# REVISED
# ENVIRONMENTAL IMPACT ASSESSMENT
# (PART VII)
# FOR THE PROPOSED
# OBED-MARSH THERMAL COAL PROJECT
# HINTON, ALBERTA

JUNE 1980

UNION OIL COMPANY OF CANADA LIMITED

RESCON COAL HOLDINGS LTD.

# PREFACE

This report summarizes the impacts that the proposed Obed-Marsh Thermal Coal Project will have on the environment. Union Oil (the proponent) believes that every aspect of the environment has been considered in this document and, based on their current knowledge have proposed worthy mitigative measures. However, they also believe that, as the process of data accumulation is continuing, these mitigative measures should be flexible in order to reflect any new data that becomes available.

This document has been written in response to the deficiencies in the proponent's Environmental Impact Assessment noted by the Department of the Environment. The proponent believes that they have fully addressed the matters of concern noted by the Department and that they have adequately fulfilled their requirements in the spirit of the Law of Alberta.

TABLE OF CONTENTS

# 1.0 AIR QUALITY

## 1.1 Impact

The most likely atmospheric pollutant throughout the life of the mine will probably be particulate dust. It is envisaged that this may be emitted from the different operational procedures involved with the coal extraction as well as its subsequent treatment for transportation. Initially, there may also be an additional source of dust; that resulting from the construction of the mine components such as access roads, haulage of materials into and around the site, grading and stockpiling of soil and overburden, workshop construction and other foundation excavations.

The impact this dust emission will have on air quality in the mine area will probably vary depending on the time of year. During the summer months the land surface alternates between wet and dry conditions with relatively few extended dry periods Environmental Impact Assessment, 1979 (EIA, page 4-9) resulting from the precipitation sequence. Dust emission, especially those produced by coal haulage along the access roads could be reduced significantly when the air has a high relative humidity and the surface is wet. Dust emission from the other mining operations are unlikely to be significantly affected by the climatic behaviour.

During the winter months, however, air quality could be seasonally affected during temperature inversions. This phenomena precludes mixing of the air masses just above ground and consequently elevated concentrations of dustfall could occur around the site on a still day. However, the winds over the lease area are predominantly from the west or south west (EIA, page 4-11) and any concentrations of dustfall will quickly become dispersed before reaching local centres of population.

Emissions, that are presently detrimental to air quality are currently being produced in the area. Of these, the proposed mine will probably only directly affect the amount of traffic using Highway 16, thereby slightly increasing dust and vehicle exhaust.

## 1.2 Mitigation

The proponent has incorporated specific mitigative measures into the mine plan in order to ensure that air quality will not be affected by the project. During the summer months water will be sprayed on the haul roads as standard operating procedures for dust control. Two water trucks have been specifically included in the equipment capital cost estimate for this purpose. In addition, the main gravel surfaced travelling roads will also be treated with calcium chloride to reduce dust. Fugitive dust generated during construction activities can be controlled by water, if it becomes a problem.

In the cleaning process at the Preparation Plant the coal will be handled mainly as a slurry in water. Therefore, little dust will be generated. Due to the plant being operated year round the machinery will all be completely enclosed and winterized, thereby reducing airborne dust from the operation.

A fluid bed coal-fuelled dryer at the Preparation Plant will be located in a totally enclosed building which will contain a dust control and bag filter system. A vacuum system to facilitate clean-up will be installed.

The clean coal will be moved by conveyor from the Preparation Plant to the coal storage and load-out facility which will be completely enclosed in galleries for dust control, and as a protection from the elements.

Coarse reject material from the coal Preparation Plant will be hauled back to the worked out mine areas at Obed, consolidated, covered with a layer of overburden and till, and reclaimed. Tailings comprising mainly clays from the retention facility will either be pumped or dredged and transported to the overburden spoil piles and covered over as described above.

