All too often discussions of Alaskan development seem to be aimed at creating the atmosphere of a high school or college pre-game pep rally. Unless the writer or the speaker fosters the belief that anything (or almost anything) is within our powers to accomplish with Alaska's unlimited development potentials, there is a feeling of being short-changed or of selling our State short.

At the very outset, therefore, I wish to thank Dean Shafer and Professor Tuck for their thoughtfulness in the wording they have used in the title and topic assigned for this final lecture. Instead of calling for a cavalry charge into the future, they have suggested that we look for avenues opening into the future. Instead of running head-on into barriers, they imply that we can plot a course which might avoid such a painful and futile approach.

The idea of "avenues" gets some very basic matters out into the open at the outset. Development must take place in a context of the possible, the timely, the desirable and the feasible. Not all things are possible. Some things that are possible must wait for their time to come. We must arrive at some consensus as to
what we want, perhaps not in specific terms, but in broad enough objectives to avoid major contradiction. "Avenues to development" is an apt description of what we should be considering when we look to the future. These are not fixed openings, but grow in size and number and diminish or disappear in response to dynamic factors of knowledge, technology, markets, etc. Some of the avenues lead only a short distance to the objective, while others stretch out to an uncertain and distant objective. We have little or no control over the creation or behavior of major avenues, but as responsible Alaskans we should keep ourselves informed and ready to move when appropriate.

Moving from "avenues" to a consideration of "development," I will define this in terms of four objectives. There are other ways in which development could be defined, but we will never get started unless we are a bit arbitrary at the outset.

Economic expansion is a generally accepted objective of development effort. It is understood as the expansion of production of material things and services, increase in gross income, expansion of total employment, etc. It requires the utilization and organization of the classic elements of economic activity: natural resources (or land), labor, capital, and a bundle of difficult to classify items such as technical knowledge, organization, entrepreneurship.

A somewhat old-fashioned objective of development effort is the increased settlement of the land. This embraces political and social objectives as well as (or instead of) economic. I say
land settlement is old-fashioned in view of the contemporary trend in the reverse direction toward increased concentration of population in urban centers. During the last century and the centuries preceding this, however, man had a drive to get at the land wherever feasible. This was based upon economic factors in dominantly agricultural societies and upon military or political factors during the periods in which the emerging nation states were jockeying for position to control the earth's surface. This was the dominant theme of our own nation until the turn of the century and it is a recurring theme here on the "Last Frontier."

A third common objective of development effort is the improvement of the human condition. In addition to attempts to raise material standards of living, it embraces the evolution of a satisfactory and satisfying social and political environment for the realization of the maximum potential of the human animal.

A corollary to these objectives is the objective of joining economic and social development. We should not be interested simply in raising the gross level of income of a region, or a nation, or a state, or locality, but we should be interested in raising the per capita income. We are concerned that not only the per capita income levels be improved, but that income distribution between individuals be on a more satisfactory basis. This is the fundamental concern of our present "war on poverty." In an age of affluence on a grand scale, a scale never before experienced in the history of the human race, we still have a malfunction in
our distribution system. As a result, we still have very serious pockets of poverty. The objective of joining economic and social development generally requires the achievement of a favorable balance between population, in and out migration, and employment opportunities.

To turn to Alaska, the fact that we are concerned about Alaska's further development implies that we consider our State as an underdeveloped or an undeveloped region. Its past development and its present development have been narrow, unstable, and highly specialized. They have been based upon a combination of very selective natural resource exploitation and the utilization of Alaska's strategic location for defense purposes. To cite only a few statistical scraps: During the decade 1931 through 1940, canned salmon and gold alone accounted for 87 percent of the value of all out-shipments. During the 1950's government provided directly between 55 percent to 70 percent of personal income received by Alaskans.

Sitting here in this auditorium on this expanding and beautiful campus, not very far from Alaska's largest city which has all the refinements and many of the distractions of a typical mid-twentieth century urban center, it is difficult to even conceive of this being an undeveloped region. But if we step beyond the limits of the Anchorage Election District and look at the State as a whole, this appears as a facade. In terms of the optimum utilization of natural resources which are currently exploited and in terms of realization of the maximum potential of all our
natural resources, Alaska is undeveloped. In terms of the levels of living enjoyed by Alaskans, outside the limited economically favored areas of our State too many of our citizens are living at levels which are well below any arbitrary "poverty line" we would care to draw. In terms of knowledge of our region and what it has, we are also merely on the threshold. We know our natural resource endowment only in a very reconnaissance manner, except in those areas adjacent to the coastal regions, transportation networks and centers of already expanding development.

