



IN THE MATTER OF THE ENGINEERING,
AND GEOSCIENCE PROFESSIONS ACT,

AND

IN THE MATTER OF THE CONDUCT OF
Canadian Natural Resources Limited [REDACTED]
[REDACTED]

**RECOMMENDED APEGA
DISCIPLINE COMMITTEE ORDER**

APEGA Discipline Committee Order

In the matter of the *Engineering and Geoscience Professions Act*

and

In the matter of the conduct of
Canadian Natural Resources Limited

The Investigative Committee of the Association of Professional Engineers and Geoscientists of Alberta (APEGA) has conducted an investigation into the conduct of Canadian Natural Resources Limited (CNRL) with respect to allegations of unprofessional conduct and/or unskilled practice pursuant to s. 44(1) of the *Engineering and Geoscience Professions Act* (Act).

The investigation related to the collapse of Tank 72-TK-1B at CNRL's Horizon Oil Sands Project on April 24, 2007.

A. Complaints

1. The APEGA Practice Review Board (PRB) forwarded the following matters to APEGA's Investigative Committee in which CNRL may have engaged in unprofessional conduct and/or unskilled practice, contrary to s. 44(1) of the Act, by:
 - a) Failing to ensure that one of their contractors had erection drawings and procedures for a skeleton structure certified by a professional engineer;
 - b) Undertaking work it was not competent to perform by virtue of its training and experience, in that it failed to verify its contractor's written engineered assembly procedures prior to the commencement of an alternative and unfamiliar tank erection procedure; and
 - c) Contracting with a company, [REDACTED], to do engineering work without confirming that company was competent to do so.

B. Agreed Statement of Facts

As a result of the investigation, it is agreed by and between the Investigative Committee and CNRL that:

2. At all relevant times, CNRL held a valid Permit to Practice with APEGA, and was thus bound by the Act and the APEGA Code of Ethics.

3. CNRL is a senior independent oil and natural gas exploration, development and production company based in Calgary, Alberta.
4. The CNRL Horizon Oil Sands Project is located approximately 70 km north of Fort McMurray. At the time of the incident, CNRL owned and operated leases covering approximately 115,000 acres for the purposes of mining oil sands. Phase 1 of the Project, which involved the separation and upgrading of bitumen, started in 2005 and was scheduled for completion in 2008, with two further phases to follow. At the time of the incident approximately 6,000 workers were working on the construction of the project.
5. [REDACTED] and [REDACTED] were contracted by CNRL to construct a total of 14 tanks, 11 on an east tank farm and 3 on a west tank farm at the CNRL Horizon Plant Site. The effective date of the contract was April 11, 2006. [REDACTED] were expected to have workers available July 2006 to commence the tank assembly at the west tank farm, with scheduled completion by September, 2007.
6. [REDACTED] a fully integrated unit for design, manufacturing, and construction of field erected steel platework structures, was contracted by CNRL to provide the components, material schedules for arrival on site, and the engineered drawings for the 14 tanks on the east and west tank farms at the CNRL Horizon Plant Site.
7. Tank 72-TK-1B was located on the west tank farm of the CNRL Horizon Oil Sands Project (the "Tank"). The Tank (more specifically described as a Dilbit Dewatering Tank) was to be a circular steel high-cone roof tank, 56.5 m diameter and 19.8 m high. At the time of the incident the tank wall shell was only completed to a height of 5.6 m.
8. The Tank structure consisted of wall, floor and roof constructed from steel plate. The roof was constructed onto a roof support structure consisting of vertical circular columns, supporting girders and radial rafters. The components of the roof support structure were assembled together with 19 mm (3/4 inch) nuts and bolts.
9. The three tanks on the west tank farm, including the Tank, were being constructed in accordance with an erection schedule prepared by CNRL. The schedule specified a sequence of construction where the tank floors were laid, the walls were started and the internal roof support structures were erected.
10. [REDACTED] were required to construct the tanks in accordance with the CNRL tank erection schedule, and in accordance with component and material schedules and engineered drawings provided by [REDACTED]. The [REDACTED] drawings showed how the components and materials they had supplied fitted together. [REDACTED] were responsible for the direction of their workers, which included giving instructions on how component parts of the roof support structure were to be supported from movement or falling until the construction was complete and the tank assemblies were self-supporting.

