Release Date: November 4, 2008

THE PROVINCIAL COURT OF MANITOBA

IN THE MATTER OF: *THE FATALITY INQUIRIES ACT*

AND IN THE MATTER OF: **STEVEN RYAN EWING, Deceased**

Report on Inquest of
The Honourable Judge Robert Cummings
Issued this 30th day of October, 2008.

APPEARANCES:

Mr. Marty Minuk, Counsel to Inquest
Ms. Betty Owen, Inquest Coordinator
Mr. William Burnett and Mr. Jim Edmond, Counsel for
Hudson's Bay Mining and Smelting Co. Limited
Ms. Marjorie Webb, Counsel for Workplace Safety and Health

Mr. John Harvie and Mr. Andrew King, Counsel for United Steelworkers of America

Mr. Vair Clendenning, representative International Brotherhood of Electrical Workers

Mr. Brian Short, representative International Brotherhood of Machinists and Aerospace Workers

Mr. Pete Walker, Health & Safety Representative, Manitoba Federation of Labour

Mr. Paul Garrett, Union of Welders and Boilermakers

Release Date: November 4 , 2008

IN THE PROVINCIAL COURT OF MANITOBA

THE FATALITY INQUIRIES ACT

Report by Provincial Judge on Inquest

RESPECTING THE DEATH OF STEVEN RYAN EWING

An inquest respecting the said death having been held by me.

I hereby report as follows:

The name of the deceased is Steven Ryan Ewing.

I hereby make the following recommendations as set out in the attached report.

Attached hereto and forming party of my report is a schedule of all exhibits required to be filed by me.

Dated at the City of Brandon, in Manitoba, this 30th day of October, 2008.

"Originally signed by
Judge Robert Cummings"

Robert Cummings

Provincial Court Judge

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I INTRODUCTION

[1] Steven Ryan Ewing died on August 16, 2000 at Health Sciences Centre in Winnipeg, Manitoba. He was 33 years old at the time of his death.

[2] The death came as a result of injuries sustained in an explosion, or series of explosions, on August 8, 2000 at Flin Flon, Manitoba.

[3] At the time of his injuries, Mr. Ewing was carrying out his duties as an employee of Hudson's Bay Mining and Smelting Co. Limited (hereinafter called the “Company”). Twelve other people sustained injuries as a result of the explosion or explosions.

[4] The fact of Mr. Ewing's death and the injuries to the others, some of which were quite severe, has become a very important and contentious issue for the people of Flin Flon and for the people who work for the Company.

[5] The Company has admitted its responsibility in the death and injuries on a number of occasions, including several times during the inquest proceedings.

II PARTIES TO THE PROCEEDINGS

[6] Parties with standing at the inquest were:

a) The Company, represented by Mr. William Burnett and Mr. Jim Edmond;

b) Workplace Safety and Health, a Division of the Department of Labour, represented by Ms. Marjorie Webb;

c) Manitoba Federation of Labour, represented by Mr. Pete Walker;

d) United Steelworkers of America, International Brotherhood of Electrical Workers, International Association of Machinists and Aerospace Workers and Local #451 of the Boilermakers (hereinafter called “the Unions”), represented by Mr. Andrew King and Mr. John Harvie.

It should be noted that the electrical workers' spokesman was Mr. Vair Clendenning and that the machinists' spokesman was Mr. Brian Short. However, for the main part, both these entities were represented by Mr. King or Mr. Harvie.

e) Counsel for the inquest was Mr. Martin Minuk.

[7] All of these representatives and counsel performed very valuable duties at the inquest and I thank them for their assistance and excellent submissions.

[8] Also of great help in the inquest process was the Inquest Coordinator, Ms. Betty Owen. She had many duties respecting the inquest, the main ones being: assisting Mr. Minuk in the preparation of witnesses, compiling all of the documents and assisting me in writing this report. I highly recommend her office to any judge who is assigned an inquest. Inquest proceedings, like many other matters coming before the Courts, are becoming longer and more complex and

the Inquest Coordinator is invaluable in helping the judge and the inquest counsel through this process.

III MANDATE OF THE INQUEST

[9] Attached as Appendix “A” is a letter from the Office of the Chief Medical Examiner dated January 22, 2002 directing the inquest. It states, in part:

> Our investigation revealed that this 33 year-old Flin Flon man died on August 16, 2000, at the Health Sciences Centre in Winnipeg from injuries sustained on August 8, 2000, during a series of explosions that occurred at Hudson Bay Mining and Smelting Company in Flin Flon where he was employed. Mr. Ewing died as a result of surface area burns to 95% of his body. The manner of death was accidental.
>
> In accordance with The Fatality Inquiries Act, I direct that an inquest be held in this case for the following reasons:
>
> • to determine the circumstances that led to Mr. Ewing's injuries and subsequent death, and
>
> • to determine what, if anything, can be done to prevent similar deaths from occurring in the future.

[10] Section 33(1) of *The Fatality Inquiries Act* (hereinafter referred to as "*FIA*") states:

> Duties of provincial judge at inquest
> 33(1) After completion of an inquest, the presiding provincial judge shall
>
> (a) make and send a written report of the inquest to the minister setting forth when, where and by what means the deceased person died, the cause of the death, the name of the deceased person, if known, and the material circumstances of the death;
>
> (b) upon the request of the minister, send to the minister the notes or transcript of the evidence taken at the inquest; and
>
> (c) send a copy of the report to the medical examiner who examined the body of the deceased person;
>
> and may recommend changes in the programs, policies or practices of the government and the relevant public agencies or institutions or in the laws of the province where the presiding provincial judge is of the opinion that such changes would serve to reduce the likelihood of deaths in circumstances similar to those that resulted in the death that is the subject of the inquest.

IV CONCLUSIONS OF INQUEST

[11] The main purpose of the inquest was to formulate recommendations as contemplated by the last paragraph of section 33(1) *FIA*.

[12] Several conclusions as required by the *FIA* can be stated here: Mr. Ewing died in Winnipeg, Manitoba at 8:01 P.M. on August 16, 2000. The immediate cause of death was burns to 95% of his body. The antecedent cause was a workplace accident while employed for the Company, which accident occurred at approximately 1:40 A.M. on August 8, 2000 at Flin Flon, Manitoba.

[13] The material circumstances relating to Mr. Ewing's death will be detailed in this report as well as my recommendations.

V LEGISLATIVE AUTHORITY FOR THE COMPANY'S OPERATIONS

[14] Ms. Webb, in her submission set out the legislative authority for the Company's operations. The issue of jurisdiction of this Court over the inquest proceedings is not disputed by any of the parties with standing herein; in fact, each party with standing assured Mr. Minuk that it would not make any such objection.

[15] However, the legislative authority is an area of importance when considering recommendations in this report. As will be apparent by the paragraphs which follow in this section, only certain acts and regulations of the Province of Manitoba apply to the Company's operations. In other words, recommendations to amend an act or regulation which is not part of the legislative scheme described below will have no effect on the Company's operations.

[16] Ms. Webb has set out the legislative authority in her submission and I cannot improve on or add to this part of her submission. Therefore, I have inserted, with some minor amendments, her submission in this area. I thank her for permission to do so.

[17] The Company is governed by an act of Parliament entitled ***An Act respecting the Hudson Bay Mining and Smelting Co., Limited***, assented to July 17, 1947, 11 George VI, Chap. 62 ("***Act***"). In that ***Act***, Hudson Bay, in the Flin Flon Mineral Area on both sides of the boundary between Manitoba and Saskatchewan, are declared to be works for the advantage of two or more of the provinces.

[18] On December 17, 1987 amendments to the ***Act*** were assented to and section 2(1) of those amendments read as follows:

> 2(1) The provisions of the laws of Manitoba referred to in the schedule apply to the Hudson Bay Mining and Smelting Co., Limited and its employees in respect of employment on and in the works and undertakings referred to in section 1.

[19] Schedule A, Part I, section 6 referenced *The Workplace Safety and Health Act*, chapter W210 of the Continuing Consolidation of the Statutes of Manitoba, as re-enacted by *The Re-enacted Statutes of Manitoba, 1987, Act*.

[20] Schedule A, Part II, section 6 referenced Manitoba Regulations 158/77 (as amended by Man. Reg. 203/77), 204/77 (as amended by Man. Regs. 86/84 and 189/85), 205/77, 206/77, 207/77, 208/77, 209/77, 210/77, 173/84, 116/85, 198/85 and 62/87, made under *The Workplace Safety and Health Act* (hereinafter called the "*WHSA*".

[21] Subsequently, on June 21, 1990, Schedule A, sections 6 of Part I and II of the *Act* were amended as follows:

> 6. *The Workplace Safety and Health Act*, chapter W210 of the Continuing Consolidation of the Statutes of Manitoba, as re-enacted by *The Re-enacted Statutes of Manitoba, 1987, Act*, as amended from time to time.
>
> 6. The following regulations, made under *The Workplace Safety and Health Act*:
>
> (*a*) *Manitoba Regulation* 189/85 (regulation respecting the construction industry), as amended from time to time;
>
> (*b*) *Derrick, Crane and Other Hoisting Equipment Regulation*, Man. Reg. 99/88 R, as amended from time to time;

(*c*) *Fibrosis and Silicosis Regulation*, Man. Reg. 100/88 R, as amended from time to time;

(*d*) *First Aid Regulation*, Man. Reg. 101/88 R, as amended from time to time;

(*e*) *Forestry, Logging and Log Hauling Regulation*, Man. Reg. 102/88 R, as amended from time to time;

(*f*) *Hearing Conservation and Noise Control Regulation*, Man. Reg. 103/88 R, as amended from time to time

(*g*) *Operation of Mines Regulation*, Man. Reg. 62/87, as amended from time to time;

(*h*) *Sanitary and Hygienic Welfare Regulation*, Man. Reg. 104/88 R, as amended from time to time;

(*i*) *Workers Working Alone Regulation*, Man. Reg. 105/88 R, as amended from time to time;

(*j*) *Workplace Hazardous Materials Information System Regulation*, Man. Reg. 52/88, as amended from time to time;

(*k*) *Workplace Health Hazard Regulation*, Man. Reg. 53/88, as amended from time to time

(*l*) *Workplace Safety and Health Committee Regulation*, Man. Reg. 106/88 R, as amended from time to time;

(*m*) *Workplace Safety and Health Forms Regulation*, Man. Reg. 107/88 R, as amended from time to time;

(*n*) *Workplace Safety Regulation*, Man. Reg. 108/88 R, as amended from time to time.

[22] Since 1990, there have not been any further amendments to the ***Act***. Any amendments to the ***WSHA*** and its regulations are incorporated by reference into the ***Act*** and have application to Hudson Bay.

[23] Appendix "B" is an agreement between the federal and provincial governments as well as the Minister of Human Resources, Labour and Employment for the Province of Saskatchewan, the Company, the United Steelworkers of America and Association of Flin Flon Trade Unions. This agreement defines the Flin Flon Mineral Area in section 1 as follows:

> The "Flin Flon Mineral Area" means all those portions of Manitoba and Saskatchewan situate, lying and being within the following metes and bounds: commencing at a point at the intersection of the 99th meridian west longitude and the 54th parallel north latitude; thence proceeding in a straight line in a northerly direction until the point at which the 99th meridian west longitude intersects with the 55th parallel north latitude; thence proceeding westerly in a straight line along the said 55th parallel north latitude until the point at which the said 55th parallel north latitude intersects with the said 102nd meridian west longitude until it intersects with the 54th parallel north latitude; thence proceeding in an easterly direction along the said 54th parallel north latitude until the point of commencement.

[24] As the Company's operations are situated in both Manitoba and Saskatchewan, the *WSHA* has application to those parts of the Company's operations located in Saskatchewan by virtue of the definition of Flin Flon Mineral Area.

[25] The enforcement of the *Act* is currently with Workplace Safety through a series of contracts between The Government of Canada represented by the Minister of Labour and The Minister of Human Resources Development and The Government of the Province of Manitoba represented by the Minister of Labour. The agreement in operation at the time of the explosion is Appendix "C". Through that agreement, the Government of the Province of Manitoba continues to provide such administrative, inspection, enforcement and related services consistent with the *Act* and its regulations. The Government of Canada compensates the Government of the Province of Manitoba in accordance with Schedule I. For the fiscal years 2000 - 2001, the Government of the Province of Manitoba was paid $160,800.00.

[26] The monies paid by the Government of Canada to the Government of the Province of Manitoba are used to partially support an office in Flin Flon, Manitoba.

(See http://www.gov.mb.ca/labour/safety/mines.html)

VI THE SMELTER OPERATIONS

[27] The events leading up to the tragic death of Steven Ewing took place on August 7 and 8, 2000 in the smelter owned and operated by the Company in Flin Flon, Manitoba. Mr. Ewing was employed by the Company.

[28] The Company has a large mining and smelting operation in Flin Flon and in a wide area of Northern Manitoba. The mines themselves are not relevant to this inquest. Copper and zinc are the primary metals smelted by the Company in Flin Flon. Each is smelted by a separate process and only the copper smelting facility is relevant to this inquest. The copper smelter will be called “the smelter” in this report.

[29] To understand the events leading to the death and injuries it is necessary to have some basic understanding of the operation of the smelter. To that end the first witness to the inquest was Mr. Eric Caba, an employee of the

Company who had not been present or acting in any capacity at the smelter at the relevant times.

[30] Mr. Caba testified on January 13 and 15, 2004 and led a tour of the smelter which took place on January 14, 2004.

[31] At the time of his testimony Mr. Caba was employed as the general superintendent of the zinc plant. He has a degree in metallurgical engineering and had been employed by the Company just short of three years. During this tenure he has been the smelter superintendent. His testimony can be summarized as follows.

[32] There are three main surface metallurgical operations undertaken by the Company. The concentrator turns ore into two concentrates, copper and zinc. The zinc plant (which is not relevant to the matters raised in the inquest)

processes the zinc concentrate. The smelter processes copper concentrate into anode copper.

[33] Concentrate comes from a number of sources, including some from in or near Flin Flon.

[34] In the winter the copper concentrate is thawed in a shed, blended with fluxes in the copper bedding bins and then transported to the roasters in the smelter proper. The concentrate is roughly 22% to 24% copper.

[35] The smelting process is a multi-stage process of oxidation which burns sulphur off the remaining minerals. The first step takes place in the roasters, of which there are five in the smelter. These are multi-hearth roasters which rake and plough the concentrate and tumble it down to the hearth below. After the concentrate has been through the roaster it is called calcine.

[36] The calcine is placed in a hopper below the roaster and from there is loaded into a rail car called a calcine car. Each calcine car holds eight tonnes of calcine and is controlled by an operator remotely.

[37] The calcine car is driven to the calcine floor over the reverberatory furnace. This furnace is variously referred to as the reverb or reverb furnace or the furnace. The furnace is built on rock. The rock bottom is referred to as the hearth.

[38] It is important to note that Mr. Ewing was working on the calcine floor at the time of the explosion and that the explosion itself occurred in the reverb furnace.

[39] There are three floors within the reverb furnace, the calcine floor being the top most.

[40] The calcine car empties its load into a hopper. The top of the hopper is located beneath the tracks on the calcine floor and the bottom of the hopper, which empties into the reverb furnace, is on the feed floor (the middle of the three floors).

[41] The reverb furnace melts the calcine into matte and slag. The matte contains copper, iron and sulphur. Slag is primarily iron oxide and silica. The matte and slag naturally separate, and the matte, being the heavier of the two, sinks to the bottom of the furnace.

[42] Gases are removed from both the roaster and the reverb furnace and processed in precipitators. Copper dust so recovered is returned to the reverb furnace.

[43] The slag is removed from the furnace on its east side and the matte on the south side.

[44] The process of removing slag is called tapping slag. Holes in the furnace wall are unplugged and the slag removed. The holes themselves are filled with clay which is also called adobe or mud in the industry. When a hole is opened, the slag is allowed to flow down a steel launder and into a large pot on a rail car. The rail car is emptied in the slag dump. This material has uses not relevant to the smelting process other than it is used as fettling, which is a coating to protect the brick walls of the furnace.

[45] The matte is tapped in much the same way as slag. It flows down bricked launders covered with sand into a ladle. The ladle is transported by rail carriage to the converter aisle where an overhead crane picks it up.

[46] The matte is processed in the converters by charging it with flux (silica sand) and blowing air on the matte. In the resulting mixture, slag is skimmed off the top and this slag is returned to the reverb furnace for further processing. The launder to feed this slag into the furnace is above the furnace burners on its west side.

[47] The process described in the immediately preceding paragraph is repeated a number of times and the resulting metal is molten copper sulphide which is roughly 80% copper. The sulphur is burned off the copper in a process called the copper blow, a skimming process occurs and then the copper, which is called blister copper, is poured into a ladle and taken to the anode casting area.

[48] In the anode casting area the final bit of sulphur is removed by virtue of another air blow. Then “polling” occurs which is a scrubbing process to remove

oxygen from the copper. This leaves anode copper which is made into a mould, cooled and removed for loading onto rail cars for shipping.

[49] Further refining is undertaken in Michigan to make cathode copper which can be sold for commercial uses.

[50] It is important to return to the calcine floor and other areas near the reverb furnace to examine the sites most important to the inquest.

[51] The rail tracks coming onto the calcine floor from the roasters split into two tracks above and to either side or the furnace. The tracks and the area between them are referred to as the “Y”.

[52] The calcine floor itself is made up of steel plates which can be removed.

[53] The roof of the reverb furnace is called the arch. The arch itself is suspended and the bricks that form it are hung on racks of pipes suspended from beams. At the point where the bricks convert from vertical to horizontal their construction is called bullnose.

[54] Above the arch on the calcine floor runs a catwalk between the rail tracks forming the “Y”.

[55] This ends a summary of Mr. Caba’s description of the premises. What follows is my own description of the activity in the smelter leading up to the tragic events in August, 2000.

[56] As mentioned above, all of the relevant events occurred in the copper smelter. The reverb furnace in that smelter (variously called throughout the proceedings and this report “the furnace”, “the reverb furnace” and “the reverb”) must be rebuilt every few years. The time during which the furnace was knocked

down and then rebuilt is termed the shutdown. The shutdowns are necessitated by the extreme temperatures used to extract the copper matte. In the early years of the operation of the reverb, rebuilds occurred as often as every six months. As brick became better able to withstand the heat and as operation of the furnace burners became more efficient, the time between shutdowns was extended. There were shutdowns in recent years in 1994, 1997 and, of course, 2000. After 2000, the next shutdown was in 2006.

[57] The shutdown may not have only involved tearing down and rebuilding the furnace; other projects may be undertaken. In 2000, major work was being done called the gas handling project at the same time as the shutdown in the reverb was taking place.

[58] During shutdown, the hourly paid employees (who are all members of one of the Unions) would be taken off their daily work and assigned work to

knock down or rebuild the reverb. Most of this work was not very specialized in the teardown portion and would be akin to the work of the bullgang: that is hard physical labour.

[59] During the normal operation of the reverb, dust would gather in the floors above the furnace. It was ascertained in the very early shutdowns that this dust would fall from above onto the workers as they used equipment to knock in the walls. This dust would present a safety hazard as it would enter the workers' eyes no matter what type of safety equipment was worn. At some time in the distant past a decision was made by the Company to remove the dust prior to much work being undertaken to knock in the furnace walls.

[60] This removal was done by hosing down with water the area above the reverb. This process was called the washdown. There is still some dispute about exactly how the explosion occurred but there is no doubt that the

washdown being undertaken at the time of the explosion was the main contributing factor.

[61] It is clear from the evidence that the washdown was scheduled to begin as soon as possible after the furnace burners were shut off.

[62] The washdown was primarily designed as a safety feature. There is also some evidence that one of its purposes may have been to cool the area in the reverb.

[63] The shutdown of the reverb began on August 7, 2000 during the day shift. The furnace was turned off very late in that day during the evening shift which began at 7:00 P.M. Washdown began after the furnace was shut off. Mr. Ewing was one of the workers involved in the washdown. The explosion or

explosions which caused Mr. Ewing's injuries and the injuries to the others occurred at approximately 1:40 A.M. on August 8, 2000.

VII REVIEW OF TESTIMONY

[64] This section of the report reviews the testimony of each witness.

[65] Every witness worked for the Company either as an hourly paid worker (and therefore, a member of one of the unions) or as a manager.

[66] Each review generally follows this format:

1. the qualifications of the witness and his history with the Company;
2. the involvement of the witness with preparations for the shutdown;
3. the role of the witness in the events of August 7 and 8, 2000.

a) ROLAND JOSEPH PRUDEN

[67] Mr. Pruden began work for the Company in 1989 and worked continuously for it until the date of the incident which gives rise to this inquest. He held several positions in and around the smelter. He worked, variously, in the smelter as a labourer, in the bag house (fume plant), zinc plant tank house, fuming plant and the reverb furnace as a calcine brakeman.

[68] In the last number of years leading up to 2000, he worked in the smelter for four to five years tapping slag and then in the smelter bag house for one year. The smelter bag house closed due to changes made by the Company and, in the summer of 2000, Mr. Pruden had started back tapping slag. He had worked one set (which comprises two day shifts, one day off followed by two night shifts). He had just commenced his second set after four days of being off.

[69] During all his time in the smelter he had never been involved in a reverb furnace shutdown.

[70] In or about 1997, Mr. Pruden became a safety steward, a position he held for one year. In early 1998 he was appointed safety co-chair. A safety co-chair is a member of the safety group whose job is to make once monthly tours of the facility and make sure, in the words of the witness, “that everything is up to par”. If something looks unsafe during the tour, it is placed on an agenda for correction. There were about eight members on the safety group and Mr. Pruden was the Steelworkers’ Union representative. During the tour, the group would meet with anyone working at that time in the lunchroom to receive their input. Following the tour, the group would meet, go over the agenda and deal with safety issues which needed follow-up. Each identified issue was given over to one person to assume responsibility for rectification and that person was responsible for reporting back to the group.

[71] Mr. Pruden testified respecting the training he received since starting to work for the Company. He acknowledged reading a copy of the smelter manual and receiving a course on the use of the respirator and other equipment. When he began work as a slag tapper, he received and read a manual. He was always placed with a more experienced worker in his early times as a tapper. On the last occasion when he returned to slag tapping (in the summer of 2000), he was made to write a test on his work. Because he had been away from this job for over a year, he had to be broken in (retrained) again. Also, despite his earlier experience, he was the "tail end" tapper, junior to his partner (the "head end").

[72] Mr. Pruden, although he had never participated in a shutdown of the reverb furnace, knew that the last shutdown had been in 1997 and that planning for the next shutdown began when the last one was completed. The shutdown in 2000 was later than past shutdowns which had usually taken place in August. The reason for this was that new converters were to be installed in the furnace.

[73] Mr. Pruden was involved from a planning perspective in that he served on a safety team to help plan the shutdown; however, his shift work and personal obligations meant that he did not participate in any significant fashion and, given the passage of time, does not recall even his limited participation.

[74] Respecting the evening shift on August 7 and 8, 2000 in which the death of Mr. Ewing occurred, Mr. Pruden reported for work about 7:00 P.M. expecting to tap slag. Prior to his work starting, he learned at the crew meeting that all the slag had been tapped and he was to tap matte and then help with the shutdown, which was to commence on that shift.

[75] He was not aware of any written manual respecting the shutdown and he expected that when the shutdown commenced, his supervisors would assign him the tasks they saw fit.

[76] Normally his shift boss was Steve Trachscl; however on that evening it was Kal Woods. He testified that it was Mr. Woods's first shift as a supervisor. Also present in a supervisory capacity were Bill Morrell, Jim Harrower and Reg Hillier. There were two safety supervisors, Rob Smytaniuk and Brian Humphries.

[77] Mr. Pruden tapped matte with Tom Wolokoff. There was another team of two men tapping matte; this meant that each team worked half hour shifts and cooled down for a half hour. He completed two or three taps and he was cooling down when he learned that the last tap of matte had been done.

[78] After his lunch, Kal Woods assigned him to work in a team upstairs washing the floors and beams on the calcine floor. Steven Ewing and Tom Wolokoff were the other members of his three man team. The routine was the

same as that for tapping; that is he would work for one-half hour and then cool down in the lunch room for the following half hour.

[79] Fire hoses were used to wash down the calcine floor area. The water source was located near the furnace uptakes at the east end of the calcine floor.

[80] Mr. Pruden understood that it was important to wash away as much dust as possible and he knew that workmen later rebuilding the furnace needed to work in an area free of the dust which was irritating to the eyes, among other hazards.

[81] He began washing on the calcine floor between 11:00 P.M. and 11:30 P.M. During his second shift he was told by one of the supervisors, Bill Morrell, to wash in and around boxes near the hoppers. At that time, he could see the

roof of the furnace and that steam from the water falling from their hoses was rising from it.

[82] He was relieved by Fred Ledoux and Steve Pickering (and presumably another person to give an equal team of three workers to his team). During that break in the lunchroom he does not recall anyone expressing any safety concerns. Certainly, he was never approached that evening in his duties as a safety co-chair with any other workers' safety concerns.

[83] When Mr. Pruden returned to work he was instructed by Jim Harrower to wash near the uptakes; however Mr. Harrower had left the scene before Mr. Pruden noticed that pipefitters were working on the floor below and that it was therefore impracticable for him to carry out these instructions. At that moment, Steven Ewing, who was on the catwalk, called him over.

[84] The catwalk was located in the middle of the “Y”. The area below it was open until the roof of the furnace.

