**curriculum
connections**



THE FOLLOWING LEARNING outcomes from the BC curriculum, as described in the Ministry's Integrated Resource Packages for teachers, can be achieved in whole or in part as students participate in the lesson plans.

The Primary Lesson Plan in this resource addresses the following Primary Program Learning Descriptors:

A variety of experiences enable the child to:

- learn and practise safety (Physical Development and Well-being)
- develop an understanding of the world around them (Intellectual Development)
- value and respect diversity and the contributions people make to their communities; develop an awareness of the roles and responsibilities of a member of a community (Development of Social Responsibility)

The Lesson Plan also addresses the following learning outcomes in Kindergarten to Grade 3:

Personal Planning K-1

Safety and Injury Prevention

It is expected that students will:

- identify the hazards and use safe behaviours in the home, school, and community

Social Studies 2-3

Economy and Technology

It is expected that students will:

- describe ways in which communities are interdependent
- describe the development of various BC communities in relation to their location and availability of resources
- identify contributions of various occupations to BC communities
- describe how technology affects individuals and communities

The Intermediate Lesson Plan field trip, presentations and follow-up activities address the following learning outcomes in Grades 5 and 6 in whole or in part.

Social Studies 5

Economy and Technology

It is expected that students will:

- analyze the relationship between development of communities and their available natural resources
- explain how supply and demand are affected by population and the availability of resources
- analyze factors that influence use and development of transportation and communications systems in different regions of Canada
- analyze the influence of technology on lifestyle and work

Environment

It is expected that students will:

- locate and describe major physical features of Canada using topographic and thematic maps
- describe the diverse distribution of natural resources within Canada
- demonstrate understanding of sustainability, stewardship, and renewable versus non-renewable natural resources
- assess effects of lifestyles and industries on local and global environments

Social Studies 6

Economy and Technology

It is expected that students will:

- describe Canada's changing economic relationship with Pacific Rim countries
- assess effects of urbanization and technology on lifestyles and environments

Environment

It is expected that students will:

- interpret and use graphs, tables, aerial photos, scales, legends, and various types of maps
- locate and describe major geographic features and selected nation states of the world
- relate population growth and settlement patterns to resource consumption and depletion in selected countries
- compare use of resources and conservation practices in Canada and other countries

The Secondary Lesson Plan addresses the following learning outcomes, in whole or in part, depending on the topic of research that is chosen or assigned.

Business Education 8 & 10

Marketing 8

It is expected that students will:

- explain how marketing practices within the marketing mix affect consumers of products and services from producer to consumer

Marketing 10

It is expected that students will:

- describe and evaluate the marketing mix for a variety of products
- outline factors contributing to product value
- create and implement a marketing plan for a product or service
- defend techniques used to market products or services globally
- evaluate how trends in society affect employment in the marketing sector and in education

Economics 8

It is expected that students will:

- outline the effects on a local economy of changes both in consumer needs and wants and in the supply of and demand for resources

Economics 10

It is expected that students will:

- prepare and interpret a simple supply-and-demand graph and apply the interpretation to a business problem
- explain the significance of competition and co-operation in business
- describe common economic indicators and explain how they apply to the standard of living

Marketing 12

Global Marketing

It is expected that students will:

- assess the impact of international trade on various businesses in British Columbia
- evaluate methods businesses use to inform potential world markets of their products, services, and ideas
- describe how governments assist and regulate businesses involved in international marketing
- analyze how various cultures affect the way businesses market their products internationally and nationally
- distinguish among methods used by primary and secondary industries to market their products or services nationally and internationally
- justify methods used to distribute goods internationally

Career and Personal Planning 8–12

Career Development: Career Skills

Awareness

To develop students' understanding and appreciation of personal characteristics and how these relate to potential careers

Grade 8

It is expected that students will:

- identify personal management, academic, and teamwork skills that are transferable to the workplace
- explain the relationship between their personal interests, attributes, and strengths and transferable skills

Grade 9

- identify role models and list their attributes
- relate their transferable skills to occupational and lifestyle choices

Grade 10

- review their transferable skills and relate them to occupational and lifestyle choices
- apply research skills to identify the various types of work within career clusters

Grade 11/12

- assess their transferable skills and relate them to occupational and lifestyle choices
- apply research skills to acquire information related to job possibilities and career interests

Career Development: Career Exploration

To enable students to take advantage of community resources in order to relate their learning and skills to education, career, and personal roles in a changing world

Grade 8

It is expected that students will:

- identify and describe career opportunities in a changing society

Grade 9

- identify mentors and resources to support career plans
- identify the courses needed to meet their career plans
- identify factors that affect the availability of career opportunities

Grade 10

- identify and investigate educational routes and experiences necessary to achieve their goals
- research career opportunities in local, regional, and global workplaces
- describe the impact on the labour market of changes taking place in society, the economy, and the environment

Grades 11 and 12

- identify possible career paths involving post-secondary training or education
- evaluate the contributions to society of various types of work
- access and use services and resources to carry out their plans



assessment



EACH LESSON PLAN PROVIDES AN Assessment section that describes ongoing strategies for use throughout the lesson. Effective assessment strategies for co-operative group work, research projects, and presentation assignments include the following:

- checklists for presentation assessment shared with students at the start of the field trip (elementary) and research assignment (secondary); samples are provided on pages 22 and 23
- ongoing portfolios of student work (e.g., journals, reports, art work collections, activity sheets, completed self-assessment forms)
- teacher observation performance rating sheets of criteria developed ahead of time in class discussion or individual conference with students
- goal-setting worksheets written in conference with students that focus on specific learning objectives for that student.

