

## COAL LABORATORIES AND THEIR PROBLEMS

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THE DECADE OF THE SEVENTIES SPARKED A HUGE UPHEAVAL IN THE COAL INDUSTRY. PUBLIC AWARENESS OF THE DANGER OF DEPENDENCE ON AN IMPORTED ENERGY SUPPLY, AND THE REALIZATION THAT A SUBSTANTIAL SHIFT TO COAL WOULD BE ESSENTIAL TO ECONOMIC GROWTH MADE THE ONCE-SHUNNED FUEL A MORE ATTRACTIVE PROSPECTIVE TO THE INVESTOR. HUNDREDS OF NEW MINES WERE OPENED AND THE CAPACITY OF EXISTING MINES INCREASED. THE COAL LABORATORY, A TINY MICROCOSM BOBBING IN THE WAKE OF THE COAL INDUSTRY, HAS UNDERGONE VAST CHANGES IN ATTEMPTING TO COPE WITH THE INCREASED DEMANDS FOR QUANTITY, SPEED AND DIVERSITY IN COAL TESTING. NOT ONLY IS THE LABORATORY FACED WITH A QUANTITATIVE INCREASE, BUT TODAY'S CONSUMER OF COAL LABORATORY SERVICES MAKES MORE SOPHISTICATED ANALYTICAL REQUESTS, REQUIRES QUICKER TURNAROUND, AND REQUESTS ASSISTANCE WITH A PLETHORA OF ENVIRONMENTAL PROTECTION PROBLEMS.

IN THE HISTORY OF EARTH'S SEARCH FOR FUEL, THE COAL LABORATORY--IN FACT, THE WHOLE COAL INDUSTRY--IS OF RELATIVELY RECENT ORIGIN. ALTHOUGH MINING AND THE USE OF COAL AS A FUEL BEGAN IN THE TWELFTH CENTURY IN GREAT BRITAIN, ANNUAL PRODUCTION DID NOT REACH SEVEN MILLION TONS UNTIL 1750. BY THE TURN OF THE TWENTIETH CENTURY, COAL WAS BEING PRODUCED ON A WORLD-WIDE SCALE AND THE COAL TESTING LABORATORY

WAS BORN. THESE LABORATORIES WERE DESTINED TO GROW AND MULTIPLY FOR SEVERAL REASONS INCLUDING THE ABUNDANCE OF COAL IN THE EARTH'S CRUST AND ITS WIDE GEOGRAPHIC DISPERSION. AS THE USE OF COAL CONTINUED TO INCREASE, THE FLEDGLING LABORATORY WAS ASSURED A CONTINUING SUPPLY OF SAMPLES.

GROWTH WAS CONSTANT, BUT IN THE EARLY YEARS IT WAS VERY SLOW. INVESTIGATIONS WERE UNDERTAKEN TO UNDERSTAND THE ORIGIN OF COAL, AND VARIOUS CLASSIFICATION SYSTEMS BEGAN TO BE DEVELOPED. AGREED-UPON WAYS OF CONDUCTING TESTS HAD TO BE FORMULATED BY GROUPS COMPOSED OF BUYER, SELLER, AND OTHER INTERESTED PARTIES.

THE WORK OF COAL CHEMISTS IS A PROCESS OF GARNERING INFORMATION FROM CHEMICAL AND PHYSICAL TESTS PERFORMED IN THE LABORATORY AND USING THIS INFORMATION TO DESCRIBE, CLASSIFY, AND PREDICT THE PERFORMANCE OF COAL UNDER VARYING PHYSICAL AND CHEMICAL CONDITIONS. A BODY OF KNOWLEDGE SLOWLY DEVELOPED ON THE QUALITY OF VARIOUS COAL SEAMS AND THE COAL CHARACTERISTICS OF INDIVIDUAL MINES.

