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Date: 19990611
Docket: C955017
Registry: Vancouver

IN THE SUPREME COURT OF BRITISH COLUMBIA

BETWEEN :

WESTSHORE TERMINALS LTD.

PLAINTIFF

AND :

SANDWELL INC., SPANTEC CONSTRUCTORS LTD.,

REASONS FOR JUDGMENT
OF THE
HONOURABLE MADAM JUSTICE LEVINE

Counsel for the Plaintiff: Frank G. Potts
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Date and Place of Hearing: November 16-20, 23-25, 30, 1998
February 9, 10, 12, 15-17, 1999
Vancouver, B.C.

I. INTRODUCTION

[1] The plaintiff, Westshore Terminals Ltd., operates a coal terminal facility at Roberts Bank, B.C., from which it carries on the business of storing and shipping coal for customers, primarily coal mine operators. The defendant, Sandwell Inc., carries on business as consulting engineers. Westshore and Sandwell entered into a contract in March 1990, under which Sandwell designed and supervised construction of an extension to the terminal. In September 1993, an incident occurred at the terminal which resulted in the contamination of coal being stored and shipped. Westshore's insurer paid approximately \$810,000 to Westshore's customers with respect to the contaminated coal and claims damages in that amount from Sandwell for negligence and breach of contract.

[2] Both liability and quantum are in dispute. Sandwell argues that Westshore has not proved that any failure on Sandwell's part caused the contamination incident and blames the incident on the negligence of Westshore employees. It disputes the quantum of damages claimed on the grounds that Westshore has not proved that the insurer was liable to pay the amounts paid and that they are reasonable.

II. LIABILITY

A. Overview of the Incident

[3] The operations at Westshore's coal terminal include receiving and unloading trainloads of various grades of coal and conveying the coal along a series of conveyor belts to either stockpiles or ships. Once unloaded from the trains, the coal must be directed on to the proper conveyor belts in order to reach its selected destination. It is of primary importance that different grades of coal not be mixed.

[4] The mechanical system that directs coal from trains to stockpiles or ships includes, in addition to the conveyor belts, "transfer gates" or "flop gates" housed in "transfer towers". The purpose of the gates is to direct the flow of coal from the unloaded trains, through a vertical chute, on to the selected conveyor belt.

[5] The gates within the transfer towers are, in essence, metal doors. When the position of a gate is changed, the top edge of the gate swings through an arc, or "flops", from one side of a chute to the other, moved by a hydraulic arm powered by a hydraulic pump. The movement of the gates is monitored by magnetic switches, variously called "limit switches", "go switches" or "proximity switches". The purpose of the limit switches is to sense when the gate is at or approaching its closed, or "seated", position. When the gate is sensed by the

limit switch, the limit switch is said to be "made" and a signal is sent to the system operator. The signal must be received and acknowledged by the operator before the conveyor belts will run.

[6] The incident in issue in this case occurred on September 26 and 27, 1993, when different grades of coal were mixed and carried to a stockpile and to two ships, contaminating the stockpile and the ships' cargoes.

[7] Gates 11 and 12 in transfer tower 1 operate in opposition to each other, so that each of them allows coal to proceed on only one of conveyor belts 2A and 2B. The mixing took place when gate 12 failed to completely close, allowing coal directed to conveyor 2B to leak on to conveyor 2A, which was carrying a different grade of coal.

[8] The system, including the movement of the gates, is controlled automatically from a central control station by computer, governed by a computer program termed "PLC logic" or "ladder logic". The gates may also be operated manually, using switches located in the transfer tower.

[9] When the gates are operated automatically, the pump that exerts pressure to close the gates continues to run for 60 seconds after the limit switches send the signal that they are "made". When the gates are operated manually, there is no built-in delay after the limit switches send the signal; the pump is turned off only when the operator switches the manual switch to "off".

[10] There is evidence that the gates were operated manually, instead of automatically, some time before the contamination incident occurred.

[11] Westshore claims that the limit switches on gate 12 were not located in the proper position, with the result that they signalled that the gate was closed when it was not. The gap created between the gate and the edge of the chute allowed coal to leak on to the wrong conveyor belt, allowing the different grades of coal to mix. Westshore blames Sandwell for the improper placement of the limit switches.

[12] Sandwell concedes that there was a gap at gate 12 which allowed some coal to leak on to the wrong conveyor belt. It says that Westshore has not proved that the limit switches were not properly placed or that the system as designed and built by Sandwell was in any other way inadequate. Its theory is that Westshore employees who operated the system manually did not run the pump to close the gate for 60 seconds after the limit switches sent the signal that it was safe to operate the conveyor belts and that the employees are to blame for the failure of the gate to close.

B. History of the Project

[13] Westshore has operated a coal terminal facility at Roberts Bank since approximately 1969. In the early 1980's, Westshore undertook an expansion of the terminal facilities, adding transfer towers, gates and conveyor belts. Sandwell was the project manager for the expansion, including planning, designing and supervising construction of the expansion. The expansion, known as the "Intermediate" or "Phase 2, Stage 1 Expansion", was completed in 1983.

[14] At the time of the Intermediate or Phase 2, Stage 1 Expansion, Westshore contemplated a further expansion of its facilities and in 1988 contracted with Sandwell to carry out a feasibility study for the further expansion. In September 1989, Sandwell responded to Westshore's request for proposals from consulting engineers to provide project management, detailed design and engineering services for the "Phase 2, Stage 2 Expansion".

[15] Sandwell was awarded the contract to provide those services in March 1990 and the Phase 2, Stage 2 Expansion was completed in 1991.

[16] The facilities involved in the contamination incident, specifically transfer tower 1 and gate 12, were added as part of the Phase 2, Stage 2 Expansion.

C. The Contract

[17] The contract between Westshore and Sandwell for the Phase 2, Stage 2 Expansion set out the standard of care required of Sandwell:

The Engineer shall render its Services to the Client under this Agreement with that degree of care, skill and diligence normally provided in the performance of Services in respect of Projects of a similar nature to that contemplated by this Agreement at the time and place that such Services are rendered.

[18] Westshore's evidence is that the contract was awarded to Sandwell in reliance on Sandwell's representations of its superior knowledge of the operation of the Westshore terminal in particular and its experience and expertise with respect to coal terminals, gathered at Westshore and elsewhere.

[19] The contract provided that Sandwell would provide design services, subject to the following specific provisions with respect to the execution of detail engineering:

- i. Completion of the final design of the facilities following the layout and design concepts established for Phase 2, Stage 1 and during the Capital Cost Feasibility study carried out in 1988.
- ii. Maximum use will be made of these drawings and the existing tracings prepared for the Intermediate Phase Expansion...

[20] Sandwell described the design constraints imposed on it in its Statement of Defence:

...the Plaintiff expressly required that the design, specifications and control systems used on the Plaintiff's earlier intermediate expansion of its terminal were to be employed for the project...

[21] The contract provided, with respect to the train unloader, that the engineers would:

Review locations of limit switches and other control devices to ensure that they are not vulnerable to damage through faulty operation or by maintenance equipment. Ensure adequate access to all limit switches. Insure limit switches operate in a failsafe manner with respect to any spring return action.

Mr. N.F. Campbell, a mechanical engineer employed by Sandwell who worked on the Phase 2, Stage 2 feasibility study and was construction manager for the Phase 2, Stage 2 Expansion, testified that it would be good engineering practice to do the same thing for the limit switches on the gates in the transfer towers. He explained that "failsafe" meant to him that if the switch fails, there is no risk to an individual to be injured in some way.

[22] The contract provided that Sandwell would document the commissioning process of the project and prepare procedures and data manuals. The evidence is that these things were not done.