Teachers develop criteria for assessing student learning based on the prescribed learning outcomes for a particular grade and subject as outlined in the BC Ministry of Education's *Integrated Resource Package (IRP)* for each subject. Specific learning outcomes addressed in the lesson plans (e.g., personal planning, business education) are listed in the Curriculum Connections section on page 13.

To develop criteria for assessing field trips/interviews, group/individual presentations, or research reports, teachers might refer to the appropriate IRP (Column 3 and Appendix D: Assessment) for strategies, sample assessment tools (e.g., rating scales, rubrics) and methods for assessing the learning outcomes they wish to address. The entire text of each IRP can be accessed online at:

www.bced.gov.bc.ca/irp/

Self-assessment rating scales for student presentations are provided as examples on pages 22 and 23.

Group Presentation Assessment for Grades 4 to 7

Criteria	Self-Assessment	Teacher Assessment	Comments
Content and Group Process			
We understood our topic assignment well.			
We made field-trip journal notes and used them to research our presentation.			
We assigned roles for group members and made a schedule for tasks.			
We researched our topic in the library and/or on the Internet and shared our findings with the group.			
Presentation			
Our presentation was organized and sequenced in logical order.			
We used interesting and appropriate visual images (photos, drawings, posters, charts, graphs).			
Our presentation was completed on time.			

Rating Scale

1—amazing, excellent

2—interesting, well done

3—needs more effort, shows promise

4—not complete, coming soon

Report Assessment for Grades 8 to 12

Criteria	Self-Assessment	Teacher Assessment	Comments
Content – Research report showed evidence of:			
<ul style="list-style-type: none"> good understanding of the issues and concepts being studied 			
<ul style="list-style-type: none"> clear understanding of topic assignment 			
<ul style="list-style-type: none"> thorough Internet and/or library research on the assigned topic 			
<ul style="list-style-type: none"> reference to site visits and interviews, notes and journals 			
<ul style="list-style-type: none"> critical thinking and reference to more than one point of view 			
Class presentation:			
<ul style="list-style-type: none"> was well-prepared, organized, and sequenced in logical order 			
<ul style="list-style-type: none"> included appropriate visual images (photos, drawings, graphs, charts) 			
<ul style="list-style-type: none"> was completed on time 			

Rating Scale

- 1–excellent (interesting, original ideas)
- 2–good effort
- 3–needs more work/thought in this area
- 4–incomplete, not presented



lesson plans



a visit to our global neighbour

Purpose

This lesson will introduce Primary students to PCT's products and operations, safety measures and economic connections to the community.

Students watch a video that explains the history, properties and uses of PCT's products, where they come from, and where and how they are shipped around the world. On a field trip to the site, students ask questions and make journal entries. After the visit, they write brief stories, complete activity sheets and create artworks based on their observations.

Materials and resources

- PCT video, television and VCR
- large map of Canada, globe
- student journals
- for each student, copies of
 - *Site Map, Elementary* on page 53 (or map transparency and projector)
 - Activity Sheets: "Safety Sandy" and "PCT Word Match" on pages 31 and 32
 - Assessment Form: "Our Visit to PCT: My Self-Report" on page 33
- art supplies for posters or murals
- resource: Teacher Backgrounders



Suggested time



- two hours for the site visit, plus preparation time to gather materials and organize transportation
- 20-30 minutes to conduct the orientation class discussion and watch PCT video
- one hour or more, as needed, for follow-up activities

Curriculum connections

Personal Planning K-1 (Safety and Injury Prevention)
Social Studies 2-3 (Economy and Technology)

(See specific learning outcomes listed on page 15.)

Preparation

- ❑ To give PCT staff time to schedule their activities accordingly, it is important that class visits are organized well in advance. For contact information, see Field Trips on page 10.
- ❑ Ensure that older students (Grades 2-3) have journals and writing materials to bring along on the field trip.
- ❑ Read the Teacher Backgrounders provided on page 45.
- ❑ Gather video equipment and art supplies for follow-up activities, and make copies of the activity sheets for each student.

