Never Forget……

Puget Sound Refinery

Delayed Coking Unit Fire

November 25th, 1998

……Never Again

For those that were working at the refinery and those who have been personally impacted, the events of those days surrounding November 25th, 1998 have been permanently etched into your memory.

We will never forget.

For those who have hired into the refinery after that date, this is the legacy you have inherited. This is the truth as we know it. What you will read in these pages will not be the cleaned-up version some would prefer that you hear. You will read first person accounts, Chemical Safety Board recommendations, Washington State Labor & Industries comments and details of the settlement agreements for the citations they issued.

It is important for everyone who entered our refinery after Nov 25th, 1998 to know the reality of what took place. Talk with the folks who were here then. Maintenance, Operators, Engineers and Managers each have their own story to tell. Listen and learn from what they have to say. By hearing their truth you can then influence what happens today and for the rest of your careers.

Only then can you say, this will never happen again.

November 25th, 1998 has changed the refinery and the people who work there forever.

This is our story…

In The Beginning…

The Coker was an addition to the refinery put in place during the mid 1980's. Construction began in 1982 and the unit was placed online in the summer of 1984. Engineers Tom Meek and Nels Enderberg were part of a team who worked on the relocation of the equipment from the Texaco refinery in Lockport, Illinois. The Lockport facility had been in operation from 1911 until they closed their doors in 1981 and we became the owner of part of their 1960's coking unit.

Operation of the Delayed Coking Unit, DCU, was the responsibility of Texaco employees while the cutting, handling and loading of the petroleum coke was done using contractors and Alpha-Omega was awarded the contract. The final phase of construction and start-up of the DCU began while Texaco employees were on a labor strike which lasted from February through July, 1984. Seeing the struggles the Texaco employees were going through, Alpha-Omega joined the Oil Chemical & Atomic Workers International Union, OCAW, local 1-591 in Anacortes.

The DCU is a process which charges a heavy tar-like residual material left over from prior processing from the Crude unit. The Chemical Safety Board describes a DCU as this:

"A delayed coker converts heavy tar-like oil to lighter petroleum products, such as gasoline and fuel oil. Petroleum coke is a byproduct of the process. Drums of coke are actually produced in batches though the operation is conducted continuously. After a drum is filled, the flow of oil is diverted to a freshly emptied vessel. The full drum contains a tarry mass, which solidifies to a coal-like substance (coke) when cooled by the addition of steam and then water. The top and bottom of the drum are opened at the completion of the cooling cycle, and the solid mass of coke is then cut into pieces and removed from the vessel."

Unheading a coke drum is a dangerous operation. The hydraulic controls to unhead the bottom of the drums were within feet of the bottom head of both drums. The Alpha-Omega workers were regularly being exposed to very hot water, steam, leaking flanges, flange fires and, if the drum had not been effectively cooled, to hot process liquid. The coke drums were on a 15 hour cycle and the 3-man crews of Alpha-Omega were regularly engaged in the unheading process and being exposed to the same hazards each time they unheaded a drum as each 15hour cycle repeated itself every 8 hours.

From the beginning of our Coker operation, the crews unheading the drums had concerns about egress. Les Brown said: "Several times we brought up our concern about not having a safe route off of the structure if something ever went wrong. We had a history of bringing egress issues to management but nothing was ever done."

Process Safety Management and the 1996 Partial Charged Drum…

Process Safety Management became law in 1992. This was brought upon by our federal government due to industrial accidents happening across the globe and the need to have a set of standards for managing hazardous processes and chemicals in industry within the United States. This new law described specific elements which, among other things, included training, procedures for handling the process and Management Of Change, MOC.

Texaco management was having difficulty understanding the intent of the law and due to this the quality of procedures across the refinery ranged from decent to poor, incomplete or simply did not exist. Some folks had their own procedures tucked away in files in the absence of formal procedures or had simply gone about business "the old school way", using their own knowledge and past experiences to get the job done. The understanding and use of MOC's was even slower to take hold. Officers and members of OCAW had been in regular contact with OSHA and WISHA trying to get clarification and understand interpretations of this new law. Through OCAW's efforts and understanding of the law, they tried influencing local Texaco management that PSM is relevant and needs to be implemented in a variety of applications throughout the refinery. Quite often discussions would end with a difference of opinion about the intent of certain elements within PSM. Due to this, change was slow.

On the day of July 6, 1996 the DCU had made a drum switch. The helper, Steve Joneli, noticed the bottom head of the "B" drum was leaking and notified his A-operator, Greg Digiovanna. Before Greg had a chance to check out the leak, Steve called on his radio again and said the bottom head was on fire. Greg immediately notified his B operator to shutdown the unit. The "B" drum had been in service less than 5 minutes. The operators followed their normal shutdown and sweeping process but the unit upset resulted in a partially filled coke drum. Tom Meek had become the unit foreman of the Crude Processing Department, CPD which included the Vacuum Pipe Still, VPS, and the DCU.

By this time in his career, Tom held two patents on coking processes, had established himself as a technical expert in coking and he had a good idea how to deal with a partial drum. But, not only did the operators have the partial drum issue to worry about, they also had "A" drum to deal with. It was full of material and needed to be cooled and then cut. Several meetings ensued to discuss options and a plan forward was agreed on. The main course of action was to partially fill the "B" drum with water at a slow rate thereby helping the material in the drum to cool and to work on cooling and cutting the "A" drum at the same time. The task of adding water to the drums was given to night shift. Some water had been introduced into both the "A" and "B" drums but due to the water inlet line only having a single, common flow indicator, the amount of water being put into the "B" drum was unknown. A decision was made to focus on the "A" drum and when that was done to concentrate efforts on the "B" drum. Water through the normal line-up to the "B" drum was halted but to maintain some water going into it, operators connected a 1-1/2" fire water hose into the top and continued adding water. When quenching of the "A" drum was complete the normal quench water line-up to the "B" drum resumed at a rate of 1,000 BPH.

Day shift arrived to find the "B" drum full of water. The drum is 96' tall and the level indicated a 76' water level. Calculations indicated this to be almost 33PSI of head pressure. This gave a total of over 132,000 lbs, or ~66 tons of force being placed on the bottom head. The operators tried draining water from the drum using normal line-ups. Only a small amount of water was able to be drained due to the drain line plugging with gooey Vac Residuum. The coke handlers then tried long-bolting the front of the bottom head. They did this so when they lowered the bottom head, it would allow the drum to drain while directing the flow of material away from the drum and into the coke pit. Unfortunately, after a short time the bottom of the drum plugged again. Some of the water had drained and the drum level had lowered slightly but, the drum was still essentially full. The only thing left was to completely remove the bottom head.

The coke handlers, who at this time were under the new management of Western Plant Services, Inc., WPSI, removed the bolts then lowered the bottom head of the coke drum and a torrent of water erupted from the bottom of the drum. The amount of force from the water threw equipment and tools everywhere, left more than 2 feet of standing water in the unit and a tar-like gooey environmental mess to clean up.

In 1995 the Alpha-Omega coke handlers had lost their contract with Texaco. Western Plant Services Inc., WPSI, had been awarded the contract to handle the refinery's petroleum coke. WPSI was a non-union Company and through multiple anti-union actions they forced a lock-out of the OCAW represented employees in June 1995. In June 1996, the OCAW members returned to work as WPSI employees represented by OCAW. The normal groups of trained and qualified coke handlers were the folks who unheaded the "B" drum.