[85] To reach the catwalk, Mr. Pruden walked in a westerly direction towards the furnace burners; just past where the hoppers ended he walked towards the midpoint of the floor and entered the catwalk. There was only one entrance to the catwalk. Mr. Ewing was standing at the end of the catwalk over the middle of the furnace.

[86] Mr. Pruden knew that in normal operations an arch blower blew dust off the catwalk and that the area was very hot. Sometimes during normal operations, he had seen an odd hot spot on the arch (or roof) of the furnace but on this evening he noticed that the arch was dark.

[87] Mr. Ewing informed Mr. Pruden that Reg Hillier had told him to wash the catwalk and the beams in that area. As he was listening to this, Mr. Pruden heard the first pop. Another explosion occurred almost immediately and the force of it blew off Mr. Pruden's respirator, protective glasses and helmet. He began running with Mr. Ewing to the only exit off the catwalk. As he ran, matte and slag material was flying through the air and the air was dark with dust. He tried to protect his face.

[88] He bumped into Mr. Ewing between the exit of the catwalk and the stairs on the north side of the calcine floor and did not see Mr. Ewing again. He ran down two flights of stairs to the ground floor. On that floor he tripped over a machine, the Brokk, and he felt someone grab him and escort him from the building. He was taken to the back of a half ton truck, his coveralls were removed and gel blankets were put on him.

[89] Mr. Pruden had suffered burns to over 46% of his body; he has had several surgeries and more surgeries will be performed in the future. His lung function has recovered somewhat but he does not know the final prognosis. He will have dry eyes for the rest of his life. He suffered from post-traumatic stress syndrome. He has not returned to work as of January 20, 2004, the date of his testimony before this inquest.

b) FRED WAYNE LEDOUX

[90] Mr. Fred Ledoux has worked for the Company for 22 years and has held a number of different positions, all in the smelter. For the two years prior to his testimony in 2004, he had been a furnace operator, a very responsible position in accordance not only with his seniority but also his obvious knowledge and understanding of the smelter.

[91] Prior to his current position he was a head end matte tapper and prior to that a head end slag tapper.

[92] The furnace operator has a number of duties, including working with the shift boss to schedule the approximate 60 cars per day that load material into the furnace, monitoring the flow of oil and oxygen in the furnace and measuring the depth of matte and slag in the furnace.

[93] In August, 2000, he was a head matte tapper.

[94] He had worked a shutdown previously, namely the 1997 shutdown. However this work was much later in the process than in 2000. He did not attend any meetings relating to the shutdown and he had no idea of what the Company's plans were concerning the shutdown or what his duties might be.

[95] One of the duties of a matte tapper at the beginning of his shift is to immediately relieve the matte tappers who are going off shift as matte tapping requires continuous supervision. Therefore at the beginning of the evening shift on August 7, 2000, Mr. Ledoux did not attend the crew meeting. His tail end tapper that evening was Steve Pickering; Tom Wolokoff and Roland Pruden were the other matte tappers that evening.

[96] When the furnace was in regular operation it would take 15 or 16 minutes to fill a pot with matte. As the furnace was to be shut down on this evening shift, the matte was flowing much slower and the filling of each pot took 20 – 25 minutes. Mr. Ledoux filled two pots and took a break with his partner.

[97] Between 10:30 P.M. and 11:00 P.M. Mr Ledoux tapped his last pot. He expected to tap another pot as he understood that the furnace should be as empty as possible prior to shutdown and he could see that matte still remained in

the furnace. However before he was able to do so, his partner Pickering told him that he had received instructions that they were to stop tapping. Mr. Ledoux was concerned sufficiently about these directions that he went to talk to the supervisors. He was unable to do so as equipment and material blocked his way towards the office. Instead he attended the lunchroom to wait for further instructions.

[98] Kal Woods came into the lunchroom and gave him and others instructions to begin washing the calcine floor area. Mr. Ledoux believes that he and the others were given this work because all other jobs had been assigned at the crew meeting. He also stated that he received no other instructions on the shutdown that evening except for these from Mr. Woods.

[99] Mr. Pruden, Mr. Wolokoff and Mr. Ewing took the first shift at 11:20 P.M. He, Mr. Pickering, and Mr. Radics took the second shift. He relieved Mr.

Pruden at 11:50 P.M. and began hosing the beams and floor area. After a short period, he walked down some stairs and hosed the beams upwards.

[100] His procedure was to hose one area, shut the nozzle off and then go to another area which required his attention. The water he was spraying was falling onto the arch of the furnace where it would either evaporate or fall through and leak into the furnace.

[101] Mr. Ledoux noticed that more than the usual number of bricks were missing from the arch. He attributes this to the fact that the furnace was running very hot just prior to the shutdown. When he was able to review the reverb operators report for August 7, 2000, he noted that as late as 11:00 that morning the burners were at 3000 degrees Centigrade which was the maximum. He noted that later in the day that only two of the four burners were on. He states that normal operating temperature is about 1700.

[102] Through the spaces in the arch he could see a red glow in the furnace.

[103] Mr. Ledoux worked for a half hour, was relieved and then worked again at 12:50 A.M. He was relieved for the last time at 1:20 A.M.

[104] At approximately 1:40 A.M. while he was sitting at the window of the lunchroom, he heard a pop followed immediately thereafter by another pop. This was followed by a large explosion which, to his perception, caused the window and the walls of the lunchroom to bow in. Everyone in the lunchroom headed towards the trap door which lead outside. Before he could get through the door, the furnace area quieted down and everyone who had left the room came back in.

[105] It was shortly after this that the shift boss Kal Woods came into the lunchroom and told everyone to remain there until a head count was completed. Mr. Ledoux wanted to attend to the three men he knew were in the vicinity of the calcine floor but he obeyed Mr. Woods' instructions.

[106] Some time passed and he heard on the radio that the three had been located. He attempted to leave the smelter through the door in the northwest corner but it was locked. He eventually made his way outside where he saw Mr. Pruden.

[107] He did not recognize Mr. Pruden such were the extent of the latter's injuries. He stayed with him talking to and holding him for comfort until the ambulance took Mr. Pruden to the hospital.

[108] A head count was taken about a half hour later and Mr. Ledoux then went to the hospital to see how the injured were doing.

[109] Mr. Ledoux was off work for a month. He agrees that counselling services were provided by the Company for those that wanted them.

c) BRAD REID RUSSELL

[110] At the time of his testimony in 2004, Mr. Russell was a 22 year old civil engineering student at the University of Saskatchewan school of Engineering. When he was not studying at university he resided in Flin Flon. His experience working for the Company came in the summers of 1999 and 2000.

[111] He acknowledged taking a one or two day basic general smelter training and orientation session prior to starting work. When he began in the

reverb furnace, he received the same training as any other employee despite being a summer student.

[112] Mr. Russell had read the smelter policy manual (Ex #10) and signed the appropriate documentation and returned it to the Company. He had read the calcine driver and brakeman manual (Ex #16) and the matte tapping manual (Ex #19) and taken tests for both of these occupations shortly after starting them.

[113] He also acknowledged that at the beginning of each shift there was a crew meeting and that the shift boss would review safety contacts, if there were any.

[114] At the beginning of his employment in July, 1999 he worked on the bullgang (general duties as assigned) and then in August he went to the reverb furnace where he worked as a slag launderer and then as the person who

manually opened the gates to the hoppers to allow the feed to go into the furnace.

[115] In 2000 he began work in the first week of May. He had another orientation but was certainly retrained as his 1999 job had been eliminated. He was a tail end matte tapper and was trained by Abe Collins. After training for four 12 hour shifts he took a written test.

[116] At the beginning of June he began work as a calcine brakeman which combined the duties of his prior work as a slag monitor and driving the calcine cars by remote control. He was still so employed at the commencement of shutdown.

[117] A few days prior to shutdown he saw a PowerPoint presentation by Chris Ecklund, another summer student, called “What is Shutdown”. After

watching it, he did not have a clear idea of what exactly would go on in the shutdown. He had also seen the Gantt chart or schedule for the shutdown in the shift boss's office.

[118] On August 7, 2000 there was a crew meeting at the beginning of the shift. He knew the shift boss was Kal Woods and that he would be given jobs as the night progressed. His first duty that night was removing floor plates from near the hoppers on the calcine floor to prepare for clean-up of that floor.

[119] Afterwards he removed material from around the furnace walls to provide easier access to the furnace.

[120] Then he was directed around 9:30 P.M. or 10:00 P.M. to hook up hoses from outlets in an area behind the burners on the main floor and string the hoses to an area between the hoppers and the burners on the calcine floor.

[121] After a break until 10:30 P.M., he was told by Jim Harrower to go up to the slag launder on the hopper level to begin hosing. He knew Jim Harrower to be one of the three supervisors that evening, the others being Kal Woods and Bill Morrell.

[122] The launder itself had been removed previously which allowed him to look into the furnace from time to time. Sand is used in and near the slag launder and it was this sand he was told to hose. He hosed away from the furnace to push the sand into the converter pit.

[123] After about an hour he was relieved and he went to the lunchroom for a half hour break. Around midnight or 12:15 A.M., he returned to this job. The only person near him was Calvin Primrose who had a garden hose and was cleaning the stairs and walkways nearby.

[124] Mr. Russell was aware that the calcine floor was being washed down but he did not see any of the workers doing so that evening. When he returned to work after this break, he looked into the furnace and could see water falling down onto the crust in the furnace. About a half hour prior to the explosion he noticed that the surface was mostly dark but that there were some orange spots. He believed that these orange spots were the glow of molten metal through the crust. He knew that an explosion would result if water came into contact with molten metal. Finally, he saw some pools of water forming on the crust.

[125] At the moment of the explosion, he had his back to the furnace. He heard a loud rumbling, turned to look over his shoulder and was immediately engulfed in black dust.

[126] The only escape for Mr. Russell was to run north. He jumped across the gap left by the removal of the slag launder and, as he went past the uptakes, he was exposed to the furnace for the first time. The force from the furnace knocked him off his feet leaving him still 15 feet from the stairs on the platform which lead to safety.

[127] He curled himself into a protective ball on the northwest corner of the platform, held his respirator to his face and waited there until everything subsided. He was in this position for less than a minute when the rumbling ceased and nothing further was billowing from the furnace. He saw that the furnace had settled through the gap left by the removal of the launder chute.

[128] Mr. Russell got up and ran down the stairs to the west exit near the area where he had hooked up the hoses earlier in the evening. Five or six other workers were assembled at this exit. The door there had been locked and

another way out beside it was blocked by a locked gate. This he knew was due to a piece of heavy machinery which had been working on the other side of the exit all evening making it unsafe in the ordinary course to use this exit.

[129] The gate was opened after a delay and he exited the smelter to an open area near the smelter meeting room. He noticed that Mr. Pruden was already receiving attention from some of the other workers.

[130] Mr. Russell's injuries turned out to be quite severe despite the fact that he felt little or no pain in the immediate aftermath. He was burned over 65% of his body, everywhere except his chest, hands and feet. He spent a total of 14 weeks in care in Edmonton in a hospital and then a rehab centre.

d) STEVEN LEE PICKERING

[131] Mr. Pickering had been an employee of the Company since December, 1995. He had been oriented for his work at the smelter and identified the Smelter Manual (Ex# 10) as something he had read.

[132] He was first broken in as a calcine feeder, which, similar to Mr. Russell, involved opening the hoppers into the furnace. After two months he became a train driver and brakeman. He was aware of the Calcine Driver and Brakeman Training Manual (Ex# 16).

[133] He then tapped slag. After that he moved to tapping matte for two or three years prior to shutdown. He was aware of the manuals relating to each of these occupations but does not believe he ever wrote a test for either.

[134] Mr. Pickering was aware of the date the shutdown was to begin and that he would be working the night shift so he expected to participate in the

shutdown process. He was working in the mill at the time of the 1997 shutdown so this was his first such experience in the smelter.

[135] He recalls one or two meetings about the shutdown, mostly covering the timelines for the shutdown. He had some memory of seeing Mr. Ecklund's PowerPoint presentation referred to by Mr. Russell.

[136] Mr. Pickering did not attend the crew meeting prior to the night shift on August 7, 2000 as he, like his partner, Fred Ledoux, had to relieve the matte tappers coming off shift.

[137] Joe Klassen was the furnace operator that night and it was he who told him to stop tapping matte. He and Mr. Ledoux mudded (that is, closed) the hole between 10:30 P.M. and 11:00 P.M.

[138] After a break in the lunchroom he was instructed by Kal Woods to hose around the calcine floor. He attended there and began hosing from the catwalk. This was the first time he had ever hosed beams down. He could see into the furnace where some parts were glowing, other parts were dark and steam was rising throughout.

[139] He was aware that some of the water from his hose was going into the furnace through missing bricks and leaks between other bricks.

[140] He worked two shifts hosing on the calcine floor and Steve Ewing relieved him each time.

[141] Mr. Pickering was in the lunchroom when the explosion occurred; he heard a couple of pops and then one big boom. The walls of the lunchroom were shaking and felt like they were going to come in. He and others exited the room

by crawling through a window over the sink into a bathroom and then out of the bathroom door. This still left him inside the building but there were now two thick brick walls between him and the furnace.

[142] After things had settled he ran upstairs to look for the three men he knew were working up there but he could not find them. By the time he arrived back downstairs, he learned that the injured were already outside and he assisted by getting gel blankets.

PETER RONALD RADICS

[143] Prior to his testimony in 2004, Mr. Radics had worked for the Company for 36 years in a number of capacities. For the last number of years he had been a train driver in the smelter.

[144] He worked at least one shutdown (1997) and perhaps more prior to the 2000 shutdown of the furnace.

[145] He saw Mr. Ecklund's PowerPoint presentation prior to the shutdown. He confirmed, as do the other workers the night of the accident, that Kalvin Woods was the shift boss.

[146] His last trip in the train taking slag to the dump was between 10:20 P.M. and 10:25 P.M. His partner that night was Steven Ewing. They locked the train and went to the reverb lunch room. Mr. Ewing had already told him that their job after the last slag dump was to hose the furnace down.

[147] When Mr. Ewing, Mr. Pruden and Cal Primrose volunteered to be the first group to hose the furnace area, Mr. Radics objected to the idea of hosing down this area altogether. He testified, however, that the others insisted on following the direction from management. The reason for his objection was he thought the furnace was still too hot for this procedure. Mr. Radics claimed that

in all other shutdowns in which he had been involved, there was a delay of about 18 hours from the time the furnace was shut down until the hosing was commenced. He also testified that up until the 1997 shutdown, garden hoses were used instead of fire hoses and that only a light spraying was done. On further examination he could not explain how a light spray would knock down all of the dust that had to be removed prior to the furnace being taken down.

[148] After the above-noted finished the first shift, Mr. Radics went up and began hosing on the feed floor around the drop pipes (leading from the hoppers to the furnace). He was on the south side of the feed floor opposite the side on which the matte holes are located.

[149] Because of problems with the length of his hose and his uncertainty as to the safety of his job, he left this work and was told by Jim Harrower (one of the supervisors) to get the slag launder ready to be taken down.

[150] On his second shift on the calcine floor (he, like other witnesses working on the calcine floor at the commencement of shutdown, described a working pattern of half hour on work and half hour rests in the lunch room), Mr. Radics began flipping up the bricks which composed the arch. This was in the area from the slag launder on the north side of the furnace. He had removed these bricks in prior shutdowns and he believed this was done to allow the furnace to cool faster. While he was doing this work, Walter (Sonny) Audet, a bricklayer, began removing wall tile. He and Mr. Audet worked in this fashion until he reached an area near the jog (an area where the furnace jogs inward corresponding with the Y moving inward to eventually form one track) at which point he found that one of the bricks had been chained up and could not be removed. He quit this work and attended the lunchroom for a break.

[151] It was just after he arrived in the lunchroom that the explosion occurred. He went to the door of the room and saw that bricks were flying around and that the explosion had covered everything in view with dust. He eventually escaped by the same means described by Fred Ledoux.

[152] Mr. Radics suffered from severe stress as a result of the incidents that night. He was off work for three months, went back for a short time and then was off work for a further month and a half.

[153] As he was removing the arch bricks, Mr. Radics could see into the furnace and he noticed four or five inches of water bubbling on the furnace floor. He felt that this was a dangerous situation. Brian Humphreys (a safety supervisor) and Jim Harrower (a supervisor) were both present and offering him direction. He believed that they both must have seen the same situation he did so he did not report anything to them.

[154] Finally, Mr. Radics asserted that Bill Morrell (a supervisor) had informed him and others at the start of the shift that the shutdown work was 17 hours behind schedule. He also felt that in other shutdowns he had participated in, there was more supervision by management.

f) BARRY HOWARD FOX

[155] At the time of his testimony, Mr. Fox had been an employee of the Company for a number of years. He was trained in and certified as an industrial mechanic and a pipefitter. In 2000 he was employed as a pipefitter and had been so employed for the previous seven years.

[156] This was his first shutdown working as a pipefitter; he had not worked in the 1997 shutdown and any previous shutdowns he had worked were as a mechanic.

[157] He and his partner Scott Storey had planned for some time to work during shutdown on the preheater, a unit that heats the oil prior to it being used in the furnace. He had been on vacation for three weeks prior to August 7, 2000 and, just before returning to work on that date, he was advised to report for the night shift. He later learned that change had been made from the planned day work on the preheater due to the fact he was deemed responsible enough to work without much supervision.

[158] On the evening shift of the explosion (August 7 – 8, 2000) his immediate supervisor was Bob Cassan. As was his usual practice, Mr. Fox reported early for work in order to meet with the pipefitters coming off shift to ascertain what had been accomplished and what work needed to be done in the night shift. It was at this meeting he learned that the furnace was still being tapped out and that therefore there was little call for pipefitting duties, at least at the beginning of the shift.

[159] On that night shift there were three pipefitters in addition to Mr. Fox, being Mr. Cassan, Mr. Wilson and Mr. Barrett. All four worked and rested together for the remainder of the shift until the explosion.

[160] His first duties that evening consisted of attending a meeting chaired by Mr. Willetts, general foreman of maintenance. This took place in the mechanics' lunchroom and was concerned with safety. Mr. Willetts was especially concerned with the potential for heat exhaustion; the pipefitters and others at the meeting were told to take it easy that night and watch their partners more closely.

[161] There was a question from the floor about shutdown being behind schedule 12 hours; Mr. Willetts said not to worry about that as the time could be made up very easily.

[162] The meeting ended at approximately 7:30 P.M. For the next 15 minutes he and the other three pipefitters on duty walked around the furnace and Mr. Cassan explained what jobs would be expected of them in the next number of days during shutdown. They then all attended the rest shack and waited to be called to a job. Around 10:00 P.M. he and the other pipefitters went out to begin cutting piping on the bottom end of the cooling jackets. These jackets are located right above the slag launder which feeds out of the furnace into the slag pots. There was a cleanup crew at that location already working below and in the general area of where they would have to cut the pipe. It was determined that when this crew took a break, the pipefitters would return to deal with the pipes.

[163] While waiting in the rest room Reg Hillier, a supervisor, attended and told them they were a good crew and asked them for any help he might need. He was assured that it would be provided.

[164] Later, Kal Woods, the shift supervisor came in and complained to them that he was being pressured by his immediate superiors, Bill Morrell and Jim Harrower. It was clear to Mr. Fox that Mr. Woods doubted the instructions he was getting from his superiors.

[165] At 11:30 P.M. the four pipefitters went out to cut the water lines noted above. They worked doing so for a half hour and then took a half hour break.

[166] After the break they all returned to the same site near the slag holes. On this occasion they were removing the top section of these water lines which were located eight to eight and one-half feet above the ground. The pipes were

difficult to get at because of their location and the cut piping had to be taken down to ground level. Because of this, the work was much slower than the pipe cutting done prior to the break. They had been working at this location for about an hour when the explosion occurred. Some time prior to this event, Mr. Fox had a confrontation with Mr. Harrower about the time needed to complete this part of the job. Mr. Morrell was also present but Mr. Fox does not believe that he could hear the conversation. Mr. Harrower told Mr. Fox to finish the job in 20 minutes and Mr. Fox told him he needed at least 30 minutes and would take 40 minutes if necessary. Mr. Harrower told him to hurry as he needed to get the furnace washed down to cool it off. When these two supervisors left, Mr. Cassan came over and asked what had happened. He told Mr. Fox that he had never heard of washing the furnace to cool it down. Mr. Fox continues to this day to regret failing to further engage Mr. Harrower and perhaps convince him not to wash down the furnace. It is clear from other evidence given at this inquest that when this conversation took place (some time just before the explosion) that

substantial amounts of water had been used for several hours on the calcine and feed floors to remove the calcine dust.

[167] When the explosion occurred Mr. Fox was working with Mr. Wilson; Mr. Cassan and Mr. Barrett were working on another set of pipes nearby. Mr. Fox was on the main level receiving and stacking pipes which had been cut by the others above him.

[168] Mr. Fox heard a number of small explosions and he looked up and saw a flame come out of the furnace near Mr. Cassan and Mr. Barrett. There was then a huge explosion and he was thrown back. He could not see for the calcine dust in the air. All he could do was crawl on his hands and knees (where he had been thrown by the last explosion) to a wall south of his location. Shortly after seeking this shelter, Mr. Cassan and Mr. Barrett arrived. He and Mr. Cassan decided they needed to find the fourth pipefitter, Mr. Wilson, and they left their

shelter to do so. They found him on his hands and knees outside the reverb lunchroom. Mr. Cassan told them both to stay there and he returned to the previous location to see to Mr. Barrett.

[169] There were about 15 others in the lunchroom including Mr. Morrell, Mr. Woods and Mr. Harrower. Eventually they all left, leaving Mr. Fox alone with Mr. Wilson. He was watering the latter's eyes to try and remove the calcine dust. Eventually they both went out via the fuming plant (a closed part of the smelter) and met up outside with Mr. Cassan and Mr. Barrett where they all washed the others eyes.

[170] Mr. Fox has never returned to work excepting a very brief period. He acknowledges receiving the same offers for counselling as the other workers in the smelter that night did.

g) THOMAS DANIEL WOLOKOFF

[171] Mr. Wolokoff has worked for the Company for over 15 years. He has been a matte tapper the last four years and prior to that he was a slag tapper.

[172] At the time of the shutdown in 2000, he was a head slag tapper, although on the evening shift of the explosion, he was tapping matte as there was no slag to be tapped. This was the first shutdown that Mr. Wolokoff had worked in the early stages.

[173] Mr. Wolokoff stated he did not see Mr. Ecklund's PowerPoint presentation and he was not part of the planning for the shutdown. He knew however that after all of the matte had been tapped on August 7, 2000, he would be washing beams to remove the calcine dust.

[174] He last tapped matte at 10:20 P.M. and Mr. Ledoux and Mr. Pickering finished the last shift of matte tapping at 10:50 P.M. He was informed by Mr.

Pruden that Joe Klassen, furnace operator, had told him on the phone that there would be some wait in the lunchroom prior to beginning the washing. About ten minutes later, Mr. Woods attended the room and directed that the hosing begin. Mr. Wolokoff was paired up with Mr. Pruden and Mr. Ewing. He began hosing on the feed floor starting at the east end and working his way forward (west). During the time he hosed that evening, Mr. Wolokoff was using a three inch fire hose and had the nozzle set almost to full spray. He knew the water he was spraying was falling onto the arch and some of it was making its way into the furnace.

[175] He was able to see Cal Primrose and Brad Russell towards the front of the furnace washing sand off.

[176] After his break (the time and duration of is that described by Mr. Pruden in his evidence) he went to the calcine floor. He could not find a hose but Jim Harrower (supervisor) was able to locate one for him.

[177] After another break, he returned to the calcine floor some time between 1:00 A.M. and 1:30 A.M. He was on the north side of that floor. He saw Mr. Pruden on the south side of the same floor and Mr. Ewing was located on the catwalk. All three were hosing the calcine dust.

[178] He saw Mr. Ewing motion to Mr. Pruden to come over and Mr. Pruden came out onto the catwalk. Shortly after he heard a number of pops; after the first pop he observed Mr. Ewing and Mr. Pruden bump into each other.

[179] Mr. Wolokoff then began running eastward toward the uptakes and he followed the tracks off the calcine floor. As he ran he could feel the floor lifting with the force of the explosions; it was pitch black and there was calcine dust everywhere.

[180] Mr. Wolokoff made it to the fuming plant lunchroom where he stayed for a few minutes before leaving the smelter for the area of the meeting room.

[181] Mr. Wolokoff states that he observed two events of some significance that evening: when he was spraying on the feed floor (during his first shift of spraying) at about 11:40 P.M., he saw the inside of the furnace through a hole in the arch. He saw a black crack about three-quarters of an inch thick and several feet long in the crust. Underneath the crust he could see the orange glow of the hot metal. He also observed about eight to ten inches of water on the top of the crust. However, of note, is that he mentioned the crack in the crust in both statements made to authorities shortly after the incident but did not disclose that he also saw water on the crust.

[182] Mr. Wolokoff also observed a pipe just north of the slag launder (the launder on the calcine floor) which had been disconnected. From the pipe he could see water pouring onto the arch of the furnace.

[183] Mr. Wolokoff had no injuries other than the dust in his eyes and lungs. He confirmed the availability of counselling. He returned to work six weeks after the explosion.

h) KELVIN EARL PRIMROSE

[184] Mr. Primrose has worked for the Company for a number of years; he has been laid off at least once but has been continuously employed since 1995. As of the date of his testimony he was working as a labourer in the mill.