The clean coal storage building near the railhead, the load-out bin, and associated conveyors will be totally enclosed for dust control. The collection conveyor under the silos will be

hooded. As methane gas build-up is a potential safety hazard, a ventilation system will be provided in the loading tunnel.

During loading of trains, coal will be discharged from the loadout chute into railroad cars. Immediately following loading, it is anticipated that the surface of the coal in each car will be sprayed with a latex binder or heavy oil which forms a cohesive top layer to prevent dusting. This system is presently being carried out at operating metallurgical coal mines and is a method recommended by the Federal government.

## 2.0 NOISE

### 2.1 Impact

Mining machinery, the preparation plant, the overland conveyor and rail load-out will develop local noise levels. However, the location of these centres of noise are located some distance from any centre of population and thus the proponent contends the impact will be minimal. The conveyor and load-out might be the only infrastructure with noise which could have some local impact both on wildlife and humans. This will, however, be minimal.

### 2.2 Mitigation

It is not expected that the noise levels resulting from the project will have any significant impact on the region as a whole. Normal mine safety operating procedures that are currently used elsewhere in the Province will be enforced to protect employees from high noise levels.

The noise levels from the conveyor will be subdued; the design has incorporated muffling to minimize the area which will be affected. It must be remembered that the entire conveyor will be in a totally enclosed system, which will reduce any noise impact significantly.

## 3.0 RECREATION

### 3.1 Impact

The area of the proposed mine is not heavily used for outdoor recreational activities (EIA, page 5-50). It seems that this is because of a preference for other local areas (William A. Switzer Provincial Park and Jasper National Park), which are more suitable for outdoor recreational activities. Apart from personal preferences, the proposed mine area has objectively, a low outdoor recreation quality and this is reflected in the low CLI capability rating of class 5-6 (Hardy 1977, page 38-39). The CLI system compares different recreational areas in an as objective manner as possible based on physical criteria. This low rating for outdoor recreational use is also reflected in the Hinton Yellowhead Regional Land Use Study (1975), which noted that it was not a prime recreational area.

Although statistical data have not been collected, it seems that hunting and fishing are probably the two main outdoor pursuits followed in the Obed-Marsh area. Convenience of access provided by the network of logging roads and proximity to Hinton probably account for this, rather than an objective quality of the fish and game resources. Little hunting potential presently remains as most of the area has been previously logged; the area between the Athabasca River and

Obed-Marsh plateau could, however, be an important moose and elk habitat. This is described under wildlife, section 8.0.

The fish streams could potentially be affected by alterations in the local hydrology. However, there are at least three other major fishing sites within 6 miles of Hinton (EIA Supplemental Report, page 139, Table 7-1-6), as well as Muskuta Creek, which is probably more intensively fished than all the Obed-Marsh streams put together (EIA, page 5-52).

On the basis of the information presented in the EIA 1979, and the Supplemental Report 1980, the proponent contends that the impact will be minimal on the recreational potential of the area. Indeed, over the long term there is every possibility that it could be improved as a result of the intensive post mining land management practices that will be undertaken.

## 3.1 Mitigation

The proponent has recognized that, although the general recreational potential will not be affected over the long term, two particular recreational assets may be temporarily affected; hunting and fishing.

The area between the Athabasca River and the Obed-Marsh ridge is currently being investigated by the proponent to determine the migratory patterns of moose and elk in this reputedly important wildlife habitat. The proponent recognizes that there may be a potential impact on the wildlife migratory patterns by the conveyor and service road. It is the intention of the proponent to use the investigation currently in progress to alter the design of the conveyor (as stated in Section 8.0) to allow as much freedom of movement as possible for the moose and elk along their original migratory paths.

The hydrology of the streams will be altered by the mining project. The mitigation measures proposed herein are described in Section 7.0.

