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Ovens Compliance Program

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INTERLAKE, INC.
Chicago Coke Plant
11236 Torrence Avenue
Chicago, Illinois 60617

COKE OVEN WORK RULES
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COMPLIANCE PROGRAM

CHICAGO COKE PLANT

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COKE OVEN WORK RULES

DESCRIPTION OF THE OPERATION

Interlake, Inc. operates at the Chicago Coke Plant two batteries of coke ovens of 50 ovens each. These ovens are Wilputte, four divided, low differential, underjet ovens. The ovens are equipped with self-sealing doors, three charging holes, and a single collector main located on the coke side of the battery. Oven dimensions are approximately 40.6 feet long, 12.5 feet high, with an average width of 18 inches, providing a capacity of 701 cubic feet of coking volume per oven. The batteries were designed with a centralized control room and a central coal charging station.

The two batteries, with their centralized control and coal charging station, were designed for and are operated as a single unit. The present coking rate is 18 hours, which means approximately 133 ovens are pushed each day.

The work force employed to operate the coke plant consists of the following:

Operating Crew - Coke Ovens:

Position: Heater
Heater Helper
Pusherman
Larry Car Man
Quench Car Man
Door Machine Man
Lidman
Door Cleaner
Spray Man
Janitor
Patcher
Patcher-Day
Patcher Helper
Topside Supervisor
Oven Foreman
Heater Foreman
Refractory Foreman
General Foreman
Spellman

Operating Crew - Wharf:

Position: Wharfman
Coke Bridge Attendant
Turn Foreman
General Foreman

Operating Crew - Coke Screening Station:

Position: Coke Loader
Cleaner

COKE OVEN WORK RULES

DESCRIPTION OF THE OPERATION (CONT)

Assigned Maintenance - Regulated Areas:

Position: Motor Inspector
Motor Inspector
Millwright
Apprentice Millwright
Pipefitter
Boilermaker
Welder
Millwright
Oiler
Instrument Man
Instrument Man Helper
Instrument Man Foreman
Maintenance Foreman

COKE OVEN WORK RULES

I. Stage Charging

A. Procedures

1. At the start of the shift, the first ovens to be pushed shall be dampered off and the oven lids removed as necessary.
2. The steam jets shall be reamed.
3. The goose necks shall be cleaned.
4. After the ovens are pushed, the side blower shall be inserted for decarbonizing as necessary, and the charging holes inspected and cleaned as necessary.
5. After the designated number of ovens are pushed, the decarbonizing steam (side blower) shall be removed from the oven to be charged.
6. The standpipe shall be inspected and cleaned as necessary to assure at least a 10" opening or the oven is not charged. The standpipe cap seat shall be inspected and cleaned.
7. The uptake cap shall be closed and luted.
8. When the larry car is in position to charge, the charging steam on the assist oven shall be turned on and the west charging lid removed.
9. The charging steam on the oven to be charged shall be turned on.
10. The sleeves shall be lowered on the east charging hole, the center charging hole, the west charging hole, and the assist oven.
11. The east hopper shall be charged.
12. When the east hopper is empty, the slide gate shall be closed.
13. The west hopper shall be charged.
14. When the west hopper is empty, the slide gate shall be closed.
15. The middle hopper shall be charged.
16. At the same time, the chuck door is opened and leveling of the oven with the leveler bar smoke sleeve in place begins.
17. When leveling is completed, the chuck door shall be closed.
18. When the middle hopper is empty, the slide gate shall be closed.
19. The east sleeve shall be raised and the east charge hole lid replaced within 20 seconds.

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20. The west charging sleeve and the assist oven sleeve are raised and the lids replaced within 20 seconds.
21. The middle sleeve is raised.
22. The larry car travels to the coal bin for the next load.
23. The middle charging hole lid shall be replaced within 20 seconds after the larry car leaves for the coal bin.
24. Any loose coal shall be swept into the charged oven through the charging holes, one at a time. Only one lid shall be off at any one time.
25. The charging lids and assist lid shall be sealed and the charging and assist steam aspiration turned off.