Procedure

- 1** Prepare students for the field trip by showing the PCT video and conducting a circle activity or a class discussion. Explain that they will need to be on their best behaviour as guests of a very big transportation terminal with large railway cars and automated machinery. Review criteria for field trip behaviour in the “Our Visit to PCT, My Self-Report” and explain that they will complete the reports back in the classroom.
- 2** To prepare students to recognize the purposes of the machinery and people they will see, ask questions such as:
 - Who has seen Pacific Coast Terminals site from the highway?
 - What did you see? (train tracks, buildings, yellow stacks, ships, trains, etc.)
 - Why are the stacks yellow? (one of the properties of sulphur is its yellow colour)
 - Who has heard of sulphur? Where does it come from? (found in food, soil, even in our bodies, especially hair and nails)
 - What is it used for? (used to make fertilizer that makes vegetable crops grow, keeps the plants big and healthy, etc.)
 - Where do the trains come from? (oil and gas refineries in Alberta, the sulphur byproduct is shipped by train to British Columbia)
 - Where do the ships go? (they come from China, Southeast Asia, India to load Canadian sulphur to take back to those countries).

If possible, show the site map on page 53 on an overhead projector and point out the major site features they saw on the video (e.g., containment tanks,

railway tracks, rail cars, liquid storage tanks, Stakrake, ship loader, ship dock, office buildings, maintenance buildings, water purification, tree plantings, Burrard Inlet, Port Moody). Refer to the geographic locations on a large map of the Lower Mainland.

- 3** Point out to students that Alberta has no access to the ocean for shipping the sulphur around the world. PCT, with its ship docking and storage facilities, provides this access. The railway makes sure the sulphur arrives safely, and the Vancouver Port Authority provides the site in Port Moody. They all work together to make sulphur available for the people who need it.
- 4** Conduct the field trip. During the visit, have older (Grades 2-3) students bring along their journals and writing materials to keep notes about what most interests them. Encourage them to ask questions about the occupations of the people they see and to keep track of what people are doing on the site (e.g., equipment operators, maintenance, security, ship crew).
- 5** Back in the classroom, in a follow-up discussion, point out the contributions and importance of the occupations they observed to BC and the local community (e.g., contributing to the local economy, providing a global service).
- 6** Distribute a copy of the activity sheet "Safety Sandy" to each student. Provide the following words on the board or flipchart and ask students to locate the articles on the activity sheet.

1. boots (*steel toes protect the feet, leather tops protect ankles*)
2. coveralls (*protect skin from cuts/scrapes*)
3. ear phones (*protect hearing from machinery noise*)
4. fire hydrant (*to put out fire*)
5. glasses (*protect eyes from flying objects*)
6. gloves (*protect hands from heat, cold, sharp objects*)
7. hard hat (*protects head from falling/flying objects, falls*)
8. vest (*reflective strips make wearer visible to others on site*)

Discuss the safety purpose of each article. Help students number the safety items and write the correct word on the blank line.

Ask students to identify other occupations that require safety clothing and personal safety equipment (firefighters, welders, construction workers, miners, loggers, fishers, factory and warehouse workers, laboratory workers, X-ray technicians, longshore workers, sailors, health care workers, farmers, police officers), discussing reasons for their choices. You might wish to begin a class list.

- 7** In Grades 2-3, distribute the "PCT Word Match" activity sheet and allow 10 minutes for students to complete the matching task. Review the answers as a class. Students who finish early might want to add their own "PCT words" from their journals and colour the illustrations.

Extension and follow-up activities

- Provide art materials such as coloured construction paper, scissors, glue, coloured markers and/or crayons, and have students make individual posters depicting what most impressed them about the PCT site. Discuss the colours and shapes they might have seen (yellow sulphur, black rail cars, green tanks, blue ocean, blue sky, green trees). Refer older students to their journal notes for more ideas.
- Students could work in groups to make a construction paper wall mural of the PCT site. Have them refer to the “PCT Word Match” word list for ideas to include. They might also refer to their journals and site maps for more ideas. The mural could have a title such as, *A Visit to Our Global Neighbour*.
- Have students write a story from the point of view of one of the occupations they encountered on the field trip (e.g., ship captain/crew, train engineer, scientist, machine operator, arborist). Ask them to describe the equipment they would operate and the skills they would use in their daily tasks. Encourage students to refer to their journals and “PCT Word Match” list.

Assessment activities

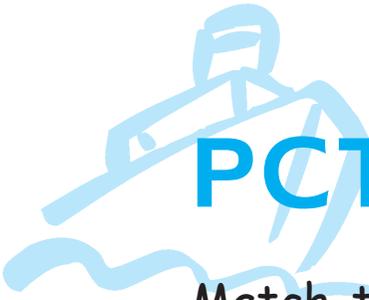
- Collect student field trip journals and assess illustrations and notes about what most interested them, using criteria decided ahead of time (e.g., thoughtful, well-observed, evidence of listening and attention to detail).
- Collect activity sheets and evaluate student understanding of the tasks, looking for completed “Safety Sandy” safety labels, understanding of new vocabulary, understanding of categories, ability to complete “PCT Word Match” activity.
- Collect the completed “Our Visit to PCT: My Self-Report” activity sheets and debrief in a class discussion of strengths, what students may have done well, and cooperative group skills and field trip skills that may need some improvement.
- Have students keep their self-reports, journals, activity sheets, artwork and stories in a portfolio. Review their accomplishments individually, looking at areas of skill growth and knowledge development, and discussing what each student might need to work on.