D. Operation of the System
1. Automatic and Manual Operation

[23] The system is designed to operate automatically under normal operating conditions. In automatic mode, the operator in the central control station selects on the computer the routing the coal is to take from the rail car, through the transfer towers, on to the conveyor belts and to the stockpiles or ships. The gates in the transfer towers are positioned by the automatic operation of the hydraulic pump so that the coal can only flow in the selected direction.

[24] The gates may also be positioned manually. Manual operation is contemplated for two purposes. The first is for maintenance: inspection, cleaning, repair. For this purpose, it may be necessary to stop the gate at any point in its arc.

[25] The second purpose for positioning the gates manually is in an "emergency", so described by Mr. R.I. Jepson, the Sandwell employee who supervised the electrical design and was involved in construction and commissioning of the Phase 2, Stage 2 Expansion. An emergency in this context occurs when there is some fault detected in the system's computer logic which causes the system to be inoperable in automatic mode to position the gates in the transfer tower. In order to keep the coal flowing through the system without stoppage to fix the immediate problem, the fault can be bypassed by using the manual switch at the transfer tower to change the gate positions.

[26] Only a maintenance crew which includes electricians or a shift maintenance crew consisting of an electrician and a mechanic may operate the system manually, whether for maintenance or in an emergency.

[27] In order to operate the gates manually, an operator must first turn the switch located in the transfer tower to the "on" position, to turn on the hydraulic pump. The operator in the transfer tower can then start the movement of the gates by pushing a button, also located in the transfer tower. Alternatively, an operator located in the local substation can start the movement of the gates, after the switch at the transfer tower has been turned to the "on" position, by pushing a button located in the substation or by applying an on/off force feature in the computer program that runs the system. The hydraulic pump will only stop pushing the gates when the switch located in the transfer tower is turned to the "off" position.

2. The Limit Switches

[28] The limit switches for the gates are located on vertical mounting posts that sit immediately in front and on either side of the lever arm that moves the gates. The location of the mounting posts and of the limit switches on the mounting posts determine at what point in the movement of the gate the switch will be "made".

[29] As the arm reaches the sensor on the limit switch, a signal appears on the computer screen in the central control station. The operator, located in that station, acknowledges the signal by pressing a key on the computer. The signal is also observed as a light in the local substation. An operator may acknowledge the signal by pressing a button on the control panel located in that station. The conveyor belts will run only after the acknowledgment is given. There is no signal or indicator in the transfer tower that the limit switches have been made.

[30] Mr. C.W. McLachlan was called as a witness by Westshore. Mr. McLachlan is a mechanical engineer who specializes in design, construction, commissioning and audit of bulk handling facilities, including the design and installation of flop gate related control systems. He was employed by Sandwell from 1970 to 1990, and was involved in all phases of the development and expansions of Westshore's coal terminal during those years.

[31] Mr. McLachlan was qualified to give expert opinion evidence as to the proper design and functioning of flop gate systems and controls in coal handling facilities.

[32] Mr. McLachlan commented in his testimony that the type of magnetic limit switch used on the gates is not a precise device and the system is "relatively crude...however, for this application, this switch is quite adequate." He explained that the further away from the pivot point of the gate the limit switch is mounted, the more precise or accurate the limit switch will be in sensing the gate at or near its closed position.

[33] Mr. McLachlan further explained that the gates travel a small distance after the limit switches are activated, and if the limit switch is activated at a position where the gate is

fully seated, there could be false unseated alarms, interrupting production. If the gate has to move an inch or two after the limit switch is made, then the gate will be designed so that the opening is effectively sealed before it moves that extra inch or two.

[34] Mr. Jepson agreed with Mr. McLachlan that the system can operate if the limit switches are placed so that they operate when the gate is within one to one-and-a-half inches from being completely closed.

[35] When the system is operated in automatic mode, the limit switches sense and signal when the gates are in the position required so that coal can flow through without leakage. When the gates are positioned manually purely for maintenance purposes, the limit switches are of no relevance because it is not important to position the gates so that coal can flow through without leakage.

[36] Westshore claims that when the gates are positioned manually in a so-called emergency, the limit switches indicate to the manual operator when to turn the switch in the transfer tower to the "off" position to stop the hydraulic pump.

[37] Mr. McLachlan stated in his report dated October 27, 1993:

In manual control, the operator moves the gate until a light indicates the gate has made the limit, after which, unless otherwise instructed, the operator would be expected to release the control.

...

It is our understanding that, when working in local control, the operator energizes the power unit until such time as the gate reaches its end limit, as indicated by a light.

[38] Mr. McLachlan's statements are not supported by his own testimony or by the evidence of Westshore's witnesses who operated the gates manually or observed them being operated manually.

[39] Mr. McLachlan stated at trial that the signal that the limit switch has been made is not a signal that the gate is seated, just that it had passed the limit switch. It would be expected to travel a small distance further after that. This is inconsistent with his statement that the light indicates that the gate has reached its "end limit".

[40] Mr. I.S. MacFarlane, a Westshore shift maintenance electrician in September 1993, testified that he moved the gates in transfer tower 1 manually from time to time before the date of the incident. He said that he would engage the hydraulic pump, watch the arm and make sure it came to a stop before he released the button. He could not tell anything from looking at the limit switch in the transfer tower, but would receive a radio communication from the operator in the control tower that they had permission to run the conveyor belts.

[41] Mr. L. Hurtubise, a Westshore operation superintendent at the dates of the incident and the trial, testified that he was asked on September 27, 1993 "to reproduce exactly how the gates were switched the last time and they were done manually". Mr. Hurtubise went to transfer tower 1 with an electrician/mechanic and "had the electrician select the gate as they normally would if they had to do it manually up in the tower..." They had a radio with them and were in contact with the foreman in the central control tower. After the gate stopped moving by itself, Mr. Hurtubise and the electrician received confirmation from the central control tower that they had indication that the limit switch had been made. He then drove to the central control tower and visually confirmed that there was a signal on the computer control panel indicating that the limit switch had been made.

[42] Thus, the limit switches are relevant to the manual operation of the gates only as confirmation that the gates have been moved to the position that triggers the sensor on the switch. The operator in the transfer tower receives that

confirmation by radio from the central control tower. It is also possible that he could receive it by radio from the local substation, although there is no evidence that any of the witnesses received confirmation from there. It does not appear that the limit switches play a role in determining how long the operator in the transfer tower leaves the hydraulic pump running to move the gates. As explained by Mr. MacFarlane, he holds the button until the gate comes to a stop: "it is a visual thing".

3. Sixty-second Delay

[43] The computer is programmed so that when the system is operated in automatic mode, the hydraulic pump operates for 60 seconds after the signal is sent by the limit switches that they have been made. There is no such built-in delay when the gates are operated manually.

[44] Westshore electricians on the maintenance or shift maintenance crews can access the computer logic on the computer screen located in the local substation. There is also a hard copy of the computer logic in the local substation.

[45] The computer logic contains the following comment in the portion of the program that sets out the conditions for running the hydraulic pump in manual mode:

run gate hydraulic pump for 60 seconds after the
limit switch is reached to ensure that the gate is
fully seated.

[46] Mr. Jepson testified that he believes that he placed the comment in the program when he developed it during the Phase 2, Stage 2 Expansion. His purpose was to explain to a maintenance electrician the function of the timer and to make it clear that if the system was being operated in manual mode and it was necessary to ensure that a gate was seated, the operator has to run the system for a fixed period after the gate switch actuates. While the warning applied in automatic mode as well, it would not be seen by the operator in the central control station and the automatic operation would ensure that the pump ran for 60 seconds after the limit switch was made.

[47] In response to an outstanding enquiry from the examination for discovery of Mr. D.E. Stevenson, Westshore operations superintendent at the dates of the incident and the trial, Westshore confirmed that the computer programming for the operation of the gates in transfer tower 1 has not changed since the completion of the Phase 2, Stage 2 Expansion in 1991. Mr. P. Idema, Westshore production manager with overall responsibility for operations and maintenance at the dates of the incident and the trial, testified that the programming has not changed since 1993.