Texaco laid responsibility for the partial drum environmental mess on Tom and he was removed from his position as Unit Foreman of the CPD and sent to Receiving, Pumping and Shipping, RP&S as a Production Analyst. Several people in the refinery believed he was being punished for the partial drum mess and this was later confirmed through Chuck Flagg's trial court deposition. Chuck Flagg was the Refinery Manager at the time and some believe he was under pressure to find a scape-goat. Tom happened to be the one to take the fall and Ron Granfors, the Hydrotreater foreman, was then put in charge of the CPD.

In early 1996, the use of **"The Green Book"** - Danger in the Comfort Zone by Judith Bardwick – was used as a basis for moving people around in the Texaco Refining & Marketing Inc. (TRMI) plants. "Change is good" was the Managements motto during this period. But this book is definitely NOT for people in Safety Sensitive positions. It had become an established Staff requirement to study this book, with the training being led by the Plant Manager, Chuck Flagg. This book deals with "job entitlement" and outlines a methodology of instilling 'fear' in people by removing them from their jobs, (i.e. Comfort Zone), in order to stimulate improved performance. This is an outrageous and dangerous concept when dealing with essential process technology information, skilled knowledge, and historical experience for safely operating a refinery or chemical plant. Use of these "new" company guidelines was being used as a cover-up for Tom being punished and moved to RP&S.

During 1996, Ron and Tom were not the only ones moved. Tim Fair was moved from the Alky to FCCU and Dave Culver was moved up from HTU/CRU assistant foreman to Unit Foremen. However, a big difference is that there were resident technology experts available to help with these other moves on a daily basis - specifically Ron helped Dave, and Gary Hayes, ex-FCC Unit Foreman, was able to help Tim Fair, but Tom was not allowed to help Ron. Ron was not given an opportunity to receive a thorough handover from Tom. The transition, which should have taken months to accomplish, was never allowed to happen.

An internal investigation ensued for the "B" drum water mess and the team suggested, among other things, to install remote unheading and to "Develop a procedure to drain or otherwise remove the water from the coke drum under similar conditions." The final report for this incident indicates the procedures had been completed but it would appear otherwise. Later, in 1999, The Department of Labor & Industries conducted a 6 month investigation and found procedures did not exist to deal with partial filled drums, as had been recommended per the 1996 investigation. This will prove to be a major contributing factor during the 1998 fire.

Chinh Luu was a Night Foreman at the time and had also made a suggestion through the plant "safety suggestion" process. His proposition was for a remote unheading site. He concluded that if the unheading controls were removed from the structure to a safer location and with cameras placed on the deck, the WPSI folks could safely deal with problem drums in the future and would not need to place anyone on the structure during unheading. His suggestion was rejected since there would not be a "return on investment". At the time, the Company had a standard for projects. If not mandated per regulatory agencies, environmental standards or product compliance, the project would be required to have a pay-out within 2 years. Chinh Luu's suggestion was a "nice idea" but did not pass scrutiny by management.

Equilon, The 1998 Storm, Partial Charged Drum and Fire…

In January 1998, Texaco had joined in a partnership with Shell and Saudi Aramco to form Equilon, Motiva and Equiva as a Limited Liability Company's, LLC's. The name of our facility changed from Texaco – Puget Sound Plant to Equilon - Puget Sound Refining Company, LLC. A new way of running the refinery was starting to show itself through the influence of folks from outside the Texaco ranks coming into our facility. Equilon had started relocating and replacing managers and engineers because of the "Change is Good" ideology. Most notably was Judith Moorad, a zoology and environmental major, who replaced Chuck Flagg as our refinery plant president.

Tom Meek was in RP&S doing the Production Analyst job and Ron Granfors was the unit foreman of the CPD. Ron was a technical expert on Hydrotreating and had recently spent time in Alberta, Canada overseeing the construction and start-up of a Hydrotreater. After he had been moved over to the CPD, Ron had regularly been heard saying, "I hate black oil". Nels Enderberg had been promoted to South Side Asset Manager in charge of the HTU/CRU's and the CPD. He had been an integral player in placing a Hydrotreating man in charge of the CPD. Somehow, Equilon management believed that a Hydrotreater expert was well suited to manage a VPS/DCU instead of the Coking expert, Tom Meek. Placing Ron on the CPD was seen as another "Change is good" maneuver, however ill-conceived the decision came about.

In late November a powerful storm blew through our region. Tuesday, November 24th, @ approximately 12:01am the storm caused a massive power outage in the refinery and the entire facility crashed. The Boilerhouse lost production of all plant utilities – plant air, instrument air, service water, boiler feed water, 600# and 250# steam. Due to the loss of steam, we lost the ability to supply Nitrogen to the refinery. The refinery process units were not able to effectively sweep or purge their processes and equipment laid idle full of hydrocarbon and chemicals. Power was later restored around 2am.

Again the DCU was faced with the problem of a partially filled drum. Drum "A" had been in service for approx. 1 hour and calculations showed roughly 1100 Bbls of 860 degf charge being in the drum.

Early that morning the refinery slowly started to come back to life. Utilities were restored and process units started purging their units in preparation for start-up of the refinery. But the partial drum on the DCU was still a significant problem and management didn't have a clear plan on how to deal with it. Tuesday during the day, management held meetings across the refinery, both with and without operator involvement, as they tried to decide how to get themselves out of this mess. Equilon management decided they didn't want another "fiasco" like they had in 1996 and this was the major reason that filling the drum with water was quickly crossed off their list of fixes, even though several operators wanted to do exactly that. No other procedures were in place to deal with abnormal situations involving partial filled drums. Tom Meek was never invited to any of the meetings concerning the DCU partial drum nor was he ever asked his thoughts or opinion on how to proceed getting the unit into a safe condition ready for start-up.

It was announced in several Refinery Re-Start meetings what the plan of action was with the Coke Drum and yet no one convincingly spoke up in opposition. No one knew what they were dealing with in this Coke Drum. Nobody consulted Shell's Westhollow Technology Center or asked for additional technical support. Westhollow is a technical center of experts specializing in every aspect of process and process control. They were not dealing with a similar 1996 tar ball at all, but a huge mass of hot, partially coked residuum. Due to the lack of technical expertise, several folks basically agreed to the plan of action. The Department of Labor and Industries later calculated that 236 days would have been required for atmospheric conditions to cool the drum. Only 37hrs had passed from the time of the power outage to the moment the WPSI folks were ready to unhead the drum.

The following is an excerpt from the internal incident investigation report of the Nov 25th, 1998 Coker fire:

Wednesday, November 25, 1998 (morning)

On the morning of Wednesday, November 25, 1998, discussions followed by a meeting to review issues relative to the partially charged drum were held. Drum temperature data was reviewed. Temperatures at the overhead line, mid-drum, and transfer line inlet points indicated approximately 220 degrees F, 270 degrees F and 90 degrees F respectively and were decreasing. Two additional steaming attempts were also made that morning. The first attempt resulted in relief valves opening on the manifold that connects the steam header and the transfer line. This indicated that there was some plugging of the transfer line and /or the coke drum inlet.