Safety Sandy



- 1 _____
- 2 _____
- 3 _____
- 4 _____
- 5 _____
- 6 _____
- 7 _____
- 8 _____





PCT Word Match

Match the words on the left with the circled words on the right.
Some words belong to more than one circle.
Connect as many words as you can.

dumper

captain

train

crew

rail car

track

sulphur

scientist

ship loader

operator

ship

engineer

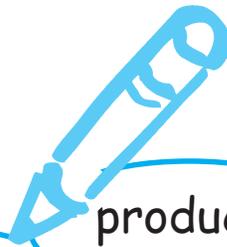
element

machinery

workers

product

transportation



On the field trip, I

YES

SOMETIMES

NO

• stayed with my group			
• asked for help when I needed it			
• asked questions and listened to others' questions			
• listened quietly when the tour guide or my teacher was talking			

I could do better next time by . . .

Teacher's comments

PCT, resources & BC

Purpose

In this lesson, students will explore the cycle of resource use in British Columbia, across Canada, and around the world.

Students watch a video about PCT storage and transport operations and ask questions on assigned topics. In the classroom, students analyze the cycle of resource use in relation to the land and community, and work in groups to create a report on one aspect of the cycle (e.g., renewable resources, supply and demand, transportation systems, sustainability).

Materials and resources

- PCT video, television and VCR
- large map of Canada, globe
- student journals
- for each student, copies of
 - *Site Map, Elementary* on page 53 (transparency and projector optional)
 - Activity Sheet: "Without Sulphur..." on page 39
 - Assessment Form: *Group Presentation Assessment for Grades 4 to 7* on page 22
- world maps to colour and label, access to encyclopedias
- art supplies for posters, murals and presentation graphs
- resource: Teacher Backgrounders



Suggested time



- two hours for the site visit, plus preparation time to gather materials and organize transportation
- 20-30 minutes to conduct the orientation class discussion and watch PCT video
- one hour or more, as needed, for follow-up activities

Curriculum connections

Social Studies 5 and 6 (Economy and Technology, Environment)

(See specific learning outcomes listed on page 16.)

Preparation

- ❑ To give PCT staff time to schedule their activities accordingly, it is important to organize your class visit well in advance, (see Field Trips on page 9 for more information).
- ❑ Ensure that students have journals and writing materials to bring along on the field trip.
- ❑ Read the Teacher Backgrounders provided on pages 47 to 50.
- ❑ Gather video equipment and art supplies for presentations and follow-up activities.
- ❑ Make copies of:
 - “Without Sulphur...” on page 39
 - “Using Our Resources” on page 40
 - *Group Presentation Assessment for Grades 4 to 7* on page 22
 - *Site Map, Elementary* on page 53

Procedure

- 1** Prepare students for the field trip by showing the PCT video and conducting a circle activity or a class discussion. Explain that they will need to be on their best behaviour as guests of a very big transportation terminal where people will be busy operating large machinery, ships and rail cars. Review criteria for appropriate field-trip behaviour and explain that they will complete the reports back in the classroom.
- 2** To prepare students to recognize the purposes of the machinery and people they will see, ask questions such as:
 - Who has seen the Pacific Coast Terminal site from the highway?
 - What did you see? (train tracks, buildings, yellow stacks, ships, trains, etc.)
 - Why are the stacks yellow? (one of the properties of sulphur is its yellow colour)
 - Who has heard of sulphur? Where does it come from? (found in food, soil, even in our bodies, especially hair and nails)
 - What is it used for? (used to make fertilizer that makes vegetable crops grow, keeps the plants big and healthy, etc.)
 - Where do the trains come from? (oil and gas refineries in Alberta; the sulphur is shipped by train to British Columbia)
 - Where do the ships go? (they come from China, Southeast Asia, India to load the Canadian sulphur to take back to those countries).

If possible, show the site map on an overhead projector during the discussion and point out the site features students saw on the video (e.g., containment tanks, railway tracks, rail cars, liquid storage tanks, Stakrake, ship loader, ship dock, office buildings, maintenance buildings, water treatment, tree plantings, Burrard Inlet, Port Moody). Refer to the geographic locations on a large map of Canada and the globe.

- 3** Point out to students that Alberta has no access to the ocean for shipping the sulphur around the world. PCT, with its ship docking and storage facilities, provides this access. The railway makes sure the sulphur arrives safely, and the Vancouver Port Authority provides the waterfront site. The industries and communities work together to make sulphur available for the people around the world who need it.
- 4** Using the Teacher Backgrounders, explain why certain countries along BC's Pacific Rim shipping routes import tonnes of sulphur each year. Distribute a copy of the activity sheet "Without Sulphur..." to each student and complete the activity together as a class.
- 5** Divide the class into groups of three or four. Distribute the activity sheet, "Using Our Resources" and assign one topic to each small group. Explain that, using their field trip notes and doing library research, each group will illustrate and present their findings to the rest of the class.
- 6** Conduct the field trip. On the trip have students bring along their journals and writing materials to keep notes about what they see that most interests them. Encourage them to ask questions about their assigned topics and record the answers.
- 7** Back in the classroom: debrief the visit in a class discussion. Ask questions such as:
 - Are oil, gas, and sulphur renewable or non-renewable resources?
 - Why does Canada export so much sulphur? (large supply and small demand, small population)
 - How is exporting sulphur contributing to resource sustainability and a healthy environment?
- 8** Explain the criteria for successful class presentations, distribute the *Group Presentation Assessment* (page 22) for grades 4 to 7.
- 9** After the presentations, debrief presentation assessments with each group.