IN THE EARLY YEARS OF COAL TESTING, MOST OF THE TESTING INSTRUMENTS USED HAD BEEN DESIGNED FOR OTHER PURPOSES AND NEEDED TO BE ADAPTED FOR USE IN THE COAL LABORATORY. OCCASIONALLY A NEW INSTRUMENT SPECIFICALLY DESIGNED FOR MEASUREMENT OF A PARTICULAR COAL CHARACTERISTIC WOULD BE INTRODUCED, BUT COAL LABORATORIES OF THE EARLY 1900S WERE NOT CHARACTERIZED BY GREAT SOPHISTICATION. BECAUSE OF THE HETEROGENEITY

OF COAL, TESTS WERE HIGHLY EMPIRICAL. IN FACT, THE DETERMINATION OF SULFUR CONTENT WAS THE ONLY REAL WET CHEMICAL TEST RUN BY MOST LABORATORIES. OTHER COMMON DETERMINATIONS, SUCH AS MOISTURE, ASH, AND VOLATILE MATTER, WERE MADE BY PHYSICAL TESTING METHODS.

CALORIMETRY WAS VERY CRUDE. OLD TIMERS IN THE BUSINESS STILL TELL HORROR STORIES ABOUT THE FOUR FOOT SPANER WRENCH NEEDED TO SEAL LEAD GASKETS ON EARLY COMBUSTION BOMBS. APPLYING SUFFICIENT FORCE TO PREVENT OXYGEN LEAKAGE FROM THE BOMB REQUIRED EXERTION OF THE FULL STRENGTH OF A MUSCULAR MAN AND OPENING THE BOMB AFTER COMBUSTION WAS EVEN MORE DIFFICULT. OXYGEN LEAKAGE WAS NOT THE ONLY PROBLEM IN COAL CALORIMETRY. VARIOUS SCHEMES WERE TESTED TO ISOLATE THE HEAT RISE ATTRIBUTABLE TO COAL COMBUSTION FROM THE EFFECTS OF THE BOMB'S SURROUNDINGS, AND MANY YEARS WERE SPENT BEFORE AN ADEQUATE SOLUTION WAS FOUND. EARLY CALORIMETRY REQUIRED THE SERVICES OF A VERY DEDICATED OPERATOR TO ACCOMPLISH RELIABLE RESULTS.

THE GAS FUSION FURNACES WERE LOUD AND SMELLY. THE OPTICAL PYROMETERS USED TO READ TEMPERATURES WERE BULKY AND UNHANDY. READING THE MELTING POINT OF FUSION CONES WAS ACCOMPLISHED BY VISUAL MEANS AND SOMETIMES RESULTED IN A WELDER'S FLASH BURN TO THE OPERATOR'S EYE. ANALYTICAL BALANCES WERE THE SWING-ARM TYPE, NEEDING CAREFUL USAGE AND CONSTANT MAINTENANCE. BECAUSE OF THE BROWN TO BLACK COLOR OF COAL AND THE PERVASIVENESS OF FINELY DIVIDED COAL DUST, THE MAJOR PROBLEM OF THE COAL LABORATORY WAS CLEANLINESS.

UNFORTUNATELY, THIS PROBLEM STILL PLAGUES THE MODERN LAB.

SEVERAL LABORATORIES THAT BEGAN OPERATIONS IN THE EARLY 1900S ARE STILL ACTIVE TODAY. THESE LABORATORIES HAVE GROWN IN SIZE, CAPABILITY, AND TECHNICAL SOPHISTICATION. HUNDREDS OF NEW LABORATORIES HAVE BEEN FORMED. BASICALLY THERE ARE FOUR TYPES OF COAL LABORATORIES. THEY INCLUDE:

1. PRODUCER LABORATORIES - THOSE LABORATORIES OWNED AND OPERATED FOR CONTROL PURPOSES BY THE COAL PRODUCER. THESE VARY FROM THE SMALL LABORATORY PERFORMING ONLY ONE OR TWO TESTS, SUCH AS QUICK CHECK ON ASH OR MOISTURE, TO THE LARGE, ELABORATE PROFESSIONALLY STAFFED ORGANIZATION OF SOME MAJOR COAL COMPANIES.
2. CONSUMER LABORATORIES - THOSE LABORATORIES OWNED AND OPERATED FOR CONTROL PURPOSES BY THE COAL CONSUMER. THEY ALSO VARY GREATLY IN SIZE AND NUMBER OF TESTS RUN.
3. INDEPENDENT LABORATORIES - THOSE LABORATORIES INDEPENDENTLY OPERATED, THE OWNERSHIP OF WHICH HAS NO VESTED INTEREST IN THE COAL INDUSTRY IN ANY WAY OTHER THAN THE RENDERING OF A COAL TESTING SERVICE.