EDITORIAL NOTE: THE DRUM ONLY HAD EXTERNAL SKIN TEMPERATURE INDICATORS AND DID NOT HAVE ANY MEANS OF DETECTING INTERNAL TEMPERATURE.

The second steaming attempt was recorded by the process computer, which showed a drum pressure rise, indicating some steam was getting into the drum. This steam flow was established through a ¾" connection on the transfer line to the drum. The temperature indicator on the transfer line into the drum also indicated a temperature rise (from 90 degrees F up to about 350 degrees F until the steam valve was turned off in preparation for drum unheading); indicating that some steam was getting in.

There were discussions about the filling and removal of a large amount of water during preparation for opening a partially charged drum in 1996. There were also discussions about adding water to the drum but concerns were raised relative to over cooling the drum contents. A decision was made not to introduce water into the drum.

Wednesday, November 25, 1998 (afternoon)

Coke drum A was isolated from the process and a permit was issued for contractor employees to unhead the drum. The permit indicated the use of SCBA (self-contained breathing apparatus) as a precaution for this work. This represented an additional safety precaution relative to the possibility of some hydrocarbon vapors and potentially H2S being present in the immediate area of the bottom head flange. Temperature data at this time indicated the overhead line, mid-drum, and transfer line inlet points to be approximately 220 degrees F, 230 degrees F, and 245 degrees F respectively. Interview information indicates that the individuals believed based on information available at the time, that the contents of drum "A" would be a "gooey tar ball" upon unheading. At approximately 12:50 pm, the top head was successfully removed by contractor personnel wearing SCBA in preparation to remove the contents of the drum. At this point in time, the drum was isolated, open on top and at atmospheric pressure.

The unheading cart was positioned at the bottom of the drum to hold the bottom head in place for bolt removal. Two tuggers were attached by cable to the cart. This was likely done to insure the cart would be quickly moved out of the way such that the drum contents would fall directly into the coke pit. Between 1:10pm and 1:23pm, contractor personnel were removing bolts on the bottom head wearing SCBA. All bolts were removed, stacked in a box and moved over to an area near the west drum. The head was then lowered by moving the valve on the unheading cart hydraulic controls to the "lower position". This was verified by indication of the final position of the valve on the hydraulic controls after the incident. From interview information, approx. 30 seconds after the last bolt was removed, the head was lowered and a cloud appeared and ignited. This was followed by a "whooshing" sound, the rapid expulsion of drum contents (approximately 6 seconds or less), subsequent flames, and the ensuing fire with thick black smoke. Response to the fire was quick. Interview data indicates refinery personnel had the first fire monitors directed at the fire within 10-20 seconds. The fire crew responded and extinguished the fire. There were two plant employee and four contractor employee fatalities.

Our Experiences…

PAUL DIXON -Alky/Poly operator–

"I was at home and received a call on my pager. All it said was 'Fire on coker'. I turned on my radio and listened to what was happening while I drove out to the refinery. When I got here I joined the 1st responder response and notified other responders of the situation. We had to wait until the fire brigade had put the fire out and secured the area before we could go in. I helped man a hydrant to assist the fire teams." From where Paul was standing he immediately realized this was not going to be a rescue. Paul stated, "Dave Hansen asked the 1st responders if they would be willing to make the recovery.", and all of the responders on the call stepped forward.

STEVE HEATHERS -Alky/Poly operator–

"I was working on the unit that day and heard radios going off in the control room. When I went in there I heard the fire whistle go off. I went outside to see what happened and saw a massive black cloud coming from the DCU. I heard over the radio that responders were in route and at that point all I could do is watch. I saw a CPD operator come into the control room and heard him keep asking, 'Didn't they quench that drum? Didn't they quench that drum?'"

PAUL DEMMON -Boilerhouse operator–

"I was sleeping after getting off night shift and my wife woke me up telling me there was a fire at the refinery and that it was all over the news. I got up and saw a news clip and quickly called out to the plant." Paul was an operator on the HTU/CRU at the time and when he called out to work, he got in touch with Tom Jones, a co-worker on his unit. "He told me he'd been fielding calls all afternoon from people calling in and asking questions. He said he heard there were fatalities and one of them might be Ron." Paul left for work early.

"When I got near the refinery I could see helicopters flying overhead and when I turned off the highway to go to the plant I saw news vans parked on both sides of the road. As I drove down the road I saw people were everywhere. Security was checking ID for anyone trying to get into the plant. I later learned that they had a total plant evacuation and all non-essential personnel were removed from the plant." Paul mentioned that all vehicle traffic had been stopped within the refinery so he started walking down to the HTU/CRU. "The road was blocked off near the CPD but I didn't care, I walked through the barricades. Even though I didn't see any fire or smoke I went down there to see if I could be of any kind of help. I walked past Ron's car, still parked near his office. I will never forget seeing his white BMW sitting there knowing he would never sit in that vehicle again.

I saw George Kinsolving and other co-workers out on the road and went over to them wanting to know if they had heard any more information. When I met up with them we all hugged. They told me nothing official had been put out but they heard there were 4 fatalities but also they had heard there had been 6 people on the structure. I walked past the DCU and saw everything blackened from the fire then continued down to my unit."

When he got to the HTU/CRU, both Reformer's and both Hydrotreaters were down. Nothing was running. Paul says, "Here we were, sitting on the unit with nothing to do but think about what had just happened. We wanted to do something, anything to take our minds off of what has just happened. But we were told to leave the units alone. Don't touch anything." Paul says soon after he got on his unit, Nels Enderberg arrived in the control room around 7pm. "We hit him with all of the hard questions. What happened? Why did this happen? Who was involved? We wanted some answers. Nels wasn't giving us any information and looking back on it now, I'm not sure if he was in shock or denial. Nels was the one who was responsible for moving Tom and Ron around. Later, around 9pm, Judy Moorad, our plant manager, came around and we asked her the same questions. She told us there were 4 confirmed fatalities and they were still looking for two others who were missing. She said they were 'checking the parking lot and calling their homes and family members to see if they had heard from them'. I guess she was hoping they had left the plant and would be found at home. Other than that she didn't tell us anything." Paul said that they were told by Judy that they can order all of the meals they wanted. "Gee, great."

He also mentioned that Charlie Schultz, a process engineer, came to the control room later that night. "Charlie was the only person in management with the humanity to tell us exactly what happened. He honestly answered all of our questions. No matter how hard the reality was to accept, we had to know the truth. To this very day, I greatly respect Charlie and trust his integrity and opinions."

BILL FISCHER –Boilerhouse Senior Process Specialist–

Bill was on vacation at the time and that afternoon was talking with his neighbor when he heard about it. Bill says, "My neighbor asked if I heard that Shell had a fire at their refinery and he believed it was on their coker. But I thought, 'Wait a minute, Shell doesn't have a coker, we have a coker. That's our coker that's on fire!'" Bill said he immediately left for the refinery. "When I got to work I reported to Ron Metcalf (the North Side Asset Manager) and asked if there was anything I could do. I suited up in Bunker gear and went to the scene. When I got there I talked with folks and helped accounting for people."