11. The procedure for assembling and supporting the tank roof support structures consisted of raising the center support column first, using a crane and securing it in the vertical position by workers operating elevating work platforms to install 4 steel cables, secured to the top of the column and anchored to lugs welded onto the tank floor. The cables were tightened using "come-alongs."
12. An inner ring of 6 support columns was erected in a similar manner, but with 3 cables on each column. The girders connecting the inner ring of columns would then be lifted and bolted into place, using 19 mm (3/4 inch) bolts, and the radial rafters would be installed between the centre column and the inner ring.
13. After the inner ring was completed, one cable, extending towards the tank center, would be removed from each of the 6 inner ring columns. The outer ring of 12 columns would then be erected, using 3 cables to support each column. The girders connecting the outer ring of columns would then be lifted and bolted into place, and all of the radial rafters would be installed.
14. After the outer ring of the roof support structure was assembled, 6 steel cables would be installed, extending from girders to alternate columns in the outer ring to anchor lugs welded into the floor of the Tank, close to the Tank wall. When these 6 support cables were in place and tightened using "come-alongs," all of the cables used to support the individual columns would be removed. The six cables remaining were intended to support and stabilize the roof support structure until the shell was completed to full height. The "come-alongs" were removed after the cables had been tightened.
15. On the date of the incident, the roof support structure in the Tank was in a suspended state of completion, with the center support column, the inside ring of 6 support columns, and the outer ring of 12 support columns in place, with the girders and rafters fitted, waiting for the shell assembly to be completed. Once the shell assembly was completed, the rafters from the outer ring's girders would be connected to the shell wall.
16. The roof support structure in the Tank had been completed the day before the collapse. Each roof support structure was supported by six cables.
17. On the date of the incident, a team of welders was working in the Tank, welding sections into the tank wall. The tank wall sections were being welded together by welders and helpers working inside welding machines that tracked around the inside of the tank wall. One Electrical Consultant and a welder foreman were inside the tank checking an electrical failure on one of the welding machines. One scaffolder was on the floor area inside the Tank. Two weld test technicians were also in the Tank, testing and marking the welds on the tank wall.

18. At approximately 2:30 p.m. on April 24, 2007, workers in and around the Tank heard several sounds, described as loud bangs or pops. The roof support structure in the Tank started to fall in an easterly direction during windy conditions. As the structure collapsed, some of the support cables failed, many of the bolts that were holding the components together failed and then the components began to come apart.
19. The structure fell onto the east side of the Tank wall. Some of the components of the roof support structure came to rest on the floor of the Tank, some components came to rest leaning against the Tank wall, and some components came to rest on the outside of the Tank on the east side. Many of the components were bent or damaged by the impact.
20. The Electrical Consultant was fatally injured when he was struck by falling steel. The Scaffolder, who was on the Tank floor, was crushed by the falling steel and died on the way to hospital. Two other workers received serious injuries and three more workers received minor injuries.
21. Respecting that collapse, CNRL acknowledges the following:
 - a) Neither CNRL nor ██████████ consulted with ██████████ with respect to what assembly sequence should be followed for the construction of the roof support structure. As the erection of the shell was independent of the roof support structure and they were being assembled concurrently, the top of the shell and the outer ring were not supporting each other.
 - b) ██████████ did not specify an erection sequence to follow to erect the tank they designed. ██████████ did not specify the assembly sequence because that was not part of the contract with CNRL.
 - c) CNRL prepared a tank erection schedule specifying the sequence of construction such as when the tank floors were to be laid, the walls to be started and the internal roof support structures were to be erected. ██████████ followed the tank erection schedule as set out by CNRL.
 - d) ██████████ did not provide written engineered erection procedures for the assembly of the roof support structure. CNRL did not ultimately obtain from ██████████ written engineered assembly procedures until after the tank collapse.
 - e) The ██████████ engineer who developed the erection procedure for the roof support structures and specified the number, size and location of the guy wires was not a qualified professional engineer in the province of Alberta ("Professional Engineer").
 - f) The bolted roof support structure, which was required to be flexible, did not have the necessary restraints to resist the lateral forces generated by the wind.

- g) The number and size of guy wires that were supporting the roof support structure in tanks 72-TK- 1A and 72-TK-1B, were not designed for the static and dynamic loads imposed by the 33 to 45 km/h wind that occurred on the day of the incident, let alone for the maximum expected wind speed of 83 km/h, as determined by the Alberta Building Code or 190 km/h recommended by the American Petroleum Institute.
22. CNRL displayed a lack of judgment in the practice of the profession by failing to ensure that [REDACTED] had erection drawings and procedures for a skeleton structure certified by a Professional Engineer.
23. CNRL displayed a lack of judgment in the practice of the profession by failing to ensure that [REDACTED] provided procedures for the erection of the roof support structure that were certified by a Professional Engineer.
24. CNRL contracted with [REDACTED] to do engineering work on its behalf without taking steps to confirm that they were competent to do so.
25. In light of CNRL's foregoing admissions respecting its conduct, the time that has passed since the incident occurred, and the cooperation of CNRL in this investigation, it is the Panel's opinion that the matter would best be resolved through a Recommended Discipline Order rather than a formal hearing.