B. Practices

1. All four (4) charging lids will be sealed with slurry after each charge.
2. The condition of each charging hole shall be checked before coal is dropped to insure the free flow of coal.
3. Goosenecks will be inspected and cleaned to a minimum of 10" before each charge.
4. Standpipes will be decarbonized before each charge as required.
5. Liquor sprays on pushed ovens will be inspected each shift and cleaned as required.
6. Defective charging hole lids will be replaced. Defective charging hole castings will be replaced as soon as is reasonably possible.
7. The battery top will be swept clean of coal. Coal spillage from charging shall be swept into a freshly charged oven that is on the main and under negative pressure to minimize emissions from the charging hole.
9. The larry car weights will be checked and the volumetric controls adjusted accordingly to maintain full charges.
10. Collector main pressures and temperatures will be check each hour. If any abnormalities are detected, corrective action shall be initiated as soon as possible.

COKE OVEN WORK RULES

II. Pushing

A. Procedures

1. The cokeside door shall be removed for inspection of the jamb refractory and cleaning of the jamb and door seal.
2. The pusher side door shall be removed for inspection of the jamb refractory and cleaning of the jamb and door deal.
3. The quench car shall be spotted.
4. The coke guide shall be racked in.
5. The carbon cutter on the pusher ram will be observed during the push. Any abnormal conditions of roof or wall carbon will be reported. The carbon cutter shall be maintained on the pusher machine for use each time an oven is pushed.
6. Spillage on the push side shall be shoveled into the oven. The spillage on the coke side shall be either shoveled into the oven or into the quench car.
7. After the ram is retracted, the pusher side door shall be replaced.

B. Practices

1. Oven Doors
 - a. Door cleaning will be done at the time of pushing.
 - b. Doors that leak after charging will be adjusted.
 - c. Doors found to be leaking 30 minutes or more after charging shall be replaced, repaired, or adjusted as soon as practicable.
 - d. The seating surface of each chuck door shall be cleaned as required. Gaskets or sealant may be used.
2. Door Jambs
 - a. Door jambs shall be cleaned on each shift.
 - b. The jamb refractory will be inspected at the time of the push.
 - c. The jambs found in need of repair will be logged to the attention of the General Foreman.
 - d. Door fires shall be extinguished as soon as possible after discovery.

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3. Oven Walls and Roof

- a. The oven walls and roof will be observed during pushing for abnormal wall or roof carbon or any abnormal condition of refractory.
- b. Any abnormal refractory conditions or carbon buildup will be reported to the General Foreman for scheduling of repairs. Repairs required will be initiated as soon as possible.

4. Green Pushes

- a. Any green pushes will be reported.
- b. The flues and walls will be inspected and the underfiring corrected as required.
- c. If repairs are determined necessary, the condition will be reported to the General Foreman for scheduling of repairs. Repairs required will be initiated as soon as possible.

III. Coking

A. Procedures

1. The following underfire and combustion conditions will be checked at the beginning of each shift:
 - a. The fuel gas flow for the scheduled pushing rate.
 - b. The stack draft for the corresponding fuel gas flow and stack draft.
 - c. The basement draft for the corresponding fuel gas flow and stack draft.
 - d. The collector main pressure established for the rate of operation.
 - e. Observe the combustion stack for any sign of visible emission. Correct, if possible, by adjustments to the combustion controls and report the adjustments made.
 - f. If the cause of emission requires repairs, the condition will be reported to the Heater Foreman who will schedule the repairs. Required repairs will be initiated as soon as practicable.
2. Flue temperatures of 1/3 of the oven walls will be observed and recorded each turn.

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3. The crosswall temperatures per shift, one wall on each battery, will be observed and recorded. The wall to be observed will be on an oven wall two hours before the oven is scheduled to be pushed. The record of crosswall temperatures will be reviewed and walls will be scheduled to insure rotation of crosswall temperatures.
4. The reversing cocks, metering pins and orifices will be cleaned on six walls of the assigned sections each shift. One 3" header will be cleaned each shift.
5. The crosswall temperatures on any green push will be inspected and observed and the necessary corrections made.

B. Weekly Inspection and Maintenance

1. The following checks and inspections will be performed every Sunday on the 7 to 3 shift:
 - a. Reverse each battery manually with the manual reverse buttons.
 - b. Reverse each battery manually with auxiliary "Dake" engine using air for one reverse and steam for another.
 - c. Record the test in the heater's log book.
2. The pressures will be checked on the 3" fuel gas headers once each week and logged in the heater's log book.
3. Waste gas dampers will be cleaned once each week. This is accomplished by marking the position of the damper, removing the set pin, revolving the damper, and returning to the original setting.
4. Waste gas valves will be checked once each week to insure they are operating freely. This is accomplished by lifting and dropping the stem until a metal to metal ring occurs, which indicates the valve is seating properly.
5. Filters for the decarbonizing and combustion air will be cleaned once each week.

