

AIR POLLUTION ASPECTS OF PROPOSED OIL SHALE DEVELOPMENT IN NORTHWESTERN COLORADO

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INTRODUCTION

It's a distinct honor to be here representing the Colorado Department of Health to relay my concerns regarding air pollution as a result of oil shale development in this state.

My biggest concern regarding oil shale development has been the substantial push by the federal government and big industry to get this new industry started in Colorado and built up to substantial size. But state and local interests have, in my opinion, been somewhat passive in acting upon both the positive and negative aspects of its impact upon the state. It's gratifying to start seeing a change in this state's passive behavior by having this seminar here today, and seeing the interest of the governor and the Colorado general assembly in establishing the School of Mines as a major environmental research center by looking in advance at such proposed developments.

One of Colorado's main attractions is its outstanding environment. Paraphrasing the concern of the Colorado Land Use Commission—we must be careful not to destroy, by overdeveloping our state, the very qualities that make Colorado such an attractive place in which to live. Energy development poses a serious threat to a still shiny but somewhat slightly tarnished reputation for clean air, mountain beauty, and a comfortable climate.

In regard to air pollution, I will cover the following items: expected emissions from oil shale processes, carcinogens in oil shale, and the estimated effects of oil shale development upon ambient air quality.

OIL SHALE PROCESS EMISSIONS

My staff is reviewing an "authority to construct" application from

Technical Secretary, Colorado Air Pollution Control Commission, and Acting Director, Air Pollution Control Division, Colorado Department of Health, Denver, Colo.

Colony Development Operation. My staff feels that this development has proposed good technology for controlling emissions. This Colony development plan contains emission estimates for the oil shale process.

A flow chart, generally depicting the TOSCO-type oil shale process, appears in figure 1. The plant is designed to process 66,000 tons per day of oil shale. At 25 gallons of oil produced per ton of shale processed, this plant would produce about 40,000 barrels of oil per day. The proposed plan contains six retort furnaces. Starting at the beginning of the process, fugitive dust emissions are expected from mine vents, roads, and other mining operations. Dust can be partially controlled by wetting down and using dust palliatives and other preventive measures. Fugitive dust emissions are also expected from the primary and fine crushers, conveyors, and surge bins. Controls on the crushers and surge bins will probably be dry collectors, that is, baghouse installations. Emissions from the conveyor transporting material from the primary crusher to open storage will likely be controlled by using water sprayers; however, the material being conveyed from the fine crusher to the surge bin will be fully enclosed and ventilated to a baghouse for control because of its fineness. From this point, the major emission sources include the oil shale preheaters, the elutriator (ceramic ball reheat and cleaning process), and the spent shale wetting and fractionation process. For this 40,000 ton oil shale processing plant, the total hourly emissions from the aforesaid sources are shown in table 1.

It is our preliminary conclusion that this particular operation is designed to meet air quality control regulations of the Colorado Air Pollution Control Commission except perhaps our odor control regulations of which the ultimate impact is still under review.

CARCINOGENS

Mr. Todd Reynolds, our air pollution laboratory supervising chemist, has assisted in preparing this portion of my paper. We think the available body of scientific knowledge is inadequate to assess properly the carcinogenic aspects of oil shale process emissions. Nevertheless, we are sufficiently concerned with possible health-related problems that I have instructed our enforcement section not to approve an "authority to construct" unless the polynuclear aromatic compounds are adequately identified and controlled. I have also instructed our enforcement staff to require ambient air monitoring for these compounds and to require revocation of a permit if unhealthy levels are detected. Besides process hydrocarbon emissions,