4. RESEARCH LABS - THOSE LABORATORIES DEVOTED TO RESEARCH IN THE FIELD OF COAL INDUSTRY DEVELOPMENT AND COAL USAGE. THEY MAY BE EITHER PRODUCER, CONSUMER, OR INDEPENDENT. RESEARCH FACILITIES ARE OFTEN MAINTAINED BY EDUCATIONAL AND GOVERNMENTAL AGENCIES SUCH AS STATE UNIVERSITIES, EPA, AND THE BUREAU OF MINES.

MANY LABORATORIES COMBINE A CONTROL FUNCTION WITH RESEARCH CAPABILITIES. IN THESE LABORATORIES, MANY DIFFERENT APPROACHES HAVE BEEN TAKEN IN THE ATTEMPT TO BRING ORDER TO THE COMPLEXITY THAT IS COAL. THE PROXIMATE ANALYSIS IS THE MOST USEFUL APPROACH FOR COMMERCIAL PURPOSES. COAL IS GENERALLY BOUGHT AND SOLD ON THE BASIS OF A GROUP OF EMPIRICAL TESTS CALLED A PROXIMATE ANALYSIS. THESE TESTS INCLUDE MOISTURE, ASH, VOLATILE MATTER, AND FIXED CARBON. THE FIRST THREE VALUES ARE DETERMINED BY LABORATORY TESTS, AND FIXED CARBON IS CALCULATED BY SUBTRACTING THE SUMS OF THESE VALUES FROM 100 PERCENT. TWO OR THREE OTHER TESTS (SULFUR CONTENT, CALORIFIC VALUE, AND FUSION TEMPERATURE OF ASH) ARE OF VITAL IMPORTANCE IN COMMERCE, ALSO.

ANOTHER TYPE OF CHEMICAL TEST IS THE ELEMENTARY OR ULTIMATE ANALYSIS. IN THIS TEST THE GASEOUS PRODUCTS OF COAL'S COMPLETE COMBUSTION ARE ANALYZED TO DETERMINE THE AMOUNTS OF HYDROGEN AND CARBON PRESENT. SULFUR, NITROGEN, AND ASH ARE DETERMINED IN THE MATERIAL AS A WHOLE, AND A CALCULATION IS MADE FOR OXYGEN BY SUBTRACTION FROM 100 PERCENT. A KNOWLEDGE

OF ELEMENTAL ASSOCIATIONS IN COAL CAN PROVIDE VALUABLE INFORMATION FOR COAL BENEFICATION ACTIVITIES AND IS USEFUL IN ASSESSING THE EXTENT OF THE HARM TO THE ENVIRONMENT OF COAL COMBUSTION. SO, TODAY, COAL IS ANALYZED FOR A NUMBER OF MAJOR AND MINOR OR TRACE ELEMENTS.