C. Coke Practices

It shall be the responsibility of the Coke Plant Superintendent to establish coking times for the particular mix of coals being used by taking into account available data from laboratory tests, test oven results, moisture content of coal, heating ability of the coke ovens, and other operating practice variables which may occur on a day-to-day basis. The goal of the Coke Plant Superintendent in establishing coking times shall be to minimize green pushes.

COKE OVEN WORK RULES

IV. Maintenance and Repair

The inspection of equipment and controls is the principle responsibility of the operators. Required repairs will be initiated as soon as practicable.

A. Inspections of the following will be conducted and conditions will be recorded on an operating report which is being developed. At the present time, it will be recorded in the Foreman's log book.

1. Conditions of Goosenecks
 - a. Exterior cracks.
 - b. Refractory lining.
 - c. Build-up of carbon.
 - d. Expansion seal between gooseneck and standpipe
2. Condition of Standpipe
 - a. Exterior cracks.
 - b. Ring collar.
 - c. Refractory lining.
 - d. Build-up of carbon.
 - e. Seal between oven and standpipe.
3. Condition of Standpipe Cap
4. Condition of Charging Holes and Lids
 - a. Cracks in casting.
 - b. Warpage of castings.
 - c. Refractory brick and mortar joints.
5. Liquor Sprays
 - a. Open.
 - b. Proper spary battertn.
6. Steam Jet Conditions
 - a. Reamed open.
 - b. Steam leaks in supply piping.

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7. Larry Car Emission Controls - Function and Physical Condition

- a. Air system - compressor, lubrication, filters.
- b. "U" tubes.
- c. Drop sleeves.
- d. Slide gates.
- e. "Air Cannons" for flow of coal from hopper.
- f. Hopper condition.
- g. Volumetric control cones.

B. Housekeeping

1. The pusher machine, larry car, door machine, and quench car locomotive will be kept neat and orderly.
2. The pusher side and coke side benches will be kept clean.
3. The top area of the batteries will be kept clean. This includes each end beyond the pinion walls, the area from pinion wall to pinion wall, and the area between the batteries.
4. The area between the two batteries at bench level between the pusher and coke side bench will be kept clean.
5. The door repair station will be kept clean and orderly.
6. The control room, both battery basements, and the alleyways, coke and pusher side, will be kept clean and orderly.
7. A weekly housekeeping and safety inspection will be conducted.

C. Inspection of the Damper System, Aspiration System and Collector Main

1. The collector main will be inspected from the coke side bench and battery top on each shift and any cracks or leakage will be recorded for scheduling of repairs.
2. Each oven dampered off will be inspected and any leakage from the damper will be recorded for scheduling of repairs.
3. The aspiration system will be inspected and any cracks or leaks will be recorded for scheduling of repairs.

COKE OVEN WORK RULES

D. Inspection of the Heating System

1. Weekly inspections and maintenance of the oven heating system is outlined under "Coking" in this Section.
2. Any necessary repairs will be reported for scheduling.

E. Prevention of Miscellaneous Fugitive Topside Emissions

1. All charging hole lids and standpipe caps will be sealed.
 2. Any other fugitive emissions will be sealed with pliable refractory or refractory slurry.
- e. Any source of emissions that cannot be stopped by sealing will be reported and recorded for scheduling of repairs.

F. Inspection and Patching of Oven Brickwork

1. The refractory door jambs will be inspected each shift and any abnormal conditions will be reported and recorded. This would include cracked, missing or spalled brick, or any loss of mortar requiring pointing of joints.
2. The standpipe, gooseneck, and charging hole brickwork will be inspected and any abnormal conditions will be reported and recorded. This would include cracked, spalled or missing brick, or any loss of mortar requiring pointing of joints.
3. Inspections of the regenerator faces, pinion walls, oven paving, door jambs, standpipes, goosenecks, and charging hole exteriors will be made weekly.