[185] He, like many of the other witnesses who work at union jobs in the smelter, has held a number of positions including tapping matte and slag. He

confirmed the same manner of training as many of the other witnesses. He confirmed receiving safety contacts from time to time.

[186] Mr. Primrose was working a regular 12 hour shift the night of August 7, 2000. His supervisor was Kalvin Woods and Mr. Woods directed him to clean up some garbage. He then removed hopper covers for about one hour. Afterwards he and his partner that evening, Brad Russell, began to wash sand away from the furnace towards the converter pit. This was near the slag launder which had already been removed. He began this work at 10:00 P.M. and worked for about three hours, including breaks, until the time of the explosion. At some time that evening he had looked into the furnace and seen that most parts were black but that there were orange glows near the walls. He felt, at the inquest, that he had seen water in the furnace but at the time of his statements just after the incident he stated unequivocally that he saw no water in the furnace. Given the passage of time since the explosion, the latter scenario is much more likely.

[187] Mr. Primrose had worked shutdowns previously but had never worked at this early stage of the proceedings.

[188] Mr. Primrose saw something he felt was unusual after returning from his first break; there was water gushing into the furnace from an open pipe through the slag launder. This line would normally have circulated water through the slag launder door to keep it cool. It looked to him like the hoses to which this pipe had been attached had been pulled free when the door was removed and the water was left to run from the pipe.

[189] Just prior to the explosion he was standing off to the side of the slag launder waiting to get the hose back from Mr. Russell. Working with the fire hose was tiring work on the arms so he and Mr. Russell were spelling each other off from time to time. He had also been using a small garden hose to remove some

sand and dust but was being careful to make sure that no water got into the furnace.

[190] He heard a small rumble followed by a larger rumble. Everything went black immediately as his eyes became full of dust. He felt pain from the heat and, in fact, discovered later that he had lost his respirator due to the fact that the plastic strap looped over his head was melted by the heat.

[191] Mr. Primrose climbed over a small landing and dropped to the floor below. The door that was nearby was locked and he and another worker, Rich Moore, climbed down an elevator shaft and were able to get outside the smelter that way. He later learned that the door was locked as on that shift a train was moving back and forth on its other side.

[192] He was helped by other workers who were not so severely affected. He spent two and a half weeks in hospital and healed at home for another month and a half. He returned to work at the mill at the end of November, 2000.

i) RICHARD WILSON MOORE

[193] At the time of his testimony in 2004, Mr. Moore had worked for the Company for over 15 years. He worked in the fuming plant, the upper roaster, the converter pit, the anode, as a carpenter apprentice and as a head matte tapper.

[194] When he began working for the Company there was no policy manual for the smelter; in fact he helped, as a senior employee, check over the preparation of the policy manual and accompanying test.

[195] Mr. Moore had worked the 1997 shutdown but it was during the rebuild phase. In August, 2000 he was a head end slag tapper.

[196] About two days prior to August 7, 2000 he and the others on his shift were asked by his supervisor to work overtime on the first night of shutdown as extra labourers were needed. After agreeing to work he was told he would be required to start knocking in the arch.

[197] Prior to the shutdown, Mr. Moore had attended at least one meeting of the committee planning for the shutdown. He had heard that there were some plans to change the slag end of the furnace but it soon became apparent that no such changes were to be made; he therefore lost interest and stopped attending the meetings. Minutes of the planning committee meetings were indicated to be circulated to him for some time after he stopped attending but he does not remember seeing those minutes.

[198] Mr. Moore had worked the night shift on the previous day, therefore ending work at 7:00 A.M. the morning of August 7, 2000. At the end of his shift, the furnace was still in normal operation. When he reported to work that evening, it soon became apparent that the shutdown had not progressed to the point at which the arch could be knocked in.

[199] Mr. Moore did not participate in the safety meeting prior to the shift as he and the others who were working overtime were in another lunchroom. Mr. Kalvin Woods was his supervisor that night and he was directed by him to firstly remove small pieces of slag which had accumulated underneath the slag holes. He could not continue this for very long as pipefitters were working above him removing pipes causing some danger to those below. It was agreed that he and his co-workers (Rob Beever and David Salahub) would break and only return to the site when the pipefitters took their break.

[200] Mr. Moore next helped string some fire hoses from the east end fire hydrant on the main floor up a staircase to the top of the furnace on the calcine floor.

[201] At some point not long before the explosion, Mr. Moore found himself in the lunchroom and realized he had not seen Mr. Beever and Mr. Salahub for some time. He left the lunchroom to look for them. He noticed that the pipefitters continued to work on the east side of the reverb. He could also see men stringing cables across the floor in preparation for the work to come. When he reached the south end of that side of the furnace he doubled back and went upstairs to the calcine floor. He noticed Mr. Pruden and Mr. Ewing using hoses there. He noted that Mr. Pruden was using the hose he had brought up earlier. He was hosing between the uptakes towards the Y in the tracks. Mr. Moore came back down and walked to the north side of the furnace where he noticed a

Brokk in operation pushing in the wall there. He felt this was unusual as he did not believe that a Brokk (basically a portable jackhammer) had been used in prior shutdowns.

[202] Bill Morrell and Jim Harrower were supervising this operation and the Brokk had already created a hole about five feet in diameter. At that point he could see into the furnace but could not see its floor.

[203] He had only been watching the Brokk for about one minute when he heard a thud. Seconds later there was a larger explosion and he looked up. Through the space left after the removal of tiles near the top of the wall of the furnace he could see matte arcing upwards and hitting the bottom of the arch.

[204] Mr. Moore knew this was a very dangerous situation and he knew that the Brokk operator was not experienced in the smelter; he was turning to warn

him to run when a large explosion threw him about 20 feet in the air. It immediately became totally black in the area and he was breathing in hot gas; he held his breath and made his way to the stairs which were just to the west of his location. At the bottom of the stairs he found the door was locked and so he made his way out an elevator shaft, over a gate and he found himself outside the smelter near the mechanics' shop. It was at that point in time that he realized that all of his safety equipment had been blown off in the explosion. This included his hat, gloves and respirator.

[205] Mr. Moore was briefly in Flin Flon Hospital and later on went to see a specialist in Winnipeg. He was off work for six weeks.

[206] Mr. Moore commented that prior to this shutdown, many of the supervisors had retired and he felt that some of the new supervisors had had no experience in the shutdown process.

j) ROBERT RUSSELL CASSAN

[207] Mr. Cassan is a pipefitter who had worked in all areas of the Company's operations, including the smelter. At the time of his testimony, he had over 27 years of experience with the Company.

[208] He had worked eight to ten shutdowns prior to the 2000 shutdown. His job during the shutdown was to remove the water jackets. A water jacket is composed of one inch pipes made of copper. It is filled with water and it is used to cool areas of the reverb which are particularly hot. Water jackets are placed near the slag and matte tapping holes near the reverb burners.

[209] Mr. Cassan worked on the evening shift of August 7 and 8, 2000. When he reported to work, Mr. Willetts, as a supervisor of the tradespeople, held a meeting and explained that until the furnace was tapped out, there would be no work to do.

[210] He had begun work at about 11:00 P.M. He worked for a period of time and then he and his coworkers went for lunch. He returned from lunch between 12:30 A.M. and 12:45 A.M. He heard the explosion and then he turned towards the furnace and saw orange flames coming towards him. He ran with his coworkers to safety.

k) BRIAN FREEMAN BARRETT

[211] At the time of his testimony in 2004, Mr. Barrett had had 15 years experience as a pipe fitter with the Company. He had worked shutdowns since 1979. He confirmed the evidence of Mr. Cassan.

[212] He believed that the furnace had not been cooled as long as it had been in the past prior to work commencing around it in 2000.

[213] Mr. Barrett was off work for about two months as a result of the injuries he received in the explosion.

l) JOHN RUSSELL LAIDLAW

[214] Mr. Laidlaw began working for the company in 1980. As of the date of his evidence, he was employed as an hourly shifter and he was employed in the same capacity in 2000.

[215] His trade was that of a bricklayer and his position was supervising the bullgang. During his years in the smelter he had been involved in various shutdowns. He had supervised some jobs in the shutdown process.

[216] In the 2000 shutdown he was placed in charge of the washdown. He had never supervised this portion of the shutdown previously. He only became aware about one week prior to shutdown of his duties.

[217] Mr. Laidlaw had attended some of the shutdown meetings when they were first held but did not attend later meetings which occurred closer to the shutdown. He acknowledged that he would be paid overtime to attend meetings but reasoned that he had enough overtime paid to him and did not need anymore.

[218] When Mr. Laidlaw came on shift in the early evening, some hours prior to the incident, he met with people from the day shift. He ascertained that the day shift was behind the anticipated shutdown schedule. Given this fact, he volunteered to clean the calcine track. He took some of the workers who would have been assigned to do the washdown with him to the calcine track. He and

his workers were still cleaning the calcine track when the explosion occurred. Some time not long before the explosion he saw Fred Ledoux and others, whom he could not identify, performing washdown duties.

[219] Mr. Laidlaw was actually in the roaster control room when the explosion occurred. This is one floor above the smelter furnace. He heard a large explosion and then a smaller explosion. He went through the reverb slag lunch room and saw Mr. Morrell doing a head count. Mr. Laidlaw went out to the furnace and checked several floors to ensure that they were no more unaccounted for workers. During this inspection he observed holes in the arch and saw a crust on the matte in the furnace. He also saw cracks in the furnace which were about a half inch wide.

[220] Mr. Laidlaw acknowledged that the washdown was a very routine job and, in his opinion, there was no need for any instruction on how to do this job.

He was aware of his right to refuse work but felt there was no reason to exercise this right on that evening as he felt there was no danger in any of the work being done. Finally, he was not aware of any dangerous incidents or explosions during any previous shutdowns.

m) GARRY WADE WILLETTS

[221] Mr. Willetts has worked for the company since 1984. He is presently the smelter superintendent. In 2000 he was the Maintenance General Foreman.

[222] This latter position meant that he was responsible for all maintenance in the smelter. Due to his supervisory position, he was involved in planning for the shutdown. He attended several meetings relating to the shutdown. Planning for the shutdown began in the late summer or early fall of 1999. Mr. Willetts attended a number of meetings and received all of the minutes of all of the meetings. He was a member of the shutdown core team. That team was

responsible to ensure that the shutdown proceeded smoothly and also to ensure that all other committees working on the shutdown completed their assigned tasks.

[223] The maintenance workers supervised by Mr. Willetts were responsible for dismantling all the mechanical pieces of the furnace and then rebuilding the furnace. The group included pipefitters, bricklayers, mechanics, electricians, boilermakers and carpenters.

[224] Mr. Willetts left the smelter at 9:00 P.M. on August 7, 2000. He was aware that Mr. Don Kirkham would take over his responsibilities for the night shift. Prior to leaving the smelter, Mr. Willetts met with a group of mechanics and pipefitters as to the progress that had been made that day. He was aware that some of the work that was to be done that day had not been completed. This was because the furnace had not been drained.

[225] During his testimony, Mr. Willetts reviewed the Gantt chart and stated that in his opinion the times on it were guesses only and needed to be adjusted according to the circumstances of the work being carried out.

[226] Mr. Willetts stated that his understanding of the main purpose of the washdown was to get rid of the dust that had accumulated above the furnace and a secondary purpose was to cool the furnace. In prior shutdowns when he had been involved, a washdown had always been completed. Mr. Willetts felt that the washdown should commence once the fires were off in the furnace.

[227] Mr. Willetts had been involved in the planning of the 1994 and 1997 shutdowns from a maintenance perspective. He felt that the planning done in 2000 was more extensive than in prior shutdowns. He knew that for the first time

a manual was being created to set out the procedures for this and future shutdowns.

[228] Mr. Willetts participated in the 2006 shutdown. One of the main differences from his perspective was the use of a consulting company. This consulting company put together a schedule for the shutdown and managed the shutdown including the supplying of some workers and equipment. Finally, Mr. Willetts was aware that in the 2006 shutdown no water was used near the furnace and instead calcine dust was vacuumed away.

n) JOHN WILLIAM (BILL) MORRELL

[229] Mr. Morrell had begun working for the company in 1975 as a labourer. Prior to his becoming a supervisor, his only experience in the smelter was in feeding calcine to the furnace and working as a slag launderer. At one point in

time during his employment with the company, he was safety and loss control officer. At the time of his testimony in 2008, he was the personnel officer.

[230] In 1999 Mr. Morrell became the reverb general foreman. This was one of only two general foremen in the reverb. Planning for the shutdown began in mid-summer of 1999, shortly after Mr. Morrell became reverb foreman. He was a member of the shutdown core team. This team included management and hourly senior people. In addition to this team, he was also a member of the roaster team and the reverb team.

[231] The goal was to list all of the tasks to be completed in the shutdown, ascertain which tasks required consultations with the engineers and then evaluate the hazard relating to each task. Mr. Morrell knew that there was no manual in place for the shutdown and it was his hope to develop one to be used in the years following the 2000 shutdown.

[232] In organizing the committees which would help develop the manual, Mr. Morrell stated that he visited a number of lunchrooms and talked to a number of the workers asking them to participate in the committee meetings. Notices were also sent out requesting participation in the committee process. He testified that he always believed that the real experts are the people who do the work. He felt that in the beginning participation in the committee process was very good but that participation dropped off as the shutdown drew nearer. It was his experience that it was hard to get shift workers to attend meetings on their days off. Even though they were paid overtime, the workers would have to make a special trip to the smelter and this was difficult for them.

[233] The senior people on the reverb team were Jim Harrower, Reg Hillier, Jim Gauthier and Kal Woods. The reverb team was responsible for planning the shutdown to the point of demolition of the furnace. His responsibility on the

reverb team was to take all the notes, put up notices, prepare minutes and attempt to get as many people involved as possible.

[234] During the course of the reverb team meetings, the senior people who had been involved in the shutdown previously, discussed the timing of the shutdown but did not discuss making any changes to the actual procedure. Mr. Morrell's impression during the meetings was that the shutdown had always followed the same procedure and there would be no substantial changes to the 2000 shutdown. Water was never identified as a potential risk or hazard when used in the washdown.

[235] Mr. Morrell identified Exhibit 27 which was a shutdown procedure prepared by him. He developed this from the minutes he took at the reverb team meetings. He posted this procedure in the reverb office and lunchroom. He felt that this procedure was a process which might occur but not an absolute direction as to this series of events during the shutdown.

[236] During the 2000 shutdown, Mr. Morrell reported to Mr. Alan Hair and Mr. Pat Merrin. Below Mr. Morrell and therefore reporting to him were Mr. Hillier, Mr. Harrower, Mr. Laidlaw and Mr. Woods. Mr. Ray Gauthier was the coordinator of the entire shutdown. He had experience in the shutdown procedures that Mr. Morrell did not.

[237] On August 7, 2000, Mr. Morrell came to work at 6:30 P.M. for his shift which began at 7:00 P.M. Mr. Morrell was the most senior person on duty during the night shift. Other more senior people and those who had greater experience with the shutdown process had all been employed on the day shift and went home at 7:00 P.M.

[238] Mr. Morrell was aware at the beginning of the shift that it was taking longer than anticipated to empty the furnace and therefore the shutdown process

was behind the anticipated schedule. There were a number of jobs which workers could do despite this fact and he and Mr. Harrower, Mr. Woods, Mr. Laidlaw and Mr. Hillier were responsible for assigning these tasks.

[239] Prior to the beginning of the shift, everyone attended a safety meeting and Mr. Merrin made a presentation. Most of the presentation on safety issues related to personal protective equipment and heat stress.

[240] Mr. Morrell became involved with a safety issue in the roasters. He was in this area for quite some time. He was not involved in the decision to shut the furnace off but he was aware that this decision was made by Mr. Hillier, Mr. Harrower and Mr. Klassen, and he was also aware that the last matte was tapped at 10:50 P.M. and the furnace fires went off at 11:00 P.M. Mr. Morrell acknowledged that the plan was for the furnace to have been shutdown by 7:00 P.M.

[241] Mr. Morrell discussed his own knowledge of the washdown procedure. He believed this process would begin immediately when the furnace was shut off. The reason for that, in his opinion, was the water in the furnace would freeze any material still in the furnace.

[242] During one of his tours in the furnace area sometime between 11:30 P.M. and midnight, he noticed two workers washing down on the top floor. In a meeting with Mr. Hillier, Mr. Woods and Mr. Harrower in the reverb supervisors' office, it was agreed two more workers would be assigned to wash the furnace. However he does not believe that this plan was put into effect prior to the explosion.

[243] At approximately 1:30 A.M. Mr. Morrell was on the main floor standing next to the Brokk operator when he heard a pop. He looked up and saw a red glow above the furnace as if a fire in the furnace had caused the area above to

glow. There were two more explosions and he attempted to extricate the Brokk operator from his harness. He was eventually able to leave through a door. He and Mr. Harrower went back into the smelter less than a minute later to look for people in need of assistance. He later learned that there were four people who had been seriously injured. They had been taken to the warehouse. Ambulances attended the scene and Mr. Morrell called Mr. Hair who came to the smelter.

[244] Mr. Morrell confirmed that at no time during the planning phase was there ever any discussion about water getting into the furnace or what affect that might have. He also confirmed that the volume of water was not being monitored during washdown.

o) JAMES WILLIAM HARROWER

[245] Mr. Harrower is currently employed by the company as general foreman of engineering services. He has no professional education. He began working for the company on December 10, 1981, starting with the bullgang in the smelter after which he moved to calcine clean up. All of his work with the company up to 2000 had been in the smelter.

[246] In 1987 Mr. Harrower commenced his supervisory duties as reverb furnace shift supervision. In 2000 he was the day shift supervisor in the smelter. His immediate superior was Mr. Morrell. Upon becoming a supervisor, Mr. Harrower worked for a period of time with an experienced supervisor. He also took several courses offered by the Company.

[247] Mr. Harrower had worked all shutdowns from 1981 to 2000. In the 1997 shutdown, he fulfilled general supervision duties.

[248] In the planning of the 2000 shutdown, Mr. Harrower's role was to be a member of teams working towards the shutdown. He was a member of the core team and the reverb team. The reverb team interacted with the safety committee by reporting safety issues to the core team. On the core team was a safety committee member.

[249] One of the differences in the 2000 shutdown was the plan to prepare written materials related to the shutdown. The driving force behind this was Mr. Morrell. The reason for preparing written materials was a feeling of management that a number of experienced workers were retiring and a manual was needed for future workers who would not have as much experience in the shutdown process. The idea from the start was to capture all the work involved in the shutdown and prepare a draft for each job. The safety team would then look at the draft and assess any risks.

[250] Mr. Harrower identified Exhibit 27 as a listing of the shutdown procedures. These procedures were discussed amongst experienced people at meetings of the reverb and core teams and then written down by Mr. Morrell.

[251] On the evening of August 7, 2000, Mr. Harrower was working the evening shift which began at 7:00 P.M. He had expected that the furnace would be turned off prior to his arriving at work but found instead that the furnace was still operating. He confirmed, as do all the witnesses, the meeting of all workers took place to discuss safety issues, prior to the shift starting.

[252] Mr. Harrower testified that Exhibit 26 stipulates that Mr. Laidlaw was to supervise the washdown; however at the supervisors meeting it was decided that this would be changed and that Mr. Woods would be supervising the washdown.

[253] Mr. Harrower had supervised a washdown in at least one previous shutdown. He had no knowledge if any of the other supervisors on shift that evening had ever supervised a washdown previously.

[254] Mr. Harrower was involved in a decision with Mr. Morrell and Mr. Klassen (the furnace operator) to shut off the furnace.

[255] Mr. Harrower testified that there were no further meeting of the workers after the furnace was shut off. Some workers had been working from the beginning of the shift on shutdown matters. He did confirm that, with the furnace being shut off, some workers' duties would have changed to be related to the shutdown but that these changed duties would have been understood by the workers at the beginning of the shift.

[256] The washdown commenced once the burners were shut off. From a practical point of view there was about a half hour time lag from shutdown to washdown commencing.

[257] Mr. Harrower noticed, at some time in the evening, that Mr. Pickering and Mr. Ledoux were washing down the area above the furnace. Also at some point during the evening, Mr. Harrower noticed that there were about two inches of water in the furnace. This water would come from the hoses being used in the washdown. The water in the furnace did not cause any concern to him as the entire furnace was black and cool at that time. At approximately 1:15 A.M., Mr. Harrower saw water spraying from an open valve near the converter slag launderer. He also saw two men washing down near the converter slag launderer.

[258] In planning the shutdown, the reverb team had decided to use a Brokk for the first time. In prior shutdowns, a small backhoe had been used. The Brokk was thought to be safer as the operator was some distance away from the machine.

[259] Just after the furnace was turned off, the Brokk operator was directed to punch holes at the northwest end of the furnace near the burners. The purpose of these holes was to allow the furnace to cool.

[260] After making one hole, the Brokk operator was beginning to make a slightly larger hole just to the east of the first hole. There was a pop just as he began starting to make the hole and Mr. Harrower saw a glow in the eastern and central parts of the furnace. He heard at least one explosion and perhaps two. There was a lot of smoke but he was able to make it out the door of the smelter. Once the smoke cleared he went back in. Mr. Harrower assisted Mr. Ewing from the facility. He then satisfied himself that no one else was in the furnace area.

[261] Mr. Harrower felt that the amount of water in the furnace during the 2000 shutdown was actually less water than he had seen in previous shutdowns. He stated that there was never any discussion that it might be hazardous to use water to wash the dust away above the furnace.

p) REGINALD HILLIER

[262] Mr. Hillier had worked for the company for approximately 34 years. He had started in 1958, and except for a period in the 1970s, had worked continuously for the company.

[263] During that time he had had many jobs. He first started work in the converter pit and then in the fuming plant and he had worked in both bag houses. He had worked his way up in the smelter from labourer to shift boss. In 2000 he was a supervisor of feed preparation.

[264] Mr. Hillier sat on the core team and the reverb team and perhaps other committees related to preparations for the shutdown.

[265] Mr. Hillier described the history of shutdowns since the 1950's. In his earlier years working in the smelter shutdowns occurred every one or two years. In later years there was more time between shutdowns due to better furnace material and more efficient operation.

[266] Mr. Hillier had experience working most of the jobs related to a shutdown.

[267] Mr. Hillier described the process of burning out the furnace. Cast was added to help burn the furnace lower. Cast had been used in every shutdown he had been involved in.

[268] Mr. Hillier felt that the planning for 2000 was much different than previous shutdown planning. In prior shutdowns there was never a plan which showed what work had begun and whose responsibility that was. There was a plan in 2000 to prepare a manual for future shutdowns. He admitted that in previous years there was a plan but the goal in 2000 was to have a much broader plan to cover everything. He felt that this would make the shutdown more efficient and safer.

[269] The purpose of the washdown, according to Mr. Hillier, was to wash the dust from the hoppers, the floors, the beams and the arch. The washdown

was to begin on the top floor and moved downward until the arch, which forms the roof of the furnace, was washed.

[270] Mr. Hillier was working the evening shift on August 7, 2000 and he arrived sometime between 6:00 P.M. and 6:30 P.M. at the smelter. He believed that the furnace would have already been shut off prior to his shift starting. He had worked this evening shift in previous shutdowns and usually the washdown was well under way by the time the evening shift started. However Mr. Hillier felt that if the timing set out in the plans made prior to shutdown was not followed exactly, that did not present any problem.

[271] By the time Mr. Hillier came on shift, the hoses were already in place for the washdown. There were three hoses: one placed at the Y above the furnace, one on the west side and one for the slag launderers. He did not give the order to start the washdown but he knew that it started at approximately

11:00 P.M. He had one safety concern about the washdown, that being the removal of some plates on the floor and he was worried that the men doing the washdown could not keep their footing. He mentioned this to Kal Woods.

[272] Mr. Hillier was part of the decision to use more hoses. This decision was made in consultation with Mr. Harrower, Mr. Willetts and Mr. Morrell. Mr. Hillier knew that more hoses had been employed in 1997 then were used in 2000. Mr. Hillier was aware that these hoses were not in place prior to the explosion.

[273] At approximately 1:00 A.M., Mr. Hillier looked into the furnace and noticed that it was dark inside. This meant to him that it was cooling off. He did not notice any water on the floor of the furnace and did not know if he would have been concerned if he had noticed water. He did not remember ever seeing water on the floor of the furnace during any previous shutdown.

[274] Mr. Hillier recalled seeing the holes in the walls of the furnace made by the Brokk. He did not feel that these holes were unusual as he knew their purpose was to cool the furnace and that similar holes had been made in prior shutdowns.

[275] Mr. Hillier was in the general foreman's office at the time the explosion occurred. The explosion sounded like three pops to him. He had attended this office for the purpose of getting a drink of water and to wait to open a locked door. The door had been locked because the converter pit was being cleaned out and a large loader was operating close to the door during this cleanout.

[276] The supervisors on duty that night had met only once when the shift started. However all four had radios and could hear all communications from anyone of the four to the others.

q) RAYMOND DENNIS JOSEPH GAUTHIER

[277] Mr. Gauthier first started working for the company in 1968. He retired from the company in 2003 but performed some consulting work for the company after that.

[278] He had worked every shutdown since 1968. His experience in the smelter was comprehensive. He was the first fulltime safety and training officer for the company, having been appointed to that position in 1984 or 1985. He was first employed in management as a reverb foreman in the mid-80s and became day foreman when the company went to a two foreman system.