Bill says that later during the investigation, when he was being interviewed by the State Assistant Attorney General and their "Subject Matter Expert", "They were insisting that the whole incident could have been prevented if the Erie City boiler had not been down for repairs." The Erie City boiler is in the Boilerhouse and is the plants emergency steam supply. "I argued with him that the cause of the utilities failure wasn't due to the Erie City being down. The power failure to the refinery caused a Feed Water failure and the Feed

Water failure caused the steam failure. We could have had 40,000 Erie City's and it wouldn't have made any difference. Without Feed Water you don't have steam."

ROB NICKERSON –Coke Handling Department Operator-

"I was working with WPSI at the time and was working night shift. We had been told we would be unheading the drum that night but they later decided to wait until the next day. I was off that morning when my son woke me up and said there was a fire at the refinery. I looked out my window and saw a black cloud coming from the plant. I drove out there and when I pulled into the parking lot and saw where the fire was coming from, I turned around and went home. I knew what had happened."

LES BROWN –Coke Handling Department Operator-

Les was also working with WPSI during this time. Les said, "Rob and I were supposed to be unheading the drum that night and we were ready to do it. Someone came to us that night and said they were going to be having more meetings about it in the morning and that we wouldn't be unheading the drum that night. Day's would do it tomorrow. We were that close to being the victims instead of the 6 that died." Les said, "I was at home when Chipper Darst (a former WPSI co-worker and current CPD operator) knocked on my window and told me the coker was on fire. I came out to the plant but they wouldn't let me in. I was a contractor then you know. I saw Woody's son and went to talk with him. He was worried about his dad."

GREG DIGIOVANNA –CPD operator-

Greg said, "I was on A&S recovering from shoulder surgery when Chinh Luu, the South Side Night Foreman, called me asking if I could come out to help because they had a total plant shutdown due to a power failure. I told him I can't because I had just had shoulder surgery, was recovering and taking pain meds."

"I was in my truck running errands when I heard about the fire over the radio. My wife called me shortly after and said the refinery called and wants me to come out. I called out to the plant and talked with Chinh Luu. He asked me if I could come in and work the board. They were trying to find reliefs for everyone on day shift so they could go meet with the CISM team (Critical Incident Stress Management) for debriefing/counseling. Even though I was on A&S, I was only one day away from my first day back to work on light duty, so I came out."

"When I got to the plant I knew I needed to go through Medical to get the OK to work and to let them know what medications I was taking. When I entered the Medical Dept, I saw some Company folks sitting with a family member of one of the workers that had been on the structure that day. I knew this person was being told the worst news imaginable. After Medical cleared me I didn't hang around. I immediately left and went

straight to the unit. I didn't walk past the DCU but instead walked down the road toward the FCCU then down to the control room."

Greg made relief with the VPS Day shift Board Operator and was told the unit was in circulation, ready for start-up. He talked with the Day shift A-Operator, Todd Jacobsen, and the Night Foreman, Chinh Luu, looking for direction. It was agreed by all to go ahead and start the unit.

"Later, I was asked to be part of the procedure rewrite team. After Tom was removed from the rebuild, the Company brought in Rod Walsh from Westhollow to manage the rebuild of the unit and oversee the procedure rewrite. Everything the rewrite team did had to go through Rod and he sent everything we gave him to Westhollow for review. The procedures our team developed changed the coking industry around the globe."

The DCU was down from Nov 24th, 1998 and was restarted after the rebuild in March 1999.

GEORGE WELCH –Instrument & Electrician Technician-

"I was working in the shop when I heard some noise outside. I went out the door and saw the black cloud. I went back in to put on my bunker gear then responded and immediately accounted for and assumed command of my folks on the fire team. I went around to the East side of the structure and started spraying water. We worked on putting the fire out and keeping other stuff cool. During the fire, I saw 5 of our folks that were on the structure that day. I talked with Wayne Wilson and he asked my thoughts on how we were going to proceed. I already knew this was not going to be a rescue."

George said, "Later, after the fire was out, the state inspectors, coroner and local authorities showed up. With the help of the coroner, we went in and recovered our co-workers. That was when we found the 6th person that had been on the structure that day."

The plant first responders recovered our co-workers from the structure. It was agreed that we wanted to give these people the ultimate respect and care possible. There was a concern that an outside agency may not care for or give the respect our people deserved.

George continued, "Tracy's death in 1996 brought about our BEST process. The decision making is flawed. BEST practices and learning's have not been followed, then or now. The Company had the wrong folks in the wrong places making the wrong decisions."

"If we can learn from adversity or even the worst, death, then we are a little bit better. People should not have to die for change to happen. The Company's Risk Ranking is a problem."

HARRY FERRIER – HEALTH, SAFETY & ENVIRONMENT DEPARTMENT-

”Normally I would have been on vacation, because I liked to challenge myself to get all my Christmas shopping done by Thanksgiving. For one reason or another, I was working. Monday morning day shift was pretty straightforward for a start to a holiday week. The weather wasn't real cold, but it was windy and wet with higher winds coming that night. Tuesday morning proved the weather man right, the storm with high winds in the early morning had knocked out the power to the plant and hammered a vulnerable BOHO with high steam demands of a way too long a duration. From the highway heading east I could see the flares in the plant burning with 100 foot flames and black smoke trailing off for miles. It was obvious the BOHO was down, so the only conclusion was that the plant was down too.”

“I don't even remember who I relieved that morning, mainly because they didn't go home right away, they had to go to a big meeting for staff, unit foreman and maintenance department heads in the foremen's building at 7 a.m. The plan was; start the refinery one unit at a time with a focus on the BOHO first. Nobody was going to do much without steam. Second, clear the flares and slop systems while each unit stabilized and secured for start-up or repairs. Before the meeting was closed, a day shift and night shift was organized for operations and maintenance supervision with a team set-up to orchestrate the refinery start-up. I was part of the start-up team, working with Renee Porter and Nels Enderberg. Later each of the unit foremen returned to the meeting room where the start-up team and staff could get an assessment of the unit’s condition. Charlie Schultz was my counterpart on nights and went home right after the first meeting to sleep, so I made up a steno pad to pass off to Charlie with notes on each unit and the unit status. We called the pad the football, because we pack it around everywhere and pass it back and forth to one another.”

“That Tuesday was one of the longest days I've ever worked in the refinery. I was in the meeting room from 7 a.m. until Charlie showed up at 6:30 p.m. that night. When I handed Charlie the football we had a BOHO making steam, the flares were cleared out and most of the units were OK, but we still had big questions about the FCCU and SRU.”

“The next morning started with another meeting so everyone (both days and nights) could get a good idea of where we were and what we could to do next. The problems with the FCCU weren't as bad as first thought and the operators did a good job getting the unit ready for start-up. The SRU troubles were a little harder to clear up if I remember correctly. When the unit went down, the sulfur solidified within the process. These plugs were taking lots of time to clear, but clear they did later that morning. Debbie Thompsen was working for Bruce Parkinson as the North side SS this week, and having come off the Alky2/SRU's, she was a natural choice for day shift to get the units back on their feet.”

“The Start-up team concept went by the way side after the Tuesday morning meeting as no two units would be competing for room in the slop or flare systems for start up. I was able to walk to each of the units to see for myself how things were going. After a couple of hours, I'd touch base with Tim Fair on the FCCU, Debbie on the SRU, and talked to Culver about his HTU'S. Around noon I was in Granfors’ office, we listened to Paul Harvey and talked about normal stuff; the stock market, sports, the units, whatever came to mind.