# 4.0 SOILS

## 4.1 Impact

The mining techniques that have been proposed by Union Oil in their Environmental Impact Assessment (1979) will result in a change in physical, chemical and biological components of the rooting zone. The impact that this change may have on the vigour, growth and success of the post mining tree growth and timber production is unclear at the present time. Union Oil are currently in the process of establishing on-site experimental plots in order to assess this influence. One of the principal objectives, therefore, of these plots will be to determine the most suitable method of re-establishing a rooting medium which would be capable of supporting a self maintaining forest ecosystem at a density of 320 trees per acre.

Physical disruption of the surface will occur. The replaced material will likely have a different structure, cohesion and bulk density from the original soil material. The soil horizonation presently seen at Obed-Marsh, such as the Ae, Bt (or Bm) and BC or the Ahg, Cg will not be present. How important each of these horizons are to tree growth will become more apparent as the results from the trial plots become available. The physical aspects of the soil play a significant role in controlling the hydrological regime of the material and its ability to supply moisture to trees. How and to what

degree mining will alter this balance of supply and demand has yet to be determined. However, evidence presented in the EIA (1979) and is reproduced in Table 1, shows that the majority of the overburden material at Obed-Marsh should have a sufficiently high moisture holding capacity (as reflected by the saturation %) to support vigorous tree growth.

The post mining land management practices will ensure that the rooting material will be capable of supplying essential nutrients to the tree roots. The minimum rate of release of nutrients should necessarily exceed the maximum demand of the trees especially at the immature to polewood stage of growth. Failure to supply adequate nutrients at this stage could result in pathogenic diseases becoming prevalent in the new stands and in severe cases, even result in the death of the tree. The data presented in Table 1 shows that the overburden material has a clay content which can be favourably compared to that of the Luvisols and Gleysols of the area, which presently supports tree growth. In can be assumed, therefore, at this time that such a clay content would ensure adequate nutrient buffering in the rooting zone.

The mining practices will result in widespread drainage being conducted over the entire Obed-Marsh mine area. Consequently, all areas which are currently poorly drained, and particularly those areas which have been mapped as having soil unit M 3 on

them should become more productive for tree growth. The anaerobic conditions that presently prevail in such areas probably limit tree root development. Widespread drainage practices associated with the mining should reduce, if not eliminate, these poorly drained soils and it is expected that in such areas tree growth could be increased.

Topographic characteristics influences the site index for tree growth (Brown and Loewenstein 1978), particularly those of elevation, slope and aspect. Although the Reclamation Guidelines (1977) presently state that the post mining land surface should reflect the pre-mining landscape, it is envisaged that where the occasion demands, the site index could be improved by surface manipulation and contouring.

In summary, it can be expected that the rooting zone material will be different from that presently developing. However, based on the data given by Union Oil in their EIA (1979), there is some reason to expect that the replaced material should similarly be capable of supporting a vigorous tree growth at a density of 320 trees per acre. The translation of theory into practice is currently under investigation with the establishment of on-site experiments in order to ascertain the most suitable post mining reclamation practices. In the proponent's view therefore, the long term impact of the Obed-Marsh project on the ability of the soil to sustain a self maintaining forest ecosystem is probably minimal.

TABLE 1

COMPARISON OF CLAY CONTENT BETWEEN SOILS AND OVERBURDEN AT OBED-MARSH

| Soils | | | Overburden | | |
|---|---|---|---|---|---|
| Horizon | Clay % | Sat. % | Material | Clay % | Sat. % |
| Bt | 23 | - | Outcrop | 11 | 48 |
| Bt | 23 | - | Outcrop | 16 | 45 |
| Bt | 25 | - | Outcrop | 37 | 60 |
| Bt | 26 | - | Outcrop | 20 | 51 |
| Ahg | 23 | - | Outcrop | 18 | 44 |
| Bt | 29 | - | Spoil | 22 | 51 |
| Bt | 31 | - | Spoil | 26 | 51 |
| | | | Spoil | 26 | 42 |

Source: Union Oil Environmental Impact Assessment 1979

## 4.2 Mitigation

Surface organic materials that are suitable as a growth medium will be collected and stored in stockpiles. This stockpiled material will be reused during mine reclamation as a surface growth medium spread over the recontoured landscape to promote rapid and productive revegetation.