ANOTHER TYPE OF INVESTIGATIVE APPROACH IS THE STUDY OF THE FUNDAMENTAL PHYSICAL CONSTITUENTS OF COAL. THE SOURCE OF COAL ASH IS THE INORGANIC MATTER PRESENT IN COAL. THIS MATTER OCCURS PREDOMINATELY AS DISCRETE PARTICLES UNEVENLY DISTRIBUTED IN COAL BUT, ALSO, AS CHEMICAL ELEMENTS COMBINED WITH ORGANIC MATTER AND IN DISSOLVED MATERIAL IN THE PORE WATER. PHYSICAL CONSTITUENTS IN COAL ARE STUDIED BY MEGASCOPIIC OBSERVATION OF COAL BEDS IN THE FIELD OR SAMPLES THEREOF AND AS AN AGGREGATE OF BOTANICAL ENTITIES THROUGH MICROSCOPIC MEANS USING OPTICAL MICROSCOPY, SCANNING ELECTRON MICROSCOPY, AND X-RAY DEFLECTION. THIS APPROACH IS CALLED COAL MICROSCOPY, OR MORE COMMONLY, COAL PETROGRAPHY, AND IT IS USEFUL IN SOLVING PROBLEMS ENCOUNTERED IN BLENDING AND UTILIZATION OF VARIOUS TYPES OF COALS IN COKE PRODUCTION.

MANY SOPHISTICATED STUDIES INVOLVING MODERN INSTRUMENTATION ARE BEING CONDUCTED ON COAL, AND THE CATALOG OF TESTING SERVICES OFFERED BY COAL LABORATORIES GROWS DAILY. FROM THE LABORATORY THE COAL PRODUCER CAN EXPECT TO RECEIVE DAILY INFORMATION ON COAL QUALITY BEFORE SHIPMENT, ENABLING HIM TO MAKE DECISIONS ABOUT PRICE AND ENVIRONMENTAL IMPACT. HE CAN BLEND VARIOUS COALS TO BUILD A MORE DESIRABLE OR MORE VALUABLE

PRODUCT. HE CAN MAKE DECISIONS ABOUT FUTURE MINING OPERATIONS BASED ON INFORMATION GATHERED FROM THE ANALYSIS OF CORE DRILLS AND CAN REGULATE HIS COAL WASHING OPERATIONS FROM COAL WASHABILITY DATA.

THE CONSUMER ALSO GAINS VALUABLE INFORMATION FROM THE LABORATORY INVOLVING PRICE DETERMINATION, PROTECTION FROM BOILER FOULING, AND ADVANCE KNOWLEDGE NECESSARY FOR COKE FORMATION AND STEEL QUALITY DECISIONS. HE, TOO, IS CONSTRAINED BY ENVIRONMENTAL REGULATIONS AND, BEFORE IT IS BURNED, NEEDS TO KNOW COAL'S IMPACT UPON THE ECOSPHERE. MANY BUSINESSES ARE AFFECTED BY COAL AND ARE RELIANT ON THE INFORMATION EMANATING FROM THE COAL LABORATORY; IMMENSE SUMS OF MONEY ARE EXPENDED ON COAL LABORATORY DATA.

BUT, BIG OR SMALL, COMPLEX OR SIMPLE, CAPTIVE OR INDEPENDENT, ALL COAL LABORATORIES HAVE COMMON PROBLEMS STEMMING FROM THE FACT THAT THE RAW MATERIAL WHICH THEY TEST IS ONE OF THE MOST HETEROGENEOUS SUBSTANCES ON EARTH.

COAL IS A BLACK/BROWN COMBUSTIBLE ROCK OF ORGANIC ORIGIN. JUST AS EVERY HUMAN IS AN INDIVIDUAL UNIT, AS NO TWO TREES ARE THE SAME, OR EVEN AS NO TWO LEAVES ON A TREE ARE IDENTICAL, COAL EXHIBITS THE COMPLEXITY EXPECTED FROM A CONSIDERATION OF ITS ORIGIN. COAL IS FORMED FROM PLANT REMAINS, NO TWO PLANTS OF WHICH WERE IDENTICAL. IT WAS FORMED BY ACCUMULATION METHODS THAT WERE PERHAPS SIMILAR IN EACH TIME PERIOD AND LOCATION BUT NEVER IDENTICAL. THESE ACCUMULATED PLANT REMAINS

WERE PROBABLY PARTLY DECOMPOSED--AGAIN A PROCESS NOT CHARACTERIZED BY UNIFORMITY--BEFORE THEY WERE SUBJECTED TO VARIOUS CONDITIONS OF SEDIMENTARY BURIAL. THE FINAL STEPS, THOSE OF INCREASING TEMPERATURE AND PRESSURE, COULD NOT HAVE BEEN IDENTICAL EVEN IN THE SAME COAL BED, MUCH LESS IN VARIOUS LOCATIONS IN THE WORLD THROUGHOUT GEOLOGICAL HISTORY. IT IS LITTLE WONDER THEN THAT COAL EXHIBITS A WIDE RANGE OF PROPERTIES.