Before 12:30, Ron was called over to the Crude shack, because the operators wanted him there for the unit start-up. They had the heat they needed and good circulation, they just wanted the go sign from their Foreman. Putting on his coat, grabbing his hat and gloves and walking out the door, was the last time I ever saw him."

"It was probably a half hour later, I got the call that the Crude unit charge pump was running, and therefore the Crude unit was running. I went over to the no.1 control room to my office to work on a log for the shift and update the football. Sometime after 1pm, I went back to the foreman's building to the meeting room for the next update meeting that afternoon. Ron Metcalf and I were in the meeting room (the room was located on the south side of the building) talking when a loud release could be heard, and in a split second an explosion. We both hit the windows at the same time looking toward the DCU drums. Flames covered the bottom of the drums and smoke rose up from the deck obscuring the drums and structure."

"I ran out to 4th Street with my radio "mike" in hand calling to identify myself and give my location to establish Incident Command. My radio was dead, so I jumped in my truck to use the hard-wired radio, it too would not work. I realized the guard was on the All Talk channel canceling out my transmissions. I parked the truck and tried my radio again. It worked. The next few minutes were spent trying to account for everybody and organize the equipment and personnel to fight the fire. I remember watching Debbie and Dick Nichols setting up staging using the boards in the back of the SS van to check people in and out. Still we had no clear accounting of operators, maintenance or the CHD guys on the unit. Bob Mainard got on the radio next after having set up a truck on the south side of the unit and had a team starting to spray water on the fire. Then Ted Duris, the head of security at the time, called me on the radio to give me the names of those who were unaccounted for. One by one I heard the names, I know these guys, and they're here somewhere. Someone else called and wanted hose teams to go up the stairs, but we didn't have any equipment on the north side of the unit. The operators from the Crude unit had the north side monitors going trying to get some coverage. Then Nels came up to me, and told me we have fatalities. I knew then the explosion and fire had done the worst that it was going to do, nothing really mattered after that. It was just a fire, stay back, let the fuel burn out, nobody else need get hurt."

"I was pretty much useless after that realization hit me, I'd lost a friend that I loved like a brother and respected for more than twenty years, and other friends that I held in high regard who I had not known long enough. Ron Granfors taught me the most important lesson in life or at least this is the way I took it; before you can manage people, you have to love them first. It was just that simple. It doesn't matter who they are or what jobs they do, they're the most important people in the world and deserve the best you can do for them. People, when they know that they're respected and cared about, respond to praise and encouragement. When they know you're working for them, and they know their backside is covered, they come through all the time."

"The following days and nights were manageable only because there was still so much work to do, there wasn't much time to let my mind dwell on that afternoon. I could see that there had been a real change in the plant as everyone tried to cope with the loss.

Greetings now in the plant were handshakes or hugs, we were closer now and we were hurting. We found a way to turn as many people loose as possible to attend the funerals, which followed within days. This gave us a chance to touch the families who had lost so much and show them how much we shared in their loss. I was able to go to four of the funerals and I remember how hard it was watching the families knowing that their lives had changed forever."

TOM MEEK –Delayed Coking Technologist-

Tom was working at the plant for Operations Planning in RP&S the day of the incident and responded to the fire. He helped fight the fire, shutdown and secure the unit, and was witness to the fallen friends and coworkers.

Tom was a key participant on the Incident Investigation Team. He was a primary witness to the fire and became one of the expert witnesses for the legal proceedings that followed.

In January of 1999 he worked on both the DCU Rebuild and DCU Procedure Rewrite Teams. He was also on a yearlong Alliance wide Delayed Coking Safety and Reliability Study Team, which stands to this day as the largest study of its kind in the Industry. The study proposed some twenty-three Delayed Coking Safety Facilities and fifty successful practices with more than twenty required procedures for safe and reliable Delayed Coking Operations. This study became a focus and foundation for subsequent Safety Projects and initiatives done for Delayed Coking Units throughout the company and within the Industry, enabling Shell to become one of the leaders in Delayed Coking Safety.

Words cannot describe the heavy hearts and minds of everyone at the Refinery, and especially for those who worked with and were such good friends of those who passed.

Emilio Aguilar gave a moving eulogy at Ron's funeral. During the service Tom read a personal poem he had written for Ron. Fellow friends and coworkers of Ron's and his, Harry Ferrier, Dave Culver, Dave Hanson and Marv Gillis, supported Tom during the reading. A copy of the poem is still posted at Ron's memorial at Hawthorne Funeral Home & Memorial Park in Mount Vernon.

For Colleen, Ross, Nicole, our coworkers and friends.

My Foreman Brother

With sparkling eyes, and his wonderfully sly grin,
Ron came to us all with so much from within.

He was the intelligent one from the complicated side,
And he brought with him so much more than just his pride.

“Problems, problems, Tommy,” he’d say.
“Complicated Hydrotreater stuff I need to get solved today.”

He could recite his units with such expertise,
That everyone in the Industry he talked with he surely pleased.

He taught folks up in Canada and around the U.S.
He certainly was one of the Worlds very best.

We worked the South side together and alone, a real test.
He had the South East and I the South West.
Timmy would tell us “They’re planning a new split!
It won’t be North and South, it will be East and West!
Then we’ll find out who will be the best!”

It made no difference this little talk jive,
For we all worked together to make our plant come alive!

It is the “Foreman’s life”, so awfully much is expected!

Eat it, breathe it, and think it, Day, & Night, and then maybe be respected.

Meeting time on Wednesday's were a very special treat.

It was a sort of a get together "Foreman Fellowship Retreat".

We all waited in quiet observance for Ron's quick insight and wit.

We just knew that he'd come up with something to make 'em spit!

They knew how smart he was and asked for his opinion.

No holds barred he'd come back with the best for our dominion.

Safety was his first and real stride,

All other things he put aside.

He worked for Unit Safety on Plant Teams,

So that we could all come home and fulfill our dreams.

We all had to walk in different shoes in recent years.

Davey and the Hydrotreater guys missed him and shed a whole bunch of tears.

The CPD guys took him in, and loved him with great care.

They got to know him well, as you can all tell by the great despair!

He suited all them to tee, for as you can see,

Ron had all of the South Unit Operators in his family tree!

I can't say enough, and you'll never know how I really feel.

For you see,

Ron was my Foreman Brother and forever will always be.

Wayne Dowe had worked with Tom for many years. He was the CPD's most Senior Operator and was Top Notch in every way. Tom wrote the following poem, which was read at Wayne's funeral service. Wayne could fix anything, and this poem says it all for those of us who worked with and knew Wayne.... We all miss him dearly...

Our Best Mechanic

He would kick at it, spit at it, swear and then fine tune!

Soon he would ask the Controlman, "Well, now how you doin'?"

He was a major Integrator of all the Crude Processing parts!

He was always so very, very important to all of its starts!

Vessels, Heaters, and Exchangers!

Valves, Pipes, and Flanges!

Compressors, Pumps, and Fans!

All of these were his, and all he did command!

Straight run, diesel, kero and gas oils, were all his cup of tea!

Vac resid was fine, but the heck with BDUee!!

When he was out, the Boss slept like a Lamb.

"No need to worry with Wein at the command!"

He would talk about the units in serious tone.