[48] Mr. Jepson noted in his testimony that he did not include in the computer logic the requirement that an operator acknowledge the signal that the limit switches were made before running coal through the system. It is not in dispute that the "acknowledge" feature was added by Westshore, without consultation with Sandwell, after the completion of the Phase 2, Stage 2 Expansion.

[49] Mr. Idema testified that at the time of the incident in 1993 he was not aware of the 60 second delay in automatic mode. He admitted on cross-examination that he was not working with the logic every day as the electricians or foremen would.

[50] Mr. MacFarlane, the shift maintenance electrician, testified that in September 1993 he was familiar with the computer logic. He was aware that in automatic mode the hydraulic pump would continue to push the gate for 60 seconds after the limit switch was made and that the extra 60 seconds was not available in manual mode.

[51] The evidence suggests that the gate moves from one position to the opposite position in less than 15 seconds or about six inches per second. Mr. Jepson agreed that 60 seconds of additional hydraulic pressure is clearly more than is required to ensure that the gate has moved through its full arc to the closed position and that a few seconds of additional

pressure would be sufficient. Mr. Idema and Mr. Jepson both testified that the computer logic for transfer tower 6, added in the Phase 2, Stage 1 Expansion, provided a five second delay in automatic mode. There have been no contamination incidents at transfer tower 6.

[52] Mr. Jepson testified that the additional pressure of the hydraulic pump running for 60 seconds would not damage the gate and that the timer delay included in the computer programming could be changed by the Westshore electricians.

E. The Incident
1. Discovery

[53] The contamination was first noticed by Mr. D.D. Parker, Westshore supervisor foreman at the dates of the incident and the trial. At approximately 5.40 a.m. on September 27, 1993, he was loading coal on to a ship. He gave instructions to stop the delivery of coal to the ship, but noticed after about 20 minutes that coal was still coming on the conveyor. He traced the source of the coal to gate 12 in transfer tower 1, which was positioned to direct coal on to a different conveyor than the conveyor going to the ship. He opened the inspection door on gate 12 and observed that the gate was four to six inches away from the seated position. He called the shift maintenance crew (the "troubleshooters") to come to the transfer tower and "manually seat [the gate] all the way". They manually moved the gate until it made contact with the edge of the chute, which they confirmed by looking through the inspection hatch:

...we just made, made it to contact -- made sure it was seated, so they opened the door, and we manually put it over.

2. Investigation

[54] Mr. Parker reported the incident to Mr. Hurtubise, the operation superintendent. He also prepared a typewritten statement describing his observations on September 27, 1993.

[55] According to Mr. Hurtubise's notes made on September 27, 1993 and confirmed by his testimony, Mr. Hurtubise was informed by Mr. Parker that at approximately 6.15 a.m. on September 27, 1993, Mr. Parker found "gate 12 was selected to 2B conveyor but gate not totally made and allowing material to bypass on to 2A conveyor." At 7.45 a.m., Mr. Hurtubise informed Mr. Idema of possible contamination. At approximately 11 a.m., Mr. Hurtubise conducted the test with the shift maintenance crew at transfer tower 1, moving the gates manually. After receiving confirmation from the central control tower that the limit switch had been made, Mr. Hurtubise opened the inspection hatch on the chute in which gate 12 is housed and observed that gate 12 was approximately two inches away from being fully over to the side of the chute.

[56] After receiving the reports of Mr. Parker and Mr. Hurtubise, Mr. Idema with other Westshore personnel reviewed where the limit switches were located on transfer towers 1 and 2 in comparison with their location on transfer towers 4 and 6. Transfer towers 4 and 6 had been built during the Phase 2, Stage 1 Expansion. Transfer tower 1 was built and transfer tower 2 was modified in the Phase 2, Stage 2 Expansion. Sandwell was involved in the design and construction of all of these transfer towers. Westshore had not experienced any leakage problems with the gates at any of the transfer towers before the incident in question.

[57] Mr. Idema testified that they observed that the limit switches on transfer towers 1 and 2 were located low on the mounting post, close to the pivot point of the arm of the gate, while the limit switches on transfer towers 4 and 6 were mounted higher up. This difference is not apparent from a comparison of photographs of gate 12 taken on the date of the incident and of gate 61 at transfer tower 6 taken around the same time.

[58] Mr. Idema assigned Mr. Stevenson to investigate why the incident occurred and identify the level of contamination. Mr. Stevenson produced a "Production Incident Report" dated October 4, 1993. Mr. Stevenson described the "Transfer 1 Gate

Operation" in the Production Incident Report as follows:

Transfer 1 and transfer 2 were completed as part of Phase 2 Stage 2. The gate proximity switch locations on these transfers are different than all others on the site. In other areas of the site the switches are set so that they do not detect the gates until they have reached their full travel position. At Transfer 1 and 2 the switches detect the gates and give the belts permission to run prior to reaching full travel position.

[59] Mr. Stevenson testified that he drew the conclusion that at transfer 1 and 2 the switches detect the gates and give the belts permission to run prior to reaching their full travel position from what Mr. Hurtubise told him about gate 12 stopping approximately two inches from "full travel".

[60] Mr. Stevenson's report continues:

The gates at transfer 1 allow coal from the Dumpers to go onto one of 2A or 2B conveyors. They are operated by a single hydraulic pump. The gates are programmed to operate in opposite directions. Gate 11 is the lead gate. When either gate is switched, gate 11 is the first to change. When gate 11 changes, gate 12 will change to the opposite position. When the gates work in the auto mode a timer is activated which keeps the hydraulic pump motor running for 1 minute after gate 12 has been detected by its respective proximity switch.

When the gates are operated from the local station no timer is activated. Therefore the gate can stop prior to reaching its full travel position when operated from this station.

[61] Mr. Stevenson made the following conclusions and recommendations:

Conclusions:

1. The above [contamination] incidents were caused when gate 12 failed to move to its full travel position when selected for 2B conveyor.
2. The proximity switches for gates 11 and 12 were activated before the gates were in the full travel position. This gave conveyors 2A and 2B run permission before it was safe to run.

Recommendations:

1. That proximity switches be relocated so that they are not activated until the gates are in their full travel positions. This has been done at Transfer 1. Should also be done at Transfer 2.
2. When gates are moved from the local station, or other than from the tower a visual check should be made to ensure the gate is in its full travel position.
3. Movement of the Limit Switches

[62] Within a day or two of the incident, the location of the limit switches on transfer tower 1 was moved to a fixed position high up on the lever of the hydraulic arm.

[63] Of Mr. Stevenson's two recommendations concerning the limit switches, only the first recommendation was implemented: the relocation of the limit switches at transfer towers 1 and 2. The second recommendation, that a visual check be made when the gates are moved from the local station, was not. Mr. Idema testified:

Our conclusion at the end of the day was that based on our experience of operating the facility for, at that time, almost 23 years, was that if the limit switches were in the correct position, there is no need to do an official check.

[64] The position to which the limit switches were moved at transfer towers 1 and 2 was not the same as the position on transfer towers 4 and 6. It was determined later, unrelated to this incident, that the first altered location was inappropriate and the limit switches were again moved. Sandwell was not consulted with respect to either relocation of the limit switches.

4. McLachlan Report

[65] Mr. McLachlan was retained by Westshore's insurers shortly after September 27, 1993 to investigate and make recommendations concerning the coal contamination incident. He attended the site on October 6, 1993, where he met with Messrs. Idema, Stevenson and Mr. S.K. Pratt, Westshore manager of purchasing and contracts. He prepared a report for the insurers dated October 27, 1993. His evidence was based on both his observations and his expertise in the design and installation of flop gate systems.