Extension and follow-up activities

- Have students create maps of sulphur transport routes from Alberta to PCT and on to the countries around the world. Have them identify and label the major physical features and natural resources that influence the routes.
- Some students might wish to study pictures and diagrams of one of the automated technologies used at PCT (e.g., ship loader, Stackrake, conveyors), make their own poster illustrating how the technology works, and share this with the rest of the class.

Assessment activities

- Collect student field-trip journals and assess illustrations and notes about what most interested them, using criteria decided ahead of time (e.g., thoughtful, well-observed, evidence of listening, attention to detail).
- Collect “Without Sulphur...” activity sheets and evaluate student understanding of the task and concepts. Look for evidence that students understand the significance of sulphur and resource use to their everyday lives.
- Collect the completed *Group Presentation Assessment for Grades 4 to 7* forms and debrief in a class discussion, describing what students may have done well and identifying cooperative group skills and/or field trip skills that may need improvement.
- Have students keep their self-assessments, field-trip journals, presentation work and completed activity sheets in a portfolio. Review their accomplishments individually, looking for areas of skill growth and knowledge development, and discussing what students might need to work to improve.

without sulphur . . .

Circle the things that need sulphur to live and grow.

Draw a **line** under people that use sulphur every day.

Make a **check mark** beside things that are made with sulphur.

animals

carrot

painter

bread

fertilizer

apple

egg

fireworks

balloon

farmer

medicine

raincoat

meat

grape

wheat

beans

tires

doctor

paper

rubber boots

chemist

milk

skyscraper

ice cream

Now, try to imagine a world without sulphur . . .

Field Trip Assignment

Using Our Resources

On the field trip to PCT, ask questions and make notes about your assigned topic. Then do some research in the library. Create a class presentation with your group.

Group 1

Compare production and use of sulphur in Canada, Russia, China and the US. Make a bar graph showing most production and least production. Make another bar graph showing which countries use the most sulphur and which countries use the least. What are some reasons for the differences?

Group 2

On a map of the world, label the countries that produce sulphur and the countries that import sulphur. Use colours to show the countries that use sulphur in making things and countries that use sulphur in farming. In what other ways are the countries different?

Group 3

On a map of BC and Alberta, mark and label the major cities. Show oil and gas resources, major railroads and shipping terminals. Use different colours to show cities and towns, natural resources, sulphur production and sulphur shipping. What pattern do you see between sulphur and communities?

Group 4

“The more a country uses sulphur, the better the nation’s economy.”
Is this true? Show this relationship on a map of the world. Use a range of colours to show sulphur use, from most to least, in at least 10 countries. Describe any relationship or pattern that you see.

Group 5

Port Moody’s important natural resource is the shoreline on Burrard Inlet. This allows ships from all over the world to reach the PCT docking and loading site. On a map of the world, mark all the port cities of the Pacific Rim. Use colour to show the ports that send ships to Port Moody for sulphur today and another colour to show ports that sent ships to Port Moody 10 years ago. Give reasons for any pattern you see.

PCT: careers & research

Purpose

This lesson plan will assist students in exploring personal, career, and community issues, using PCT as a resource.

Using PCT contact information, students set up interviews in person, by telephone or through e-mail with individuals working in careers that interest them. All students do Internet and library research to create class presentations or reports (topic to be determined in consultation with teacher) on one aspect of the terminal's operations.

Materials and resources

- PCT video, television and VCR
- computers with Internet access (optional)
- student journals or notebooks (for career interviews)
- for each student, a copy of
 - *Pacific Coast Terminals Fact Sheet* on page 47
 - *Careers at PCT* on page 55
 - *Web Sites* on page 57
 - *Report Assessment for Grades 8 to 12* on page 23
- resource: Teacher Backgrounders

Suggested time

- 20-30 minutes to conduct the orientation class discussion
- 5-10 minutes per student/group for class presentations

Curriculum connections

Business Education (Marketing 8 & 10, Economics 8 & 10)
Marketing 12 (Global Marketing)
Career and Personal Planning 8-12

(See specific learning outcomes listed on pages 17–18.)

Preparation

- ❑ Gather video presentation equipment and materials, if necessary.
- ❑ Read the Teacher Backgrounders provided on page 45.
- ❑ Make a copy of *Report Assessment for Grades 8 to 12* for each student (see page 23).