A man full of knowledge and so much common sense,

Even the best Engineer's would request his stance!!!

He would muse about Crossword, Farming and "H"!

He would muse about "D"-Team folks, 442's and Trucks!

Engine blocks, carburetors and frames!

Wheels, power packs, and jacks!

All topics of interest would be discussed and fussed!

To pay attention and to understand was sometimes a Helper's must.

He was a man of conviction and told us his ideas!

Nothing missed his scrutiny of wondrous inner thought.

Out came his opinions, and as you have probably guessed,

He was usually right and far above the rest!

We loved working with him, and we just know he felt the same!

Wayne, our best mechanic, we all wish you were here again!

You will forever be in our family, and forever our friend!

L&I Investigation Findings, Settlement and the CSB…

The final report by the Equilon internal investigation team was issued Dec 22nd, 1998.

The internal investigation team was made up of members from inside and outside our facility. Representatives from Equilon PSRC were - Operations, Safety, Engineering, Process Control and Inspection. Others involved were from WPSI, Westhollow, and a representative from the Bakersfield refinery.

Among the several recommendations made by the team, one specific recommendation was to "When developing plans for replacement of the hydraulic drum unheading controls and unheading cart tugger controls due to the incident, revise to a more remote location."

This was one of the recommendations from The 1996 Coke drum water incident investigation and Chinh Luu's original safety suggestion more than 18months previous. If the Company had followed the previous recommendations to move the unheading controls to a remote location this horrible tragedy would not have happened.

This was more than Chinh Luu could endure.

He left the Company 3 months later, in March 1999.

The Department of Labor & Industries concluded a 6 month investigation in May, 1999. CPD Operators stated during their L&I testimonies that the accident would never have happened if Tom had been on the Unit. He had been appointed "The Expert" by the Equilon Management, and that it was very troubling to L&I as to why he had been moved to another part of the refinery if that were the case. Following the internal incident investigation, Tom was specifically requested to lead the DCU rebuild. But after two weeks he was removed from the DCU rebuild and placed on the Procedure Rewrite team due to concern by the Equilon Legal Department of his having been named "The Expert", yet had been removed from the DCU 2 years prior, and then immediately put back on the unit after the incident occurred. This became a huge question and focus for the investigator's and attorneys.

Below is a summary of the citations, violations, final report and details of the settlement agreement. The settlement was negotiated in late May among PACE Local 8-591, the Washington Industrial Safety & Health Administration (WISHA), and Equilon.

In January 1999, OCAW merged with the paper workers represented by UPIU to form a new union to be known as PACE - Paper, Allied-Industrial, Chemical and Energy Workers International Union. The Local Union was now known as PACE Local 8-591.

The 2 citations and explanation of violations were:

Item 1-1 Type of violation: Uncharacterized

296-24-073(1)

The employer shall furnish to each of his employees a place of employment free from recognized hazards that are causing or likely to cause serious injury or death to his employees.

The employer was not in compliance with the above duty, and employees were exposed to a fire and explosion hazard, in that:

1) Procedures were not adequately developed, reviewed and followed for the change from water cooling to ambient-air-cooling prior to conducting the un-heading procedure on 11/25/98;
2) Procedures were not adequately followed to evaluate the change of conditions when the Erie City Boiler went out of service;
3) Certain employees were not adequately trained to deal with the potential danger of using a coke drum cooling procedure other than water cooling;
4) Employees were not adequately trained on the use of a coke drum cooling procedure other than water cooling prior to conducting the drum un-heading procedure on 11/25/98;
5) Current procedures for water cooling the coke drum were not followed prior to conducting the drum un-heading procedure on 11/25/98; and
6) Current operating procedures were not reviewed to reflect a change from the use of water cooling of the coke drum. Consequences of deviating from the water cooling procedure were not reviewed during the most recent procedure review process.

Item 1-2 Type of Violation: Uncharacterized

296-67-017(5)

The employer shall establish a system to promptly address the (HazOp) team's findings and recommendations and ensure that the recommendations are resolved in a timely manner.

The employer did not resolve in a timely manner certain safety items identified as "SF-1" and "SF-2" in the 1996 HazOp study on the Delayed Coking Unit.

Here is a summary of the settlement:

The Department of Labor and Industries has concluded its six-month investigation into a fatal refinery fire in Anacortes last November with an unprecedented $4.405 million compliance agreement designed to make the Equilon-owned refinery safer and more healthful for workers.

Six workers died last November 25th as they were attempting to restart the delayed coking unit at the refinery following the previous day's power outage.

The tragic event marked the worst industrial catastrophe since the Department of Labor and Industries began enforcing the Washington Industrial Safety and Health Act (WISHA) more than 26 years ago.

The agreement is the largest monetary settlement ever reached by any state in a worker safety and health investigation. It also would rank among the top compliance agreements ever obtained by the federal Occupational Safety and Health Administration (OSHA).

The agreement calls for Equilon to abate the identified deficiencies. The company has installed remote-controlled unheading equipment for the coking unit.

Other elements of the agreement include:

Third-party consultant

Equilon agrees to hire an independent consultant to conduct a comprehensive audit of the refinery's compliance with L&I's Process Safety Management standard. L&I sees this as a key element of the agreement and a critical step toward making the Equilon refinery safer and more healthful for workers. The Process Safety Management standard and its requirements cover highly hazardous worksites, including refineries, because of the potential for fire, explosion or catastrophic release of highly hazardous materials. L&I and the union will receive quarterly progress reports from the consultant, including Equilon's plan and schedule to address the report. Equilon agrees to correct the deficiencies identified in the audit. The cost of the audit and responses to its findings will be at least $350,000.

Scholarships

Equilon agrees to donate $1 million to the union's Fallen Worker Scholarship Fund in memory of the six workers who needlessly lost their lives at the delayed coking unit. The fund will be administered by the union.

Safety and health improvements in the community

Equilon agrees to promote the establishment of programs to achieve lasting improvements in workplace safety and health beyond the refinery. Equilon will:

- Donate $1 million to an existing educational organization within Washington to establish a Workplace Safety and Health Institute. The agreement calls for the parties to jointly identify the educational organization and then work with this organization to develop a governing structure and operating mission. The "Worksafe Institute of Washington" was chosen and a branch opened at Skagit Valley College.
- Donate $350,000 to the City of Anacortes Fire Department toward the purchase of a new ladder/pumper fire engine.

- Agree to implement the Union's Triangle of Prevention Program (TOP). TOP is a union-based alternative to company-promoted initiatives on health and safety.
- There will be a full-time Health and Safety representative, selected by the local union from among its members and paid by the company.
- Also part of the settlement was that: "The Company agrees to assign Puget Sound Refining Company bargaining unit employees to perform required coker drum unheading, drilling and pit crane operation functions associated with coker operations. For Seniority purposes, such employees will be placed in a separate "Coke Handling Department".

WPSI workers were brought in to our refinery as Equilon employees.

They formed a new operating unit, the Coke Handling Department as represented members of PACE Local 8-591.

The "**Fallen Workers Memorial Scholarship Fund**", administered by the Union, generates 10's of thousands of dollars annually in scholarships and grants. Since 1999, from the initial $1,000,000 investment, hundreds of thousands of dollars have been given in scholarships and grants to students from our local communities and continues to provide a significant amount of educational financial aid each year.