[66] Mr. McLachlan stated in his report that he was informed that the problem occurred when the gate was moved by an operator at the local control station in the substation. He noted that in automatic operation, the hydraulic pump operates for one minute after the limit switch is made, but in manual control, the operator "moves the gate until a light indicates the gate has made the limit, after which, unless otherwise instructed, the operator would be expected to release the control."

[67] Mr. McLachlan's statements that the gate was moved from the substation and that the operator moves the gate until the light indicates that the gate has made the limit are not supported by the evidence. Mr. Idema testified that Westshore does not know where the gate was moved from because the individuals involved could not recall, and that it is normal to move the gate manually from the transfer tower. The lack of evidence to support the statement that the light is a factor in stopping the gate movement in manual mode is discussed above.

[68] When Mr. McLachlan visited the site, the limit switches at transfer tower 1 had already been moved. He therefore inspected the gates in transfer tower 2. He observed:

The gate limits observed in Tower No. 2 were arranged so that the gate would make the position limit well before the gate was fully seated in operating position (see Photograph Nos. 1 and 2). The limit switches were located on a much smaller radius than the outer radius of the gate, with the result that an error in the location of the switch would be magnified at the outer radius of the flop gate.

...

Observation of the limit switches for the Tower No. 2 gate, indicate that they would be activated significantly in advance of the gate reaching its final seated position.

The Tower No. 1 limit switches had been relocated, subsequent to the incident, to a position further from the gate pivot. They are also now located so that the movement of the gate subsequent to the activation of the switch is significantly less.

[69] Mr. McLachlan did not observe the location of the switches at transfer tower 1 before they were moved. There is no evidence that he had access to any measurements of the prior location of the limit switches on transfer tower 1 or took any measurements of the location of the limit switches at transfer tower 2. The photographs included in his report were apparently of transfer tower 2 and there is nothing in his report or his

evidence to indicate that he saw photographs of transfer tower 1 taken by Mr. Stevenson before the limit switches were moved. Mr. McLachlan was not consulted about the move of the location of the switches at transfer tower 1. Furthermore, the evidence is that the location to which the switches at transfer tower 1 were moved immediately following the incident was not consistent with the description given by Mr. McLachlan at trial about their location relative to the pivot point of the gate.

[70] The gate at transfer tower 2 was not operated while he was present. He opened the inspection hatch on the side of the chute at transfer tower 2 and observed that the gate was closed.

[71] Mr. McLachlan concluded:

It is our opinion that the incident resulted due to incorrect placement of the diverter gate limits in Tower No. 1. A secondary cause was that in local operation, the "time down" function available in automatic control is not automatically available. Regardless of the latter, the limit switch would have prevented the incident if located properly.

[72] Mr. McLachlan explained in his testimony that the "time down" function is the 60 second delay in turning off the hydraulic pump in automatic operation. In cross-examination, he agreed that if an operator moving the gate in manual control had received instructions to run the hydraulic pump for 60 seconds after the limit switch is made as indicated by the light, that would be the type of instruction contemplated in his report. He disagreed, however, that an electrician on a shift maintenance crew would understand the logic of the control system and stated:

We design systems to be idiot-proof, that's the jargon, which is fail-safe, as much as can be done, so we had no assuredly when problems occurred that the individual who goes out there understands the system.

[73] While Mr. McLachlan has considerable expertise in the design and installation of flop gates and gave expert evidence as to the proper mounting of limit switches, his conclusion that the incident occurred because the limit switches were mounted in the wrong place on transfer tower 1 must be based on his observations rather than his expertise. His knowledge of the location of the limit switches at transfer tower 1 derives only from the anecdotal evidence of the Westshore personnel to whom he spoke when he visited the site on October 6, 1993. In his report, he stated that switches of the type used on the gates "are reliable, however, can be more difficult to accurately locate so as to provide precise control of the devices". Not having seen the location of the switches on transfer tower 1 at the time of the incident or any evidence of their precise location, Mr. McLachlan's conclusion can only be an inference that he draws from the facts that there was a leak and that the system operated, the very inference Westshore asks the court to draw, essentially from the same evidence.

5. Brooker Sketch

[74] Westshore produced a sketch prepared by Mr. T. Brooker, a design technician employed by Sandwell at the time of the incident. The sketch is labelled "Flop Gate "Go" Switch Location (Gate #12)". The sketch was located by Westshore shortly before the trial began.

[75] Westshore relies on this sketch to show that the location of the limit switches at gate 12 at the time of the incident allowed a gap of one foot, nine inches to exist between the top of the gate and the edge of the chute when the limit switch was activated.

[76] Mr. Idema testified that he asked Mr. Brooker, either directly or indirectly, to prepare the sketch after he observed the difference in the location of the switches at transfer towers 1 and 6. Mr. Idema testified that he believes the sketch was made based on Mr. Brooker's measurements of the location of the limit switches at transfer tower 1 in September 1993,

because Mr. Brooker was instructed, either by Mr. Idema or another Westshore manager, to take such measurements. Mr. Idema said that based on the sketch and the reports of Mr. Parker and Mr. Hurtubise, they concluded:

...that the error that would be induced by having a limit switch mounted so low was significant enough that the gate could indicate it closed while it was still open, as much as a foot open. The tests, I think, were actually six inches, but it was potential possibility that the proximity could trip earlier than that.

[77] Mr. McLachlan stated in his report:

A brief review carried out by WTL indicated that a gap in excess of 1 foot was possible given the switch arrangement in place at the time of the incident.

Mr. Idema testified that he probably gave that information to Mr. McLachlan. During his testimony at trial, Mr. McLachlan was shown Mr. Brooker's sketch and testified that it was an accurate representation of the phenomena he described that when the limit switch is located closer to the pivot point of the gate it would be less precise than if the switch was mounted further out from the pivot. He did not know if the sketch was an accurate sketch of transfer tower 1 or 2 at the time of the incident. He did not say that he had previously seen the sketch.

[78] Mr. Brooker's testimony was imprecise, presumably affected by the fact that he had not been involved in this matter since the sketch was prepared until just before he testified. He recalled preparing the sketch. He testified that his superior at Sandwell sent him to Westshore to prepare the sketch. He acknowledged receiving a fax addressed to him at Westshore from Sandwell dated November 1, 1993, with drawings of gate details attached. He said that he used the drawings attached to the fax for the measurements of the gate and measured the location of the limit switches at the tower. He converted the measurements of the drawings attached to the fax from metric to feet and inches for the sketch he prepared. He testified that he did all of this around November 1, 1993.

[79] Mr. Campbell testified that the drawings of gate details attached to the November 1, 1993 fax were not of the gates in issue in this case and did not relate to the Phase 2, Stage 2 project. He suggested if Mr. Brooker's sketch and the plan of gate 12 in evidence were blown up to the same scale and compared, they would overlap if the measurements used by Mr. Brooker were accurate. Plaintiff's counsel maintains that the two drawings do overlap, while defendant's counsel says they do not. While the degree of overlap is a matter that the court can determine by comparing the two exhibits, it is not possible to determine the significance of differences which exist in the details of the drawings and how those may affect the measurements.

[80] The problem with Mr. Brooker's evidence is that if he measured the location of the limit switches on gate 12 at transfer tower 1 on November 1, 1993, they had already been moved. Westshore's counsel suggests that I must conclude from Mr. Idema's evidence that Mr. Brooker prepared the sketch immediately after the incident and that Mr. Brooker is wrong about the date that he prepared the sketch.

[81] It is probable that the sketch was prepared immediately following the incident, as Mr. Idema testified. That would explain the comment in Mr. McLachlan's report about the possible gap in excess of one foot. The evidence does not, however, support a finding that the sketch accurately represents the location of the limit switches on gate 12 at the time of the incident and therefore accurately demonstrates the possible gap resulting from that location.