[279] In 1994, 1997 and 2000, Mr. Gauthier was the shutdown coordinator. In 2006, he was brought back for a nine month period as an adviser to the shutdown.

[280] The history of Mr. Gauthier's position as shutdown coordinator is worth reviewing. In 1994, his first year as coordinator, he was taken off his reverb foreman job and told to order all equipment, materials and manpower for the shutdown. This was the extent of his responsibilities in 1994. In 1997, he was more responsible for tracking paperwork and making sure funds were in place for the shutdown. In 2000, the company had in place a new superintendent and a new assistant superintendent (Mr. Hair and Mr. Merrin, respectively). Neither had any experience with the shutdown previously. In fact, neither had ever worked in the smelter. Because of this, Mr. Gauthier's responsibilities increased significantly. He felt that his basic situation was informing each of his two superiors what tasks he was undertaking respecting the shutdown as opposed to receiving directions from them.

[281] Respecting the jobs involved in the shutdown, Mr. Gauthier had worked on or supervised almost every job. By coincidence, he never was on shift when a washdown had been completed.

[282] The core team was the umbrella committee for all of the other committees related to the shutdown. Mr. Gauthier, Mr. Hair, Mr. Merrin and a representative from each of the other teams made up the core team. Mr. Gauthier recommended what subcommittees should be formed beneath the core team. He insured that each subcommittee had an experienced team leader who would complete the job of that subcommittee.

[283] An example of this was the reverb team. Mr. Morrell was the natural team leader as he was the reverb foreman but Mr. Gauthier appointed himself to that committee as he knew he had more experience than Mr. Morrell in the shutdown. The reverb team was the largest subcommittee as it had the most

work to complete. In addition to Mr. Gauthier, Mr. Olyniuk was also a part of the reverb team as he had a lot of experience to offer.

[284] Mr. Gauthier noted that everyone who worked in the smelter was welcome at all meetings, whether that person was an hourly paid worker or management. Mr. Gauthier also noted that some of the subcommittees beneath the core team were chaired by hourly paid workers.

[285] Mr. Gauthier described the reverb team's activities. At its early meetings, the team drew up a wish list of all of the things it hoped could be completed during shutdown. The company's engineer would then advise the team whether or not this wish list could be completed from the point of view of cost and time. Once the committee knew what could be done, log books for prior shutdowns were consulted and a list was drawn of jobs to be completed.

Descriptions for these jobs were then completed with an emphasis on detailed descriptions for those jobs in which there had been accidents.

[286] These expanded job descriptions were called procedures. Once the procedure was completed, it was reviewed at the next meeting of the core team and then set out in the manual. The engineer in attendance at the team meeting would often write down most of these matters and Mr. Hillier and Mr. Harrower would produce the finished product to be placed in the manual.

[287] There was never any plan to have a finished manual covering all the details of the shutdown for the 2000 shutdown. The priority was to complete a manual in 2000 for the high risk activities and to continue working on all activities to include them in a manual for the next shutdown. There was a much larger manual prepared for the 2006 shutdown than the one for the 2000 shutdown.

[288] The manual for the 2000 shutdown was not completely prepared until about two days prior to the actual shutdown. Copies of the manual were kept in two places: the shutdown meeting room in the warehouse and the reverb office.

[289] It was Mr. Gauthier's idea to have a manual prepared for the 2000 and later shutdowns. There had been no thought of preparing a manual as late as 1997 because there were so many senior people who could handle all of the jobs in the shutdown. Between 1997 and 2000 there were nine experienced men who retired or left the company's employ.

[290] The shutdown manual is Exhibit 27 in these proceedings.

[291] In the 2000 shutdown, Mr. Gauthier was the reverb foreman during the days leading up to the shutdown. This allowed him the time he needed to organize all of the supplies for the shutdown.

[292] Mr. Gauthier was shown the shutdown assignment sheet which is Exhibit 26 to these proceedings. He felt it was incorrect as there was no way to determine when the fire was turned off to the furnace. In fact, Mr. Gauthier felt that shutdown did not commence until the furnace was turned off.

[293] Mr. Gauthier, as noted above, was working the day shift on August 7, 2000. When his shift ended at 7:00 P.M., he knew there was still 16 inches of material in the furnace to be burnt off prior to the furnace being turned off. During the whole of his day shift on August 7, 2000, Mr. Gauthier was aware that that was approximately 16 inches of material in the bottom of the furnace and that this measurement had not markedly changed from the time he started his shift until the end of the shift. This was due to the fact, mainly, that material was being burned off the walls and being added to the material on the floor of the furnace. Mr. Gauthier anticipated, when he left the smelter at 7:00 P.M. on

August 7, 2000, that the furnace would have to be in operation for a number of hours prior to being shut down.

[294] Mr. Gauthier worked as a consultant for the company on the 2006 shutdown. This shutdown was different in many aspects from all prior shutdowns. In addition to the preparation of a comprehensive manual for the shutdown and a much higher concentration on safety aspects (as had been commented on by Mr. Gauthier and previous witnesses), there were different aspects to the process itself. There was no water used at any time to remove dust or cool the furnace. The furnace was cooled by induced draft fans and other methods using blowing air which cooled the furnace much quicker than in any prior shutdown.

[295] The dust above and surrounding the furnace was removed in two separate ways:

a) For two weeks prior to shutdown, two men worked blowing dust away from the arches;

b) Two Unijet trucks were brought on the premises and were used to vacuum away the remaining dust.

[296] In cross-examination, Mr. Gauthier indicated that the plans for the shutdown should have called for a crew meeting and a safety meeting after the fire was turned off to the furnace. He admitted that the furnace would have cooled while the meeting was taking place.

[297] Finally he admitted that after the incident, Mr. Mike Chrupalo told him that the purpose of knocking holes in the walls of the furnace during washdown was to allow the supervisors to look into the furnace and insure that no water was building up. If water was building up, washdown should be delayed until the water evaporated.

r) KEITH JOHN LOGGIE

[298] Mr. Loggie was the general foreman of the reverb furnace during the day shift on August 7, 2000.

[299] He had had several duties with the company since starting his employment in 1979. As many of the previous witnesses had done, he started out as a labourer. Some of his positions were as follows: supervisor of the bullgang, worker in the fuming plant, shifter in the reverb, night foreman, smelter foreman and general foreman. About one-half of his employment with the company was in the reverb furnace.

[300] Mr. Loggie had worked every shutdown since 1979. He had worked most of the jobs associated with the shutdown. In 2000, his area of responsibility

was in the anode and converters so he was not directly involved with the reverb furnace.

[301] He worked in the reverb furnace the first night of the shutdown. When he first started his shift, the furnace was operating and the goal was to drain the furnace.

[302] Mr. Loggie had very little to add to the evidence of other witnesses respecting August 7, 2000.

[303] He was working during 2006 shutdown as a night shift general foreman and confirmed, as other witnesses had, that no water was used during the shutdown and that an outside consulting firm had been hired to plan the shutdown.

s) THOMAS ANDREW GOODMAN

[304] Mr. Goodman at the time of his testimony in the spring of 2008 was vice-president of technical services and human resources. In 2000, he was a vice-president of metallurgy at the company. As such, Mr. Goodman represented the first witness at the inquest who could be characterized as upper management in the company.

[305] In 2000, Mr. Goodman was responsible for the line management of the smelter, zinc refinery, powerhouse and other aspects of the company's facilities.

[306] Mr. Goodman started with the company in 1979 as a supervisory trainee. He has a diploma in metallurgical engineering and technology from a technical college in British Columbia.

[307] He had worked several shutdowns as a supervisor. He had planned several shutdowns as well. He felt he had sufficient experience to do Mr. Gauthier's job, if necessary.

[308] In 2000, Mr. Goodman had general oversight responsibility through the superintendent of the company but he had no direct planning responsibility for the shutdown. Mr. Hair was the superintendent. Immediately below him was Mr. Merrin. Directly under Mr. Merrin was Mr. Gauthier.

[309] Mr. Goodman described the planning process involved in the shutdown. Historically, hourly workers had not been involved in any part of the planning process. Some time in 1980s, the hourly workers were invited to become more involved in planning the next shutdown and this involvement increased as the years went on. He described the fact that in addition to the hourly workers and the management at the smelter, there were several

professional engineers, with varying degrees of experience, who were resource people available for the shutdown.

[310] A number of witnesses had attempted to explain the purpose of using cast iron and ferra silicon in the reverb furnace. Mr. Goodman's explanation was the most cogent one. Magnetite in the furnace reduces the capacity of the furnace by settling and staying on the bottom. Cast iron and ferra silicon are put into the furnace where they react with the magnetite to allow the magnetite to be removed as slag. At shutdown it is desirable to have the hearth at a proper level and therefore for months prior to shutdown there is a campaign to ensure that the furnace bottom is ready for shutdown. When the furnace bottom is prepared properly, the work to be done after the furnace is turned off near the matte and slag tapping holes is much easier to accomplish. As well, there is work to be done near the bullnose and in that area it is very cramped for space and the lowering of the furnace bottom permits work to be done in this area more easily.

[311] Mr. Goodman had been involved, in previous shutdowns, in supervising the washdown. His last experience had been during the 1994 shutdown. The sequence was to shut the burners off and then begin the washdown. Usually the washdown would start on the west side and proceed eastwards. The order it would be done was predicated on who was working on the floors below and where they were located.

[312] Mr. Goodman did not attend any of the meetings to plan the 2000 shutdown. He had no planning responsibilities for the 2006 shutdown, either.

[313] From Mr. Goodman's perspective the most critical part of the 2000 shutdown plan was the gas reconstruction project. Therefore, there was no pressure from his perspective to complete the reverb shutdown quickly.

[314] Mr. Goodman confirmed that the company has expert reports which recommend that water not be used in any future shutdown. He confirmed the company's commitment not to use water in any future shutdown.

t) KALVIN JAMES WOODS

[315] Mr. Woods started working for the company in 1990. He began on the bullgang in the smelter and worked there for three years. He was transferred to the fuming plant and returned to the reverb furnace around 1996.

[316] Much of this time in the smelter was spent as a bricklayer. His duties were to repair arch brick and walls. He was appointed a furnace operator in approximately 1999. At the time of the shutdown he was an hourly rated supervisor which meant that he was still a union member even though he had supervisory duties. In the weeks prior to the shutdown in 2000, he was a shift boss.

[317] Mr. Woods had worked in the 1994 and 1997 shutdowns. In 1994, in addition to other duties, he was part of the washdown crew. In 1997 his responsibilities had more to do with bricklaying.

[318] Mr. Woods knew that the washdown did not commence until after the furnace was shut off. This was due to the fact that, while the furnace was running, workers were still tapping matte and slag. These workers would be soaked with water if the washdown commenced any sooner.

[319] On August 7, 2000, Mr. Hillier, Mr. Harrower and Mr. Morell were the management responsible for assigning duties to him when he reported for the night shift. Mr. Woods was aware that a plan was certainly in place and he was aware, generally, of what jobs had to be completed.

[320] Mr. Woods was the only witness to mention that after fire off, the first duty is to haul boiler ash. This took approximately 45 minutes to one hour that evening and all the workers had to wait in the lunch room while this was being completed.

[321] Mr. Woods assigned the workers involved in the washdown. He did not know whether any of them had been involved in this activity previously but he knew that all of them had experience in and around the reverb furnace.

[322] There were two workers washing, each using a fire hose. Washdown took six or seven hours to complete.

[323] Mr. Woods did not suggest to any of the workers that the arch should be sprayed with water to cool the furnace down.

[324] Mr. Woods checked from time to time to make sure the beams were being washed. He also checked the furnace bath from time to time. He noticed that it was black from the west side to the jog and that from there to the east side of the furnace the bath was still molten. He describes this as being orange in color and liquid in appearance.

[325] In addition to supervising the washdown, he had other jobs to supervise in the slag launders on the west side and in the roasters.

[326] Sometime after 1:00 A.M., Mr. Woods took his first break. He was having lunch with Joe Klassen in the fuming plant office when the explosion occurred. He ran through the fuming plant and up the back stairs on the east side of the furnace to the calcine floor. Mr. Morrell was there and told him to gather everybody in the lunchroom for a head count. There were men missing but he found out that they were being attended to in the smaller warehouse.

[327] So far as Mr. Woods was concerned, there was no difference in the planning and implementation from the 1997 shutdown to the 2000 shutdown.

[328] Mr. Woods had never received any training as to what might happen if water came into contact with molten metal but, as he had seen this happen in the smelter, he knew an explosion would result.

u) ALAN THOMAS CHALMERS HAIR

[329] Mr. Hair joined the Company in 1996. He had graduated from the University of Leeds in 1983 with a degree in mineral engineering. Prior to working for the company, he had experience with other smelters. However, these were not the same as the reverb furnace in Flin Flon.

[330] Mr. Hair worked from 1996 to 1998 as the general superintendent of the zinc plant. He then moved to the smelter. The 2000 shutdown was his first. Mr. Hair, however, did have experience with other furnace rebuilds. In 2000, Mr. Hair was responsible for the overall operation of the smelter and the powerhouse. He reported to Mr. Tom Goodman in the company.

[331] Mr. Hair's responsibility was to provide oversight in the planning for the shutdown. The prime event which was driving the process of the shutdown was the gas handling project, which was also called the spill gas project. Mr. Hair confirmed, as had several other management witnesses, that the gas handling project would take much longer to complete than the reverb shutdown. As such, there were no time pressures to complete the reverb furnace shut down and rebuild.

[332] Mr. Pat Merrin was primarily responsible for supervising the shutdown process. Mr. Ray Gauthier had been relieved of his regular duties about a year prior to the shutdown in order to commence planning.

[333] Mr. Hair demonstrated knowledge of the other members of the management team who were involved in the shutdown. He also knew that a manual related to the shutdown was being prepared prior to the 2000 shutdown. Mr. Hair characterized this as part of an overall process taking place in the smelter of developing manuals for all activities in the smelter.

[334] Mr. Hair knew that water had been used in the washdown process since about the time the smelter had been built. He did not believe the water used in this manner could be a danger or cause an explosion. However, he did confirm that at one of the other smelters at which he had worked, the shutdown

process used a vacuum to remove unwanted dust and air was used to cool the furnace.

[335] On the evening of August 7, 2000 at about 8:00 P.M. he had received an update from Mr. Morrell as to the shutdown. His next contact from the smelter was the report of the explosion. He arrived at the smelter just after the last ambulance left.

[336] Mr. Hair was involved in the preparation of the management's letter to Workplace Safety and Health (Exhibit 37 in these proceedings).

[337] After the rebuild of the furnace in 2000, planning began for a shutdown in 2003. However, because of improved combustion capability, the shutdown was able to be delayed until 2006.

[338] The shutdown in 2006 utilized outside consultants in a large part. According to Mr. Hair, this was part of a company plan to use outside help in many of its projects. The outside consultants were Auburn Technical Services and they had responsibility for the reverb demolition and rebuild. Their main business is the demolition and rebuild of this and similar types of furnaces.

[339] There was no water used for washdown during the 2006 shutdown. Instead, the furnace was cooled by fan-blown air and the dust in the structure above and around the furnace was removed by vacuum.

v) THOMAS EDWARD LINDSEY

[340] Mr. Lindsey began working for the company in 1974 just after he finished high school. When he gave his evidence in May, 2008, he was employed as the Employee Health and Safety Coordinator. He represents worker concerns respecting health and safety to the company.

[341] Mr. Lindsey is also a member of the Mines Regulations Review Committee which is a committee composed of members from unions, management of various companies and government representatives. This committee insures that mine regulations are as up to date as possible.

[342] Mr. Lindsey described his duties with the company.

[343] His main purpose in testifying was to introduce Exhibit 72 which was the report submitted to Workplace Safety and Health on behalf of the unions.

VIII EXPERT'S REPORTS

[344] There were four experts' reports filed during the inquest. They are all attached as appendices to this report. Some parts of these reports were removed by agreement of all counsel prior to their filing.

[345] These reports are as follows:

a) S.P.D.F. Chemical Associates Ltd. report (author: Dr. H. D. Gesser) dated August 16, 2000 attached as Appendix “D”. This is called the “Gesser Report”;

b) Testlabs International Ltd. report (author: Dr. W. W. Tennesey) dated September 29, 2000 attached as Appendix “E” This is called the “Tennesey report”;

c) Swacer Inc. report (authors: Dr. John H. S. Lee and Hoi Dick Ng) dated September 21, 2000 attached as Appendix “F”. This report is called the “Swacer report”;

d) A. R. Jennings report dated September 27, 2000 attached as Appendix “G”. This is called the “Jennings report”.

[346] The Gesser report is very technical and answers the question: Can hydrogen be produced (and cause an explosion) when the water is contacted with molten copper at elevated temperatures? The conclusions of the Gesser report are commented on in the Jennings report. Dr. Gesser is of the opinion that the explosion was of the boiling liquid expanding vapour or physical vapour type. This occurred when water penetrated the surface of the material in the reverb and came into contact with hot copper (matte). The water then vaporized rapidly causing the explosion.

[347] The Tennesey report first states that molten metal and water interactions are a well known hazard in the metal casting industry. Violent explosions occur. There are a number of distinct phases prior to the explosion. At first, a vapour blanket forms between the matte and the water. This blanket may collapse in a small region with resultant high heat transfers and rapid rise in

pressure. This rise in pressure causes high pressure steam to be produced which expands rapidly thereby causing damage.

[348] In a similar fashion to Dr. Gesser, Dr. Tennesey concludes that the event on August 8, 2000 in the smelter was not a hydrogen explosion.

[349] Developing further his theory of a steam explosion, Dr. Tennesey states:

> The large volume of water poured onto the hot bath, consisting of magnetite caused the slag to crack and then the magnetite to crack. The crack could be called quench cracking or thermal cracking. The cracking would propagate in length (across the width of the furnace) and in depth. Finally water would contact the molten, or near molten magnetite and this is when the popping began, evolving into a larger explosion.
>
> However, fortunately this was not a fully developed steam explosion. Based on the author's experience of viewing and evaluating the damage caused by rapidly evolving steam in water/molten steel explosion at Algoma Steel in Sault Ste. Marie in 1996, a fully developed steam explosion would have leveled the walls of the furnace.
>
> The energy of the explosion in the reverbratory furnace on August 8, 2000 was one of a lower level likely due in part to low depths of water (ie: 2 to 3 inches), encountering the molten/or near molten magnetite in the

> cracks. A situation never developed where a small amount of water was "trapped" under molten metal to create a colossal and much more violent molten metal/water steam explosion. In the HBM&S situation the water was merely "confined" in the crack while in intimate contact with the molten or near molten magnetite.

[350] The Swacer report, through what its authors learned from the events of the early morning hours of August 8, 2000, conclude that the explosion was most likely a stratified steam explosion. The remainder of the report seeks to find a scientific basis for this type of explosion. Firstly, the report looks at the amount of water and matte which must be present for this type of explosion and concludes that the minimum of both these substances was present. To establish a stratified steam explosion, water must have accumulated. In other words, water cannot evaporate at a rate greater than its introduction into the smelter. Again from the circumstances of the explosion, the report concluded that sufficient unevaporated water must be present. Thirdly, the report looks at whether sufficient time had passed to form a solid crust of slag on top of the matte. It concludes that there was such a crust and that a trigger event would have had to occur to fracture the

layer of slag to permit water to come into contact with molten matte. Next the report concludes that slag alone could not have participated in a stratified steam explosion. The conclusion of the Swacer report states:

> From the physical evidence obtained after the explosion, the nature of the injuries to the workers in the immediate vicinity of the reverberatory furnace, and the theoretical analyses carried out, it may be concluded that the most probable cause of the August 8th incident is one of a stratified steam explosion.
>
> It is postulated that a solid crust of slag was formed on top of a pool of molten matte while the "wash down" operation was taking place. The solid crust of slag, possibly in combination with a layer of steam, served as an insulating blanket. This permitted the water from the fire hoses entering into the furnace to accumulate on top of the slag crust.
>
> This eventually formed a stable, stratified configuration of water on top of the molten matte separated by an insulating layer of a solid crust of slag and possibly steam. A significant trigger event fractured the solid crust layer, which permitted the water to come into contact with molten matte and started an initial precursory explosion. This precursory explosion caused further fragmentation of the crust bringing more water into contact with the molten matte. The precursory explosions escalated rapidly and brought about the final major event.

[351] The Jennings report contains many recommendations for changes to shutdown procedures. The most likely probable causes of the explosion are the

interaction of water with molten material, a boiling liquid expanding vapour explosion or a combination of the two.

[352] Neither Swacer nor Gesser provided recommendations to prevent another such explosion because the parameters of both reports did not call for any recommendations. Both Tennessey and Jennings included recommendations.

[353] From a reading of the reports, it becomes clear that the exact cause of the explosion cannot be known. In Swacer, the authors leave unknown the precipitating event which triggered the fracture of the slag layer. In Jennings, the causes are listed in order of probability. Tennessey states that the large crack he found in the smelter top layer was probably the area in which the water was able to come into contact with the molten metal.

[354] However the exact cause is unnecessary for the purposes of the report. Neither is a technical name for the event necessary. There are several common factors in all the reports and an engineering background is not required to find them. The use of water during the washdown process was the primary factor which resulted in the explosion. Some parts of these experts' reports were concerned with the regulation of the temperature of the bath in the smelter or regulating the amount of water introduced into the bath. The first question which needs to be answered prior to looking at the regulation of temperature and amounts of water is whether water needs to be used at all in an area in which there is present molten metal.

[355] As will be seen later in this report, this question has been answered.

IX FINDINGS OF CREDIBILITY

[356] I heard from 23 witnesses during the course of the hearings which began in January 2004 and ended with the last witness in May 2008.

[357] These witnesses were all connected with the Company either as hourly paid workers (all of whom are members of the various unions with standing at this inquest) or management.

[358] I do not have to determine the credibility of any of these witnesses to come to the conclusions and recommendations in this report. However, I can make the following observations: many of the hourly paid workers were very quick to offer in their testimony theories as to what had gone wrong or how the Company was not sufficiently prepared for what happened. On the reverse side, many of the witnesses who were employed by the Company as managers were

not very forthcoming in their testimony. Many of these witnesses could not remember details which they surely should have been able to do.

[359] Despite this, I was able to form a fairly accurate picture of the events leading up to the explosion.

[360] One witness, in particular, impressed me greatly. That was Mr. Ray Gauthier. He was the coordinator of the shutdown. He was very fair in his assessment of the events in August of 2000. He also displayed a wealth of knowledge and was not afraid to share it on the stand. He was able to reduce some of the complex processes in the smelter to terms which those of us who do not work in the smelter could understand. Mr. Gauthier was also very even-handed in his testimony: he admitted that certain events could not have been foreseen and he was also prepared to accept, as a member of management,

what could have been improved. Much of my own findings and conclusions stem from the understanding Mr. Gauthier provided in his testimony.

X MAGNETITE AND ITS IMPACT ON THE SHUTDOWN EVENTS

[361] A good part of the testimony of some of the management witnesses was devoted to the question of how much of the bath, after the furnace was turned off, consisted of magnetite.

[362] The reason for this can be seen in the Tennessey report. At page 30, Dr. Tennessey discusses his analysis of the bath of the furnace and indicates there was very little matte and instead most of the bath beneath the slag was composed of magnetite. Magnetite has a much higher melting point than does matte. Therefore, according to this expert, the furnace bath beneath the slag was at a much higher temperature than it should have been. When the water

came into contact with the magnetite, the explosion was much greater than it would have been than if it had come into contact with matte.

[363] Mr. Caba, in the first day of testimony, talked about magnetite. What follows are his answers to questions put to him about magnetite:

> Q Now, magnetite is a substance that is either found in the furnace or introduced into the furnace. Maybe you can talk a bit about that and compare it, if you could, in its temperature or least burning temperature as compared to the copper and the other metals.
>
> A Magnetite, the term itself refers to a specific oxide vine which has a higher melting point than the slag or the copper. The term within the smelter is used much more--much less succinctly than that and is used to refer to any material, solidified material on the bottom of the furnace. It is used to refer to any, for lack of a better term, slushy layers within the furnace. Those will be composed of at least a portion of magnetite. That is the general term that is referred to. (page 64 line 2 of transcript from January 13, 2004)
>
> A Specifically you will -- the, the bottom of the furnace will contain magnetite, yes.
>
> Q And does that have to do with the fact it's heavier than the other materials so it sinks to the bottom?

A No. Magnetite actually will normally sit and is, is often referred to as a mushy layer between the slag and the matte. If you draw the matte level down too low you can get that layer sticking to the bottom and that's generally accepted as the mechanism in which the bottom builds up. And the purpose of the cast iron and the stirring primarily is to get that material on the bottom back up into the flow of material so it can exit the furnace.

Q So you can actually take it out of the -- remove it from the furnace?

A With the slag and with the matte. (page 82, line 24 of transcript from January 13, 2004)

A Magnetite is a -- the primary component of it. I hesitated away from the, the chemical definition because within the terminology it's used to describe any solidified material that, that is built up on the bottom. The primary constituent would be magnetite. (page 2, line 26 of transcript from January 15, 2004)

[364] Mr. Gauthier had these things to say about magnetite:

Magnetite is a form -- I'm not a metallurgist to the point where I can give you a complete explanation of magnetite. I just know that it is a form of slag that is basically -- most of it is developed in the converter isle during their process. (page 59, line 3 of transcript from April 24, 2008)

And that's why we add cast all through the whole

campaign is from these -- the books gone. From the furnace measurements it tells me, oh, I got a buildup here. Slag must have attached, magnetite containing slag must have attached to the bottom. Now, the only way I can get it back up off again so that I have a full furnace to operate with, is to burn it out.(page 59, line 3 of transcript from April 24, 2008)

And for some reason magnetite is formed mostly when your silica is lowest, so when you're breaking it up, if you can add more silica to it, it helps to revert it back to a simple slag.