Procedure

- 1** Distribute the *Pacific Coast Terminals Fact Sheet*. Explain that students will have opportunities to explore PCT operations and ask questions of designated PCT personnel. Distribute the *Web Sites* page. Direct students to access the PCT video on the Sultran Web site (www.sultran.com) as homework or as a library research assignment and/or to watch the video before the next class.
- 2** Distribute the *Careers at PCT* sheet on page 55 to students who indicate an interest in following up their career plans by exploring jobs and careers at PCT. Explain that they will have opportunities to visit the site to observe how people work at the terminal and to interview one staff member who is working in an area of the student's career interest.
- 3** Depending on the subject being taught, assign an independent research and presentation project based on the learning outcomes listed in Curriculum Connections on pages 17 and 18 that can be completed using PCT as a resource. For example:
 - **Business Education - Marketing 10:** How does Pacific Coast Terminals market its services globally? What is the rationale behind these global marketing techniques?

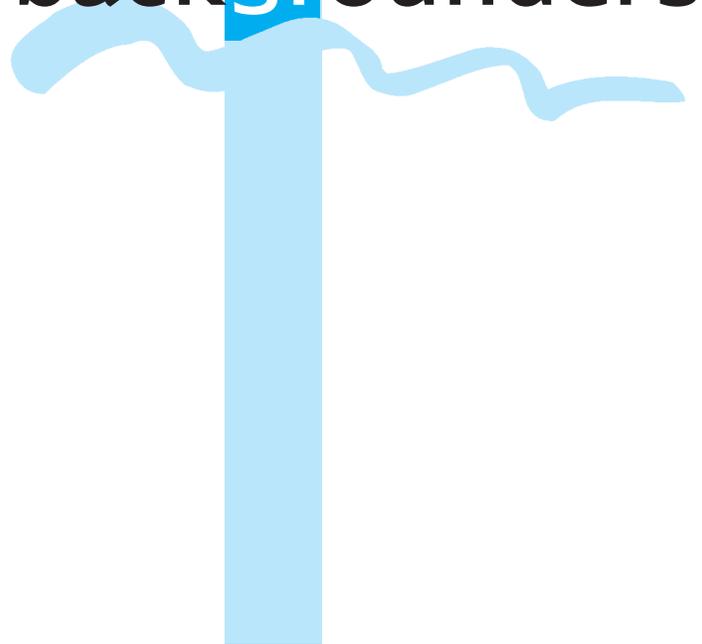
- **Business Education - Economics 8:**
What might be the effects on the local economy of a significant increase in the worldwide demand for sulphur and sulphur products?
 - **Business Education - Economics 10:**
How does the Pacific Coast Terminal economic model illustrate competition and cooperation in business?
 - **Marketing 12 - Global Marketing:**
What is the impact of increase in PCT's international business on the local businesses that support the terminal operation? What other ways are used to distribute sulphur internationally?
- 4** Set the criteria for presentations in a conference with each student. See *Site Visits/Interviews* on page 10 for more information.

Assessment activities

- Collect and assess student interview questions and follow-up notes, looking for evidence of understanding of the assignment, notes on the PCT video and research and preparation in advance of interviews.
- Observe presentations with the checklist of criteria prepared ahead of time in conference or discussion with students. See page 23 for a sample presentation assessment tool.



teacher
backgrounders





Pacific Coast Terminals FACT SHEET

Pacific Coast Terminals . . .

- is a port terminal located on the Burrard Inlet in Port Moody, BC
- was established in 1929 in New Westminster and opened its Port Moody location in 1960; in 1981, the company moved all operations to the Port Moody site
- receives materials from Western Canada's resource companies by train and sends them off by ship to ports around the world
- is a key economic contributor to the world sulphur market as the largest sulphur export terminal in the world
- is one of the largest bulk liquid export terminals in the Port of Vancouver
- is a wholly owned subsidiary of Sultran Ltd.

The terminal . . .

- uses state-of-the-art equipment
- covers 108 acres
- receives more than 150 ships and 48,000 rail cars annually
- handles more than 3.5 million tonnes of sulphur and more than 700,000 tonnes of ethylene glycol in a typical year.

The products handled at Pacific Coast Terminals:

- bulk sulphur, which is used mostly in the production of fertilizers
- ethylene glycol, which is used in manufacturing polyester fibres, plastic pop bottles and many other products.

Pacific Coast Terminals in Port Moody . . .

- is committed to a healthy and safe environment
- supports community organizations and initiatives
- contributes to the economic sustainability of Port Moody
- is an important part of the Port of Vancouver and Canada's export industry
- received the Burrard Inlet Environmental Action Program's "Award for Environmental Excellence" in 1997
- received the ARC Arts Council's "Service in the Arts" award in recognition of its outstanding support, contribution and leadership in 1996.

What is sulphur?

Sulphur is . . .

. . . the 13th most abundant element in the Earth's crust and one of the most versatile and essential raw materials on earth. This bright yellow product can be derived from natural gas, coals and other fuels during the refining process, recovered from sulphides or extracted from the Earth as pure, elemental sulphur.