[82] The sketch indicates that the electrical connection was at the bottom of the switch, while a photograph of the switches on gate 12 taken on or around September 27, 1993 shows that the

electrical connection was at the top of the switches. Mr. Jepson testified that the sensor would be activated below the electrical connection, while the sketch indicates that they are activated at the top. It is not possible to determine what difference, if any, this may make to the accuracy of the gap indicated by the sketch.

[83] The evidence of Mr. Parker and Mr. Hurtubise was that they had observed gaps of between two and six inches. No explanation was given for the difference between their observations and the gap indicated by Mr. Brooker's sketch.

[84] I find that Mr. Brooker's sketch does not accurately show the gap that would result from the location of the limit switches on gate 12 on September 27, 1993. It does, however, illustrate the relation between the location of the limit switches and the sensing of the closure of the gate.

6. Brodie Report

[85] Mr. M.N. Brodie has worked professionally as an electrical engineer for 51 years. He was qualified to give expert evidence as an electrical engineer with particular expertise in the design, commissioning and installation of control systems for conveyor systems and related equipment including flop gates. His report was dated October 13, 1998.

[86] The scope of Mr. Brodie's report was:

A review of the factors that appear to have led to the unintended mixing of two products during transfer from train to ship or storage, the equipment involved, and the deductions and opinions expressed in the reports of Messrs. C.W. McLachlan, P.Eng. and T.J. Peach, P.Eng.

Westshore did not tender the report of Mr. Peach and most of Mr. Brodie's report that refers to Mr. Peach's report was edited.

[87] Mr. Brodie testified that for the purposes of his report he assumed that:

The proximity switches were designed to indicate the Gates were approaching position while in automatic mode and to activate a 60 second timer.

He testified that he also assumed that the limit switches at gates 11 and 12 were located in the right place "because there was lots of running on time to carry the...gate home".

[88] In his report, Mr. Brodie criticized Mr. McLachlan's report on the basis that Mr. McLachlan misinterprets the signal sent by the limit switch when it is made as a "closed" signal. Mr. Brodie's opinion is based on his understanding, from his review of the computer logic, that:

After reaching the limit switch showing approach to the new position the pump on the hydraulic power unit will continue to run for another 60 seconds under control of an off delay timer to ensure proper seating of the gate in the new position.

and that: "...the intended function of the limit switch...is designed to show approach to the new position not arrival."

[89] Mr. Brodie stated that in manual operation, the limit switch is not used to indicate approach to the new position and the terminal gate position is verified by observation. He said in his report:

Local (Manual) operation is normally intended to be used for servicing of the chutes and gates. It is only incidentally available as a back-up when Remote

(automatic) operation is not functional.

. . .

In case of a failure of any part of the automatic control system or any of the controlled elements, the system operator will dispatch a crew from the maintenance group to either effect a repair or perhaps arrange for an alternative form of operation.

[90] In his testimony, Mr. Brodie said that it is not possible to "idiot-proof" the system when it is operated in manual mode:

There is no real idiot-proofing in manual mode because manual mode is intended to allow a knowledgeable person to override or force or make something happen that automatic is not permitting.

[91] Mr. Brodie testified that he assumed that the Westshore mechanics or troubleshooting teams would be fully familiar with the automatic control logic and with procedures to be followed in manual operation.

[92] Mr. Brodie stated his opinion in his report:

The control system, its logic, components and arrangement appear to have performed as planned in both Remote (automatic) and Local (manual) modes.

The mixing appears to have occurred as a result of improper use of the Local (manual) operating mode in this one instance.

The improper use is the result of an apparent failure to understand the control logic and a failure to recognize that the limit switch showed approach to the new position rather than seated in the new position. It is clear from the PLC logic and drawings that limit switches were not intended to play a role in the manual movement of the gates.

In my opinion, the system designed by Sandwell was appropriate for its intended use and performed satisfactorily when used properly.

[93] Mr. Brodie testified that in his opinion the system operated as intended because in ten years of operation of this kind of system at Westshore there was only one recorded incident of the type in issue in this case. In automatic mode, the limit switches did what they were supposed to do. The computer logic shows no role for the limit switches in manual operation. The system operated for its intended use:

...to allow the operator to process coal from the dumpers either to storage or to ships and it appeared to have done that for a long time before anything went wrong.

Mr. Brodie stated that the "improper use" was operator error in not continuing to apply hydraulic pressure after the limits had been made.

F. The Issue

[94] The difference in opinion between Mr. McLachlan and Mr. Brodie is the difference in issue in this case: was Sandwell's obligation to design a system that operates so that, when the gates are positioned manually, the manual operator relies on a limit switch to indicate that the gate is closed (or so close to closed that there will be no leakage), or a system that requires the manual operator to keep the pump running for some period of time (up to 60 seconds) after the limit switch is made?

[95] Westshore says that if the limit switches had been properly placed, the incident would not have occurred. By properly placed, Westshore means that they would not send the signal that they were made until the gate was effectively

closed. Westshore relies on the evidence of Mr. Campbell, Mr. Jepson and Mr. Brodie, who said that effective closure is one to one-and-a-half inches from the edge of the chute, if the limit switches are properly placed they will activate when the gate is in that position, and it is reasonable for an operator to assume that if the limits are made, it is all right to proceed. Westshore's position is that if the system was not designed to operate in that manner, Sandwell failed to warn Westshore and advise it of the steps to be taken to operate the system safely.

[96] I think it fair to say that Sandwell has no dispute with Westshore's position with respect to the proper operation of the system and in particular the limit switches, provided the system is operating in automatic mode. Sandwell's position is that the system was not designed or intended to operate in manual mode in the manner Westshore claims, it warned Westshore by placing the 60 second delay comment in the computer logic, the Westshore personnel who operated the system were aware of the warning, and they failed to heed it.

G. Disputed Evidence

[97] One of the issues in this case is Westshore's failure to obtain and retain evidence, immediately following the incident, to explain what happened on September 26 and 27, 1993.

[98] Other than the reports of Mr. Parker and Mr. Hurtubise, there are no reports of workers who operated the system on those dates, including the shift maintenance crew. Messrs. Idema and Stevenson testified that the union workers were not interviewed to determine what they did and why they did it, because of labour relations practices at Westshore. When interviewed in preparation for this litigation, the individuals who were directly involved in the operation of the system on September 26 and 27, 1993 did not remember what happened. Mr. MacFarlane testified that he had no recollection of being involved in the manual operation of the flop gates at transfer tower 1 between September 25 and 27, 1993.

[99] Computer logs that recorded faults in the system and original work orders produced to correct them were destroyed after two years, in accordance with Westshore's normal document destruction policy. Mr. Idema testified that the documents in evidence, computer records of original work orders, were inaccurate and at least one of them misdiagnosed the problem at gates 11 and 12.

[100] Westshore claims that evidence as to what happened on September 26 and 27, 1993 to cause the system to be run manually or the precise manner in which it was operated is immaterial to the outcome of this case. It says the undisputed facts that the system was running, there was contamination, and the system cannot run unless the limit switches are made, are sufficient to prove its claim that if the limit switches were in the right place the incident would not have occurred. It says there is no evidence of any cause for the limit switches to fail, such as mechanical failure, a faulty, loose or misaligned switch, or an operator bypassing the limit switch by running the system without having received the signal that the switch had been made. The only conclusion that can be drawn from the undisputed evidence, it says, is that Sandwell breached the contract and was negligent in designing and installing the limit switches in the course of completion of the Phase 2, Stage 2 Expansion in 1991.

[101] Westshore nonetheless tendered some evidence that describes events that occurred on September 26 and 27, 1993. Westshore says that the evidence tendered satisfies any onus on it to prove the cause of the contamination.