G. The Spare Equipment Inventory Shall Be

8 Coke Side Doors
4 Pusher Side Doors
8 Coke Side Jambs
2 Pusher Side Jambs

H. Maintenance of Wilputte Self-Sealing Oven Doors Adjustment

1. Preliminary adjustment to be made before doors are placed on oven.
 - a. Set two adjusting screws on each corner up to the sealing plate, and then back up one turn and lock.

COKE OVEN WORK RULES

2. Second preliminary adjustment to be made after doors are placed on oven.
 - a. Adjust all screws progressively so that a .003" feeler gauge will not pass under any screw. Set up lock nuts.

V. Training of Operators

It is the responsibility of the Coke Plant Superintendent to reinstruct all Coke Plant Supervision annually in the details of these Work Rules. Each Coke Oven Foreman shall reinstruct incumbent employees annually in their particular duties under these Work Rules. Each new Coke Oven employee shall be instructed in his first week of employment of his duties under these Work Rules. The Coke Plant Superintendent shall keep a record on instructions hereunder made by himself and by Coke Oven Foremen. Such record shall show the date and names of employees instructed.

MAINTENANCE OF WILPUTTE SELF-SEALING OVEN DOORS

Adjustment

1. Preliminary adjustment to be made before doors are placed on oven.
 - a. Set two adjusting screws on each corner up to the sealing plate, and then back up one turn and lock.
2. Second preliminary adjustment to be made after doors are placed on oven.
3. Final adjustment to be made after reaching operating temperatures.
 - a. Adjust screws progressively until seal is complete. Set up lock nuts.

Doors once correctly adjusted rarely require readjustment during the life of the sealing edge. Therefore, the cause of a leaking door is most likely due to a piece of carbon under the sealing edge; and no attempt at readjustment should be made until the need for it has been carefully verified. The door and frame first should be carefully cleaned and observed at least twice around. If it still leaks, readjustment is then in order.

Any adjustment of the door sealing edges should be made by one competent person only, assigned specifically to this work.

ENGINEERING PLANS AND OTHER STUDIES

When the coke batteries were built in 1956, all known feasible technology was engineered into the installation. Therefore, most of the prescribed controls are in use on the coke batteries, i.e.:

A. Existing Engineering Controls - Charging

1. Aspirating steam system has been used in standard practice. The system has been increased in capacity to adequately accommodate the requirements for stage charging.
2. Mechanical volumetric controls are part of the original larry car design.
3. "Air Cannons" have been installed to provide for positive and rapid flow of coal from the hoppers.
4. Aspirating steam jets are provided for insertion into the standpipe for carbon removal.
5. The pusher ram head is designed with roof carbon cutters which are readily replaceable.

B. Existing Engineering Controls - Coking

1. The collector mains are equipped with regulators to provide positive uniform pressure control in the collector mains. New collector mains were provided in Battery #1 and #2 thru wall repairs.
2. Door repair facilities are provided at bench level to facilitate handling of doors for repair with the door extractors on coke and pusher side machinery. Spare door racks are also provided on the coke and pusher side to implement door repairs and provide spare door availability.
3. Eight spare doors were provided with the original installation and has since been increased to 12 doors.
4. The original design of the door machine on the coke side provided a heat shield for protection while cleaning doors. The heat shields have been maintained.

In addition to existing engineering controls, Intelake has conducted studies on potential methods for improving control of emission.

Charging

In the mid and late 1960's, several larry cars were equipped with scrubbing devices to capture emissions during charging. These larry cars were specified as part of new installations. It soon became apparent that problems existed with this type of equipment which made it unsatisfactory as a reliable system to prevent emissions on charging.

ENGINEERING PLANS AND OTHER STUDIES

In 1969, the American Iron and Steel Institute co-sponsored with the Federal EPA a project for charging which was developed and installed as a prototype unit on P-4 battery of J&L's Pittsburgh Works. The theory involved with this project of attempting to confine or capture emissions within the existing gas handling system seemed to Interlake the most practical idea to develop.

As a result, Interlake, began a program to experiment with various ideas to test their practicality for capturing emissions within the gas handling system.