Q All right. And that's how you get it out of the furnace?

A And the ferro is iron.

Q Right. That's what I understood it to be, iron and sand sort of thing; is that correct?

A Yeah.

Q So the solution that you were given years ago was ferro-silicate to lift it, ferrosilicon to get it out, right?

A Correct.(page 14, line 31 of transcript from April 29, 2008)

[365] Mr. Goodman states the following respecting magnetite:

A -- and as the bottom has magnetite, if -- I'm struggling to how to say this to sort of meet your criteria, the simple way, understandable and correct. But

> magnetite which is over oxidized iron will, will tend to migrate to the bottom of the furnace and settle in the bottom of the furnace and reduce the capacity of the furnace. It makes the furnace much less efficient. To control that, from time to time, as it's monitored and as, as the operators see that the, that the furnace bottom is, is starting to build up, they would introduce cast iron or ferrosilicon into the, into the furnace. Ferrosilicon or, or, or cast iron acts as a reductant, sinks to the bottom of the bath and then acts as a reductant, as it melts the -- reduces the, the magnetite to, to basically to FEO (phonetic) so that it can form slag with, with the silica that's present in the furnace and it can be removed as slag, and the, the net effect is that the furnace bottom will be, will -- the hearth level will go down.(page 10 line 27 of transcript of April 30, 2008)
>
> Both I would expect because, because the furnace isn't one monolithic flat, perfectly flat bottom. By the time it's, it's shut down it has those different relief within it, so I would expect that, that they would have a bottom that is largely comprised of, of magnetite and you would have other areas of the furnace that might have, you know, some matte and some slag.(page 45 line 16 of transcript of April 30, 2008)

[366] I was encouraged by some counsel to conclude that controlling magnetite in the furnace prior to shutdown in 2000 was done differently than in any prior shutdown. The purpose, according to this line of reasoning, was to

allow new equipment into the area under the bullnose (just below the uptakes which removed the gases from the reverb). Mr. Gauthier testified extensively respecting this issue. Some of his words are as follows:

> Q So basically, what you're saying, then, is that you're trying to get as much out of the furnace, and especially this stuff at the bottom, as you can, and percolate it up to the top so that it can --
>
> A Correct (Page 31 line 33 of transcript of April 23, 2008)
>
> A At shutdown, I'd order ten tons, and charge it to the shutdown budget. And basically, between the time I ordered it and the startup, it would all be used up. So I did buy specifically for that. But we also used lots of recycle, like bolster (phonetic) arms, launders, made out of cast. (Page 33 line 14 of transcript of April 23, 2008)

[367] All of Mr. Gauthier's evidence points to the fact that the draining of the reverb was the same during every shutdown he was involved in. To confirm this he states the following:

> Q Now, in terms of the activities, though, to get to where you needed to be to shut the furnace off, that is, comparing '06 to 2000, and years before, is the same process as all of the ones that you described, smelting the

walls off --

A Yeah.

Q -- dropping the silver pegs in, everything that you've described for previous years went on in 2006?(Page 100 line 6 of transcript of April 29 ,2008)

Q Okay. And the focus on this occasion, as you said, was more than any other shutdown, to get that particular area of the bullnose as low as possible, right?

A Yeah.

Q Using your roaster arm method, right?

A Correct. Well, that shutdown and the shutdown before it. (Page 47 line 12 of transcript of April 29, 2008)

[368] There in fact is no controversy in the operation of the reverb furnace up to the shutdown in 2000. The methods of “burning out” the magnetite prior to the shutdown were the same as the prior shutdown in 1997. It is also clear that magnetite is removed regularly as the furnace is operated and that its removal is part of the running of an efficient furnace, whether during normal operation or specifically leading up to a shutdown. On all of the evidence I have available, I

cannot find any change in practice in this area in 2000 from any other shutdown year. It is impossible to determine if the composition of the bath of the reverb after the furnace was turned off was any different than the composition in any other shutdown. Mr. Gauthier clearly had no safety concerns related to the composition of the bath and I can find no evidence that he should have had any such concerns.

[369] Dr. Tennessey's concerns respecting magnetite only become important when there is water present in the furnace to react with molten metal. That is the most important question facing this inquest: whether water can be eliminated from coming into contact with molten metal.

XI SHUTDOWN PLANNING

a) Long Range Planning and the Preparation of the Manual

[370] A considerable portion of the evidence at this inquest related to management practices and whether the Company was properly prepared for the shutdown.

[371] Respecting this aspect of the inquest, it must be remembered that the shutdown of the reverb furnace occurred at irregular intervals of approximately three years. The inquest did not assess (and there was no suggestion by any of the parties that it should) the usual management and organizational practices of the Company in operating the smelter. The only assessment I have been asked to make is for that relatively small period of time in which the 2000 shutdown occurred and the long range planning leading up to the 2000 shutdown.

[372] The Company management responsible for the shutdown is as follows:

a) Mr. Tom Goodman was the vice-president of metallurgy. He had general oversight responsibility but no direct role in the planning of the shutdown (from his evidence at page 5 line 27 of the transcript of April 30, 2008);

b) Mr. Alan Hair was the superintendent of the smelter and power house and had direct supervision over all of the projects during shutdown including the shutdown of the reverb furnace;

c) Mr. Hair's assistant was Mr. Pat Merrin;

d) Mr. Ray Gauthier was the shutdown coordinator and, as such, was directly involved in the tearing down and re-building of the reverb.

[373] Under Mr. Gauthier were a number of supervisors. At this point in the organization of the shutdown, the supervisors were either assigned to the day shift (7:00 A.M. to 7:00 P.M.) or the night shift. Mr. Gauthier worked the day shift during the shutdown and was therefore in charge of the supervisors. The

Shutdown Assignment Sheet for August 7, 2000 (both day and evening shifts) is attached as Appendix “H”.

[374] Appendix H details the supervisors for the time of the explosion. Mr. Bill Morrell is shown as the reverb foreman and beneath him is Mr. Reg Hillier. Beneath these two are: Mr. Jim Harrower, Mr. Kal Woods and Mr. John Laidlaw. Also listed are three supervisors under the mechanical demolition category who are not of direct concern in the events leading up to the explosion.

[375] A complete organizational chart for the evening shift on August 7, 2000 is shown as Appendix “I”.

[376] The Company had begun planning for the shutdown in the fall of 1999. This was when Mr. Gauthier was relieved of some his usual duties at the smelter and began his duties as shutdown coordinator.

[377] The following quotes from Mr. Gauthier's evidence are instructive as to how the shutdown planning occurred in 2000 (all of these passages are from his testimony on April 23, 2008):

> A Which made me responsible -- like, in 2000, or 1997 we started the crews, you know.
>
> Q What do you mean by that, sir?
>
> A Crews of people that had crew meetings to develop what we were going to do during shutdown, and how we were going to do it.
>
> Q Okay.
>
> A And we continued those in 2000. In fact, we, I think we added a couple of teams. (Page 15 line 32) but in terms of the core committee itself, the umbrella group, do you recall today who that was? Or not the persons -- how it was made up for 2000?
>
> A It was made up of Alan Hair.
>
> Q Yes, sir.
>
> A Pat Merrin. And the representative from each of these teams, from any other team.
>
> Q Okay.

A And I was there.

Q So then in terms of the identification of the sub-committees, am I right that that would have been your contribution as well as the co-ordinator that you would have recommended to Mr. Hair or Mr. Merrin that we need these sub-committees?

A Yes. (Page 18 line 9)

[378] Commenting on how he got the members of each subcommittee, Mr. Gauthier stated:

A And for some of the outlying teams, like the trades, you, you wanted somebody with experience, and you really didn't care whether you got the supervisor, the foreman, or -- what do they call –

Q It didn't matter who it was. The most experienced person.

A Yeah. As long as he had the experience, you really didn't care who it was going to be.(Page 20 line 12)

Q Now, the reverb committee, I understand, and I could be wrong, that's the largest of these sub-committees. Would that be it?

A Yes.

Q Okay. The one which would arguably have the

most work to do? Is that it?(Page 23 line 6)

Q And as I read through it, there seemed to be a continuous discussion of all of the little items that needed to be identified in respect of the shutdown. Is that more or less what you fellows were doing?

A Yes.

Q Almost a type of brainstorming session, where everybody would think back to what they did in previous years, and speak it out, and then you would write it down. Is that what was going on?

A Yes.

Q Now -- and I would think that at some point you had a list that you thought you were comfortable with. Is that correct?

A Yes.

Q And once you had reached that list of activities you were comfortable with, is it then that you set upon the discussion of what that work involved, and what the procedures were with respect to that work? Or did you talk about the procedures alongside the identification of the jobs?

A We're basically to this now?

Q No. Just how you got, yeah, where you were.

A No, no. But I mean –

Q Yes.

A Look, when we finish brainstorming, we're basically to the bullet points.

Q Yes.

A On how to proceed with the shutdown.

Q Okay.

A Our next step was to go through it, and say, Is there a high risk to this? A low risk? No risk? You know, is it just the normal mundane job, or is there a risk involved that we're aware of?

We went back through -- we had log books that identified where we had accidents or incidents during shutdowns, previous shutdowns. We went through that to help us decide was there a risk on this point, or wasn't there. We picked the ones where there was either a risk of bad assembly, or accident, and we said we've got to make a procedure for this one, because we don't have time, like, just (inaudible) point, you're already to that size. And we didn't have the time to develop it all, so we looked at where have we had problems doing assembly, or where we had accidents, and we said, okay, these are the ones where we want to expand it out into a procedure.

Q So in what we have there, as Exhibit 27, which is the manual that you have in front of you, does that contain only the, what would be the high and low risk activities? Or more than that?

A This contains everything, but where it's expanded, that's what we considered our procedures.(Page 41 line 21)

Q Okay. So as the procedure, or the task was identified, as you say, you would write that up, discuss it at a meeting. If you were happy with it, it would be saved somewhere for later compilation into the book?

A Correct.

Q Now, as you moved through the process, did you feel that you would have time in 2000 to do the complete manual?

A We knew we wouldn't.

Q You knew you wouldn't get that done?

A No. What we ended up with is what we had time to complete.(Page 44 line 9)

[379] According to Mr. Gauthier, there was a committee structure to plan for the shutdown. This system of having committees responsible for planning the shutdown began for the 1997 shutdown. The committees, according to all of the evidence I heard, included members of both management and union workers.

[380] The main committee to which all others reported was called the Core Team and the members included all of the top management. The committee with the heaviest workload was the Reverb Team which planned the actual shutdown, tear down and rebuild of the furnace.

[381] What was new in 2000 was the plan to produce a manual of all of the jobs involved in the shutdown. After being shown the Shutdown Manual which is Appendix “J” to this report, Mr. Hair comments on this in his evidence on May 21, 2008 at page 11 line 7:

> A I'd seen, I think, bits and pieces of it. I don't believe it was pulled together as a complete package until just before the, the shutdown. So, the individual procedures would have been developed. This was viewed very much as, as a work in progress. The -- as I was saying, they had an overall approach of developing procedures and training manuals, and normally, you would -- in the case of the operating positions, it's relatively straightforward because we're obviously doing those operations every day, day in, day out. And you can develop the procedures and fine tune them or whatever relatively quickly, and we've done

> that for, as I say, operating positions. This was expanding that approach to shutdown activities, which happened less frequently, some non-routine basis. So, it was until we'd actually gone through the shutdown, it would be hard to finalize the procedures, because performing the shutdown was meant to advise us of, you know, of some of the steps that may not have been immediately obvious, for example.
>
> Q Shutdowns had occurred in '97, '94. You agree with that?
>
> A Yes. Shutdowns had been approximately every three to four years, 1999, '94 and 1997 were the previous three.
>
> Q Were you aware of any manuals that had been prepared for the shutdowns of '97 and '94?
>
> A No, the -- not in, not in this form.

[382] The procedure for preparing the manual is succinctly described by Mr. Gauthier in the quotation from his evidence set out above.

[383] Other witnesses have described the preparation of the manual, beginning with Mr. Willetts who testified on April 10, 2008:

> A The core team was responsible for the -- making

sure that the other teams function properly and they were responsible for the, the shutdown itself.

Q And who would make up this sort of, I guess, larger supervisory group? Who would be represented at that?

A The core team?

Q Yes.

A On the core team, there was a mixture of smelter management and some hourly people as well. (page 4, line 11)

A The health and safety committee is a mixture of smelter management and hourly people representing each union, that meet on a monthly basis and look after the, the day-to-day safety issues in the smelter.

Q Okay. And did they have some special function with respect to the shutdown?

A Many of the people on the joint health and safety committee were part of the shutdown planning group. (page 4 line 29)

A The planning that was done in 2000 was, my opinion anyway, far more extensive than the planning that had been done in previous shutdowns.

Q You, you mentioned a manual and you were shown a manual that was marked as exhibit. And I understand you didn't directly create the manual, but you were aware

that the manual was being created?

A I was.

Q Did you know why, why the manual was being created?

A Yes, I did.

Q Could you, could you just explain that to the court?
A Well, it was to nail down procedures for every task that was going on during the shutdown so that we could prepare for the next shutdown basically. Put a, put a manual together, job procedure manual.

Q And in terms of safety, can you describe for me the priority you (inaudible) safety in connection with planning the shutdown?

A The priority of safety?

Q Yes.

A Safety, the 2000 shutdown, was, was top priority. (page 24 line 32)

[384] Mr. Morrell also testified as to the reasons behind the manual and how it was prepared:

Q And what was the reason that there was a decision

made, or a consensus arrived at that there would be the shutdown manual prepared as a result of this experience?

A Our experience had been using the safety loss control process, and, and it's, it's a, it's a, a package process to manage safety. It's, it's loss control. It's control of lost, people, process, material, and equipment.

This process worked so well while we were developing manuals for training, as an example, it's -- you take a -- like, if you took a job, a specific job, you would tear that job down. You would list all of the different functions or, or, or tasks that's performed in that job. At -- the first thing that you would look at after you have that list, list of tasks would be are there any functions here that we don't really need to do or that could be engineered out of that?

The second thing you do is then you do an analysis of that task by where you actually document everything that gets done when that task is being performed.

The next thing that you do is you do an evaluation on the hazards of that particular task, and it's given a rating, it's a rating system where it's given a rating of -- it would be -- the hazard would be high, medium, or low, depending on the rating of that, of that, that particular task. Would then dictate would you, would you write a very comprehensive procedure or would it be just a, a, a statement of, of what is to be done, or that it wouldn't need anything documented or, or any specific instruction.

A We -- the, the attempt was to do -- to use that very same method to develop a shutdown manual so that over

> the period of time, you would be able to, to have a comprehensive manual that would take everyone of those things that you would do for shutdown and be able to develop that kind of a comprehensive manual, but it would take a long time to do that. (page 9 line 17 of transcript of April 15, 2008)

[385] Mr. Harrower testified on April 16, 2008:

> Q And how was it that your committee, this reverb committee, interacted with the safety committee?
>
> A As jobs were identified, safety committee would look at the jobs but they would also report, the reverb team would report to the core team of which there was a safety team member of, so there was some communication in that manner as well.
>
> Q So was a representative then of each of these subcommittees, two of which were discussed already which would be the reverb and the other being a safety, was there a representative of each of these subcommittees sitting on the core team?
>
> A Yes. (page 89 line 27)

[386] Finally, Mr. Hillier on April 22, 2008 testified:

> But in this time we wanted a plan that was -- everything was documented and, and, and they were making job procedures on how to do it and everything and it was, it was a much broader plan to cover everything. That was my understanding.

> Q Do you know why they decided that they were going to do this in 2000?
>
> A To make it more efficient and, and safer. (page 16 line 29)

[387] What Mr. Gauthier is basically describing is a process undertaken by the Company to develop a shutdown manual. Mr. Gauthier felt one was needed given the fact that many of the employees who had considerable experience in the shutdown had retired in the latter part of the 1990's. Mr. Hair stated that the development of the manual was part of an overall strategy of the Company to have in a written form some of the usual procedures. The other members of the management, all of whom had experience with the shutdown process, described why a manual was necessary. Several noted that safety was one of the prime benefits of developing the manual.

[388] All of the above witnesses are certain however that the manual would not be fully developed in time for the 2000 shutdown. In looking at the 2006

shutdown (which will be the subject of a section later in this report), Mr. Gauthier described a manual which was much larger and more specific respecting each of the steps of the shutdown.

[389] To return then to how the manual was written, the evidence of Mr. Gauthier should be reviewed. A written record of each of the activities associated with the shutdown was prepared. Each of these activities was analyzed to ascertain its level of risk. To determine the level of risk, in addition to relying on the memory of the members of the committee, logbooks kept of previous shutdowns were reviewed. Accidents or incidents were identified and the risk was assigned. Mr. Gauthier knew that there was insufficient time to develop full procedures for each of the activities. Therefore, procedures were only developed for those activities which were deemed to be a higher risk.

[390] A similar procedure can be seen in reviewing the evidence of Mr. Harrower and Mr. Hillier as quoted.

[391] The manual (Appendix "J") had the following to say about the washdown:

> #10 Wash down furnace
> Four fire hoses· are used to wash down furnace. Attach 2 hoses to hydrant a1 front of furnace located on the north West Side of landing. Attach 2 hoses to hydrant located on the east wall of the slag tapping area.
>
> Using 2 fire hoses start at the West End and wash calcine floor from west to the middle. Using 2 fire hoses start at East End and wash calcine floor from west to middle. After floor is washed down, start at west and East End of furnace and wash down uptakes, beams and arch brick.

[392] This detail is opposed to the section on removing the job and uptake burners which states:

> #6 Remove job burner and up take burner
> A) Remove uptake burner:

1. Phone powerhouse at 2598 or 2408 and let them know that you are shutting down the burner

2. Go to burner #1 on computer screen (F1 or A)

3. On screen will snow boxes CDE letters in red (oil flow). Press "C" on keypad which will put you in box C which should be outlined in white after "COO is pressed. ._

4. Check bottom of white boxed area to see if showing either Auto or Manual. If in auto press ALT S which will show TRGT set. Make sure you hold down ALT button while pressing the letter "0". Press number 0 button than enter, which should drop your numerical value to 0 and shut oil off to burner.

After oil has been shut off on computer go to the sough east corner of the oil room. Two valves are situated on the horizontal line running south, (#1 oil line). The steam should be up on the valve directly on the line. rotate the valve until the steam lowers to the valve. Attach the steam line (flexible metal hose) to the oil line through the opening on the valve line, which is facing east. Make sure the screw clamps are tightened firmly with a pipe wrench before applying ~... steam. Open the steam line valve fully (the one located on the oil line). The steam should be fully moved up. Now open the steam line valve, which is located on the other end of the flexible metal line (south middle of the five valves). Open the valve until steam is up. You should now have steam going through the iine and burner. Go to the uptake burner (a length of tube with two valves pointing directly into the furnace) which is located at the north East End of the furnace. Turn the air off the burner,

(the larger of the two lines going into the burner). Pull the burner out of the furnace; (make sure the nozzle is pointed in a safe direction). Check to see if steam is coming out of the nozzle end. If the steam is present, partially c10sethe steam line nozzle end, (smaller of the two lines going into the burner). Than put the burner back into the furnace. Secure the burner and turn the air back on. After putting the burner back into the furnace, go back to the oil room and shut off the steam. Make sure you turn the steam valve line off before shutting off the steam line going into the oil line. After shutting off the steam line in the oil room go back to the uptake burner and turn the air offon uptake burner. Pull the burner out of the furnace, (pointing the nozzle of the burner in a safe direction); open the steam line on the burner to drain all the steam. Trace the airline (flexible rubber hose) to its source and shut off that valve. Go back to the burner (make sure the nozzle is pointed in a safe direction) open the airline on the burner to drain airline. Using a crescent wrench remove both hoses from the burner and store the burner in a safe location.
Note: (Before doing any of the work above, make sure you are wearing all required Personnel protective equipment.)

Remove job burner:
1. Bring up burner #4 on the computer screen (F4 or 0 buttons)

2. On screen will snow boxes CDE letters in red (oil flow). Press "C" on keypad which will put you in box C which should be outlined in white after "C" is pressed.

3. Check bottom of white boxed *area* to see if showing either Auto or Manual. If in auto press ALT S, which will

> show TRGT. set. Make sure you hold down ALT button while pressing the letter "on.
>
> 4. Press number 0 button than enter, which should drop your numerical value to 0 and shut oil off to burner.
>
> 5. After oil has been shut off on the computer go to the south wall of the oil room and shut off valves on top line that runs east west or #4 burner oil line. Put steam line on valve that is far right of the 5 valves where steam line (metal flexible hose) runs off of. Open far right valve located on #4 oil line. Open steam line valve that is located behind the valve you just opened on the oil line. Now open main steam line than follow procedures 5 & 6 for uptake burner. Burner is located middle of north side of furnace at jog.
>
> Note: After steaming out lines and guns put them in the reverb office upstairs for storage.

[393] Mr. Gauthier testified that only those matters of higher risk would receive a detailed job description. The job description for the washdown is clearly not detailed, and, as will be seen in the analysis of the washdown procedure in this report, it is clear that no person responsible for preparing the manual thought there was a high risk associated with the washdown. In fact, Mr. Gauthier and others testified that the job description set out under washdown

reflected the fact that several floor plates had been removed in the area where the workers who were doing the washdown would stand. Therefore, the description is to remind the workers and supervisors that footing may be dangerous.

[394] After reviewing all of this evidence, I have come to the following conclusions:

a) In 1997, a decision was made by the Company to form committees which would plan the shutdown. This necessarily meant that there was greater participation in the planning process by not only management but also hourly paid workers. This step can only be seen as a positive step towards a safer workplace;

b) In 2000, a decision was made by the Shutdown Coordinator, Mr. Gauthier, to increase the number of committees which also can only be seen in a positive light;

c) In 1999, to prepare for the shutdown in 2000, a decision, apparently lead by Mr. Morrell and Mr. Hair, was made to prepare a manual. All of the witnesses who could testify on this point knew that the manual would not be completed prior to the 2000 shutdown and in fact some testified that a shutdown would have to be completed prior to knowing all of the many details which would be included in a manual. Even this effort to make a start on a manual meant, according to Mr. Willetts, that the 2000 shutdown was planned better than any prior shutdown. It is trite to state that a manual should have been prepared long before 2000; the simple fact of the matter is that it was not. The important question is whether a more complete manual might have avoided the tragic events of August 7 and 8, 2000. It is my opinion that they could not have been so avoided;

d) The manual was being prepared by the most experienced persons available and in a manner which included safety as one of the top priorities. Much was made in the testimony and arguments of the fact that some of the

most senior people at the smelter had retired and therefore were not involved in the 2000 shutdown. One only has to look at the experience and qualifications of the people who were present, whether they be hourly paid workers or management, to realize that there was a wealth of experience to draw on in the preparation of the manual. Mr. Gauthier made every effort, I believe, in finding senior people for each of the committees. He mentioned that, knowing Mr. Morrell would be head of the reverb committee and knowing that Mr. Morrell had been away from the reverb for the last few years, he put himself on this committee to insure at least one senior person was present. So far as safety was concerned in the planning process and in the preparation of the manual, Mr. Harrower, Mr. Willetts and Mr. Gauthier all describe the fact that there was a committee whose sole concern was safety and members of the regular smelter safety committee sat on the main committee, the Core Team;

e) In preparing the manual and at the same time in preparing for the 2000 shutdown, a risk assessment was made of every task. Every task which had a

heightened risk was detailed. The washdown had very little descriptive detail written. All the witnesses who testified on this point confirmed that the washdown was not seen as a high risk task;

f) It is always to be hoped that the preparation of a manual will cause the authors to look carefully at each step and determine whether there is any risk involved and whether that risk can be eliminated. I have already stated that the committee members planning the shutdown and preparing the first draft of what would be a much larger manual did so in good faith. They did not see the risk associated with the use of water to clean the dust from above the reverb. The main reason for this is that there had never been any previous accident or incident with the use of water in this manner;

g) Finally, there was much questioning devoted to the procedures for the washdown and whether a change in any of the procedures might have prevented the tragedy. Some of these procedures and/or changes are as follows:

i. a delay in starting the washdown would have prevented the tragedy;

ii. a more detailed description of the washdown would have resulted in less water going into the reverb;

iii. monitoring of the amount of water used;

iv. monitoring of the bath temperature;

v. measuring the furnace bottom differently.

[395] The experts' reports referred to above do not agree on what conditions exactly existed to cause the explosion or even what type of explosion occurred. What they do confirm is that the presence of water was the key factor in the event. I indicated to counsel several times during the inquest, and I am still of the very strong opinion, that if there had not been water present in the furnace as a result of run-off from the washdown, the explosion would not have occurred. It was not a matter of managing the water in a better manner. It was not a matter

of taking into account some of the other factors or changes noted above. The only certainty is that if the dust could be removed in another manner without the use of water, no explosion would occur. Therefore, a tweaking of the instructions on the use of water in the manual makes no difference at all to the final outcome.

b) MANAGEMENT ON THE EVENING OF AUGUST 7, 2000 AND EARLY MORNING OF AUGUST 8, 2000

[396] The management on the evening shift of the explosion was the subject of some debate in submissions to the inquest. Various witnesses testified concerning this matter.