C. Conduct

CNRL freely and voluntarily admits that its conduct, described above, constitutes unprofessional conduct.

Section 44(1) of the Act states:

44(1) Any conduct of a professional member, licensee, permit holder, certificate holder or member-in-training that in the opinion of the Discipline Committee or the Appeal Board

(a) is detrimental to the best interests of the public;

(b) contravenes a code of ethics of the profession as established under the regulations;

(c) harms or tends to harm the standing of the profession generally;

(d) displays a lack of knowledge of or a lack of skill or judgment in the practice of the profession or;

(e) displays a lack of knowledge or lack of skill or judgment in the carrying out of any duty or obligation undertaken in the practice of the profession.

Whether or not that conduct is disgraceful or dishonorable, constitutes either unskilled practice of the profession or unprofessional conduct, whichever the Discipline Committee or the Appeal Board finds.

The Rules of Conduct of the APEGA Code of Ethics state:

1. Professional engineers and geoscientists shall, in their areas of practice, hold paramount the health, safety and welfare of the public and have regard for the environment.
2. Professional engineers and geoscientists shall undertake only work that they are competent to perform by virtue of their training and experience.
3. Professional engineers and geoscientists shall conduct themselves with integrity, honesty, fairness and objectivity in their professional activities.
4. Professional engineers and geoscientists shall comply with applicable statutes, regulations and bylaws in their professional practices.
5. Professional engineers and geoscientists shall uphold and enhance the honour, dignity and reputation of their professions and thus the ability of the professions to serve the public interest.

CNRL has breached the Act, and therefore engaged in unprofessional conduct, by:

1. Displaying a lack of judgment in the practice of the profession by failing to ensure that [REDACTED] had erection drawings and procedures for a skeleton structure certified by a Professional Engineer;
2. Displaying a lack of judgment in the practice of the profession by failing to ensure that [REDACTED] provided procedures for the erection of the roof support structure that were certified by a Professional Engineer; and
3. Failing to uphold or enhance the honour, dignity and reputation of its profession by contracting with a company, [REDACTED] to do engineering work without confirming that company was competent to do so.

Orders

On the recommendations of the Investigative Committee, and by agreement of CNRL with that recommendation, following a discussion and review with the Discipline Committee Case Manager, the Discipline Committee hereby orders that:

1. Pursuant to s. 63(k) of the Act:
 - i) CNRL will, within a reasonable time following acceptance of this Recommended Discipline Order, appoint a senior member of its management team, at the VP level or higher, to liaise with APEGA for the purposes of assisting in the development and review of a new APEGA Practice Standard respecting the outsourcing of engineering and geoscience. The engagement with APEGA may take up to 25% of the appointee's time during the more active stages of Standard development. The appointee will first be

satisfactory in the discretion of APEGA, exercised reasonably; have a solid grounding in the issue; and will possess sufficient authority to implement change within CNRL and to advocate for the new standard to the profession;

- ii) CNRL's appointee will be expected to actively participate on a committee convened or appointed by APEGA for the purpose of determining the manner and method of a province-wide consultation process with APEGA members clarifying the issues and proposed standards for outsourced engineering.
 - iii) APEGA expects that the appointee will be engaged in this work for a maximum of 24 months, with the volume of work varying depending on the schedule of consultations and work with the committee to develop the requested standards;
 - iv) CNRL will pay the costs associated with the consultation process as determined by APEGA, to a maximum value of \$150,000 unless otherwise agreed by both CNRL and APEGA;
 - v) Upon the ratification of the new standard by APEGA, CNRL will then be subjected to an audit to ensure that the new standard is being met, and will be required to successfully pass that audit to the satisfaction of APEGA.
2. Upon giving CNRL not less than 14 days' advance notice, this matter and its outcome will be published by APEGA in any form or media deemed appropriate, but having regard to the established publication practices of APEGA in prior cases, and such publication will name CNRL. APEGA will work with CNRL (both acting reasonably) to obtain input and agreement where possible on the final form and content of any public statement, summary, release or the like, other than this Recommended Discipline Order.
3. CNRL will be assessed, and will pay, a fine of \$10,000, pursuant to s. 64(1)(b) of the Act.

APEGA Investigative Committee

[Redacted Signature]

Canadian Natural Resources Limited

[Redacted Signature]

APEGA Discipline Committee

Approved this 21 day of November, 2016

By: [Redacted Signature]
Case Manager