Abandonment and reclamation objectives are discussed in detail in the proponent's EIA (1979). Experience gained from early reclamation efforts on small surface areas disturbed during exploration and construction, as well as the extensive experience that St. Regis (Alberta) Ltd. has locally with reforestation can usefully be drawn upon to ensure a successful reclamation program for mined lands.

Soils that are currently poorly drained and thus yield lesser quality forest production can be enhanced by encouraging better drainage. Physical disruption, the mixing with more granular media, recontouring, and perhaps even ditching can encourage better soils on such sites.

# 5.0 FORESTRY

## 5.1 Impact

The most significant environmental impact that the proposed mining operation will have will be temporarily to remove the forests presently covering the landscape. This impact will be physically, aesthetically and economically evident in the local region, even though these changes will only be temporary. The proponent has recognized however, those pertinent facts which are essential to obtaining a good restored forestry industry and which may be sensitive to such an operation.

Although physically the forests will be removed, trees are a re-newable resource and for this reason the long term impact will be negligible. Union Oil is committed to and endorses the concept that the post mining landscape should be compatible with having a commercially viable timber production. Although research work needs to be done, the proponent's present evidence suggests that a more controlled and successful restocking program could occur as a result of the relatively intensive management techniques used in the post mining reclamation program.

Aesthetically, the landscape will be temporarily changed as soil stripping and overburden removal progressively advances over the property. The higher areas of the mine are amongst

the highest areas locally and can be visible from some distance.

The major impact the mine will have economically on the forestry industry will be to delay the future timber harvest schedule for the disturbed site. However, most of the lease has already been logged and all remaining areas will be logged ahead of mining activity. Therefore, no existing commercial timber will be lost to production.

## 5.2 Mitigation

In cooperation with St. Regis, the harvest of all commercial timber from the rights of way for the corridor across the Athabasca River should precede construction.

Commercially valuable forest species will be replanted on disturbed lands, consistent with present land use. Initially, reclaimed land will be stabilized against erosion by establishing a protective vegetation cover. Grasses and legumes will be used for this purpose. Reforestation is expected to commence in the year after the seeding of grasses and legumes. The planting of conifers will likely utilize nursery stock and/or selected native transplants (wildlings). The reforestation operation will be supported by ongoing studies and experimentation, on reconstituted soils and with selected tree stock prior to commencement of mining.

While the following list includes a number of suggested studies it is expected that additional phases for experimentation will develop particularly as mining progresses:

a) Mechanical means of breaking or processing forest trash so as to provide surface material for the protection of reclaimed land against wind and water erosion.

b) Experimentation with varying depths of growth media on levelled spoil from the standpoint of forest growth.

c) Study and experimentation with reforestation by (i) seeds, (ii) nursery stock, (iii) wildlings.

d) Determination of growth response to fertilizers by conifers grown on reclaimed land.

e) Identification of the most suitable species of legume and grasses for use in revegetation.

Abandonment is subject to the reclaimed area having topography conforming with government regulations. It is also subject to satisfactory revegetation of the reclaimed land so that surface cover, soil protection and reforestation are adequately assured.

As discussed above, disturbed areas will be stabilized and revegetated, first with grasses and legumes (to stabilize the soil), and then with commercial forest species. Native non-forest vegetative species will re-invade the area by

natural means and follow the successive patterns of the boreal forest immediately following land preparation for revegetation. Since reclamation and revegetation will be an ongoing activity proceeding simultaneously with mining, any adjustments found by experience on site to be necessary in implementing the rapid reestablishment of vegetative cover can be made at that time.