COAL'S HETEROGENEOUS NATURE DICTATES THAT THE EARLY TESTS WERE PREPONDERATELY EMPIRICAL AND BASED UPON ECONOMIC NECESSITY. THE SAME HETEROGENEITY INCREASES THE PROBLEMS ASSOCIATED WITH SAMPLE TAKING. THE GREATER THE DEGREE OF VARIABILITY OF A MATERIAL, THE MORE DIFFICULT IT BECOMES TO OBTAIN A REPRESENTATIVE SAMPLE OF THE MATERIAL.

THE COAL LABORATORY IS FACED WITH THE TASK OF SAMPLING ONE OF THE MOST DIFFICULT OF ALL NATURAL MATERIALS TO SAMPLE. LARGE AMOUNTS OF COAL MUST BE COLLECTED IN AS SYSTEMATIC A MANNER AS POSSIBLE, AND THEN MUST BE REDUCED IN VOLUME AND SIZE USING CAREFULLY CONTROLLED METHODS. MOST OF THIS WORK IS DONE OUTSIDE THE LABORATORY, AND IT IS IMPOSSIBLE BY LOOKING AT THE LABORATORY SAMPLE TO TELL WHETHER OR NOT CORNERS WERE CUT IN SAMPLING AND PREPARATION. THEREFORE, THE LABORATORY MANAGER OR SAMPLING DIRECTOR FACES A MASSIVE TASK IN SUPERVISION OF THESE ACTIVITIES.



AFTER THE COAL SAMPLE HAS BEEN TAKEN BY OR UNDER THE SUPERVISION OF A PERSON QUALIFIED BY EXPERIENCE AND TRAINING FOR THE RESPONSIBILITY AND WHO HAS UNDERSTANDING OF THE VARIABLE CONDITIONS UNDER WHICH COAL MAY BE SAMPLED, SPECIFIC INFORMATION ABOUT THE IMMEDIATE CONDITIONS AND A KNOWLEDGE OF THE NATURE OF THE PARTICULAR COAL BEING SAMPLED, THE COAL IS READY FOR REDUCTION FROM A GROSS SIZE (REQUIREMENT FOR UNCLEANNED COAL--210 POUNDS OF 2" X 0 COAL) TO A LABORATORY SAMPLE OF 50 TO 100 GRAMS OF -60 MESH COAL. THE INDEPENDENT, QUALITY CONTROL LABORATORY IS OFTEN REQUIRED TO PERFORM THIS PREPARATION PROCESS ON HUNDREDS OF SAMPLES DAILY, WHILE CONSTANTLY PROTECTING THE INTEGRITY OF EACH INDIVIDUAL SAMPLE. ONE DOES NOT DO THE JOB OF CRUSHING AND RIFFLING COAL IN A CLEAN WHITE LAB COAT.

THE SIZE AND COMPLEXITY OF HOUSEKEEPING CHORES IN A COAL LABORATORY ARE STAGGERING. CLEANLINESS IS BASIC IN ANY LABORATORY, BUT IF A SCALE OF DIFFICULTY IN ACCOMPLISHING THIS BASIC FUNCTION IS EVER ESTABLISHED, COAL LABORATORIES WILL HAVE TO BE AT THE TOP OF THE LIST. SMALL WONDER THAT CLEANLINESS IN THE COAL LAB IS JUST AS UNATTAINABLE AS GODLINESS.