[102] Sandwell says that Westshore must prove its case by producing admissible evidence from which facts can be found that prove what happened to cause the contamination. It argues that it is not sufficient to say that because leakage occurred, Sandwell is responsible. It rejects as inadmissible hearsay much of the evidence tendered by Westshore that attempts to explain problems encountered at gates 11 and 12 on September 26 and 27, 1993.

[103] The disputed evidence tendered by Westshore consists of

the following:

1. Portions of the "Production Incident Report" produced by Mr. Stevenson on October 4, 1993.

[104] In preparing his report, Mr. Stevenson had the written reports prepared by Mr. Parker and Mr. Hurtubise and spoke to them. He recorded information he took from Westshore's computerized management system concerning what was happening at the terminal every two minutes between just before midnight on September 26, 1993 until some time on September 27, 1993. He referred to a "Gate Control Flow Diagram", prepared by a consultant at the request of Mr. Idema, which set out in a diagrammatic format the computer logic that operates the gates at transfer towers 1 and 6. He took photographs of gates 11 and 12 and transfer tower 1 on or around September 27, 1993. He had "train sheets" and "ship loading sheets", which recorded the dumping of coal trains and the loading of ships on September 26 and 27, 1993.

[105] Mr. Stevenson did not speak to the workers employed on the shift maintenance crews during September 26 and 27, 1993, as they did not report to him. He spoke only to the superintendent and foreman who reported to him.

[106] Mr. Stevenson set out the following "Chronology of Events" in his report:

September 26, 1993 @ 1201 hrs. Gates 11 and 12 at transfer 1 were changed so that conveyor 1A from Dumper 31 would go to conveyor 2A and conveyor 1B from Dumper 32 would go to conveyor 2B.

There was a fault at transfer 1, preventing the gates to be changed automatically from the operations tower (which is the normal practice). The shift maintenance crew was required to assist with the change.

The shift maintenance electrician found a force on the gate which was initiated to prevent the hydraulic pump motor from running. He took the force off the motor. The gates were then moved to the desired location using the local control at transfer 1. When the gate "made" the go switch indicating that the gate was in position, the electrician reinstalled the force on the pump motor.

[107] Mr. Stevenson testified that the first paragraph of the chronology came from the computer records. He could not recall where he received the information in the second and third paragraphs, but confirmed that it could only be from a foreman or superintendent.

[108] Mr. Stevenson also referred to work orders reporting that gates 11 and 12 were not working and describing work done. Mr. Stevenson did not see the work orders himself and could not recall where he got the information about them recorded in his report.

[109] Sandwell objects to the admissibility of the chronology of events and the references to the work orders on the grounds that they are hearsay.

[110] Sandwell objects to the admissibility of Mr. Stevenson's conclusions and recommendations for their truth as facts on the grounds that they are his opinions.

[111] Sandwell objects to the admissibility of the "Gate Control Flow Diagram" on the grounds that the consultant who created it did not attend to testify concerning its creation.

2. Portions of the "Loss Report" prepared by Mr. T.A. Barker, a consultant hired by one of Westshore's insurers, on October 14, 1993.

[112] Mr. Barker prepared his report after meeting with Mr. Stevenson on or around October 14, 1993. In his report, he states:

The plant had been changing the gates manually from the local station since 6:30 p.m. on

September 24, 1993. The gates had been changed twice prior to the discovery of the open gate. Historical records indicate that the hydraulic pump was in a low hydraulic oil level. The plant limited the pump to manual only due to this low level. They were not concerned with the level, as at the alarm stage there is still plenty of oil to operate the pump.

INCIDENT

On September 24, at 6:30 p.m., an "electronic force" was placed on the hydraulic pump by computer to keep it from operating automatically. This was done to limit operation due to the low hydraulic oil level alarm. At 6:55 a.m. on September 25, a successful local gate shift was performed with Gate 11 directing product from Conveyor 1A to Conveyor 2B. Gate 12, of course, was arranged to direct product from Conveyor 1B to Conveyor 2A.

The incomplete gate switch occurred at 12:01 a.m. on September 26. Between the hours of 11:50 a.m. and 2:25 p.m., approximately 2,000, metric tons of petroleum coke were mixed with metallurgical coal when the coke passed through the incompletely closed Gate 12 and onto Conveyor 2A, in addition to Conveyor 2B.

[113] Mr. Barker was not called to testify concerning his report. Mr. Stevenson recalled taking Mr. Barker on a tour of the site but could not recall commenting on his report. Mr. Idema was aware that Mr. Barker met with Mr. Stevenson on or around October 14, 1993 and Mr. Idema had seen the report. He presumed that Mr. Barker obtained information contained in the report from Mr. Stevenson's report. He could not recall any Westshore personnel commenting on Mr. Barker's report. Mr. Idema testified that:

I can -- cannot recall if we commented back on the report and said, well, there's a few things here that are not quite correct or what actually occurred with that report.

[114] Sandwell objects to the admissibility of Mr. Barker's report on the grounds that it is hearsay.

3. Computer listing of work orders

[115] As noted above, Westshore destroyed the original work orders after two years in accordance with its normal destruction policy. Sandwell objects to the admissibility of the computer listing of the work orders produced by Westshore on the grounds that it is not the best evidence of the work orders. It says further that if the computer records of the work orders are admissible, they should be given no weight because of Mr. Idema's testimony that in at least one instance they are wrong.

[116] Counsel made submissions concerning the admissibility of the disputed evidence. Westshore argued that to the extent the evidence is hearsay it should be admitted as business records under section 42 of the Evidence Act, R.S.B.C. 1996, c. 124 and the common law (*Ares v. Venner* (1970), 73 W.W.R. 347 (S.C.C.)), and under the common law principles of reliability and necessity (*R. v. Khan* (1990), 59 C.C.C. (3d) 92 (S.C.C.), *R. v. Smith* (1992), 75 C.C.C. (3d) 257 (S.C.C.) and *R. v. B. (K.G.)* (1993), 79 C.C.C. (3d) 257 (S.C.C.)).

[117] I have reviewed the disputed evidence and the authorities relied on by both parties. I find it unnecessary to decide whether the disputed evidence is admissible for its truth, because, if so admitted, it does not assist Westshore in proving its claim. The evidence is contradictory and unexplained. Despite detailed evidence on the operation of the system, none of the witnesses explained the implications for the issue to be decided in this case of a low hydraulic oil level alarm or the nature of any force that may have been placed on the system that required the gates to be operated

manually. It is impossible to draw any inferences from that evidence that assist in determining why or how the contamination occurred.

[118] There is no dispute that there was leakage at gate 12. Sandwell's defence assumes that the gate was operated manually the last time before the incident occurred. On all of the evidence other than the excluded evidence, I find that the gate was so operated. While the disputed evidence might, with proper explanation, assist in determining why the gate was operated manually, standing on its own it is of no assistance.

H. Findings of Fact

[119] This case is essentially one of circumstantial evidence. There is no direct evidence of what the operators who shifted gate 12 on September 26 or 27, 1993, before the contamination occurred, actually did. There is direct evidence that contamination occurred because coal leaked from gate 12 on to conveyor 2A when it was directed to conveyor 2B.

[120] Based on the all of the evidence, I find as follows:

- (a) Gates 11 and 12 were moved manually the last time before the contamination incident occurred.
- (b) There was a gap at gate 12 sufficient to allow the coal running through that gate to leak on to conveyor 2A when it should have gone only to conveyor 2B.
- (c) At the time of the incident, the mounting posts and the limit switches at gate 12 at transfer tower 1 were mounted low relative to the arm of the gate. I do not find from the evidence, including the photographs produced, however, that the location of the limit switches on gate 12 was either the same or materially different from the location of the limit switches at transfer towers 2 or 6.
- (d) At the time of the incident, the computer logic included the warning that the hydraulic pump should be run for 60 seconds after the limit switch is reached to ensure the gate is fully seated.
- (e) At the time of the incident, the Westshore employees on the shift maintenance crew knew that the warning was included in the computer logic.
- (f) The system was designed for normal operation in automatic mode and for operation in manual mode primarily for maintenance. It was contemplated that the gates may be positioned manually for operations purposes on an exceptional basis and then only by knowledgeable personnel.
- (g) There were no prior incidents of contamination involving gaps at any of the gates in the system and there have been none since.
- (h) If the limit switches on gate 12 were made when the gate was an inch to an inch-and-a-half from being fully seated, it is more likely than not that there would not have been a gap that allowed coal to leak on to the wrong conveyor belt.
- (i) If the manual operator of gate 12 on September 26 or 27, 1993 had run the hydraulic pump for 60 seconds after the limit switch was made, it is more likely than not that there would not have been a gap that allowed coal to leak on to the wrong conveyor belt.