## 6.0 GROUNDWATER

### 6.1 Impact

Removal of the coal and disturbance of the overburden above the seams will cause a temporary depletion of groundwater storage and recharge rates. However, the regional groundwater flow system in the lease area occurs at depth, well below the mineable coal seams. Moreover, groundwater flow is largely discontinuous through the overburden and is present as a series of perched water tables. In particular, the coal seams are major aquifers in the area, and where they subcrop they give rise to springs. Downward flow of water appears to be interrupted by zones of lower permiability and this deflects the groundwater flow laterally towards the perimeter.

The groundwater system, its associated hydraulic gradient and water flow, that is currently present within the coal and overburden will be completely altered by mining. It should be expected, however, that mining would increase the downward flow of water as the permiability of the overburden will be increased. In addition the post mining drainage system will direct the groundwater to the perimeter edge coinciding with the subcrop of No. 1 seam. The impact this will have on the springs and headwater regions of the radiating tributaries is not precisely known. There is a high probability that the backfilled sandstone overburden fragments, in particular, will

develop into an aquifer that is just as effective in maintaining base flow for the streams as the removed coal aquifer. The proponent thus contends that the overall impact on the groundwater system will be minor.

## 6.2 Mitigation

The aquifers underlying the lease blocks provide year round seepage to the headwater regions of radiating tributary streams thus probably maintaining some base flow throughout the year. Coal mining activities will disturb this process by causing greater seasonal variability in streamflow. However, as the mine water will be pumped into the headwaters of creeks after suitable treatment at a reasonably consistent quantity and quality, a constant streamflow should be maintained.

Some sampling and analysis of groundwater quality from existing aquifers will assist in characterizing the groundwater that is expected to seep into the pits. The present data from Bulk sample pit No. 16 shows that this water is well within Canadian Drinking Water standards and could be released into the watershed without any treatment.

## 7.0 SURFACE WATER

### 7.1 Impact

The nature and characteristics of the surface water patterns will be affected by the mining operation. In particular, the removal of forest vegetation may increase spring run-off, although as indicated in deficiency statement 4.1 (EIA Supplemental page 37) this need not be the case with timber removal. However, potential moderate erosion has been shown to exist on the steeper slopes underlain by collvium (EIA, page 4-7 and Figure 4.2-1). In these areas, the lack of surface cover could increase the rate of response of the watershed to precipitation during the summer, resulting in some surface erosion and sedimentation. The use of water during the operational phase of the mine may also reduce the water supply to the major fishery streams, notably Apetowun, Baseline, Oldman and Canyon.

Surface water characteristics could also be affected during the initial construction period. Land grading, foundation work and other excavation activities could increase the water siltation and thereby affect its quality particularly for fisheries as noted above. However, there should be no reduction in the quantity of surface water leaving the lease.

Additional contamination of surface waters by $NO_3$-N could arise from the use of blasting slurry or fertilizers. As indicated in the EIA Supplemental Report (page 49), the most likely source of $NO_3$-N contamination is from the increased use of fertilizers arising from the post mining reclamation program. It has been estimated, based on a significant volume of published literature (EIA Supplemental Report, pages 49, 50, 52), that even at the lowest concentrations of ammonia needed to be considered toxic, the daily N- fertilizer application rate would have to exceed 26 kg/ha during winter. It is clearly unlikely that such high concentrations will be released into surface water through infiltration and drainage, particularly in view of the low fertilizer applications needed to establish tree seedlings.

## 7.2 Mitigation

The possibility of sediments entering the streams as suspended materials in yard and mine area runoff and from mine pit waters has been anticipated and provision has been planned for drainage ditching and settling ponds to capture sediments before the waters are released to streams.

The possibility of sediment releases during construction disturbances associated with site preparation can be further reduced by scheduling the construction of settling basins and

ditches early in site preparation activities. Proper sizing of the runoff collection and settling basin system to accommodate major precipitation and snowmelt event can effectively eliminate downstream sedimentation problems. Prompt stabilization and revegetation of disturbed soils to reduce rill erosion and proper road and culvert construction and maintenance will also be significant in reducing the input of sediments to streams.