"The only thing we can do for those who lost their lives in November is do our best to make sure no accident of that kind ever happens again," said Kim Nibargar. **"This agreement will help us make that a reality."** Kim was president of the PACE Local 8-591.

"We see nothing but good coming out of this settlement," said Local 8-591's Equilon unit chair, George Welch. **"We feel gratified we were able to set up a wall-to-wall safety inspection, and not have the company fight us on the citations, as in the past."**

The development of the US Chemical Safety and hazard Investigation Board (CSB) came out of an amendment to the 1990 Clean Air Act. The CSB became operational in January 1998. The organization was still in its infancy when it took part in the investigation of the November 25th fire and did not have the resources available to it then as they do today. Funding, staffing and access to technical experts in the wide range of industry they investigate were slow to come. Due to this some of their earlier findings have been a bit confusing for some. But 3 years later, in August 2001, the CSB issued a "Safety Bulletin" aimed at addressing a specific PSM issue, Management of Change - MOC. By this time PSM had been law for almost 10 years. OSHA and the Washington State Dept of Labor & Industries had a solid understanding of the intent and application of the elements within PSM.

The CSB Safety Bulletin showcases the Equilon fire of November 25th, 1998 as a model for the failure to engage in a proper MOC.

The following is a portion of the original August 2001 CSB Bulletin. The elements in the bulletin which relate to our facility are intact and are as presented in the original document but have been reformatted to fit this document:

MANAGEMENT OF CHANGE

Introduction

The U.S. Chemical Safety and Hazard Investigation Board (CSB) issues this Safety Bulletin to focus attention on the need for systematically managing the safety effects of process changes in the chemical industry.