Avenues for Economic Expansion

If Alaska requires further development, the next question is in what general direction should we turn to discover the avenues for economic expansion. The development enjoyed by Alaska during the decade of the forties and fifties was from natural defense and related activities. With minor upward and downward fluctuations these activities have assured a plateau of development since the mid-fifties, and we face the always present threat that the technology of warfare and war manpower demands elsewhere on the globe may suddenly cause a further downward shift of this key part of Alaska's economic base. There should be no argument that we must either turn to our natural resources to find a base for the further development of our State, or contrive to assure a continued flow of Federal funds into our economy. As an economist, I will confine my comments to the first alternative.

Our knowledge of Alaska's natural resources base is still fragmentary, and there is need for further very extensive and
intensive investigations and explorations before we can formulate any really reliable picture of what our natural resource endowment really is. But what has been revealed to us and what we can infer from reconnaissance evidence indicates that it is a very broad and varied endowment.

Technological change and advance will greatly modify this natural resource endowment through its influence upon both demand and supply factors. Transportation technology, for example, is playing a critical role in current consideration of development in all parts of the North. Petroleum exploration in the Canadian deep Arctic is going forward on the assumption that transportation to western European markets across the Arctic Basin is feasible by means of nuclear powered submarine tankers yet to be built. Movement of iron ore and other solid minerals by pipe lines in the form of pellets or as slurry will make the most remote parts of Alaska accessible to markets.

Knowledge of the natural resources endowment and the dynamic influence of technology are not enough. The rate and nature of our State's future development will be determined by the broad national and world context of growth and change, and the manner in which these external forces express themselves in terms of effective economic demand for the products Alaska can provide. Those resources we know Alaska has and those we have some basis for expecting may be discovered will have to seek markets outside the State if they are to achieve any significant development. This is not a simple relationship between availability of natural
resources in Alaska and a market for them outside. The relationship is complicated by having to consider all other possible alternative sources of supply. We are starting with the assumption that Alaska has, or will have, a substantial and varied natural resource endowment to play the role of the basis for its future development. We must now construct a national and world context from which to view this future role.

Resources for the Future, Inc., in a 1963 study of national growth has given us some indication of the range we might expect.

Very briefly, they foresee a population growth from 180 million people in 1960 to 245 million by 1980, and 331 million by the year 2000. Gross national product will increase, according to their projections, from about 500 million dollars in 1960 to one billion dollars in 1980, to two billion dollars in the year 2000. Population growth, coupled with increasing levels of living, will cause personal consumption expenditures to quadruple between 1960 and the year 2000. Gross private investment will increase between 1960 and 1980 by 160 percent and between 1980 and 2000 by 115 percent.

Given this broad picture of national growth and demand for material things, the future relationships of Alaska's natural resources to national markets will be quite different from those of the past. Alaska's northern location will be a less significant physical barrier to development. Within this national future

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there will be other regional factors which will both accelerate and intensify the impact upon Alaska. The continuation of the major western movement of people, capital and industry will cause a significant national reappraisal of Alaska and its resources. Our State will be within economic reach of the new Pacific Coast industrial complexes and population concentrations that are now in the making and will reach their maximum in the next decade ahead.

Looking at the world context, population growth will go on accompanied by continuing international competition and conflict short of total war. Nobody has any certainty for this last assumption, but it must be made for if competition and conflict are not kept within reasonable bounds, mankind will have no future worth mentioning. Looking at the world and mankind as a whole, after brushing aside the surface chaos of national rivalries, we find that today we are and in the future will be increasingly engaged in two critical races: a race between world population growth and natural resource development, and a race to reverse trends widening the gap between living standards in the poor and rich nations. On the outcome rests the future of civilized life on this planet.

The population increase which the world has experienced in recent centuries can be expected to continue, but at a slightly declining rate. The United Nations, for example, estimated the world population at the beginning of the Christian era at a quarter of a billion persons. It took 1,650 years to double this number to one-half billion. The doubling periods then
occurred with startling rapidity: two hundred years to double
to one billion, eighty years from one to two billion, and it will
probably take only forty-five years to increase to four billion
by 1975. A leveling off of the growth rate is expected to take
place about and after the year 1980, on the assumption that some
population control methods and practices will have found general
acceptance before that time. Even so, world population is ex­
pected to reach somewhere between five and seven billion by the
year 2000.  