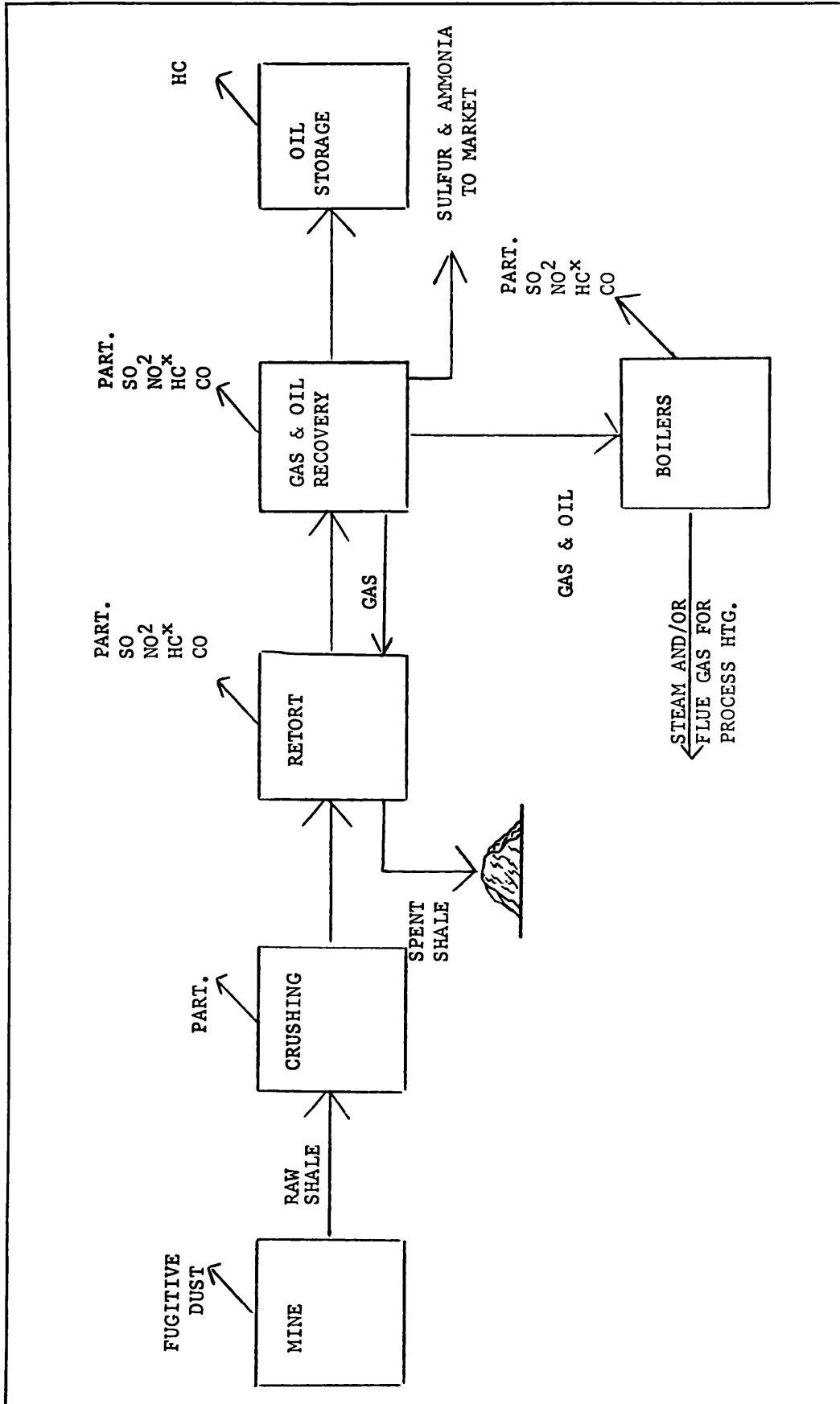


FIGURE 1.—Oil shale retorting process. Goal: 25 gallons oil/ton shale.

TABLE 1.—TOSCO oil shale process: summary of maximum emission rates lb/hr

SOURCE	SO ₂	NO _x	PARTICULATE	HC	CO
RAW SHALE CRUSHING & HANDLING	0	0	200	0	0
RETORTING	800	5000	600	300	40
GAS & OIL RECOVERY	200	800	15	3	14
BOILERS & SUPERHEATER	110	700	15	5	5
OIL STORAGE	---	---	---	2	---
TOTAL	1110	6500	830	310	59

we are also concerned about minute quantities of carcinogens which may be transported by blowing particles of oil shale or spent shale.

Since we are not a research operation, we must rely on other organizations for health effect information on which to base our final regulatory and permit decisions. We are especially interested in two papers being prepared by Denver Research Institute personnel which could shed some light on oil shale carcinogens:

“Investigation of the Hydrocarbon Structure of Kerogen from Oil Shale of the Green River Formation,” by J. J. Schmidt-Collerus and C. H. Prien; and

“Polycondensed Aromatic Compounds (PAC) and Carcinogens in the Shale Ash of Carbonaceous Spent Shale from Retorting of Oil Shale of the Green River Formation,” by J. J. Schmidt-Collerus, F. Bonomo, and C. H. Prien.

Some other critical questions regarding polynuclear aromatic hydrocarbons (PAHs) include—what are the *amounts* and *identities* of the PAHs present? How will the PAHs be *transported* into contact with humans or enter into food chains?

EFFECTS UPON AMBIENT AIR QUALITY

Besides the question of carcinogens, the ability of proposed oil shale processes and communities to meet existing state and federal ambient air quality standards is questionable. In Garfield and Rio Blanco Counties, the state standards for particulate matter and sulfur oxides are 45 and 15 micrograms per cubic meter, respectively. I doubt the standards will tolerate the amount of industrial activity and community growth now proposed for the Piceance Basin and adjacent areas. Our enforcement section will have to deny “authority to construct” unless the standards can be met. The ability to meet ambient air standards must be analyzed using air pollution predictive models. Also, the commission may choose to reconsider its ambient air quality standards. The decision on standards will be difficult since the present standards are designed to keep the surrounding mountains visible and the air somewhat clear. A key question is: Do the citizens of that area and of the state want to sacrifice the present particulate matter standards, hence air clarity, to help relieve a national energy problem?

Even if ambient air quality standards were relaxed in valley areas, almost everyone would agree that clear and clean air should remain in the national forests, wilderness and recreational areas which abut proposed development areas. The air pollution predictive model will be the main

tool for demonstrating that downwind air pollution problems will not occur.

What sources should be modeled? Commission regulations, now drafted and scheduled for hearing in June, require that both direct and indirect sources be modeled. Direct sources include industrial processes and equipment. Indirect sources include motor vehicle traffic generators, such as office buildings, shopping centers, highways, housing subdivisions and employment centers.

CONCLUSION

I trust that complete environmental inventories will be prepared and plans made that reflect the location of significant natural amenities and ecosystems, as well as scenic, cultural and historic resources of this area. I also trust that these critical environmental inputs will, in turn, guide the state toward making sound environmental and land use decisions in the best public interest.