I. Burden of Proof

[121] The burden of proof in cases where the evidence of negligence is circumstantial was discussed in *Fontaine v. Leowen Estate* (1998), 156 D.L.R. (4th) 577 (S.C.C.). *Fontaine* dealt with the doctrine of *res ipsa loquitur*, deciding that it has no application in negligence cases. The decision is useful, however, for its discussion of circumstantial evidence.

[122] Major J. pointed out the burden of proof in any negligence case (at p. 583):

As in any negligence case, the plaintiff bears the burden of proving on a balance of probabilities that negligence on the part of the defendant caused the plaintiff's injuries.

[123] He then quoted from Sopinka, Lederman and Bryant, *The Law of Evidence in Canada* (Toronto: Butterworths, 1992) at p. 81:

Res ipsa loquitur, correctly understood, means that circumstantial evidence constitutes reasonable evidence of negligence. ...If, at the conclusion of the case, it would be equally reasonable to infer negligence or no negligence, the plaintiff will lose since he or she bears the legal burden on this issue. Under this construction, the maxim is superfluous. It can be treated simply as a case of circumstantial evidence.

[124] Major J. agreed, stating at p. 585:

It would appear that the law would be better served if the maxim was treated as expired and no longer used as a separate component in negligence actions. After all, it was nothing more than an attempt to deal with circumstantial evidence. That evidence is more sensibly dealt with by the trier of fact, who should weigh the circumstantial evidence with the direct evidence, if any, to determine whether the plaintiff has established on a balance of probabilities a prima facie case of negligence against the defendant. Once the plaintiff has done so, the defendant must present evidence negating that of the plaintiff or necessarily the plaintiff will succeed.

J. Duty and Standard of Care

[125] There is no real dispute concerning the legal principles applicable in determining the nature of the duty owed by Sandwell to Westshore or the standard of care Sandwell was required to meet.

[126] Sandwell characterizes the duty it owed Westshore as a duty to exercise reasonable care in carrying out its design and supervisory services on the Phase 2, Stage 2 Expansion. It says that it owed no duty to warn Westshore of risks known or which ought to have been known to Westshore, as Westshore was a sophisticated operator with qualified personnel (*Murphy v. St. Catharines General Hospital et al.* (1963), 41 D.L.R. (2d) 697 at 711-2 (Ont.H.C.); *Austin v. 3M Canada Ltd.* (1974), 7 O.R. (2d) 200 at 204-5 (Co.Ct.); *Gledhill v. Liverpool Abattoir Utility Co., Ltd.*, [1957] 3 All E.R. 117 at 123 (C.A)).

[127] Westshore does not dispute the characterization of the duty owed by Sandwell, but claims that its personnel were not "sophisticated users" of the system when it was running in manual mode and were entitled to rely entirely on the limit switches to indicate that the gate was closed.

[128] Both parties refer to the standard of care as set out in the contract. Westshore claims that Sandwell had special expertise which imposes a higher standard of care than would be imposed on an engineer who does not have that expertise. Sandwell acknowledges its special expertise, but says that the contract specifies that it exercise a reasonable degree of care, skill and diligence, judged by the standards of competence in engineering practice, to discharge its obligations. It does not specify that Sandwell is either a guarantor of its work or judge it on the basis that in hindsight it could have done more to prevent the incident from occurring (see *McLachlin, Wallace and Grant, The Canadian Law of Architecture and Engineering*, 2nd ed. (Toronto: Butterworths) at 101-3; *Larche v. Ontario* (1990), 75 D.L.R. (4th) 377 at 380 (Ont.C.A.); *Sherwood Park Professional Building Ltd. v. Scandinavian Management Services Ltd. et al* (1982), 40 A.R. 233 at 238-40 (Q.B.); *White Rock Lodge Properties Ltd. v. B.C. Hydro & Power Authority* (1993), 9 C.L.R. (2d) 250 at 255-6 (B.C.S.C.)).

[129] The standard of care specified in the contract is applicable to Westshore's claims of both negligence and breach of contract. Sandwell was required to exercise reasonable care, skill and diligence, consistent with its experience and expertise in engineering, in carrying out the services required under the contract.

K. Breach of Duty or Contract

[130] Westshore claims that Sandwell was negligent and in breach of contract in failing to ensure that the development, design and construction of the Phase 2, Stage 2 Expansion were adequate to segregate coal flowing through gate 12 without mixing grades. In particular, on the evidence, Westshore alleges that Sandwell is responsible for faulty placement of the limit switches at gate 12, failure to reproduce the design from the Phase 2, Stage 1 Expansion, failure to produce drawings, manuals and commissioning reports and failure to warn Sandwell that when moving the gates manually for operational purposes, additional hydraulic pressure should be applied after the limit switches were made to ensure that gate 12 was completely closed.

1. Placement of the Limit Switches

[131] Westshore's primary argument is that the leak of coal through gate 12 is evidence that the limit switches were improperly mounted. Westshore relies further on the evidence of Mr. Idema and Mr. Stevenson who testified that they observed that the limit switches at transfer towers 1 and 2 were mounted lower than on transfer tower 6.

[132] Westshore's argument is weakened by the fact that there was no incident of leakage at transfer towers 1 and 2 prior to the incident. The 60 second delay in automatic mode accounts for no incidents when the gates are operated automatically. I accept the evidence of Mr. MacFarlane that the gates at transfer towers 1 and 2 had been moved manually other than for maintenance purposes, from time to time before the incident, with no leakage. If the limit switches were mounted in the wrong place, as submitted by Westshore, one would expect that there would have been problems of leakage before this unique incident.

[133] Westshore submits that there is no evidence that points to any other cause of the incident other than the faulty placement of the limit switches. It says the fact that the system operated after the movement of the gates indicates that there was no mechanical problem that caused the incident. Further, Westshore's witnesses testified that they have no evidence that the limit switches were bypassed, and that would be an extraordinary event that would have been noted. They said that they found no fault with a limit switch, or that the switches were loose or out of alignment.

[134] The problem with Westshore's reasoning lies in the overall lack of evidence relating to the cause of the incident. While Mr. Idema and Mr. Stevenson testified that the limit switches on transfer tower 1 were in a different place than on transfer tower 6, Mr. Parker noticed no difference and neither Mr. Hurtubise nor Mr. MacFarlane testified on this issue. The photographs are not sufficiently clear to indicate a difference of any significance. There is no other direct evidence that the limit switches were mounted differently at the two transfer towers.

[135] Similarly, there is no other evidence that supports the denials of a mechanical fault, bypass of the limit switches, or faulty, loose or misaligned limit switches. Westshore admits that the memories of its witnesses concerning the incident are vague, and documentary evidence of what happened at the time is not available. Westshore denies that the limit switches were bypassed because it would have been an extraordinary event and noted somewhere. One wonders, however, why Westshore found it necessary to insert the "acknowledge" feature into the computer logic, preventing the system from running until it was confirmed that the limit switches were made, if they had never been bypassed in the past. Furthermore, the documents in which a bypass or fault with a limit switch may have been noted are no longer available.