Some additional site specific studies of hydrologic features, stream morphometry, flooding frequencies and local drainage characteristics will be necessary to provide the detailed data base for proper engineering of structures, such as tailings retention dykes, settling ponds, culverts and ditches, and to ensure their integrity during heavy storms.

Definitive plans are required for treatment of domestic waste waters, collection and disposal of used oils and greases, and emergency planning for accidental spillage of fuel, waste water or chemicals to prevent contamination of surface waters. Since any such releases will have to comply with government water quality standards, design to those standards is proper mitigation procedure.

More detailed consideration will be given to obtaining a greater part of the necessary water for industrial purposes from a combination of near-site sources including groundwater, pit seepage, surface streams and recycled tailings pond water.

## 8.0 WILDLIFE

### 8.1 Impact

The coal lease area is not heavily used by wildlife. There have been two field studies conducted by consultants on behalf of Union Oil (Techman 1978 and F.F. Slaney & Co. 1977, 1978), which supports this conclusion. There are three registered traplines in the area (compared to 80 in the Fort McMurray area), which further supports the fact that wildlife species are not found in abundance in the area. Rather, the wildlife species that are found, use the adjacent area in the Athabasca valley as a migratory route during winter.

Although sitings of various mammals within the lease area have been cited (EIA page 4-100), the highest frequency of mammals was found in the valley. The proponent concludes that, the impact of mining the coal within the lease area on the higher plateau will be minimal and should not significantly affect the present wildlife patterns. It is recognized, however, that some impact would occur as a result of the conveyor route and access road over the Athabasca valley.

### 8.2 Mitigation

There have been few wildlife studies conducted along the Athabasca valley in the project area. Although the proponent

has recognized that the proposed conveyor route could affect the local wildlife population, little factual evidence exists on which to base any mitigation plans that might be necessary.

The proponent therefore started the first phase of a wildlife monitoring program in winter 1979 in the Athabasca valley. The purpose of the study will initially be to determine the extent and patterns of the wildlife migratory routes. Only with this data can a precise wildlife impact assessment be presented. However, the proponent has already stated that the conveyor design can be modified to allow free passage of ungulates through the valley. Since the conveyor will be elevated at certain sections along its route, animal passage underneath it will be possible, although some adjustment by the animals to its visibility and sound will be required. Animals in this area are already acquainted with industrial activities, roads, railroads and human presence, and can be expected to adapt readily.

The rapid revegetation of areas disturbed by construction along this corridor will replace and in some cases slightly augment wildlife habitats, particularly for forage and browse vegetation.

Access road traffic should be alerted to the possibility of encountering wildlife on the road to avoid road kills. In

discussions with appropriate government agencies it may be found desirable to restrict hunting near the corridor both for safety and as a wildlife protection measure.

Measures to protect water quality will be sufficient to maintain present fish populations and fish habitats. Stream crossings with culverts should be properly constructed to facilitate the passage of fish and to prevent erosion and sedimentation.

In the unlikely event that increased access to some of the streams results in excessive recreational fishing use to the point of endangering the fish populations, appropriate government interventions or stocking programs may become necessary.

## 9.0 ARCHAEOLOGICAL AND HISTORIC RESOURCES

### 9.1 Impact

It was generally concluded that the Obed-Marsh mine area would be generally unsuitable for permanent or temporary habitation during prehistoric times, despite the abundance of quartzite pebbles suitable for flaking (EIA, page 4-118). No evidence was forthcoming from the field survey conducted by the proponent of prehistoric quarrying, workshop activity, or human habitats. It is clear that the mining operations would obliterate any archaeological evidence that might be present in the area. There is a well made and preserved log cabin adjacent to the Obed Fire Tower as well as some abandoned cabins in both Obed and Marsh blocks. These would be destroyed by the mining.

### 9.2 Mitigation

The only specific mitigative measures taken by the proponent should be the dismantling of the cabin and moved intact elsewhere. The abandonment cabins should be evaluated for their heritage value prior to any salvage operation taking place.

## REFERENCES


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