This bulletin discusses two incidents that occurred in the United States in 1998. Each case history offers valuable insights into the importance of having a systematic method for the management of change (MOC). An MOC methodology should be applied to operational deviations and variances, as well as to preplanned changes—such as those involving technology, processes, and equipment.

~~~EDITORIAL NOTE: ONLY THE EQUILON INCIDENT WILL BE PRESENTED HERE ~~~

Background

On November 25, 1998, a fire at the Equilon Enterprises oil refinery delayed coking unit in Anacortes, Washington, caused six fatalities. A loss of electric power and steam supply approximately 37 hours prior to the fire had resulted in abnormal process conditions.

Process Description

A delayed coker converts heavy tar-like oil to lighter petroleum products, such as gasoline and fuel oil. Petroleum coke is a byproduct of the process. Drums of coke are actually produced in batches, though the operation is conducted continuously.

After a drum is filled, the flow of oil is diverted to a freshly emptied vessel. The full drum contains a tarry mass, which solidifies to a coal-like substance (coke) when cooled by the addition of steam and then water. The top and bottom of the drum are opened at the completion of the cooling cycle, and the solid mass of coke is then cut into pieces and removed from the vessel.

Incident Description
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Pre-Incident Activity—
A severe storm on November 24 caused an electric power outage in the refinery. The storm interrupted process operations and also stopped the production of steam. At the delayed coking unit, the on-line drum had been filling for about an hour and was approximately 7 percent full. The other drum was full and was being cooled.

Although electric power was restored after 2 hours, an additional 10 hours passed before steam production was re- established. During the interim, the tarry oil in the piping between the furnace and the partially filled drum cooled and started to solidify.
Once steam was restored, the operators were unsuccessful in attempting to inject it into the drum through the normal route because of the plugged piping. (When normally injected, steam creates passages in the tarry mass through which cooling water can later flow. It also drives off remaining residual volatile petroleum and sulfur compounds from the coke.)

. . . the Equilon incident underscores the need to have MOC policies that include abnormal situations, changes to procedures, and deviations from standard operating conditions.

A process interruption in 1996 had also resulted in a partially filled drum. At that time, water was injected into the drum to cool the material inside. However, when the drum was opened, a torrent of water, heavy oil, and coke spewed out—which created a hazard and required a major cleanup. An internal investigation team recommended that procedures be written for cooling/emptying partially filled drums. However, this task was not completed. On the day of the fire, neither the process supervisor nor the operators had any written procedures for handling partially filled drums.

The process supervisor was aware of the seriousness of the previous incident. He left instructions directing the night shift not to add any water, and instead to allow the drum and its contents to simply stand and cool overnight. On the following morning, he met with the operators to determine how to empty the partially filled drum. No engineers, who could have provided technical support, were present at this meeting.

Preliminary Operations—
The supervisor and operators observed that the exposed part of the bottom flange of the drum felt cool to the touch. They also noted that temperature-sensing devices located beneath the insulation on the outside surface of the drum indicated approximately 230 degrees Fahrenheit (°F), as compared to the 800°F of a typically full drum.

One operator suggested adding 100 barrels of water to the drum. However, the supervisor was concerned about such a course of action because of the previous incident. Upon further discussion, they decided—because part of the drum felt cool, and the temperature-sensing

devices read only 230ºF—that it was not very hot inside and it was safe to open the vessel as long as they first injected some steam.

An operator connected a steam hose to the oil inlet piping at the bottom of the drum. Several witnesses said that the steam warmed the top of the piping, but the bottom remained cool. It is likely that steam flow had been established, but the rate of flow was low.

Opening the Vessel—
Personnel expected a tarry mass to drain from the drum. The supervisor and process operator directed that the drum be opened with a minimum number of people present. Because they were also concerned that the limited flow of steam might not sufficiently strip all the toxic compounds from the tar inside the vessel, they required that the workers removing the bolts on the drum heads wear self-contained breathing apparatus.

The top head was unbolted and lifted from the drum. The bottom head was also unbolted and held in place by a hydraulic dolly. The operator then activated a release mechanism to lower the dolly.

The relative coolness of the bottom flange erroneously suggested… that the temperature inside the drum was cool—when, in fact, only the material adjacent to the inside walls had cooled.

Witnesses reported hearing a whooshing sound and seeing a white cloud of vapor emanate from the bottom of the drum. The hot petroleum vapor burst into flames.

The process supervisor, an operator, and the four contract personnel assisting were caught in the fire and did not survive.

After the incident, Equilon relocated the controls for the hydraulic dolly to allow workers to position themselves farther from a drum when opening it.

Follow up Analysis—
The supervisor and operators analyzed the situation and devised process changes to empty the drum. The relative coolness of the bottom flange erroneously suggested to them that the

temperature inside the drum was also cool—when, in fact, only the material adjacent to the inside walls had cooled.

Unknown to the coker unit personnel present, the core of the mass remained insulated from heat loss. Within the core, residual heat continued to break down the petroleum, creating a pocket of hot pressurized volatile oil. Had the limitations of temperature- sensing devices been better understood, personnel may have realized that the low temperature readings were not representative of the hot core.

The Equilon incident could have been avoided if the "change" was managed by a team experienced in hands-on operations, safety procedures, and engineering calculations.

Matt Wallis, Skagit Valley Herald

It was assumed that the entire drum contents had cooled to safe levels during the 2 days since the power failure. However, heat transfer calculations would have indicated that weeks would be required for the drum contents to cool sufficiently via heat losses to the ambient environment.

Lessons Learned

Chemical processing enterprises should establish policies to manage deviations from normal operations. Systematic methods for managing change are sometimes applied to physical alterations, such as those that occur when an interlock is bypassed, new equipment is added, or a replacement is "not in kind." However, the Equilon incident underscores the need to have MOC policies that include abnormal situations, changes to procedures, and deviations from standard operating conditions.

For an MOC system to function effectively, field personnel need to know how to recognize which deviations are significant enough to trigger further review. It is essential to prepare operating procedures with well-defined limits for process variables for all common tasks. Once onsite personnel are trained on MOC policy and are knowledgeable about normal limits for process variables, they can make informed judgments regarding when to apply the MOC system.

Once a deviation is identified that triggers the MOC system, it is management's responsibility to gather the right people and resources to review the situation. The skills of a multidisciplinary

team may be required to thoroughly identify potential hazards, develop protective measures, and propose a course of action.

The Equilon incident could have been avoided if the "change" was managed by a team experienced in hands-on operations, safety procedures, and engineering calculations. Written procedures for cooling and emptying partially filled drums, as recommended by an Equilon investigation team in 1996, might also have reduced the likelihood of this incident.

In any operation, situations will arise that were not foreseen when the operating procedures were developed. At such times, personnel may want to conduct operations in a way that differs from, or contradicts, the process technology or the standard operating procedures.

To assure that these deviations from normal practice do not create unacceptable risks, it is important to have a variance procedure, or to have incorporated the same means of control into other management systems. The variance procedure will require review of the planned deviation, and acceptance of the risks it poses. The variance procedure should require the explanation of the deviation planned; the reasons it is necessary; the safety, health, and environmental considerations; control measures to be taken; and duration of the variance.

Variances should require the approval by a suitable level of management, based on the process risks involved. Also, they should be documented to assure consistent understanding by all affected individuals and departments of what specific departure from normal practice is to be allowed.

A formal hazard analysis may be appropriate depending on the complexity of the change or variance. A hazard analysis for the Equilon situation would have likely determined the limitations of the temperature readings and that it was unsafe to open the drum. It would have also identified the possible release of a large volume of very hot liquid as a significant risk.

Summary

Neither the Equilon Enterprises oil refinery fire nor (case #2) involved emergencies that required rapid decision making. In each instance, time was available to look into the circumstances more thoroughly. Each situation could have been avoided with a more analytical and structured approach to problem solving.

The Occupational Safety and Health Administration's (OSHA) Process Safety Management standard and the U.S. Environmental Protection Agency's (EPA) Risk Management Plan require covered facilities to manage changes systematically. It is good practice to do so, irrespective of the specific regulatory requirements.

If your organization has an MOC policy, review it to be sure that it covers operational variances in addition to physical alterations. If you do not have a systematic method for handling changes, develop and implement one.

To maximize the effectiveness of your MOC system, include the following activities:

- Define safe limits for process conditions, variables, and activities—and train personnel to recognize significant changes. Combined with knowledge of established operating procedures, this additional training will enable personnel to activate the MOC system when appropriate.

- Apply multidisciplinary and specialized expertise when analyzing deviations.
- Use appropriate hazard analysis techniques.
- Authorize changes at a level commensurate with risks and hazards.
- Communicate the essential elements of new operating procedures in writing.
- Communicate potential hazards and safe operating limits in writing.
- Provide training in new procedures commensurate with their complexity.
- Conduct periodic audits to determine if the program is effective.

Conclusion…

Whether we were working days, working nights, on vacation, called out to support operations or called out to respond, each of us have different experiences and have been affected by this tragedy in different ways. Although, one thing is common among everyone who was working at the refinery then:

The DCU fire of 1998 changed the refinery and everyone who works there forever.

This is our story and the truth as we know it, as we saw it unfold, as we saw it happen...

It is our responsibility to learn from this and to prevent anything like this from ever happening again.

A lot has changed since November 25th, 1998. Some improvements have been made over the years. Most notably are the addition of our TOP process, inclusion of our Health & Safety representative, changes to Lock Out/Tag Out and the way we handle our permitting. These changes will make our refinery a little safer and will help all of us go home healthy and safe.

But some believe the Company is still failing with one of the most critical aspects of PSM and to their obligation to "furnish to each of his employees a place of employment free from recognized hazards that are causing or likely to cause serious injury or death."
Doing proper MOC's.

State and Federal agencies visit our refinery from time-to-time and engage in a variety of inspections and audits. Some of those audits are centered on compliance to PSM. And still, many years after the once largest penalty ever issued in the history of the Washington State Dept. of Labor and Industries, our refinery management is still receiving citations and fines due to the lack of compliance to the Process Safety Management statute.

Many years have passed since the fire. The absence of procedures or a MOC was proven to be a significant factor causing the fire and fatalities in 1998.

Although some things have changed, some things have not.

Never Forget – Because the Company did not follow PSM as it relates to procedures or the application of MOC's, 6 people needlessly lost their lives in 1998. If we continue to demand proper attention be brought to all of the elements within PSM and insist on having proper procedures and the execution of proper MOC's, only then can we say - *Never Again*.

We will never forget

In loving memory…

Wayne “Wiener” Dowe, 44

Mt Vernon

A head operator in the refinery's crude processing department and an OCAW member

Ron J. Granfors, 49

Burlington

Foreman in the Crude Processing Department

Warren "Woody" Fry, 50

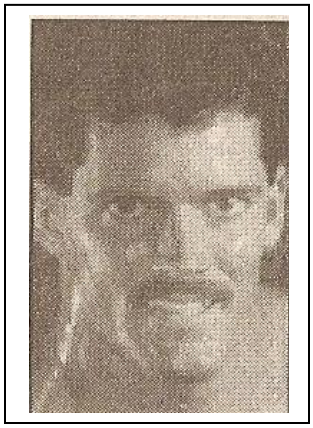
Anacortes

An OCAW – represented employee with western plant services inc.

Ted Cade, 23

Bow

An OCAW – represented employee with western plant services inc.



Dave Murdzia, 30

Mt Vernon

A foreman with western plant services inc.

Jim Berlin, 38

Anacortes

An OCAW – represented employee with western plant services inc.

Information for this article is from individual interviews with:

Paul Dixon	Steve Heathers	Paul Demmon
Bill Fischer	Rob Nickerson	Les Brown
Thomas Meek	Greg Digiovanna	George Welch
Harry Ferrier		

As well as information from:

- The Washington State Department of Labor and Industries news release dated May 26th, 1999
- Near Miss #96-10: DCU 15C100B coke drum drain w/large water release
- Incident investigation report – Coker Fire 11/25/98
- Settlement agreement between the state of Washington, Equilon Enterprises LLC, Puget Sound Refining Company, Texaco Refining and Marketing INC., and their predecessors and successors And the Paper, Allied-Industrial, Chemical & Energy Workers International Union Local No. 8-591
- Workplace Safety and Health Institute Grant Agreement dated April 13th, 2000
- Memorandum of Agreement Between Paper, Allied-Industrial, Chemical & Energy Workers International Union (PACE) Local No. 8-591 and Puget Sound Refining Company a Division of Equilon Enterprises LLC dated the 20th day of MAY1999
- USW Local 12-591 archives
- US Chemical Safety and hazard Investigation Board safety bulletin No. 2001-04-SB | August 2001
- The PACESetter, Vol. 1 no. 5, July/August 1999