[136] Thus, while it is probable that the incident would not have occurred if the limit switches were made when they were an inch to an inch-and-a-half from being fully closed, Westshore has failed to prove that the incident was caused by faulty mounting of the limit switches.

[137] If the limit switches were improperly mounted at gate 12, Westshore has not proved that Sandwell did or failed to do anything in connection with the services provided under the contract or otherwise, that caused or contributed to faulty placement of the limit switches.

2. Design

[138] The only evidence of a fault in the design is in an "as-built" drawing of the cylinder arm of a flop gate prepared by Sandwell for the Phase 2 Stage 2 Expansion. This drawing shows the limit switches mounted low and behind a "pillow block" that sits in front of the pivot point of the gate.

[139] Messrs. McLachlan, Campbell and Jepson testified that limit switches would never be mounted in the location shown on the drawing. Messrs. Campbell and Jepson testified that the drawing would not be used by a contractor to install the limit switches. Mr. Jepson described the process of commissioning the gates, including mounting the limit switches. That process had nothing to do with a drawing or the location shown on the drawing.

[140] I am satisfied that the drawing was not used in the placement of the limit switches and has no relevance to the incident.

3. Mounting the Limit Switches

[141] Mr. Jepson described the procedure normally followed in mounting the limit switches during the commissioning of the gates, as follows:

Q How does one normally commission a flop gate system like this, Mr. Jepson?

A The first thing that you would do is just check that the wiring was correct, that the wiring was completed as per the drawings. Then you would check that the devices actually functioned, you'd push the buttons and make sure that the signals actually got to the computer. You would trick the limit switches by putting a washer or something like that on the limit switch to make sure that the signal made it to the computer. Then you would roughly adjust things and just make sure that you could make the gate move back and forth.

Q And when you say "roughly adjust things" what things are you speaking of?

A The limit switches primarily, you would put them just somewhere close to where they need to be. And then the last things you would do is seat the gate fully, loosen off the limit switch, pull it back so that it wasn't actuated, and then carefully move it towards the actuator so that it just tripped as the gate, as it just detected the gate in the seated position, and once you'd done that for both switches, then you would cycle the gate back and forth a few times and just make sure it worked reliably.

. . .

Q And you've just described your regular practice in terms of commissioning?

A Yes.

Q Now, do you have any specific recollection of commissioning the gates at transfer tower 1 in the fashion you've just described?

A No, I do not.

Q Do you have any reason to believe that you would not have followed your regular practice in commissioning those gates?

A No, I don't.

\JDB- There is nothing in Mr. Jepson's description of the commissioning of the gates and mounting of the limit switches or in any other evidence which suggests that he or any other Sandwell employee did anything unusual in the course of carrying out that aspect of the work or failed to do anything that was required under the contract.

[143] Mr. Jepson testified that there were some problems encountered with the limit switches at gates 11 and 12 during commissioning, having to do with the type of metal used in the mounting plate. The problems had nothing to do with the location in which the limit switches were mounted.

4. Failure to Reproduce Phase 2, Stage 1 Design

[144] The contract required that Sandwell use the design and drawings from the Phase 2, Stage 1 Expansion. The evidence is that Sandwell reproduced the design of the Phase 2, Stage 1 Expansion with one exception: the delay in stopping the hydraulic pump when the gates are operated in automatic mode was changed from five seconds to 60 seconds. Mr. Jepson testified that at most a few seconds of additional pressure could be required to completely close or seat the gates after the limit switches were made. The 60 second delay was incorporated into the computer logic for a different reason, and could have been changed by the Westshore electricians if it was too long. I am satisfied that this variation from the contract did not contribute to the incident.

5. Plans and Drawings

[145] Sandwell did not produce the drawings, manuals and reports required by the contract. In the circumstances, I find that these breaches did not contribute in any way to the cause of the incident.

6. Failure to Warn

[146] Sandwell submits that it had no duty to warn Westshore that, when moving the gates in manual mode, additional pressure should be applied after the limit switches were made to ensure that the gates were closed. It says that Westshore's personnel were experienced, competent and knowledgeable about the system. They can be taken to have known and understood the risk that when operating the gates in manual mode, the 60 second delay available in automatic mode was not available and extra pressure should be applied after the limit switches are made. Furthermore, Sandwell says that any duty to warn was satisfied by the warning placed in the computer logic.

[147] In Murphy, supra, the court dealt with the duty of a manufacturer to warn users of an article that could not be regarded as being inherently dangerous. In that case, the article in question was an intravenous unit from which a catheter became severed. The court said at pp. 711-2:

Assuming, as I do, that such a duty is owed by a manufacturer to someone in the plaintiff's position, there was sufficient warning of the possible danger given here, or alternatively, the circumstances were such as to dispense with the necessity of an express warning. In the first place, it has always to be borne in mind that this instrument was never intended or expected to be handled by a member of the public but only by doctors or under their close supervision or instruction. Indeed, I think Mr. Ballard was quite correct in saying that until 1961, the company thought that it would only be used by doctors who were specialists in the field of administering intravenous injections.

It has also to be remembered, as Mr. Keith pointed out, that hospitals would ordinarily be the only agencies who would use the Intracath in the ordinary course of events....I repeat, its use, generally speaking, was expected, reasonably and logically, to be in hospitals, where Deseret could assume that competent and experienced persons would have charge of it.

[148] I agree with Sandwell that the Westshore personnel who ran the system to change the gates in manual mode were experienced, competent and knowledgeable about the system. Mr. MacFarlane, the only Westshore witness who had actually operated the system in manual mode, said that he was familiar with the computer logic, knew about the 60 second delay in automatic mode and knew that the 60 second delay was not available in manual mode. I find that he also knew that the warning to run the hydraulic pump for 60 seconds after the limit switch was made was in the computer logic.

[149] I find, as in Murphy, that if any warning to apply additional pressure after the limit switches were made was necessary, sufficient warning was given, or alternatively, none was necessary because of the competence and experience of the personnel running the system.

[150] In ordinary circumstances, it was reasonable for the Westshore employees to assume that if the limit switches are made, the system can run without leakage. These were clearly not ordinary circumstances. Moving the gates manually in order to operate the system was exceptional. It cannot be determined what circumstances led to the adoption of this exceptional course of action. Whatever those circumstances were, the experienced, competent and knowledgeable Westshore employees knew or should have known there was some risk of leakage if the gates were not fully closed and to heed the warning, of which they were aware, to run the pump for 60 seconds after the limit switches were made to ensure the gate was closed.

[151] I find, from all of the evidence, that if the Westshore employees had heeded the warning and applied hydraulic pressure to the gates for 60 seconds after the limit switches were made, even if the limit switches were made when the gates were more than one to one-and-a-half inches from full closure, the gates would have been fully closed when the coal was put through. The only inference to be drawn is that the Westshore employees failed to heed the warning.

L. Conclusion

[152] Westshore has not proved on a balance of probabilities that the contamination incident that occurred in September 1993 was caused or contributed to by Sandwell failing to exercise the reasonable care, skill and diligence required of it under the contract in designing and commissioning the Phase 2, Stage 2 Expansion. Nor has Westshore proved that Sandwell failed to warn Westshore of risks of the operation of the system that Westshore did not know and could not be expected to have known. On the contrary, Sandwell has proved on a balance of probabilities that the Westshore employees knew of the risks and failed to heed the warning provided by Sandwell.

[153] Sandwell has no liability for the contamination. Westshore's claims against Sandwell are dismissed.

III. QUANTUM

[154] As I have found that Sandwell is not liable for the contamination for which Westshore compensated its customers, it is not necessary for me to consider the parties' submissions relating to damages.

IV. COSTS

[155] Subject to any submissions counsel wish to make with respect to costs, Sandwell is entitled to its costs on scale 3.

"R.E. Levine, J."