How is it used?

Sulphur exists everywhere in everyday life — in the food we eat, the clothes we wear and as a building block for products such as rubber, paint and steel. Some economists say that the more sulphur a country consumes, the higher its standard of living.

Sulphur in food and medicine

- Fertilizer: More than half of the sulphur produced worldwide is used to make nitrogen, potassium and phosphate fertilizers
- Medicine: Sulphur compounds treat chronic bronchitis, tuberculosis and high blood pressure. In dermatology, this yellow substance is used in acne and dandruff products

- Protein: Sulphur is present in the proteins in our food — eggs, bread, meat and milk contain this basic yellow ingredient.

Sulphur in industry

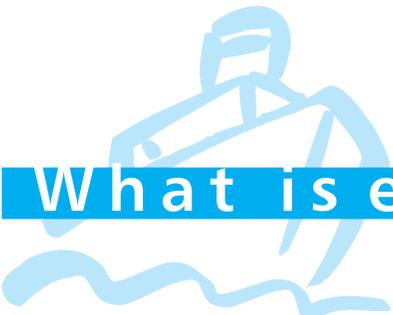
- Paper and fibres: It is used in the manufacture of paper, cellophane, synthetic and natural rubber, rayon, nylon fibres and textiles.
- Paint: The dye industry uses sulphur to manufacture pigments.
- Steel: Sulphur is used in the manufacture of steel.
- Sulphur derivatives: Industry also uses sulphur derivatives, such as sulphuric acid, as a raw material for countless chemical processes.

It is a building block of life for plants and animals

- Metabolism: Plants, animals and people need sulphur to help synthesize proteins.

Properties of sulphur

- Odorless and non-toxic
- Can be transported in solid or liquid state



What is ethylene glycol?

Ethylene glycol is . . .

. . . a colorless, sweet-tasting liquid that is used primarily as an anti-freeze and in the manufacture of polyester fiber and film. During World War I, when it became of commercial interest, it was used as a substitute for glycerol in the manufacture of explosives.

Ethylene glycol is also used

- as a heat-transfer fluid in aircraft and runway de-icing mixtures
- to provide freeze-thaw stabilization to latex coatings
- to improve flexibility and drying time of oil-based paints containing alkyd resins
- as a dehydrating agent for natural gas
- in motor oil additives
- as an additive in the formulation of inks, pesticides, wood stains, adhesives and other products.

In explosive water-gels and slurries, it lowers the freezing point and acts as a coupling agent between water and the other components.

High purity ethylene glycol is used as a solvent and suspending medium for ammonium perborate, the conductor in most electrolytic capacitors.

Chemical properties

Ethylene glycol (C.A.S. 107-21-1) is completely miscible with water and many organic liquids. Ethylene glycol markedly reduces the freezing point of water. It is a slight fire hazard when exposed to heat or flame and a moderate explosion hazard when exposed to flame. It can react violently with chlorosulfonic acid and oleum.

Synonyms for ethylene glycol are

- 1,2-dihydroxethane
- 1,2- ethanediol, ethylene alcohol
- ethylene dihydrate
- glycol
- glycol alcohol
- monoethylene glycol.

Contact Information

For more information about Pacific Coast Terminals' school programs or to arrange a tour or interview, please e-mail your request providing information regarding preferred dates and times, number of students and grade level(s) to:

lorri.ogrady@pct.ca

Or, fax or mail the following form to:

Pacific Coast Terminals Co. Ltd.