World-wide natural resource demand will continue to grow not
only as a result of this unprecedented population growth, but also
as a result of increasing per capita demand. The aspirations of
the low-income nations, whose people will comprise an estimated
three-quarters of the world's population by the year 2000, and
their need for rapid industrialization and for more and better
food, housing and clothing will accelerate this already growing
demand.

Assuming a population of nearly seven billion by 2000 and
per capita resource demands at levels now found in the more de­
dveloped places, Resources for the Future, Inc., recently advanced
the following very tentative estimates of the general magnitude
of increases required to meet worldwide demand for resources:
(1) a tripling of aggregate food output just to provide adequate
calories, and considerably more to provide adequate proteins and
vitamins; (2) a five-fold increase in energy output; (3) perhaps

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2/ United Nations, Future Growth of World Population (New
a five-fold increase in output of iron ore and ferro-alloys and somewhat less in copper, but a much larger increase in bauxite-aluminum; and (4) a quadrupling of lumber output.

In this context of rising resource demand curves, it can be expected that all known Alaska natural resources will be given greater consideration and achieve greater development than in the past, and that new discoveries will be made under the stimulus of these population induced resource pressures. Conditioning factors to these assumptions are the known or inferred worldwide natural resource reserves in relation to world requirements and the differences in national needs and national resource endowments. I will only touch very briefly on a few of the more obvious of the avenues which may or may not open up for Alaska.

Alaska's economic expansion in response to world food requirements will depend upon the outcome of international arrangements for utilization of high seas fisheries, the implementation of programs for use of the continental shelf, etc. Our timber resources will come under increasing development in the years immediately ahead. Minerals present a more varied prospect.

Although the largest worldwide demand increases appear to be for iron ore, Alaska's competition position will be narrowed by costs and by the extensive world reserves of much higher grade direct shipping ore. Resources for the Future, Inc., for example, estimates that world reserves of high grade ore will be twice the

projected demand for the year 2000, not considering the rate at which new deposits of areas previously classified as inaccessible are being opened up. This study characterizes the future of iron ore as one of abundance without even speculating on the needs for the upgrading of known resources.

Other minerals present different futures. World reserves of copper, according to the President's 1962 Committee on Natural Resources, would last only until 1985, zinc until 1980, lead until 1970, and tin until 1990 on the basis of 1956 world rates of use and state of technology. We need not give too much weight to these dates, but they are enough to tell us that the future of these key metals are not to be measured in centuries, as in the case of iron ore, but only in decades. Assuming that projected demands will exhaust presently known and inferred reserves before the year 2000, even with what now appear as adverse cost factors, any deposits of these metals found in Alaska will be seriously considered for production in the immediate future.4/

Alaska does have an impressively large unrealized hydroelectric power potential, but the materialization of aluminum production as an avenue for Alaska development cannot be taken as assured. The critical need to raise worldwide standards of living not only requires the greater use of natural resources, but also a shift in the pattern of distribution of worldwide industrial production between developed and underdeveloped nations.

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The underdeveloped nations contain most of the large hydroelectric potentials, two-thirds of the world's bauxite, but they produce less than two percent of its aluminum. The barriers of political unrest and lack of local capital undoubtedly will be overcome under the enormous pressures these peoples will bring to bear upon the chief contestants in the shifting battle between East and West. Furthermore, the technology of aluminum production is undergoing major change which could affect the present key importance of low-cost power. In view of this, it is not certain that Alaska will become a major aluminum producing area even if some of our power giants come to life.

Turning to energy in its own rights, based on general knowledge of geological formations around the world and rates of occurrence of coal seams, oil and gas fields, and oil shale, and the 1960 rate of use, the most authoritative speculation gives 900 years as the outside limits of the life of the world's fossil fuel reserves, both known and inferred. At rates projected for the year 2000, on the other hand, Resources for the Future estimated the outside limits of the life of the world's fossil fuels at only 150 to 200 years. Others have regarded even these as overly optimistic estimates of the life expectancy of these resources. The President's 1962 Committee on Natural Resources, for example, anticipated that nuclear energy must become the principal energy in less than a century because of the inadequacy of all other forms of energy available. In this view, man's development of nuclear energy came none too soon. Alaska's fossil
fuels are already being gotten at and this will be accelerating for the rest of our lifetimes.