C. Interlake Studies on Charging

1. The first project to be tested was the practicality of utilizing the power of the exhauster to provide the suction necessary to capture the charge emissions. The concept required a piggy-back standpipe, goose-neck, and collector main with dual collector main controls. The concept of carbon accumulation and maintenance of a safe atmosphere within the second collector main. Application for patents of the concept have been filed. Further development of this project was dropped in favor of development of stage or sequential charging similar to the J&L project, but less sophisticated.
2. Since the existing larry cars were cars with turntable hopper feeds with a common drive, it was necessary to modify a car to provide individual hopper feeder drives in order to permit stage or sequential charging. Experimenting with stage and sequential charging in 1971 soon proved additional assists were required to improve suction during the charge to contain emissions. Projects were initiated to investigate empty oven pressures using various sized steam jets, redesign of drop sleeves to maintain as effective a seal as possible during the charge and development of a leveler bar seal at the chuck door to minimize leakage during the leveling operation. These projects were developed in 1971 and 1972.
3. In 1972, Republic Steel revealed they had converted a four hopper larry car to a three hopper larry car using the fourth drop sleeve area to install a "U" tube to obtain further vacuum by using the next series oven to provide additional suction with its aspirating steam nozzle. Since Interlake's larry cars are three hopper larry cars, we could not abandon one hopper to utilize a "U" tube similar to the Republic Steel design. Therefore, a project was initiated to experiment with a fixed "U" tube on four ovens in 1972. This project was moderately successful, but presented a problem for sealing the "U" tube when not in use.
4. The fixed "U" tube was abandoned in 1973 in favor of a design for mounting on the larry car. In order to maintain as effective a seal as possible, the larry car was also designed with a mechanical pushing device to replace the charging hole lids as soon as the drop sleeve was raised. This device was moderately successful and Interlake applied for a patent on the device. The operation of the larry car in a stage charging sequence reduced the charging emissions, but was not yet satisfactory.

ENGINEERING PLANS AND OTHER STUDIES

5. The development by US Steel of a successful stage charging larry car led to further modification of Interlake's larry car for stage charging in 1975. A complete new aspirating steam system was installed. The larry car was equipped with a smoke pipe to connect the #1 and #3 hoppers and a "U" tube to utilize the next series oven as an assist for aspiration and provide the sources of suction. The turntable feed was maintained and the drop plug was utilized for sealing off the hopper when it was empty instead of slide gate. The installation of the smoke pipe required abandonment of the mechanical device for replacing the charging hole covers. This did not change the effectiveness of the larry car since the device was only partially effective. Manual replacement was more effective. The total modification was not completely successful in containing emissions.
6. In 1976, it was decided to modify the second larry car with a completely redesigned drop sleeves with slide gates and replacement of the turntable feed hoppers with gravity feed hoppers. This car indicated in its initial use it was a decided improvement over the turntable car. With some modifications and establishment of proper procedures, it is expected to accomplish a smokeless charge.
7. In addition to development work for modification to the larry car for stage charging and its attendant improved aspirating steam capability, a project was initiated for design of a hydraulic goose-neck cleaner. This unit is currently in operation on one larry car, with the second to be installed before the end of 1980.

D. Interlake Studies on Coking

Recognizing the need to control door emissions during the coking cycle, two projects have been under investigation.

1. In 1974, a water cooled door jamb was designed and four were cast and installed on the battery for evaluation. Although all four have failed, the initial results indicated some promise for success. The initial design will be studied for possible modifications.
2. Since metal to metal contact for self-sealing doors does not guarantee an effective seal, we initiated a project to install gaskets in place of the stainless steel sealing strips on the self-sealing doors in 1975. The gaskets do indicate an improvement over stainless steel strips, so evaluation of this program was continued, however, the project was abandoned when no improvement could be confirmed in long term testing. The thru wall repair of #1 and #2 Batteries included rehabilitated door with new Wilputte Flex-Seal knife edge for both pusher side and coke side doors -- chuck doors were fitted with Toledo gasket. Chuck doors have been replaced with knife edge seal-Wilputte design.

ENGINEERING PLAN AND OTHER STUDIES

3. A third project was tested relating to door emissions. A test hood was designed to evaluate the feasibility of capturing door emissions at the top of the ovens. The test was not successful in capturing the emissions. The lack of adequate suction made it apparent the energy requirement would be enormous in order to approach successful capture at the oven top.