[397] On April 16, 2008, Mr. Harrower testified:

> Q Now do you recall, sir, today, how it was that Mr. Woods got assigned to what it was that Mr. Laidlaw was to be doing?
>
> A There was meeting all the supervisors at the start of the shift and we decided at that point who was doing which tasks.

Q So even though the shutdown assignment sheet provided for one thing, are you saying that you, Mr. Morrell, Mr. Hillier, Mr. Laidlaw, Mr. Woods, got together and decided that you were going to change the assignments?

A I'm not sure if Mr. Laidlaw was there or not. I don't know if we'd call it change assignments 'cause I don't know if this is, well, yes, change assignments from that sheet, but that sheet was only an overview of what we needed for supervisory and men for those jobs. (page 104 line 1)

Q And unofficially, between the four supervisors on that night, you re-divided up the work?
A Correct.

Q Okay. Why were John Laidlaw's assignments given to Kal Woods?

A I couldn't say other than my assumption would be because Kal Woods was the reverb supervisor that would be responsible for that shift during normal operations.

Q And, and who, in fact, would have been responsible then for the wash down that night?

A Again, it would have been the group of supervisors.

Q So it would have been the group and not anyone in particular?

A Correct. (Page 15 line 5 of April 17, 2008 transcript)

[398] Mr. Morrell testified on April 15, 2008:

> Q Evidently not. But the question is, someone's got to be in charge to be mindful of what the backlog is. You know, what the -- when things can get done and make the, the call. We'll start this at this hour instead of this hour. You'll do this now, and then come back to that. Who is it that -- in this group of five, if I could call it that, between yourself and the four below you, that were making those calls?
>
> A Not one individual would be making those calls. It would be a team. I mean, it would be a discussion between the, the, the group and, and decisions made as we go.
>
> Q All right. This would be all five of you then; is that it?
>
> A Yes.
>
> Q And the five of the -- Mr. Laidlaw, Mr. Woods, Mr. Harrower and Mr. Hillier, and of course, yourself.
>
> A Yes. (page 36 line 17)

[399] It is quite apparent that all five of the managers on shift that evening were to make the decisions. This is despite the fact that Mr. Morrell was in charge of the other four.

[400] There was no evidence brought forward at the inquest that suggested that this management style contributed to a dangerous situation or contributed in any way to the explosion. There was a suggestion by some counsel that this was inappropriate for some reason. I do not agree.

[401] As I commented in the previous section, it was the presence of water in the reverb which lead to the explosion. The decision to wash above the furnace was made months before and in accordance with the practice during shutdowns for as long as anyone could remember (on that point, Mr. Hillier indicated in his evidence on April 22, 2008 at page 69 line 2 that he had been involved in a washdown in 1977).

[402] I can find no evidence in improper management practices on the evening of the tragedy.

XII THE WASHDOWN

[403] The washdown has been described throughout this report. However a review of this procedure is necessary.

[404] Mr. Woods testified on May 20, 2008. He was assigned the duty of supervising the washdown. Relevant portions of his evidence are as follows:

> Q Well, let's go back to 1994, and if you can recall tell us a bit about your job washing down the furnace, and when and how long after the furnace was turned off would you have started that job, or would you have started before the furnace was turned off?
>
> A You'd never start it before the furnace was shut off.
>
> Q Why is that?
>
> A Because there's people working down below that were tapping matte –
>
> Q Would get wet?

A -- or whatever, and would get soaked by you doing it.

Q Okay. So you wait until the furnace turns off?

A Yeah. (page 35 line 27)

Q So are you saying then from roughly 11 o'clock until midnight, other than hauling boiler ash, nothing was done?

A Basically yeah.

Q And everyone was where?
A In the lunchroom. (page 47 line 4)

Q Do you know when they started that activity?

A Just after the boiler ash was done.

Q Just after the boiler ash?

A Yeah.

Q And who assigned that work to them?

A I did.

Q And what was the procedure that they were to follow?

A There was no procedure.

Q There was no procedure?

A No.

Q Well how would they know what to do then?

A All they were doing was washing dust off the beams.

Q But if they hadn't done it before what would -- how would they know what to do?

A I knew what to do and I hadn't done it before either.

Q Well, did you have any discussions with them about what to do, where to start, how this was to be conducted?
A Well, they knew that they had to start on the west side of the furnace and work their way east. (page 47 line 20)

Q -- the arch down? Not just to get the dust off the beams but to cool the arch down?

A The main part is to get the dust off, but you get to cool the arch down, too, with it. (page 85 line 22)

[405] Mr. Hillier testified on April 22, 2008. His evidence is:

Q Why do you do it –

A -- the purpose?

Q -- and how do you do it. Yeah.

A The hoppers have, have, have a little bit of dust left in them, there's dust on the floors and the beams, there's dust on the arch and one you thing -- one, one part of the shutdown is, is you have to send men down on the beams to physically knock in the arch, and there's all the dust flying and everything. And, and that was the purpose of the -- of, of, of the wash down of the furnace, was to clean it off so that when we did go to work on it, there wouldn't be all that dirt and dust flying around.

Q So --

A And --

Q Yes, sir, I --

A I was just going to answer the second part.

Q Yeah, okay.

A Do you want to give me the question again --

Q No, and then --

A -- for the second part?

Q -- the next question is, the purpose and then how it was to be done.

A It was to be done by starting on top floor and, and

> washing off the floor and, and then going down to the beams, washing the hoppers and then washing the arch, itself.
>
> Q Okay. So when you say washing the arch, that would be the top of the furnace, itself?
>
> A The brick.
>
> Q The brick.
>
> A Yes.
>
> Q Okay. So what I understand you to be saying is that really you start at the upper most level, start hosing things down so that as you get down to the lower levels, when things start getting bashed around, so to speak, and demolished, that the men who are working there are not going to have dust dropping down and dirt dropping down on them as they're working. That's basically it?
>
> A Yes.
>
> Q They're trying to clean the work area?
>
> A Yes. (page 17 line 13)

[406] It should be noted that Mr. Hillier was involved in a washdown in 1977 so the practice of washing during shutdown has a long history.

[407] Mr. Morrell testified:

> Q What would they be doing? Like, what was the reason that they were washing that?
>
> A To wash all the dust and the material build-up on the furnace. (page 48 line 33 of transcript of April 15, 2008)

[408] Mr. Steven Pickering testified on February 17, 2004:

> Q And Kal Woods, that night, then, is the person that instructed you on the wash-down in the lunchroom?
>
> A Yeah.
>
> Q And he told you -- the specific instructions he gave you was that he wanted you to wash-down all the beams, the middle and the calcine tracks.
>
> Q Yeah.
>
> Q Now, you testified on Thursday that you believed the water was used to cool the furnace. But did anyone give you instructions that the water was being used to cool the furnace?
>
> A Not really, no, I just kinda -- it was mostly to get the dust off the beams, but with all that water going down, obviously it's going to cool down the furnace so you could work in it.
>
> Q All right. So that's something that you presumed.

Your instructions were to clean the dirt off the beams in the furnace?

A Um-hmm. (page 33 line 15 of transcript of February 17, 2004)

[409] Mr. Pruden testified:

Q And part of the reason that you're doing this washing, as I understand it, is to get whatever this stuff is off these beams so that when you -- people are working below that, it's not falling down on them.

A Yeah.

Q Falling into their eyes and causing discomfort.

A Yeah.

Q Is that right?
A Yeah.

Q That's the purpose of what you're doing.

A Yeah. Because after everything is shut down, and demolish of the reverb is done, you got lots of men in there that do -- in different areas do different jobs, mechanics, like what have you, and if you don't have those -- if you're working with brick and stuff and shit -- dust falls into your eyes and stuff, it's, it's very irritant, yeah.

Q So, what -- let's start from the top and try to get as

much of this down to the bottom as possible; is that it? Is that what you're doing in the washing process of these beams?

A Well, you're just trying to clean the beams off as best as you could, yeah.

Q All right. And other than the beams, what else would you be washing down?

A The floors.

Q The floors.

A Just the basic floor level, just --

Q The floor also would have dust on it and --

A Dust.

Q -- calcine deposits.

A You got fettling that falls onto the ground. Fettling is like slag that you put into the furnace to cool off.

Q When it's too hot.

A Yeah.

Q So, basically this is a cleanup procedure.

A Yeah.

Q For safety and also, you know, for future jobs that will be done inside.

A Yeah. Yeah. (page 66 line 5 of transcript of January 20, 2004)

Q Okay. So, in, in terms of what you were doing and what you could see immediately other people doing, those tasks, and I think you've already given as evidence to Mr. Minuk, neither appeared unsafe or anything wrong with. You were cleaning the beams.

A Yeah.

Q Is that fair?

A Washing the floors and cleaning the beams.

Q Right.

A Yeah.

Q And I take it from that, you were not in any way trying to cool down the furnace or do anything else. You were just cleaning the beams.

A Yeah. Washing floors.

Q As you had been instructed.

A And, yeah.

Q And the floors.

> A Cleaning up the dust off the beams and stuff. (page 131 line 4 of transcript of January 20, 2004)

[410] These are basic descriptions of the washdown procedure in 2000 from the men who had done this for other shutdowns and, in Mr. Pruden's and Mr. Pickering's case, were involved in washing down at the time of the explosion.

[411] The actual planning of the washdown is discussed in the immediately preceding section.

[412] The procedure was simple; as Mr. Woods stated above: "all they were doing is washing dust off the beams". There were instructions given to Mr. Pickering and the others doing the washdown as to what area to start and it appears there was some supervision from the management who were present.

[413] The shutdown manual (Appendix "J") states the following respecting washdown:

> #10 Wash down furnace
> Four fire hoses· are used to wash down furnace. Attach two hoses to hydrant a1 front of furnace located on the north West Side of landing. Attach two hoses to hydrant located on the east wall of the slag tapping area.
>
> Using two fire hoses start at the West End and wash calcine floor from west to the middle. Using two fire hoses start at East End and wash calcine floor from west to middle. After floor is washed down, start at west and East End of furnace and wash down uptakes, beams and arch brick.

[414] This accords with the evidence I have quoted above.

[415] There is some variation of the evidence in what the actual purpose of the washdown was. Almost all of the witnesses to the inquest were asked the purpose of the washdown. The only exceptions are Bradley Russell and Brian Barrett. All of the remaining witnesses confirmed that the purpose was to rid the upper section of the smelter of dust in order that the knocking down of the reverb furnace could take place safely. The safety issue was the dust, if allowed to

remain, would fall into the workers' eyes causing irritation and sometimes greater injury.

[416] A number of the witnesses stated that one of the purposes (expressed by many of these witnesses as a beneficial side effect) was to cool the furnace. The first person to express this was Mr. Primrose (page 28 line 24 of transcript of February 24, 2004). Mr. Laidlaw (page 44 line 25 of transcript of April 9, 2008), Mr. Willetts (page 31 line 27 of transcript of April 10, 2008), Mr. Harrower (page 134 line 1 of transcript of April 16, 2008 and page 10 line 15 of transcript of April 17, 2008) and Mr. Woods (page 85 line 1 of transcript of May 20, 2008) also confirmed this. Mr. Primrose is an hourly paid worker and the remainder were supervisors. Mr. Goodman testified that a benefit of washing the dust away was to cool the furnace (page 47 line 7 of transcript of April 30, 2008). He is in upper level of management of the Company and had extensive planning experience.

[417] It appears that from all of this evidence that the water certainly had a cooling effect on the reverb.

[418] I have already concluded in this report that water in the reverb furnace was the key factor in causing the tragic events of August 8, 2000. The only possible way water could have been introduced into the reverb was through the washdown. That water was falling through the arch (the roof of the furnace) and into the bath below is described by most of the witnesses to the events of August 7 and 8, 2000. Many of the hourly paid workers such as Mr. Russell, Mr. Pickering and Mr. Primrose saw water. Some of the supervisors did as well. Mr. Harrower in his evidence of April 17, 2008 stated:

> Q Okay. What was the water doing on the surface of the bath at that particular time; do you know?
>
> A As I recall, bubbling.
>
> Q Bubbling? What does "bubbling" mean?
>
> A As in a little boil.(page 38, line 33)

[419] There is some dispute in the testimony as to whether the furnace bath was black on top or whether it was glowing in parts. This does not matter. There was some question as to whether a more detailed procedure, greater supervision, a strict assignment in advance of the workers involved in the washdown or a monitoring of the water in the bath might have prevented the tragedy. I cannot find any evidence that changing any of these factors might have prevented the tragedy.

[420] None of the managers and hourly paid workers who assisted in drawing up the plans for the shutdown thought that there was any danger involved in the use of water in this fashion. As people will commonly do, they relied on past experience which taught them that no danger existed. Mr. Pruden represented the view of those working in the smelter on the night shift of August 7, 2000 when he stated:

> Q Okay. So, in, in terms of what you were doing and what you could see immediately other people doing, those tasks, and I think you've already given as evidence to Mr.

> Minuk, neither appeared unsafe or anything wrong with. You were cleaning the beams. (page 131 line 4 of transcript of January 20, 2004)

[421] In short, the washdown was seen as a simple procedure which was implemented to insure safety problems did not exist later in the shutdown. There was no danger attached to it by anyone.

[422] As I have already stated, no changes to this procedure could have helped. The simple fact is that water should under no circumstances be used near molten metal. As will be seen later in this report a solution was found which eliminated the washdown yet still accomplished the safety goals.

XIII THE EXPLOSION

[423] The explosion or, as many witnesses described the event, the series of explosions was a terrifying event. Plastic which held respirators in place melted, hard hats and other clothing were torn off and the air was filled with blinding dust and gases.

[424] One person, Steven Ewing, died of the severe burns he received to 95% of his body area. Twelve other men were injured, some quite severely and permanently.

[425] Mr. Pruden's description of the explosion is very telling. He was working with Mr. Ewing above the reverb washing the calcine dust. He stated:

> Q And then you heard the first pop.
>
> A Yeah.
>
> Q Now, when you hear the first pop, what did you think?
>
> A I had no time to think.
>
> Q Okay. Why was that?
>
> A Because the second pop went off my glasses and respirator and helmet went flying.
>
> Q Okay. Now, at that point did you know what was happening?
>
> A No. I knew that something was going on, but…

Q So, when your glasses and respirator and hat came off, did the force which knocked your equipment off your face knock you down to the ground at all?

A No. It -- as soon as the second one went off, I went running and it was like, it was like tripping wire.

Q It was like?

A Tripping wire. Every time I took a step, there's a blast.

Q All right. Now, would I be correct based on what you've told us that you would have just now told us you would have not been near the end of the, the east end of this catwalk, you would have been out in the walkway toward the west end of it.

A When it went off?

Q Yes.

A I was in --

Q The first time.

A -- middle of the, middle of the furnace with Steve.

Q And that would be the middle of the catwalk.

A No. Right at the end of the catwalk.

Q Right at the end of the catwalk.

A Yeah.

Q And then did you start leaving that area right after the first pop? Or was it the second one that you started running?

A It was first pop we looked at each other and we didn't know -- I don't know -- to me it -- we didn't know what was going on. We looked at each other's eyes and the second pop went and we just ran down the catwalk.

Q All right. And in order to get off the catwalk you have to go the same way that you came.

A Yeah.

Q There was no exit off to the other side.

A No.

Q Off the middle of the furnace end.

A Yeah.

Q So, you have to run all the way back from the end of the furnace toward the east end, which is toward the burners.

A Yeah.

Q And that particular side there are some, I would imagine some staircases that you knew existed at that area.

A Well, when I ran to the end of the catwalk, it was, it was like total blackness.

Q All right.

A All the dust from the beams covered me and Steve, and all I could see as I was running down the catwalk was slag or matte, broken brick flying through the air and I was trying to protect my face.

Q You're trying to protect your face --

A Running, because all I could do is run, and I got to the end of the catwalk and Steve and I had bumped into each other, and then I lost Steve from there. I just ran right for the first staircase, and all I could see was an orange glow, and that's where the explosion had happened, so that's the only place I could run, is run down those stairs and down to the main level.

Q Okay. So, I'm going to just stop you right there. The second explosion goes, and after the first explosion was there any dust or anything of that sort, the first one?

A The first pop was just a light pop, and then the second one shook the whole building and then everything just fell.

Q And all this dust and material that you had described earlier that you would have been in the business of washing down began to fall from the roof of the building and everywhere and would have been engulfed in this

black dust, you said.

A Yeah. Calcine dust.

Q Calcine dust. At this time, having been engulfed in the dust, you no longer had your respirator, your goggles and your helmet.

A Right.

Q Were you wearing any gloves at that time?

A Yes.

Q Pardon me?

A Yes.

Q And these are the cotton gloves that are --

A No.

Q You had special gloves. What type of gloves are they?

A They called brick layer gloves. They're rubber gloves and they got a cotton lining on the back.

Q And the hands are rubber?

A Yeah.

Q And that would be just because you were hosing.

A Because we were washing down.

Q You were working with water.

A Yeah.

Q All right. Now, by the time you got -- as you were running you said that you could see pieces of brick and molten metal and sort of projectiles in the air; is that it?

A Yeah.

Q And I would assume that this was coming from the furnace area.

A Yeah.

Q Is that correct?

A Well, that's the only place it would come from.

Q Okay. And the colour of these objects, were you able to see that in the black? Could you see any colours out of the black?

A Just once in a while you, you just see orange flying, orange rock or whatever, brick or whatever.

Q Some orange --

A Just flying through the air.

Q Now, if we could go back to 4A, for example.

A Okay.

Q And we know that you were -- here's this top right-hand picture, that you were somewhere in the middle of the furnace and you had to run back east toward the burner.

A Right.

Q Now, this being the north.

A Yeah.

Q And the toward the top of the 4A, and the south being towards the bottom diagram of the Manitoba Labour logo, which way did you go down the stairs?

A North.

Q To the north side?

A Yeah.

Q All right. That would be on the side opposite of the matte hole.

A Right.

Q All right. And it's at that point as you were going down the staircase, or was it before that you had lost -- bumped into Mr. Ewing?

A I was at the end of the staircase where I bumped into him.

Q Now, as you -- what happened to you, sir, as you went down the staircase? I know that you told us as you were running toward the staircase you were protecting your face from anything that might have --

A Yeah.

Q The explosion, and you were now going down the stairs. What happened then?

A I just ran down to the orange glow, and I didn't know if it was going to go off again, and I, I think if it would have went off again I wouldn't be here today, but it was -- must have been where that explosion happened, it's the only place I had to run is there. Then I ran down. I got onto the main floor, and I believe I tripped onto the Brokk that was beside the north wall.

Q So --

A At the bottom level.

Q You ran down the stairs from the calcine level, you would have to go down to the feed level, the second floor.

A Well, I ran, there's two sets of stairs that go, one goes this way, you got to run this way, and then go down this way.

Q Okay. So, was there any obstructions as you

moved down these two sets of stairs to the feed floor?

A If there was I made it through them.

Q Pardon me?

A If there was I made it through them because I just ran.

Q Was there any, any of these airborne projectiles, or steam, or anything of that sort that you experienced as you were going down the stairs?

A No.

Q Pardon me?

A Just as soon as we got to the end of the catwalk and turned and hit each other, everything seemed to stop. And I just ran, just a matter of seconds getting down those stairs and out, trying to get out of that building.

Q Now, when you got down to the floor level --

A Um-hum.

Q -- what happened then?

A I believe I tripped over a Brokk and someone had grabbed me and walked me out of the building.

Q The Brokk I understand was a drill of some sort that -- or it’s like a jackhammer of some sort.

A Yeah.

Q To knock brick into the furnace for the destruction part.

A Yeah.

Q Now, in terms of the impact of the steam, if there was steam, the projectiles, the heat, and all of the things that occurred to you that you encountered as you were on the top level, that all occurred as you were on the catwalk running toward the staircase; is that correct?

A I believe so, yeah.

Q And that other than perhaps intense heat as you moved down the stairs --

A Yeah.

Q -- there were no other obstructions for you.

A No. I think everything went -- all I can remember is just the top floor everything flying, and then once I got to the stairs I just made my way down, whether there was dust in the air, there probably was dust in the air still, but I made my way down to the, the main level. I don't recall being hit by anything. (page 102 line 22 of transcript of January 20, 2004)

[426] Mr. Morrell described trying to assist the Brokk operator at the time of the explosion:

> Q And what, after the second pop and seeing this red glow, did you think was going on at that point in time?
>
> A Wasn't sure what was going on, but instinctively I started to back up and, and grab the Brokk operator to, to, to back up, as well.
>
> Q Now, my recollection is that the Brokk operator had this device somehow harnessed to his body; is that it?
>
> A Yes.
>
> Q Now, did he have the actual device harnessed to him, or the controls?
> A Well, it's the controls. It's hardwired to the machine.
>
> Q I see. So, a long cable –
>
> A Yes.
>
> Q -- into the machine, and he's wearing the, the -- some type of apparatus that has the controls attached to it.
>
> A Yes.
>
> Q Now, were you able to, I guess, use that word, free this fellow from the harness?

A No. I tried to help him take it off, and as I was helping him get it off, the explosion occurred. (page 54 line 11)

[427] Mr. Russell described the explosion:

A Well, I guess basically I had my back to the furnace. I was slightly to the, to the south of the slag launder chute and so I was facing the converter pit, and I was just, just hosing down the sand and at that point I heard just a loud rumble or it was basically a very loud, loud rumble. And so I turned to look over my shoulder because I could tell the noise was coming from behind me.

Q Had you ever heard that kind of noise before working on the furnace?

A No, no, it was very loud, much louder than anything I had heard around there before. So I turned, turned to look over my shoulder and as I did that I was just immediately engulfed in, in dust and, and completely just, just black, blacked out. I couldn't see anything at that point. And so I guess my first instinct was just to, just to run. I don't know why, just to run and get, get off the platform and away from the furnace, I guess. So I turned to -- I was out on the platform so the only direction I could go was, was to the north, and so I turned to run across the platform towards the north. And at that time the, the slag launder chute had been removed so there was a small, small opening on the platform, a gaping hole basically that I would have to jump across and I guess I just had a visual in my mind of where that, that hole would be and so I knew

how many steps and I was able to get over that….

Q So you sort of, as you were about to tell us, had -- sort of had some sense from working there how far away you were from the hole, so to speak, where the launder was and you were able to get there and get across; is that it?

A Yeah. So I was now on -- I had reached the north side of the slag launder chute but still on the platform. And at that point there's, there's large -- there's uptake, uptake, like from the burner there's those -- the uptake -- I don't know what they're called exactly….

A So those -- when I was on the platform for the most part those provided some, some protection, some -- I wasn't able to, like see the furnace from, from there so as I was running across there, there was some protection from whatever dust or, or concussions coming from the furnace. And so as I kept going north a little further I then became exposed directly to the furnace because I made my way past the last one and at that point I kind of had to turn towards the furnace to get off of the platform, and at that point I don't know, just now becoming exposed to the, to the furnace there was a concussion or something or just, just a billowing of dust or something, but somehow I got knocked off my feet at that, at that point.

Q And you were then on the floor, so to speak; is that it --

A I kind of --

Q -- near the stairwell or you don't know?

A No, I was still, I was still a good 15 feet from the stairwell, still basically on the platform of the slag launder.

Q When you were knocked to the ground did you lose any of your safety equipment?

A I don't know when, but I know that at some point I got the -- my respirator strap that goes over your helmet got, got knocked off, so it was still just hanging around my neck --

Q All right.

A Just handing down here, and that's the only piece of equipment that kind of got, got, got lost on me.

Q And your glasses stayed, your helmet stayed?

A Helmut stayed for sure, yeah, and glasses, I'm not sure about my glasses.

Q So what happened then when you were knocked to the ground?

A At that point I just, I just, I just backed into, into a corner, the northwest corner of the, of the slag launder platform and I just backed in there and I just kind of curled myself into a ball and tried to protect my body as much as I could from, from the furnace. And at that point also I grabbed my respirator and held it to my face and, and I just sat there and waited until, until everything subsided.(page

35 line 20 of transcript of January 22, 2004)

[428] Mr. Pickering was in one of the lunchrooms at the time of the explosion and he testified:

> A The walls were shaking. Felt like the walls were going to come in. They're cinder blocks and they were probably moving a good foot and a half to two feet inwards and outwards, just swinging like that. (page 90 line 12 of transcript of January 22, 2004)

[429] Many of the other witnesses who were present describe similar terrifying moments. Because of the dust in the air and because of the fact one door was blocked due to heavy equipment in use outside it, many of the workers had trouble evacuating the smelter.

XIV THE SHUTDOWN IN 2006 AND THE FUTURE OF THE SMELTER

[430] The Tennessey report (Appendix “E”) recommends on page 34 of that report that “the use of water washing during the shutdown of the reverberatory

furnace should be prohibited due to the danger to life when adequate control as to the volume of water used cannot be assured."

[431] The Jennings report (Appendix "G") recommends in its summary that "a carefully designed industrial vacuum system be considered for dust removal in the smelter instead of daily blowing and washdown at the end of the campaign. Hopefully, this will remove the necessity for washing down a hot furnace and improve daily working conditions."

[432] I commenced hearing evidence in 2004 but there was a lengthy break until 2008 when I heard the remainder of the evidence. The one advantage of this was that I was able to hear evidence respecting a shutdown which occurred in 2006.

[433] Considerable changes had been implemented.