RECRUITMENT OF PERSONNEL IS THE MOST FRUSTRATING TASK OF COAL LABORATORY MANAGEMENT. MUCH OF THE WORK IN THE TESTING OF COAL DOES NOT YIELD READILY TO AUTOMATION. IT IS EXTREMELY DIFFICULT TO FIND PEOPLE WHO ARE WILLING TO ACCEPT JOBS WHICH GET THEM DIRTY. SINCE DIRTY JOBS ARE NOT DESIRABLE,

APPLICANTS ARE FEW AND USUALLY HAVE LITTLE TRAINING OF ANY SORT AND, YET, THE JOBS AVAILABLE IN COAL SAMPLING AND SAMPLE PREPARATION REQUIRE PHYSICAL STAMINA AND INTELLIGENCE AS WELL AS EXTENSIVE TRAINING. THIS IS A DIFFICULT PACKAGE TO FIND, AND WHEN WE ADD A TOLERANCE TO DAILY IMMERSION IN COAL DUST, IT BECOMES ALMOST IMPOSSIBLE TO RECRUIT PERSONNEL FOR CERTAIN LABORATORY JOBS. ALSO, THERE ARE PROBLEMS ASSOCIATED WITH RECRUITMENT OF TECHNICIANS FOR LABORATORY BENCH WORK, SINCE THE NEED FOR COAL TESTING SERVICES IS NOT RESTRICTED TO DESIRABLE LOCATIONS AND TECHNICALLY TRAINED PEOPLE DO NOT CHOOSE TO LIVE IN REMOTE AREAS.

THE PURCHASER OF COAL TESTING SERVICES NEEDS TO TAKE SEVERAL FACTORS INTO CONSIDERATION WHEN HE IS RATING A LABORATORY. QUALITY OF WORK, CONFIDENTIALITY OF RESULTS, SPEED AND PRICE--IN THAT ORDER. TOO OFTEN THE ORDER IS REVERSED. SPEED OF SERVICE AND LOW PRICE ARE ENTIRELY IRRELEVANT IF THE QUALITY OF THE ANALYTICAL WORK IS QUESTIONABLE OR IF THE RESULTS OF THE LAB TESTS ARE MADE AVAILABLE TO OTHER INTERESTS. THE UNINFORMED BUYER OF ANALYTICAL SERVICES IS PRONE TO TAKE QUALITY FOR GRANTED AND THEN EXPECT BOTH FAST SERVICE AND LOW PRICE.

THE PRIME CONSIDERATION IN CHOOSING A LABORATORY MUST BE A JUDGEMENT REGARDING THE ABILITY OF THE LAB TO PRODUCE ANALYTICAL DATA THAT IS CLOSE TO THE TRUE VALUE OF THE PRODUCT TESTED. TRUE VALUE, OF COURSE, CANNOT BE DETERMINED UNTIL THE TOTAL VOLUME OF COAL IS CONSUMED, BUT THE MEASURE OF

A LABORATORY'S QUALITY IS HOW CLOSE IT CAN COME TO THE TRUE VALUE BY SAMPLING AND ANALYZING A REPRESENTATIVE PORTION OF THE GROSS LOT. THE SOPHISTICATED CONSUMER OF LABORATORY SERVICES WILL REQUIRE THE LABORATORY TO DEMONSTRATE ITS CAPABILITY.

TO BE COMPETITIVE, THE MODERN COAL LABORATORY MUST HAVE A GOOD QUALITY CONTROL SYSTEM. IT SHOULD BE ABLE TO PROVE THAT IT PROVIDES A UNIFORM, QUALITY SERVICE IN TESTING, INSPECTION, ANALYSIS AND, IF APPLICABLE, RESEARCH. IT SHOULD BE ABLE TO MEET MINIMUM SPECIFICATIONS IN THREE AREAS: PERSONNEL, EQUIPMENT (INCLUDING CALIBRATION AND STANDARDIZATION), AND EVALUATION OF RESULTS. A COAL LABORATORY SHOULD BE UNDER THE TECHNICAL SUPERVISION OF A PROFESSIONAL SCIENTIST. IT SHOULD BE STAFFED BY PERSONNEL WHO ARE QUALIFIED BY TRAINING AND EXPERIENCE TO CONDUCT TESTS AND INSPECTIONS, TO PERFORM CALIBRATIONS AND STANDARDIZATIONS, AND TO CERTIFY THAT MATERIALS AND PRODUCTS TESTED COMPLY WITH THE REQUIREMENTS OF APPLICABLE STANDARDS.