E. Engineering Plans - Charging

1. Stage Charging

Both larry cars have been modified for stage or sequential charging. Car number one was modified in 1972 for individual operation of the turntables to permit stage or sequential charging. Car number two was modified in 1976 to gravity feed hopper with air stimulators for rapid movement of coal. The number two car was also equipped with individually operated drop sleeves and slide gates.

Car number two did a more effective job of controlling emissions, so it was planned to further modify car number one to a configuration similar to number two car. The conversion was completed in the fourth quarter of 1977.

2. Double drafting by means of a "U" tube has been designed and installed on both larry cars. Number one larry car was completed in 1973 and number two larry car in 1976.
3. Individual drop sleeves and slide gates were installed on number two larry car in 1976. Number one larry car was fitted with redesigned drop sleeves incorporating slide gates in the fourth quarter of 1977.
4. Gooseneck Cleaner

A high pressure water gooseneck cleaner has been developed and was installed as part of the conversion of number one larry car. In 1980, the gooseneck cleaner was relocated at the bench level which improved it efficiency.

5. Smoke Sleeves for Leveler Bars

Smoke sleeves have been installed and are in operation on the leveler bars of #1 and #2 pusher machines. Engineering is investigating a more efficient type air seal.

REPORT OF TECHNOLOGY

Interlake, Inc., through its representatives on various committees, has been an active participant in programs sponsored by the American Iron and Steel Institute. The AISI became aware of potential hazards related to coke oven workers in the Pittsburgh area through work being done by a fellow of the Pittsburgh School of Public Health. This work was sponsored by US Steel, J&L Steel, and others, beginning in 1961. AISI offered to help sponsor an expanded investigation of other areas of the United States to determine if the same pattern held true or if the pattern was peculiar to the Pittsburgh District. Ultimately, it was shown the pattern held true for all districts of the United States.

Concurrent with the research program on the effect of the environment on the health of coke oven workers, a task force was appointed to survey known technology and evaluate its application to coke oven operations to reduce or contain emissions. Several scrubber-type charging cars were being installed on new battery constructions at this time. Reports on their progress and efficiency were furnished to the task force group. These reports on the larry cars installed in 1967-1968 did not indicate they were very satisfactory as a reliable system for preventing emissions during charging.

In 1969, the AISI co-sponsored with the Federal EPA, a project for smokeless charging which was developed and installed as a prototype project on P-4 battery of J&L's Pittsburgh Works. This particular project was designed on the principle that all gas being evolved should be captured in the collector main. Charging spouts and hopper discharges were designed to maintain a seal at all times during the charge. Some basic units of the total project were sound and proven applicable to the basic charging procedure. The car, itself, was sophisticated electronically to adapt to automatic control of charging and leveling which was difficult to maintain.

Subsequent to the development of the AISI/EPA charging car, US Steel initiated and perfected the technique of stage charging to accomplish a smokeless charge. The main requirements were to provide adequate suction and suction from two sources. This is accomplished either with a double collector main or by use of a "U" tube to use on adjoining oven as an assist oven. US Steel's development of the technique on a single collector main battery pointed out the need to control the amount and number of openings to the oven during charging, provide a smoke sleeve with adequate seals for the leveler bar, and to increase aspirating steam to provide adequate suction.

"Pipeline" charging or Coalteck Preheat Coal Charging is recognized as a potentially true smokeless charge. The system is still being proven on a commercial scale. Problems associated with the system other than actual charging remain to be solved. The charging procedure has proven to be smokeless. Application of the system to existing units is still questionable.

The Summary Report on Control of Coke Oven Emissions to the American Iron and Steel Institute by Battelle Columbus Laboratories in 1973 gave a very comprehensive review of the state of the art in all areas of the coking process with an evaluation of the effectiveness of the known technology. This is a very fair and reliable guide to known available technology.

REPORT OF TECHNOLOGY

The potential for use of high pressure water for cleaning is well known. Applicable design of systems for adaption to coke oven needs is still required. Manual use of high pressure water cleaning has been utilized for specific problems. A manual system for gooseneck cleaning is currently in service at Interlake.

As an active member of AISI, Interlake is currently involved with the AISI/EPA sponsored program of Battelle Columbus Laboratories for development of more effective coke oven door seals.