[434] Mr. Gauthier commented on these in his evidence on April 23, 2008:

> Q In 2006, though, was it similar to 2000, and years before that? Or was it a completely different process this time?
>
> A It was a completely different process. I mean, our shutdown was totally different. We swore off water. We found that by leaving the ID fans on that we cooled that furnace like it's never been cooled ever before.
>
> Q The ID fans?
>
> A Yeah.
>
> Q What are they?
>
> A Induced draft. They're the fans that draw all the gases out of the furnace into the reverb boilers, and out.
> Q I see.
>
> A We left them on for 24 hours. And God, if we'd only known it was that simple.
>
> Q And in terms of what you did for the dust and things of that sort, what did you do for that?
>
> A We got -- well, we did a number of things. We put two arch blowers on for the last two weeks in order to -- like, arch blowers are guys that blow the dust off the arch.

Q Yes, sir.

A So -- and we told them we wanted all the beams and everything else blown off on a regular basis. Then we brought them both out on that last shift to blow everything off one final time.

Q And who was it that you brought out? Some contractors? Is that it?

A No. Arch blowers.

Q Arch blowers. Okay. Yes.

A That's a job on the furnace, but there's only one person on that job normally, but we doubled up on it for the last two weeks, and to start out with as little dust as we possibly could at the start.

Q Just sort of blowing it –

A Then we got –

Q Like, blowing the dust off early on?

A Yeah.

Q Okay.

A And then we got Uni-Jet to go in and vacuum all they could, and our own Uni-Jet truck did the same. Between the two of them, they vacuumed everything they could.

Q Well, it sounds to me like what you were trying to do is use fans to blow the dust down as much as you

could, and then get someone to vacuum it –

A No, it's not fans. It's just blow pipes.

Q Oh, okay.

A People with blow pipes. I mean, you take the blow pipe, and you can lift all the dust that's sticking to a beam, eh?

Q Sort of like that fancier, perhaps more sophisticated device, a leaf blower. Is that it?

A Yeah.

Q A similar concept?

A Actually, the leaf blower is probably more complicated. Ours is just in-plant air.

Q Okay. (Page 95 line 1)

Q So in a nutshell, you moved from water to air, fans, and vacuum cleaners?

A Yeah. We, we not only used the ID fans. We also put a bunch of holes in the arch, and put air horns in, so that we were increasing the volume there that was travelling to the furnace. And for quite a while, we left the pre-heater fan on, too, which delivers air to the burners, but ends up inside the furnace. So we were moving as much air through that furnace as we could for that timeframe.

Q So that the cleaning process, which, until 2006, had been traditionally done with water, was now being used with air, just to blow the dust off?

A And (inaudible).

Q And then the accumulation of dust was going to be vacuumed, and any other dust that could simply be vacuumed out of the air would be vacuumed as well. Is that it? Trying to clean it as best you could using air –

A As best we could.

Q -- and vacuum?

A Yeah.

Q And the cooling, rather than simply just allowing the furnace to cool over time, by letting it, just time pass, its cooling was assisted by blowing air on to it as well?

A Air conduction, yeah. (Page 99 line 15)

[435] Mr. Hair also testified about the changes in the 2006 shutdown:

Q That's exactly what I was going to get, that you would have to do whatever it was that you needed to do and third parties would come in and do testing and examination, so to speak, on an ongoing basis to make sure that you met the standards that are required for these international certifications.

A So, the shutdown plan for 2006 was done within the framework of the 18001 management system.

Q All right.

THE COURT: How often do they come, I'm sorry, sir? You said every how many months?

THE WITNESS: Compliance audits are every six months, recertification is every three years. It's a bigger audit every three years for your recertification. If they find any major nonconformances, you can lose your certification.

BY MR. MINUK:

Q Right. They sort of do these audits of your operation, so to speak.

Now, the -- we understood from Mr. Gauthier that he had been brought back as part of a team to work on the specific planning, if we could call it that, of the 2006 shutdown.

A He, he was brought back in and Lawrence Balfour was brought back as well, Ray, to cover off the operations aspects and Lawrence, at that time, to cover off the maintenance side of things.

Q And much like previous years, the men who were going to be working on that particular shutdown started long in advance of the shutdown to do their work of preparing and getting ready for the eventual day; is that correct?

A Right.

Q And we understood from Mr. Gauthier that now there's a large manual, so to speak, that may even still today be a work in process, but there's a large manual dealing with matters relating to shutdown activities at the smelter.

A Yes. There was a -- we engaged a third party to, to assist with aspects of the overall shutdown and, and specifically the -- some aspects of the reverb furnace rebuild, a company called Obon Technical Services (phonetic). So they provided the overall scheduling assistance. There have been changes organizationally within the company so that the, the shutdown project was managed partly through our central services, central engineering services, which was -- have got the project management expertise and, as I say, we used Obon Technical Services and it covered all aspects of the shutdown, like, you know, procurement and also cost control, so the report, the final report on shutdown is pretty thick because it's got all aspects of the shutdown. But included in that would be addressing issues around safe work plans and, and the like.

Q So, it sounds to me, then, that your staff worked with a third party consultant, hand-in-hand, to prepare for the shutdown in this large manual you've just described; is that it?

A Yes. And that would be consistent with our approach to, to major projects, in general, over the last few

years. It's ...

Q Hire consultants and ...

A The triple seven group of projects that I had mentioned earlier, the spill gas project, was one of the first parts of that, but we've had a lot of significant project implementation here since 1999 and we've adapted some of the methodology of the approach to, to that. And, yeah, more extensive use of third parties, for example.

Q Now, we've heard that in the 2006 shutdown no water, at all, was used and essentially, it was a matter of -- although I used a home tool example of a leaf blower, but essentially a blowing the dust down to the lower levels and ultimately using high-powered vacuuming equipment in order to try to remove the dust and cooling was, was conducted by the use of fans and the arch fan, the furnace fans and the like.

A That's correct. We left the boiler fans on, for example, to cool air through the furnace, which hadn't been practised in the past.

Q And we understood that the process of using the fans to cool out was about a 24 hour period and give or take a few hours.

A They -- the process -- this, this -- the process of the shutdown was different, given that we weren't washing down the furnace. So, there was a period where the

> furnace could be cooled, but at the same time, work was commencing on other aspects of the, the teardown that could be accessed externally without having to deal with the condition of the furnace before it had a chance to cool. (page line of transcript of May 21, 2008)

[436] I heard from all of the hourly paid workers in 2004. Unfortunately, this meant that I was unable to receive comments on the 2006 shutdown from any of these workers.

[437] In summation, the following changes were made in the 2006 shutdown:

a) Auburn Technical Service provided consultant services connected to the planning and the execution of the shutdown;

b) The reverb was cooled using induced draft fans and air horns; while this cooling process went on, work around the reverb related to the shutdown was completed;

c) Instead of removing the dust above the reverb using water, two new steps were undertaken:

i. Arch blowers were used more extensively. During the operation of the furnace the arch blower would clean the area around the arch by blowing dust away. In the lead-up to the 2006 shutdown, these men were used more extensively to blow dust away;

ii. Uni-jet vacuum trucks were employed to blow the dust and material which could not be dislodged by the arch blowers' equipment.

[438] The danger of having water come into contact with molten metal was eliminated.

[439] I should also touch upon the future of the smelter. Mr. Hair stated on May 27, 2008:

> EXAMINATION BY THE COURT:
> Q Mr. Hair, I think it was Ms. Webb that asked you a question which elicited in -- part, part of your answer was

> that shouldn't be a problem again because I don't think there will be another shutdown. Can you just tell me what that meant?
>
> A Well, it's been reasonably well documented in the press that there's a number of economic and technical challenges facing the current technology that we use in the copper smelter, and from an environmental perspective, we've, we've only got until 2014 to address it, at the latest, and given some of the current economics and the current life of mine plan, there's a chance that the smelter may close before then. If we can extend the campaign life the way that we did from 2000 to 2006, given that we only really improved some of those process combustion controls and procedures part of the way through that campaign, we'd likely anticipate that we could run this smelter to its final closure without the need for another shutdown. That's not categoric, but that would be our, our expectation, at any rate. (page 126 line 17)

[440] Clearly this inquest was called to address legitimate concerns. However, it has been eight years since the tragedy in August, 2000. It appears that economic and environmental reality has changed the situation markedly. Notwithstanding this reality, counsel made excellent suggestions as to what I should recommend.

XV CONCLUSIONS

a) Changes to the Fatality Inquiries Act

[441] Some counsel have proposed that I recommend changes to the *Fatality Inquiries Act* (*FIA*). I do not feel that any such recommendations are necessary.

[442] Firstly, this inquiry concerns the death of Steven Ewing and making the smelter in Flin Flon as safe a workplace as possible. I do not want to take anything away from this perspective.

[443] Secondly, there was nothing in the inquest process which would cause me to believe any changes should be made.

[444] The premise for making changes seems to be a perception that there was a delay in getting the inquest completed. There were a number of

interruptions to the process. To start with there was a delay in commencing the inquest while criminal charges were pending against the Company.

[445] The *FIA* has the following sections:

> Effect of criminal proceedings on inquest
> 34(1) Where, before commencement or completion of an inquest, a criminal charge is preferred in respect of the death that is the subject of the inquest, the presiding provincial judge may postpone or adjourn the inquest pending determination or conduct of a hearing on the criminal charge.
>
> After criminal proceedings completed
> 34(2) Upon determination of the criminal charge under subsection (1), the provincial judge may proceed with the inquest or, where the judge is satisfied that the circumstances of the death have been adequately examined, the judge may file a report with the minister advising that the circumstances of the death have been adequately examined, making reference to the proceedings on the criminal charge.

[446] So far as I know, no inquest begins until criminal proceedings involving one of the parties are dealt with.

[447] The effect on these proceedings was that the inquest did not begin until 2003, almost three years after the death of Mr. Ewing.

[448] There were many parties with standing at the inquest, most of who were represented by counsel. Thus there were delays due to the difficulties in blocking off time for the taking of evidence. After the standing hearings in 2003, the first opportunity the parties had to commence the hearing of evidence was in January, 2004. Similarly, after the proceedings noted below, the hearings were unable to be resumed until April, 2008.

[449] What appears to be the main complaint of delay by some of the parties is the time taken to hear appeals from my decision on a motion brought by the Company. That motion asked for an order to disclose documents. I refused to make the order and the Company gave notice that it intended to appeal that

decision. At that time all parties with standing agreed that the inquest would not proceed until the appeal was heard.

[450] What transpired was a series of decisions over a three year period including two decisions of the Court of Queen's Bench and three decisions of the Court of Appeal.

[451] The first decision of the Court of Appeal was given in November, 2004. It determined that a provincial judge did have jurisdiction to hear the motion brought by the Company. A second decision of the Court of Appeal issued in January, 2005 deciding a procedural matter. The final appeal was determined by the Court of Appeal on September 15, 2006. It determined that I order disclosure of the documents.

[452] Following this decision, the documents were disclosed, counsel considered their positions and the hearings re-commenced in April, 2008.

[453] The two main appellate decisions provided guidance in these two areas: the jurisdiction of a judge sitting in an inquest and the law respecting litigation privilege.

[454] I am urged to recommend changes to the *FIA* to prevent these types of proceedings. Counsel argue that inquests which are delayed will permit the situation which lead to the death to continue to the danger of other persons. I cannot accept this argument as it relates to workplace death and injuries such as those which occurred in August, 2000.

[455] There are already in place many procedures which protect workers once a workplace incident occurs. In this instance, as will be seen later in this report, the employees through their unions, the employer and the Mines Safety Unit began an extensive process which culminated in recommendations to insure

that a similar event would not happen again. As will be later discussed, *Workplace Safety and Health Act* regulations were specifically promulgated as a result of the tragic events of August, 2000. In other words, many of the necessary changes were made long before the inquest heard its first witness.

[456] I cannot and will not speak to other types of inquests and their urgency. However, it is clear that where criminal charges are pending, no inquest will be held in a prompt fashion.

[457] This inquest has value however as a final look at the events which occurred in the Company's workplace, as a final chance for all those who were involved to come forward and speak about it and as an opportunity to look at the changes which have been made in the workplace and to laws and regulations.

[458] In conclusion, I strongly believe that this inquest has not been flawed by delay.

b) Reports to Workplace Safety and Health

[459] One of the regulations under *The Workplace Safety and Health Act* (hereinafter called "the *WSHA*") is 228/94 which is called the Operation of Mines Regulation. This regulation applies to the Company by virtue of the agreements set out in the section herein entitled "Legislative Authority for the Company's Operations".

[460] Section 24(1) of the Operation of Mines Regulation stipulates:

> Procedure in cases of accident or injury
> 24(1) Where an accident or dangerous occurrence mentioned in this section occurs in or about a mine, the employer shall
>
> (a) notify, within the time prescribed in subsection (2),
> (i) a mines inspector, and
> (ii) the workplace safety and health committee;

> (b) facilitate the investigation of the occurrence by the workplace safety and health committee;
>
> (c) prepare a written report on the accident or dangerous occurrence or facilitate the preparation of the committee's report; and
>
> (d) submit the report to a mines inspector and the workplace safety and health committee without undue delay and in no case more than seven working days after the accident or occurrence.

[461] Pursuant to this regulation, there were two reports issued to Mr. Hewitt, the representative of the Mines Inspection Branch in Flin Flon. The first was from Mr. Hair on behalf of the Company dated December 8, 2000. The second was from the Union members of the Joint Workplace Safety and Health Committee (hereinafter called “the joint committee”). This report was undated but apparently was sent to Mr. Hewitt just after December 8, 2000.

[462] Examination and cross-examination of many of the witnesses at the inquest was conducted utilizing the statements that witness had provided to the joint committee. It was readily apparent that this committee undertook its

investigation immediately after the explosion. Notes were taken as the committee talked to each witness. One set of notes was taken by one of the union representatives and another set was taken by the Company representative. This lead to the examination of some of the small variations between the two versions when they differed. However, this process did impress on me how seriously the committee members took their responsibilities.

[463] From this investigation by the joint committee was to come a report to Mr. Hewitt. Unfortunately, two reports were sent as noted above. The joint committee was able to agree on the factual circumstances concerning the explosion but was not able to agree on conclusions and recommendations. The Company report is Appendix “K” and the Union report is Appendix “L”.

[464] These reports are useful as guides but it must be remembered that the evidence looked at by the joint committee was different than that presented to

this inquest. As well, some of the conclusions and recommendations do not deal with matters arising from the explosion but are related to general operations of the smelter.

[465] Much was made of the fact that the joint committee did not produce one report. There was a suggestion that I make a recommendation that a joint report must be produced. I am not sure how such a recommendation, if ever implemented, would be enforced. It is clear to me that labour relations can be difficult and that dissent between an employer and its employees may sometimes be the only method of solving a problem. Certainly, Mr. Hewitt, by his later correspondence to the Company, appeared to treat the recommendations of both the Company and the Unions very seriously.

[466] Finally, the main recommendation of both was implemented for the 2006 shutdown; that is the elimination of the use of water in the cleaning process.

c) Entrances and Exits

[467] Several of the men present during the explosion (both supervisors and hourly paid workers) had difficulty leaving the reverb area as a door was locked. The door was locked temporarily to allow heavy machinery to remove material. The reason for this is explained in the aforementioned reports to Mr. Hewitt (both reports being identical on this point):

> At 12:10 A.M. the 988 loader began removing the dope pile from in front of the reverb furnace. At this time the west side access door to reverb was locked as per previously developed procedure for removal of converter pit dope. Dope removal continued until the time of the explosion.

[468] Commenting on the explosion, these reports state:

> The injured who made it to the west Reverb exit found it locked.

[469] And further on in the reports:

> Of the three HBM&S employees and the two contractors In the area of the 150 Brokk, the two contractors and one HBM&S employee exited by way of the west stairs through the elevator shaft gates (because the west reverb exit door was locked).

[470] Part 13 of Regulation 217/2006 of the *WSHA* regulations states, in part:

> Safe access and egress
> 13.1(1) An employer and an owner must provide and maintain a safe means of access to and egress from
>
> (a) the workplace; and
>
> (b) all work-related areas at a workplace.
>
> Secondary means of egress
> 13.4 An employer must ensure that there is a
> ready, convenient and safe secondary means of egress from the workplace that is conspicuously marked and readily usable at all times if
>
> (a) the primary means of egress from a workplace becomes unusable because of a malfunction of equipment or a work process; or

> (b) a worker could be isolated from the primary means of egress

[471] Both reports come to the same recommendation as to this problem:

> Reassess all access ways within the smelter:
>
> - Investigate possible relocation and design of west reverb stairway and entrance/exit.
> - Doors, which may be used for escape or to allow rescue, must not be locked or otherwise blocked to impede egress in event of emergency.
> - All smelter external exit doors should open outwards.
> - All exits must be clearly marked with luminous paint or suitable markings.
> - The locking hasp must be removed from the reverb access door immediately.

[472] I am of the opinion that the regulation above adequately deals with the law in this area. There will be many occasions in the workplace when exit doors become unusable; at the smelter in August, 2000 the exit was blocked to insure that a worker did not walk into the path of machinery outside. What was not

provided in the smelter on August 8, 2000 and what the regulation does provide for was a ready, convenient and safe means of secondary egress. The reports to Mr. Hewitt recommended physical changes to the smelter but did not recommend a change to the law. Similarly, I see no need for a change to the current law.

d) Tethering to Machine

[473] One of the contractors was tethered to a Brokk and was unable to extricate himself at the time of the explosion. This is described by Mr. Morrell in his evidence on April 15, 2008:

> Q And what, after the second pop and seeing this red glow, did you think was going on at that point in time?
>
> A Wasn't sure what was going on, but instinctively I started to back up and, and grab the Brokk operator to, to, to back up, as well.
>
> Q Now, my recollection is that the Brokk operator had this device somehow harnessed to his body; is that it?
>
> A Yes.

> Q Now, did he have the actual device harnessed to him, or the controls?
>
> A Well, it's the controls. It's hardwired to the machine.
>
> Q I see. So, a long cable –
>
> A Yes.
>
> Q -- into the machine, and he's wearing the, the -- some type of apparatus that has the controls attached to it.
>
> A Yes.
>
> Q Now, were you able to, I guess, use that word, free this fellow from the harness?
>
> A No. I tried to help him take it off, and as I was helping him get it off, the explosion occurred. (page 54 line 11)

[474] I did not hear from the Brokk operator to discover how he came to be tethered to his machine in this manner.

[475] I understand that the common practice in the industry at the present time is to operate machines such as a Brokk in one of two ways:

1. Use of a remote control device;

2. If there are cables running from the Brokk they go to a podium which contains the controls. The operator then stands at the podium to operate the Brokk. The operator is not attached to the podium.

[476] This is a practical solution to the matter. However, nowhere in the regulations under the *WSHA*, whether in the Operation of Mines regulation or the other regulations under the *Act*, is it clearly stated that a worker should not be tethered to his machine.

[477] Such a regulation should be put in place.

e) Miscellaneous Matters

i) Application of Changes to the Company

[478] Ms. Webb, on behalf of the Department of Workplace Safety and Health, reminded me in argument that some of the changes to laws proposed by

other counsel would not affect the Company's operations. The Company's obligations under the law are very carefully defined in the section of this report entitled "Legislative Authority for the Company's Operations". Ms. Webb encouraged me to make recommendations to changes to the Operation of Mines Regulation. This regulation does apply to the Company.

[479] I am aware of this in making my recommendations.

ii) Fulltime Health And Safety Representative

[480] It was suggested by some counsel that a fulltime safety representative for industries similar to the Company's operations be recommended by me. That person would be answerable to the non-management workers.

[481] The internal responsibility system is discussed in greater detail in this report. Its main premise is that all workers, whether they be hourly paid or

supervisors, are responsible for safety at work premises. Everyone has the basic right to be heard on something as important as safety. As will be seen, this system is behind many of the provisions of the *WSHA* and regulations.

[482] Section 40 of the *Act* establishes a workplace safety and health committee. It is very carefully comprised of an equal number of employee and employer representatives and has two co-chairs, one chosen by the employee representatives and one by the employer representatives. This balance would be disturbed if there was a full-time safety representative, either on the committee or with concurrent jurisdiction to it.

[483] The internal responsibility system places responsibility on every person and this too would be fundamentally changed by such a fulltime representative.

[484] For these reasons, I am not prepared to recommend that legislation include a mandatory fulltime safety representative.

iii) Hot Metal Industries And Molten Metal Industries

[485] The Company carries on business in a molten metal industry. There are very few molten metal businesses in this Province. Most, if not all, are in the mining and smelting sector.

[486] Suggestions were made by a number of counsel that I should make recommendations respecting not only molten metal but also hot metal industries.

[487] I cannot agree with these suggestions. I heard no evidence respecting hot metal industries and whether any of the circumstances which led to the tragedy in Flin Flon may apply to such industries. It is not the purpose of this inquest to recommend changes to other types of businesses when the effect of

these changes is unknown and there is no evidence that the changes, if implemented, would prevent injury or death in those industries.

iv) Advisory Council Pursuant To Section 15 Of *WSHA*

[488] The *Act* has the following provisions:

> ADVISORY COUNCIL
> Advisory council
> 15(1) The Lieutenant Governor in Council may in accordance with subsection (2) appoint a council to be known as "The Advisory Council on Workplace Safety and Health", which shall consist of a chairperson and not less than six or more than 12 members.
>
> Composition of advisory council
> 15(2) Of the members appointed under subsection (1),
>
> (a) 1/3 shall be appointed after consultations by the minister with organizations representing workers;
>
> (b) 1/3 shall be appointed after consultations by the minister with organizations representing employers; and
>
> (c) 1/3 shall be appointed after consultations by the minister with technical and professional bodies whose members are concerned with the general purposes of this Act.

Chairperson

15(3) In addition to the members appointed under subsection (1), the Lieutenant Governor in Council shall appoint a person, other than a person appointed under subsection (1), as chairperson of the advisory council; but the chairperson does not have a vote in the affairs of the advisory council.

Term of office

15(4) The chairperson and members of the advisory council shall hold office for a term of three years and thereafter until their successors are appointed.

Quorum

15(5) A majority of the members of the advisory council, which shall include two persons representing the views of workers and two persons representing the views of employers, constitute a quorum of the advisory council.

Meetings of council

16(1) The council shall meet at the call of the minister or the chairperson, but in any case at least once a year.

Jurisdiction of council

16(2) The council may advise or make recommendations to the minister on any one or more of the following matters;

(a) workplace safety and health generally, and the protection of workers in specific workplace situations;

(b) the appointment of consultants and advisors by the minister; and

> (c) any matter relating to workplace safety and health on which the minister seeks the council's opinion.
>
> Review every five years
> 16(3) At least once every five years, the council shall review this Act and its administration and report its findings and recommendations, if any, to the minister.
>
> Review at request of minister
> 16(4) The council shall review any matter relating to the Act and its administration when requested to do so by the minister and report its findings and recommendations, if any, to the minister.

[489] I have been advised that this council, some time after the explosion, made recommendations to the Minister which resulted in many changes to the *Act*. These changes will be examined later in this report.

[490] I am further advised that this council has beneath it two standing committees, one of which deals with safety in agriculture and one of which deals with mines safety. This latter committee is composed of representatives of the large mining concerns, Hudson Bay and Inco, the Unions and Workplace Safety

and Health employees. It brings a great deal of experience to its deliberations, as does the council itself.

[491] If I have learned one thing in my years of hearing evidence about the smelter and touring the facility on two different occasions, it is that the smelter is a complex operation which is, in many ways, unique to Canada.

[492] I will be making a number of recommendations in this report and I feel strongly that the standing committee charged with reviewing the Operation of Mines Regulation review my recommendations and report to the council. Similarity, I would hope that the Advisory Council itself review my recommendations prior to any changes being made to the law.

v) Near Misses

[493] An incident may have occurred in the reverb during the 1997 shutdown. It was called a “near miss” by all counsel because no explosion ensued and no worker was injured. Apparently this event became known to the Joint Workplace Safety and Health Committee when it investigated the events of 2000.

[494] I am loath to mention this near miss in my report because I have no evidence that it actually occurred. All I have is a report or reports gathered for the preparation of the letters to Mr. Hewitt which are Appendix “K”and “L” hereto.

[495] However I was encouraged by all counsel to include a recommendation on near misses.

[496] A near miss in a workplace such as a smelter can be the first hint that something is terribly wrong and that the lives of workers are in danger. I

emphasize once again that there is no evidence that there was a near miss in 1997 or at any other shutdown.

[497] Regulation 2.9(1) of *WSHA* regulation 217/2006 states:

> Investigations: serious incidents and accidents
> 2.9(1) An employer must ensure that each of the following is investigated as soon as reasonably practicable after it occurs:
>
> (a) a serious incident;
>
> (b) an accident or other dangerous occurrence
>
> (i) that injures a person, and results in the person requiring medical treatment, or
>
> (ii) that had the potential to cause a serious incident

[498] It was suggested to me that the words "had the potential to cause a serious incident" would ensure that near misses are reported and investigated. These words do not seem sufficient to me. A near miss should be defined and there should be an onus placed not only on employers to report a near miss but

also employees who witness a near miss. This would then be in accordance with the internal responsibility system.

[499] Ms. Webb also suggests that a section be included in the Operation of Mines Regulation and I concur.

f) Internal Responsibility and Changes to The Workplace Safety and Health Act

[500] Underpinning the *WSHA* is the concept of the internal responsibility system in the workplace. In addition to the internal system is the external system of legislative control through the Department of Workplace Safety and Health.