2300 Columbia Street

Port Moody, BC V3H 5J9

Fax: 604-936-2951

TO: PCT SCHOOL PROGRAM

Request for: Site Visit Interview

Preferred Dates/Times

Number of Students

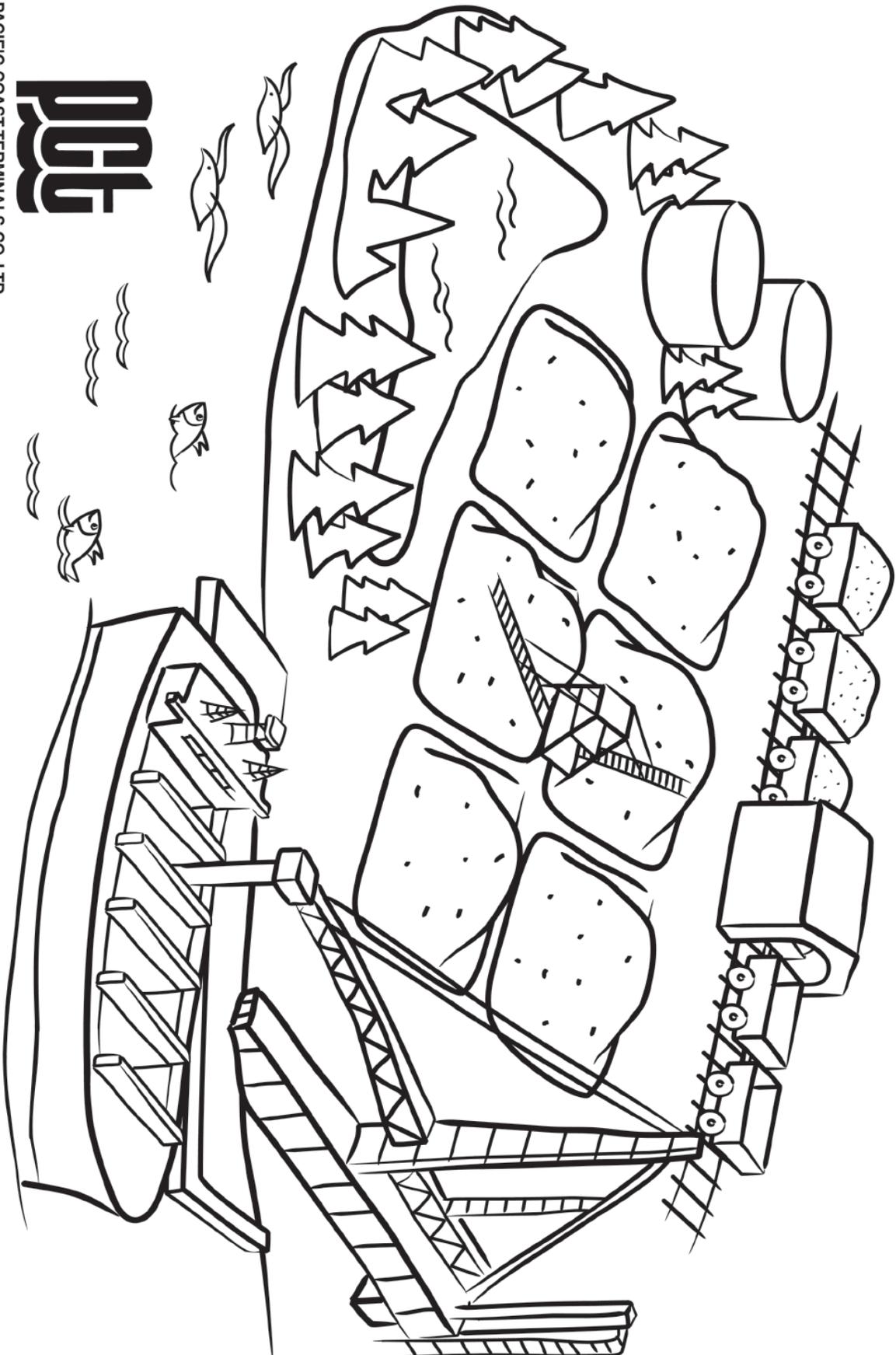
Grade Level(s)

School Contact



**student
resources**





PCT

PACIFIC COAST TERMINALS CO. LTD

Careers at PCT

PCT employs a highly skilled workforce, many of whom are members of the International Longshore and Warehouse Union (ILWU – Canada).

Longshore workers are involved in the loading, unloading and checking of cargo to and from vessels, and the storage of these goods on the docks and in warehouses. Some of the specific jobs are:

- Bulk shiploader
- Checker/clerk
- Foreman
- Liquid bulk operator
- Mobile crane operator
- Rail car mover
- Ship crane operator
- Ship unloader

PCT's operations are managed and supported by people who specialize in:

- Accounting
- Administration
- Engineering
- Information technology
- Maintenance
- Management

Contact Information

For more information about Pacific Coast Terminals' school programs or to arrange a tour or interview, secondary students can e-mail a request providing information regarding preferred dates and times, career area of interest and grade level to:

lorri.ogrady@pct.ca

Or, students can fax or mail this form to:

Pacific Coast Terminals Co. Ltd.

2300 Columbia Street

Port Moody, BC V3H 5J9

Fax: 604-936-2951

TO: PCT SCHOOL PROGRAM

Student Request for Interview

Preferred Dates/Times

Career Interest

Grade Level

School Contact



WEB SITES

The following Web sites contain useful information on sulphur, markets and products, and transportation in BC. It is important for teachers to review all sites and links before recommending them for student research, as information on the Internet changes frequently.

Pacific Coast Terminals holds no responsibility for the truthfulness or accuracy of any material located through the sites or their links.

Sulphur research

Alberta Sulphur Research Ltd.

www.chem.ucalgary.ca/asr/core.html

Chemicool: Chemistry site

www.chemicool.com/elements/sulfur.html

Curriculum visions: Chemistry teaching site

www.curriculumvisions.com/Elements/Sulphur.html

Sulphur Institute

www.sulphurinstitute.org

US Geological Survey

minerals.usgs.gov/minerals/pubs/commodity/sulfur/stat/

Web Elements Chemistry site

www.webelements.com/webelements/elements/

Products and markets

Institute of Arable Crops Research

www.iacr.bbsrc.ac.uk

International Fertilizer Society

www.fertiliser-society.org

Transportation

Pacific Coast Terminals

www.pct.ca

Sultran

www.sultran.com

Canadian Pacific Railway

www.cpr.ca

Port of Vancouver

www.portvancouver.com