MONITORING OF REGULATED AREAS

Monitoring data for all occupations in the regulated areas will be obtained and recorded. The regulated areas are defined as follows:

1. The coke oven batteries including topside and its machinery, pusher side and its machinery, coke side and its machinery, and the battery between the pinion walls.
2. The wharf.

SCHEDULE FOR IMPLEMENTATION

A. Engineering Controls for Charging

1. Stage Charging

Both larry cars have been modified for stage charging. Car number one was modified to individual turntable feed in 1972. Development of stage charging procedures with this configuration was not as effective as expected. Therefore, in 1976, number two car was converted to a gravity feed car equipped with individually operated drop sleeves and slide gates. Number two car was much more effective in controlling emissions than number one car, so it was planned to convert number one car to gravity feed hoppers with individually operated drop sleeves and slide gates. The conversion was completed during the fourth quarter of 1977.

2. Double Drafting

Both larry cars have been equipped with "U" tubes to provide double drafting of the oven during the charge by using an assist oven. Installation of the "U" tubes was completed during modifications for stage charging.

3. Aspiration

Aspirating steam for charging and decarbonizing has been available since the batteries were built, as part of the initial installation. Aspirating steam potential for charging was increased in 1975 with the installation of a larger steam header with capabilities for increased steam pressure. Aspirating steam nozzles were also increased in size at this time.

4. Mechanical Volumetric Controls

These controls are provided on the hoppers of both larry cars as a part of the initial installation of the coke ovens.

5. Devices to Facilitate the Rapid Continuous Flow of Coal

Number one and two larry cars have been equipped with the air jet, called an "air cannon", to facilitate the rapid continuous flow of coal.

6. Individually Operated Drop Sleeves and Slide Gates

Number one and two larry cars have been equipped with individually operated drop sleeves and slide gates.

7. Mechanized Gooseneck and Standpipe Cleaners

A high pressure water jet gooseneck cleaner has been designed for installation on one of the larry cars. Its installation was completed in 1978. The device works satisfactorily, but debugging continues. A second and similar unit is being installed on the batteries.

SCHEDULE FOR IMPLEMENTATION

8. Air Seals on Leveler Bars

The coal spillage sleeves, which were part of the original pusher machine design, were modified in 1972 to provide an air seal for the leveler bar. Improved designs were developed by Corporate Engineering. The leveler bar seals were installed in 1978.

9. Roof Carbon Cutters

Carbon cutters were provided on the pusher ram head as part of the original installation.

B. Engineering Controls for Coking

1. Pressure Control Systems for Collector Mains

A pressure control system to maintain uniform collector main pressures was provided with the original coke oven installation.

2. Door Repair Facilities

Door repair facilities, both coke and pusher side, immediately available to the door handling equipment at bench level, have been provided as part of the original coke oven installation. Spare door racks are also available as part of the system to provide ready access to spare doors and to facilitate door repairs.

3. Adequate Spare Doors

Eight spare doors were provided when the ovens were originally built. Four additional spare doors were purchased to increase the total to 12 spare doors.

4. Chuck Door Gaskets

Gasketing materials or sealants are available for temporary control of chuck door emissions.

5. Heat Shields on Door Machines

Heat shields on door machines are provided as part of the original machine design for the coke ovens.

C. Filtered Air

Positive pressure temperature controlled filtered air is provided for battery topsides, lunchroom and wharf. A project has been initiated internally under two separate Engineering Requests to develop necessary equipment and costs for project approval and installation. A schedule of anticipated completion dates is as follows:

SCHEDULE FOR IMPLEMENTATION

<u>Equipment</u>	<u>Anticipated Completion Date</u>
#1 Larry Car	Completed and in service - 4-27-79
#2 Larry Car	Completed and in service - 5- 3-79
#1 Pusher	Completed and in service - 4-30-79
#2 Pusher	Completed and in service - 5-31-79
#1 Quench Car-Locomotive	Completed and in service - 12-28-79
#2 Quench Car-Locomotive	Completed and in service - 5- 1-80
#1 Door Machine	Completed and in service - 2-25-80
#2 Door Machine	Completed and in service - 7- 6-79

D. Work Practice Controls

1. Charging

- a. Procedure and Works Practices have been written and included in this document.

2. Pushing

- a. Procedures and Work Practices have been written and included in this document.

3. Coking

- a. Procedures have been written and included in this document.