[501] The internal responsibility system places the responsibility of creating and maintaining a healthy and safe workplace on every person in the workplace to the degree that he or she has the authority to do so. A key element of the

system is the joint workplace safety and health committee which has representatives from management and workers. This committee is tasked with investigating incidents and receiving complaints concerning safety in the workplace. It also identifies risks to health and safety.

[502] Prior to the explosion, this system was in place. Mr. Pruden testified as to his participation in the system on January 20, 2004:

> A I was a safety steward I think a year, and then the present safety co-chair resigned or stepped down, so I took over as position of safety co-chair.
>
> Q And do you recall when it was that you took over as the safety co-chair?
>
> A I would say early ’98.
>
> Q Now, could you tell the court what it is that this safety co-chair responsibility is about?
>
> A The responsibility of the safety co-chair, I believe, is we go on tours safety, have a safety group, electrical safety co-chair, chemical safety co-chair, and we do these tours around the plant to make sure that everything is up to par, and if there's something that’s unsafe, then we put it on the agenda to, to get it fixed or up to working capacity.

Q Now, how many people sit on this committee?

A I would say six or eight, be about eight.

Q Now, you mentioned that there would be someone from the mechanical side, someone from the electrical side.

A Steel.

Q Who or what group did you represent?

A Steelworkers.

Q The steelworkers.

A Yeah.

Q You were the, the steelworkers union rep –

A Right.

Q -- on this committee.

A Right.

Q Now, was this only comprised of employees or were also management people –

A Well, the health and safety committee, you have your co-chairs from the, the unions, and then when you do

the tours, you have your smelter safety coordinator, who was Bill Fulford at that time, and he would go on these tours with you and he would write down the problems. He would do all the, pretty much all the writing, and if you found something wrong, you'd let him know and then he'd write it down. So, we do the tour, and then we, we set up an afternoon to do the meetings in the meeting room.

Q Um-hum.

A And then you would have your superintendent, your supervisors, just the top supervisors, and then you would sit down and, and the mechanical foreman too I believe was there, electrical. You would sit down and you would go over the agenda, past and present problems, and try to get a follow up on what's happening with the, the last tour. You know, if something wasn't fixed, why wasn't it fixed. Then you give the date to have it fixed, stuff like that. It was just so you, you would have your management there at the safety meetings.

Q All right. How often would you meet with this committee?

A I think it's probably once a month, give or take.

Q And one of the things that you said earlier on was that you'd tour the plant. Does that mean you would tour the entire facility?

A You would –

Q Or just like the furnace area?

> A No. You go the smelter bag house -- just trying to think of the name -- the feed prep area where the belts are, you go into the dryers, the dryers, unloading bin, then you'd walk down towards the calcine tracks, top of the furnace, into the reverb area. And then you'd do your converter pit, and then the anode.
>
> Q So, it was essentially a walk about from the start of the process right through to the end.
>
> A Yeah. It was just, it's a circle that you just go around. We, we had a path that we followed. (page 22 line 6 of transcript of January 20, 2004)

[503] Partly as a result of the tragic events at the smelter, the *WSHA* was amended in 2002. Certainly, some of the unions whose members work in the smelter and the management of the Company made submissions to the council which made recommendations to the Minister. The purpose of the amendments was to insure that the internal responsibility system was strengthened in the workplace. The following sections were added to the *Act*:

> Employer's duty re training
> 4(4) Without limiting the generality of clause (2)(b), every employer shall provide information, instruction and training to a worker to ensure, so far as is reasonably

practicable, the safety, and health of the worker, before the worker

(i) begins performing a work activity at a workplace;

(ii) performs a different work activity than the worker was originally trained to perform; or

(iii) is moved to another area of the workplace or a different workplace that has different facilities, procedures or hazards.

Duties of supervisors

4.1 Every supervisor shall

(a) so far as is reasonably practicable,

(i) take all precautions necessary to protect the safety and health of a worker under his or her supervision,

(i) ensure that a worker under his or her supervision works in the manner and in accordance with the procedures and measures required by this Act and the regulations, and

(ii) ensure that a worker under his or her supervision uses all devices and wears all clothing and personal protective equipment designated or provided by the employer or required to be used or worn by this Act or the regulations;

(b) advise a worker under his or her supervision of all known or reasonably foreseeable risks to safety and health in the area where the worker is performing work;

(c) co-operate with any other person exercising a duty imposed by this Act or the regulations; and

(d) comply with this Act and the regulations.

Establishment of workplace safety and health program
7.4(1) An employer shall establish a written workplace safety and health program for each workplace where 20 or more workers of that employer are regularly employed.

Content of program
7.4(5) A workplace safety and health program must include

(a) a statement of the employer's policy with respect to the protection of the safety and health of workers at the workplace;

(b) the identification of existing and potential dangers to workers at the workplace and the measures that will be taken to reduce, eliminate or control those dangers, including procedures to be followed in an emergency;

(c) the identification of internal and external resources, including personnel and equipment, that may be required to respond to an emergency at the workplace;

(d) a statement of the responsibilities of the employer, supervisors and workers at the workplace;

(e) a schedule for the regular inspection of the workplace and of work processes and procedures at the workplace;

(f) a plan for the control of any biological or chemical substance used, produced, stored or disposed of at the workplace;

(g) a statement of the procedures to be followed to protect safety and health in the workplace when another employer or self-employed person is involved in work at the workplace that includes

(i) criteria for evaluating and selecting employers and self-employed persons to be involved in work at the workplace, and

(ii) procedures for regularly monitoring employers and self-employed persons involved in work at the workplace;

(h) a plan for training workers and supervisors in safe work practices and procedures;

(i) a procedure for investigating accidents, dangerous occurrences and refusals to work under section 43;

(j) a procedure for worker participation in workplace safety and health activities, including inspections and the investigation of accidents, dangerous occurrences and refusals to work under section 43;

(k) a procedure for reviewing and revising the workplace safety and health program at intervals not less than every three years or sooner if circumstances at a workplace change in a way that poses a risk to the safety or health of workers at the workplace; and

(l) any other requirement prescribed by regulation.

Requirement for consultation
7.4(6) The employer shall design the workplace safety and health program in consultation with

(a) the committee for the workplace; or

(b) if there is no committee, the representative for the workplace.

Program available on request
7.4(7) The employer shall make a workplace safety and health program available to the following persons on request:

(a) the committee;

(b) if there is no committee, the representative;

(c) a worker at the workplace;

(d) a safety and health officer.

Workplace safety and health committee
40(1) Every employer shall establish a workplace safety and health committee

(a) for each workplace where at least 20 of the employer's workers are regularly employed; and

(b) for any other individual workplace or class of workplace designated by written order of the director.

…

Membership of committee

40(8) A committee

(a) shall consist of not fewer than four or more than 12 persons, of whom at least 1/2 shall be persons

(i) representing workers who are not associated with the management of the workplace, and

(ii) appointed in accordance with the constitution of the union that is the certified bargaining agent or that has acquired bargaining rights on behalf of those workers, or where no such union exists, persons elected by the workers they represent; and

(b) shall have two co-chairpersons — one chosen by the employer members on the committee, and the other chosen by the worker members on the committee — who shall alternate in serving as chairperson at meetings of the committee and shall participate in all decisions of the committee.

Duties of committee

40(10) The duties of a committee include

(a) the receipt, consideration and disposition of concerns and complaints respecting the safety and health of workers;

(b) participation in the identification of risks to the safety or health of workers or other persons, arising out of or in connection with activities in the workplace;

(c) the development and promotion of measures to protect the safety and health and welfare of persons in the workplace, and checking the effectiveness of such measures;

(d) co-operation with the occupational health service, if such a service has been established within the workplace;

(e) co-operation with a safety and health officer exercising duties under this Act or the regulations;

(f) the development and promotion of programs for education and information concerning safety and health in the workplace;

(g) the making of recommendations to the employer or prime contractor respecting the safety and health of workers;

(h) the inspection of the workplace at regular intervals;

(i) the participation in investigations of accidents and dangerous occurrences at the workplace;

(j) the maintenance of records in connection with the receipt and disposition of concerns and complaints and the attendance to other matters relating to the duties of the committee; and

(k) such other duties as may be specified in this Act or prescribed by regulation.

Workplace safety and health representative

41(1) Each employer shall cause a worker not associated with management to be designated as the worker safety and health representative

(a) at a workplace, other than a construction project, where a safety and health committee is not required but where 10 or more workers are regularly employed;

(b) at a construction project, notwithstanding the requirements for a safety and health committee; and

(c) at any other individual workplace or classes of workplaces which the minister may designate.

Employer response to recommendations

41.1(2) If an employer receives written recommendations from the committee or representative identifying anything that may pose a danger to safety or health of any person, the employer shall respond in writing to the committee or representative no later than 30 days after receiving the recommendations unless the employer implements all of the recommendations within 30 days of receiving the recommendations.

Contents of employer response

41.1(3) The response of an employer must

(a) contain a timetable for implementing the recommendations that the employer accepts; and

(b) give reasons why the employer disagrees with any recommendations that the employer does not accept.

Referral to safety and health officer

41.1(4) If no agreement can be reached regarding the response of an employer under subsection (3), any of the following may refer the matter to a safety and health officer:

(a) the employer;

(b) the committee;

(c) a member of the committee;

(d) if there is no committee, the representative.

Order from officer

41.1(5) If a dispute regarding a recommendation is referred to a safety and health officer, the officer may issue an order or a decision in accordance with this Act.

No limitation

41.1(6) Nothing in this section limits the right of a worker to refer any matter respecting safety and health directly to a safety and health officer.

> Information to committee or representative
> 41.2 If requested by the committee or a representative, the employer or prime contractor shall disclose the following to the committee or representative:
> (a) information concerning the testing of any equipment, device or chemical or biological substance used at a workplace;
>
> (b) an inspection or investigation report respecting safety and health at the workplace;
>
> (c) a report respecting workplace safety and health monitoring or audits.

[504] Section 4 sets out the duties of employers and insures that the onus is on the supervisor to protect the safety of those in the workplace.

[505] Section 7 establishes the workplace safety and health program and states that it must include the identification of danger in the workplace.

[506] Section 40 establishes the workplace safety and health committee and insures that its members come equally from workers and management. The powers of this committee are quite extensive.

[507] I have concluded on examining these sections and the *WSHA* as a whole that:

a) The system of internal responsibility remains the basic premise underpinning the *Act* as a whole;

b) Part of the system of internal responsibility is that authority brings greater responsibility for safety. This is strengthened by the amendments;

c) The joint committee has sufficient power to insure a safe workplace once hazards are identified.

[508] Ms. Webb suggested to me that the amendments were sufficient and that I need not make any recommendations for changes to the *Act*. I am aware that a lengthy process of examination was undertaken by the Minister's council and that this council itself is composed of experts from both management and

union. Finally, I know that the council received submissions from interested parties prior to making its report to the Minister.

[509] Therefore I agree that no further amendments need be recommended in this report.

g) Water and Molten Metal

[510] I have already concluded in that section of the report titled "Washdown" that the supervisors and hourly paid workers relied on past experience. Because there had never been an incident, an explosion or an injury during the washdown, planners and those actually involved in the washdown did not foresee any danger in water falling through the arch and onto the partially cooled furnace bath.

[511] Perhaps the views of the planners and workers were coloured by the fact that the washdown had been designed to ensure the safety of workers who knocked down the furnace. In any event, it is now clear that recognition of the danger and consultation with an engineer (both of which were done after the explosion) resulted in the implementation of another procedure to accomplish the same result: namely, cooling of the furnace with fans and removal of dust with forced air equipment. This perfect hindsight was expressed best by Mr. Gauthier who, in testifying about the changes made for the 2006 shutdown, stated:

> A …And God, if we'd only known it was that simple.
> (page 95 line 14 of testimony of April 23, 2008)

[512] I have already concluded in the section called “Findings of Credibility” that I found Mr. Gautier’s evidence compelling because he gave it in such an honest and straight-forward fashion. On April 29, 2008 he testified about the events leading to the explosion. He was talking about the use of water and the fact that no danger in doing so was recognized. He expressed, in the following quotes, what was underlying the evidence of many of the witnesses, whether

they be hourly paid workers or supervisors: the guilt over the injuries and death and the knowledge, realized only after this tragic event, of the dangers involved in the washdown:

> Q But in that regard -- and I'm not interested in mistakes or anything like that.
>
> A No, no, I'm just saying, well, I feel partially guilty for what happened and –
>
> Q And just to be clear –
>
> A -- there's nothing anybody else can do about that, that's my internal.
>
> Q This is not -- so that you understand, and I'm, I'm going to ask you to understand. This is not about blame. This is about finding out the cause.
>
> A Yes, I know. (page 49 line 32 of transcript of April 29, 2008)
>
> "No, no one was aware that we have the potential to cause an explosion. Following the plan might have let us (inaudible) sneak by again." (page 50 line 30 of transcript of April 29, 2008)

[513] Division Five of the Operation of Mines Regulation is titled “Protection from Molten Material”. Section 256(1) states:

> Working with Molten Material
> 256(1) No person shall deliberately caused or permit molten material to come into contact with cold, damp surfaces or substances where the contact could cause an explosion

[514] What is clear to everyone involved with the smelter is that the explosion on August 8, 2000, the investigation by the joint safety and health committee, the resulting recommendations from the engineers and the changes which were instituted in the 2006 shutdown, clarified that under no circumstances should water be allowed to come into contact with molten metal. Section 256(1) does not specifically state this.

[515] The Operation of Mines Regulation should be amended to state:

1. Water should not be allowed to contact molten material under any circumstances;

2. If water is to be used on premises where molten material is present, it should only be used after an engineering study has shown that it can be used safely and after such study delineates the parameters and restrictions on its use.

h) Systematic Procedures and Safety

[516] There are two approaches to identifying hazards in the workplace: responding to an incident and attempting to identify dangerous procedures or premises prior to an incident happening. This latter approach can, for lack of a better term, be defined as a proactive approach to safety.

[517] The internal responsibility system encourages such a proactive approach.

[518] It is clear that the Company and its workers took a proactive approach, even prior to the 2000 incident. Mr. Pruden, one of the hourly paid workers, was

a member of the joint health and safety committee prior to the explosion. He testified about his duties as follows:

> A I was a safety steward I think a year, and then the present safety co-chair resigned or stepped down, so I took over as position of safety co-chair.
>
> Q And do you recall when it was that you took over as the safety co-chair?
>
> A I would say early ’98.
>
> Q Now, could you tell the court what it is that this safety co-chair responsibility is about?
>
> A The responsibility of the safety co-chair, I believe, is we go on tours safety, have a safety group, electrical safety co-chair, chemical safety co-chair, and we do these tours around the plant to make sure that everything is up to par, and if there's something that’s unsafe, then we put it on the agenda to, to get it fixed or up to working capacity.
>
> Q Now, how many people sit on this committee?
>
> A I would say six or eight, be about eight.
>
> Q Now, you mentioned that there would be someone from the mechanical side, someone from the electrical side.
>
> A Steel.

Q Who or what group did you represent?

A Steelworkers.

Q The steelworkers.

A Yeah.

Q You were the, the steelworkers union rep –

A Right.

Q -- on this committee.

A Right.

Q Now, was this only comprised of employees or were also management people –

A Well, the health and safety committee, you have your co-chairs from the, the unions, and then when you do the tours, you have your smelter safety coordinator, who was Bill Fulford at that time, and he would go on these tours with you and he would write down the problems. He would do all the, pretty much all the writing, and if you found something wrong, you'd let him know and then he'd write it down. So, we do the tour, and then we, we set up an afternoon to do the meetings in the meeting room.

Q Um-hum.

A And then you would have your superintendent, your supervisors, just the top supervisors, and then you would

sit down and, and the mechanical foreman too I believe was there, electrical. You would sit down and you would go over the agenda, past and present problems, and try to get a follow up on what's happening with the, the last tour. You know, if something wasn't fixed, why wasn't it fixed. Then you give the date to have it fixed, stuff like that. It was just so you, you would have your management there at the safety meetings.

Q All right. How often would you meet with this committee?

A I think it's probably once a month, give or take.

Q And one of the things that you said earlier on was that you'd tour the plant. Does that mean you would tour the entire facility?

A You would –

Q Or just like the furnace area?

A No. You go the smelter bag house -- just trying to think of the name -- the feed prep area where the belts are, you go into the dryers, the dryers, unloading bin, then you'd walk down towards the calcine tracks, top of the furnace, into the reverb area. And then you'd do your converter pit, and then the anode.

Q So, it was essentially a walk about from the start of the process right through to the end.

A Yeah. It was just, it's a circle that you just go

> around. We, we had a path that we followed. (page 22 line 6 of transcript of January 20, 2004)

[519] Mr. Morrell, one of the supervisors, testified respecting the proactive approach of the Company to safety:

> Q Now, you mentioned you were a member of the joint safety and health committee. Did you -- were you involved in tours conducted by the mines branch?
>
> A Yes. Monthly.
>
> Q And what was your role on those tours?
>
> A I, I done it -- I done those tours as a safety committee representative when I was a union representative. I've also done those tours with the -- as, as the safety and loss control co-ordinator for the smelter. And I also done those tours as the general foreman.
>
> Q And what's the purpose of those tours?
>
> A To look for any hazards or conditions that might lead to a hazard, and we would, we would tour the area with the mines inspector, and he may find things that he needed to have attention, and we would make sure that it got, got repaired.
>
> Q Now, we've also heard evidence about a -- something called the red hazard book. Could you just describe to the court what that is?

A The red hazard book, I was -- I believe was a result of -- we had a, a -- along with the, the regular safety committee, we had, we had started a number of group -- it was actually the same group of people that was involved in the safety committee. We called it the proactive safety group. And out of that was a number of initiatives that we took on to improve. One of things was that this red hazard book, the, the purpose of it was, is that it -- when -- if an employee and/or supervisor saw that there was a hazard, together they would enter that, that information into this red book. And then it would -- myself, as the, as the safety loss control co-ordinator at the time, I would review those monthly, as well as the committee, to make sure that anything that was reported in that book had been rectified. (page 64 line 21 of transcript of April 15, 2008)

Q And when was that -- the proactive safety team formed?

A We first initiated that group in '97. I believe '97. And, and it was at -- the idea was, is, you know, you have maintenance which is when things happen you fix them, and then you have preventative maintenance where you look for potential things that could happen and, and fix them before they happen.

And the whole concept was, is that if you had a, a, a proactive look at things, the committee would tour the plan looking for things that -- potential hazards or things that could possibly go wrong and do something about them before they went wrong. (page 72 line 6 of transcript of April 15, 2008)

[520] It is clear from this evidence that procedures were in place at the smelter in 2000 to identify any hazard. It is unfortunate that the hazard attached to the use of water in the shutdown was not identified. I have commented on this area extensively in this report. I do not believe that the failure to identify this hazard was a failure of the system or a failure of the legislation. As I have noted, the legislation has been changed to emphasize the internal responsibility system.

[521] Identifying hazards is only the first step in creating a safe workplace. Putting effective controls in place is the second step.

[522] There should be a precise and systematic procedure, once a hazard is identified, detailing what controls are required. This procedure should follow this precise order:

1. Elimination of the hazard;

2. Engineering controls which might include such matters as modifying existing equipment;

3. Administrative controls that alter the way the work is done;

4. Personal protective equipment for the worker to reduce his chance of injury.

[523] If this precise order is not followed in dealing with any given hazard, safety is not optimized. For example, if every hazard that is identified is solved by adding personal protective equipment, then there is never any consideration given to the three other procedures, all of which would provide greater safety to the worker.

[524] The tragic events of August 8, 2000 came about because the washdown was not identified as a hazardous procedure. However, it struck me that counsel, by the nature of their questions, focused on administrative methods

of dealing with the hazard of the washdown. There was much evidence gathered respecting the monitoring of water flow, the timing of the washdown in relation to the shutting off of the furnace and other like matters, all of which have been identified by me in this report. None of these administrative controls, if they would have been put into effect, would have eliminated the hazard or made the workplace safer in any manner.

[525] I was also struck by the experts' reports which recommended a variety of ways to address the hazard which were a mixture of the above controls without any systematic approach.

[526] Finally, the reports filed by the Company and the Unions to Mr. Hewitt, the mines inspector, addressed a range of safety issues and controls to deal with the issues without a systematic approach.

[527] Why is a systematic approach so important? Once a hazard is identified, the first question should be whether it can be eliminated, given all considerations, including cost. Elimination is clearly safest for all workers. If the hazard cannot be eliminated, engineering controls should next be considered. With engineering controls, the hazard remains present but no action is required from the worker.

[528] If engineering controls cannot deal with the hazard, then administrative controls must be reviewed. At this stage, not only does the hazard remain but the worker is now affected directly. Safe work procedures mean education and constant supervision. At this stage any worker or supervisor error, even the smallest of mistakes, can result in injury.

[529] Finally, if none of the controls noted above are practicable, protective equipment must be worn by the worker to reduce the chance of injury.

[530] Each step in this system of instituting controls brings the hazard closer to the worker. That is why it is so important to start with the first step and follow down giving full consideration at each stage to the possibility of dealing with the hazard.

[531] The manner of dealing with the hazard of water use during the shutdown is a case in point. The first question, once it is determined that water is the source of the problem, should be to look at eliminating it. Monitoring the amount of water or the temperature of the bath are administrative controls which are very much open to leaving a dangerous hazard, given the fact that water and molten metal should not come into contact.

[532] However, eliminating the use of water will still leave the safety hazard of calcine dust falling in the workers' eyes as the reverb is knocked in. Following

the same step process, it is clear that dust cannot be eliminated as it is by-product of the day to day operation of the smelter. Engineering controls can be put in place by way of greater use of arch blowers and the unijet vacuum to eliminate dust to a great extent.

[533] This precise order of controlling hazards should be recognized in the statute or regulations. There would then be a systematic procedure for dealing with each identified safety hazard in any workplace.

[534] The relevant portions of the *WPSHA* are contained in regulation 217/2006 which states:

> Personal protective equipment required
> 6.1(1) An employer must ensure that, to the extent practicable, the safety and health of each worker is protected by
>
> (a) the design of the workplace or work process;
>
> (b) the use of engineering controls; and
>
> (c) the implementation of safe work procedures.

> 6.1(2) An employer must ensure that a worker wears and uses personal protective equipment
>
> (a) during the period necessary to implement a measure described in subsection (1);
>
> (b) if the measures taken under subsection (1) are insufficient to protect the safety and health of the worker;
>
> (c) in any of the circumstances described in sections 6.7 to 6.18; and
>
> (d) in the event of an emergency in the workplace, including a spill or discharge of a hazardous substance

[535] The first problem with this regulation is its title: Personal protective equipment required. The last step in the systematic procedure is to look at personal protective equipment. This may be a subtle matter but I have learned that in a workplace such as the smelter where molten materials are present, heat exhaustion is a constant safety concern and the protective equipment worn by the workers handicaps the visual, olfactory and auditory senses of those same workers, that every step, however small which can help create a safe workplace is important.

[536] This part should have a title more in keeping with its true purpose such as, Controls for Eliminating Hazards.

[537] This section should also reflect the fact that the order in which the controls are listed is the order in which they should be applied, taking into account all circumstances. I have been advised by counsel for Workplace, Safety and Health that the order of reviewing identified hazards is generally that of subsections in regulation 6.1(1). If that is the case, then there should be no problem in explicitly setting this out in that regulation.

[538] Therefore regulation 6.1(1) should not only be re-titled but should also be amended to bring certainty to the order in which every hazard is reviewed.

RECOMMENDATIONS

[539] My recommendations are therefore as follows:

1. The Advisory Council established pursuant to section 15 of the *WSHA* and/or the standing committee under the Operation of Mines regulation should review my recommendations and report to the Minister;

2. The *WSHA* or its regulations should be amended to reflect that no worker should be tethered to mobile machinery;

3. The Operation of Mines regulation should be amended to define “near misses” and place an onus on every person in the workplace to report a near miss;

4. The Operation of Mines regulation should be amended to state:

a. Water should not be allowed to contact molten material under any circumstances;

b. If water is to be used on premises where molten material is present, it should only be used after an engineering study has shown that it can be used safely and after such study delineates the parameters and restrictions on its use.

5. The *WSHA* should be amended to provide for the precise and systematic procedure for controlling identified hazards as set out in the section “Systematic Procedures and Safety”

XVI APPENDICES

Appendix	Exhibit Number	Description
A	1	Letter from Chief Medical Examiner dated January 22, 2002
B	70	Agreement defining the Flin Flon Mineral area
C	71	Agreement for the provision of services in the Flin Flon mining area by the Province of Manitoba
D	66	Gesser report
E	67	Tennesey report
F	68	Swacer report
G	69	Jennings report
H	26	Shutdown assignment list for August 7, 2000
I	36	Organization chart for August 7, 2000 shift
J	27	Shutdown manual
K	37	Company report
L	72	Union report

XVIII DISTRIBUTION LIST

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2. Dr. A. Thambirajah Balanchandra, Chief Medical Examiner

3. The Honourable Dave Chomiak, Minister Responsible for *The Fatality Inquiries Act*

4. The Honourable Nancy Allan, Minister Responsible for *The Workplace Safety and Health Act*

5. Mr. Jeffrey A. Schnoor, Q.C., Deputy Minister of Justice & Attorney General

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8. Mr. Marty Minuk, Counsel to Inquest

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15. Mr. Pete Walker, Health & Safety Representative, Manitoba Federation of Labour

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