COAL LABORATORIES SHOULD HAVE ALL THE NECESSARY TEST FACILITIES FOR THE WORK WHICH IT WARRANTS IT IS ABLE TO PERFORM AND BE CAPABLE OF MAKING AND REPEATING MEASUREMENTS AND ANALYSES ACCURATE WITHIN THE LIMITS SPECIFIED IN THE APPROPRIATE STANDARDS. THEIR STANDARD REFERENCE MATERIALS SHOULD HAVE DIRECT TRACEABILITY TO THE NATIONAL BUREAU OF STANDARDS OR OTHER APPROPRIATE AGENCIES. THE LABORATORY MUST BE ABLE TO GIVE AND PROVE IT CAN GIVE ACCURATE, RELIABLE, AND REPEATABLE RESULTS. THIS IS BEST DEMONSTRATED BY A GOOD REFERENCE SAMPLE PROGRAM,

SOMETIMES CALLED A ROUND ROBIN PROGRAM. NOT ONLY MUST THE LAB BE ABLE TO GIVE ACCURATE, REPEATABLE RESULTS BUT IT SHOULD BE ABLE TO DEMONSTRATE BY ITS RECORDS THAT IT IS CAPABLE OF REPEATABILITY AND ACCURACY IN LABORATORY TEST RESULTS.

FORTUNATELY, IT IS MUCH EASIER TODAY TO ASSESS A LABORATORY, PERHAPS BECAUSE OF AN INCREASED INTEREST IN LABORATORY ACCREDITATION WHICH HAS CAUSED TO BE DEVELOPED A GREAT MANY GUIDELINES FOR USE IN JUDGING THE RELATIVE MERITS OF LABORATORIES. ONE OF THE OUTSTANDING PROGRAMS IS THAT OF THE AMERICAN ASSOCIATION FOR LABORATORY ACCREDITATION (AALA), WHICH, WITH ITS PARENT ORGANIZATION, THE AMERICAN COUNCIL OF INDEPENDENT LABORATORIES, HAS DEVELOPED CRITERIA FOR ACCREDITING SEVERAL TYPES OF LABORATORIES ON THE BASIS OF SUCH PARAMETERS AS PERSONNEL QUALIFICATION AND EXPERIENCE, CONDITION OF TEST EQUIPMENT, RECORDKEEPING AND QUALITY CONTROL SYSTEMS, AND OTHER NECESSARY LABORATORY CONTROLS. THE CAREFUL CONSUMER OF LABORATORY SERVICES WOULD BE WELL ADVISED TO SECURE INFORMATION ON SPECIFICATIONS TO BE USED IN JUDGING LABORATORIES FROM THE AMERICAN COUNCIL OF INDEPENDENT LABORATORIES, INC., 1725 K. STREET, NW, WASHINGTON, DC 20005. ASTM COMMITTEE D05 ON COAL AND COKE IS ALSO CURRENTLY PREPARING A STANDARD WHICH WILL BE USED FOR THE EVALUATION OF TESTING LABORATORIES.

A WORD SHOULD BE SAID ABOUT THE ROLE OF THE PRIVATE, FOR-PROFIT, INDEPENDENT COAL LABORATORY IN THE UNITED STATES ECONOMY. THESE INDEPENDENT LABORATORIES PROVIDE A VALUABLE SERVICE TO THE COAL INDUSTRY, SINCE THEY RENDER REPORTS OBJECTIVELY AND WITHOUT VESTED INTEREST. THE CORNERSTONE OF

OF THE STRUCTURE OF THE INDEPENDENT LABORATORY IS ITS INDEPENDENCE, IMPARTIALITY AND OBJECTIVITY. THE OWNER OR MANAGER OF THE INDEPENDENT LABORATORY MUST REPORT FACTS TO CLIENTS IN AN UNBIASED WAY, COMPARABLE TO THAT OF A PROFESSIONAL IN MEDICINE AND LAW. THE LABORATORY DOES NOT LONG REMAIN IN OPERATION UNLESS IT MAINTAINS ABSOLUTE INDEPENDENCE, IMPARTIALITY AND CONFIDENTIALITY, WHETHER THE CLIENT BE AN AGENT OF GOVERNMENT, A COAL PRODUCER, A SELLER, OR A COAL CONSUMER, OR ANY OTHER LINK IN THE CHAIN OF COMMERCE AND INDUSTRY. THE INDEPENDENT LABORATORY IS AN IMPORTANT BUILDING BLOCK OF OUR FREE ENTERPRISE SOCIETY. THESE FIRMS HELP:

- A. INDUSTRY TO IMPROVE THE QUALITY AND THE PERFORMANCE OF ITS PRODUCT
- B. CONSUMERS TO CHOOSE WISELY AMONG A RANGE OF PRODUCTS
- C. GOVERNMENT AGENCIES TO OBTAIN ACCURATE AND OBJECTIVE ENGINEERING AND SCIENTIFIC INFORMATION SUPPORTING THEIR LEGISLATIVE RESPONSIBILITIES.

THUS, A PROPER ENVIRONMENT FOR GROWTH OF INDEPENDENT LABORATORIES IS IN THE NATIONAL INTEREST.

THE COAL LABORATORY OF TODAY FACES A BRIGHT FUTURE. MANY CHANGES HAVE BEEN MADE SINCE THE EARLY 1900S. RAPID STRIDES HAVE BEEN MADE IN INSTRUMENTATION. MODERN CALORIMETRY REQUIRES LITTLE OPERATOR INPUT. ELECTRIC FUSION FURNACES WITH AUTOMATED TELEVISION READOUT SYSTEMS MAKE ASH FUSION TESTS SIMPLER AND MORE ACCURATE. ANALYTICAL BALANCES ARE ELECTRONICALLY CONTROLLED AND HAVE DIGITAL READOUTS.

COMPUTERS HAVE BEEN DEVELOPED TO OPERATE MANY LABORATORY FUNCTIONS WITHOUT HUMAN HELP. SAFETY PRACTICES HAVE BEEN VASTLY IMPROVED. QUALITY CONTROL AND QUALITY ASSURANCE PROGRAMS ARE THE NORM INSTEAD OF THE EXCEPTION. NEW FRONTIERS, SUCH AS TESTING FOR THE SYNFUELS INDUSTRY, ARE BEING EXPLORED. ACCREDITATION BY A NATIONALLY RECOGNIZED ORGANIZATION (AALA) IS A REALITY INSTEAD OF A DREAM. THE ROLE OF THE INDEPENDENT LABORATORY HAS BEEN FIRMLY ESTABLISHED AS A FUNCTIONING INTER-MEDIARY BETWEEN BUYERS AND SELLERS OF COAL.

OTHER THINGS FIRMLY RESIST CHANGE: COAL IS STILL HETEROGENEOUS, IT IS STILL BLACK. CLEANLINESS IN THE LAB IS STILL ACCOMPLISHED WITH GREAT DIFFICULTY AND REQUIRES ETERNAL VIGILANCE. THE COAL LAB WORKER STILL MUST BE INTELLIGENT, VERY STRONG, AND MUST LOVE SOAP AND WATER. THE CUSTOMER STILL WANTS ANALYTICAL RESULTS THE DAY BEFORE YESTERDAY AND WANTS THEM WITH ASTM STANDARD ACCURACY.

WITH ALL ITS PROBLEMS, COAL TESTING HAS SURVIVED ITS FIRST 100 YEARS -- THE PERIOD OF INFANCY. THE CHILD NOW WALKS AND LOOKS FORWARD TO THE DAY IN WHICH IT WILL RUN.