Alaska's resource endowment is not sufficiently well defined to warrant more refined speculation than the above, but we can draw up a minimum list of what to expect in the nature of avenues for development represented by Alaska's mineral resources. Exploration for and development and production of fossil fuels, ferro-alloys, copper, lead, zinc and tin will become increasingly active in the immediate future. By that I mean within the next decade. For the longer pull extending beyond the year 2000, we can expect certain other metals, principally iron ore, to come under active consideration.

The most familiar international force which might accelerate these great expectations is our strategic location in relation to Japan and the Far East. Japan as a manufacturing nation imports 90 percent of its raw materials. It ranges around the world for supplies of pulp, minerals, fossil fuels, etc. It is not necessary here to review the many avenues being explored by Japan in seeking ways to meet many of its raw material requirements through Alaska natural resource development. Will this avenue remain open and will it expand or contract? United States national policy at present appears to assure the continuation and expansion of trade with Japan as a political necessity in our international life. As long as Japan is willing to accept the role of a partner of the United States in the world ahead, Alaska can be assured that it will be a means which will continue to accelerate consideration of its development potentials. But there are "butts" to consider.
We must not close our eyes to the fact that the USSR is aware of the political importance of Japan also. We must never forget that Alaska is not the only source of supply available to Japan.

What I have said so far is dependent upon forces and factors external to our State and upon which we can exert little or no influence. The most we can do is to keep informed and alert. To recognize when the avenue does open and be ready to move.

Before leaving natural resource development, therefore, I would like to touch upon some more immediate goals in this area which are within our hands. First is the improvement of our present basic economic structure. This involves identifying ways in which new economic activity linkages could be formed with the major basic economic development. When a major forest product industry such as a pulp mill is introduced into the State, for example, opportunities are created for establishment of other smaller wood-utilizing industries such as sawmills, plywood plants, etc. The objective of all Alaskans should be to maximize the effects of current primary activities and those in immediate prospect through exploring all the related activities that might be brought into being.

Another objective under improvement of the basic economic structure is to promote greater productivity and efficiency in our established industries. The Governor's committees attempting to improve Alaska fisheries products is a case in point. The salmon industry has for decades continued to exist on the same production methods, the same marketing setup, the same product
packaging created in the opening decades of the century. Faced with more efficient, more aggressive, and more attractively packaged and marketed products from other fisheries in our nation and by foreign competitors, our salmon activities have stagnated or are suffering significant decline. The emerging Alaska king crab industry is a heartening example of what needs to be done.

There is always the need to study and to devise new political and social programs and institutions, what economists have come to call the "infrastructure," to foster higher productivity, greater local labor utilization, etc. There is a need to encourage the use of locally generated and held capital in local investments and to encourage the importation of capital from outside of Alaska. These are all things that we as Alaskans can do something about, and in many cases are doing something about.

Settlement--Some Long-Range Speculation on the Human Condition

I now would like to shift from a consideration of natural resource development and reconsider the matter of development in terms of settlement and the human condition. My comments here will be drawn heavily from a recent very stimulating experience which I enjoyed. This was a symposium on the future of the "middle North" around the world sponsored jointly by the Arctic Institute of North America and The Johnson Foundation at the latter's headquarters at Wingspread, Wisconsin, April 22 through 24, 1966. The background papers prepared for this symposium put stress upon the problems of northern settlement. In particular questions were raised about the requirements to attract and hold
the sort of population needed for resource development in this region, if viable settlement patterns could be developed, if this could be done in the face of national and worldwide trends toward greater urbanization. The participants were either those who had had experience in northern regions around the world or those who had no orientation to the north but who had been involved in consideration of the pressing social and economic problems which contemporary society and civilization must face. The consensus was not encouraging to future settlement.

An economist (not myself) involved in problems of urban development cited the cost of maintaining modern community amenities and concluded that these were certainly far beyond the capabilities of the North to support without substantial subsidy from outside. Urbanization trends were too strong and were based upon economic and social factors which cannot be ignored. The experience in Europe was cited as one of a gradual loss of population in the northern reaches of the nations of western Europe. The USSR attempts to force-feed northern settlement have been modified and revised in recent years, and never were altogether successful even with the types of inducements and pressures which this highly authoritarian form of government can bring to bear.

The discussion was shifted to more fundamental grounds by a prominent physical scientist and educator who declared that the questions in the background paper had been framed in a nineteenth century context. The context or environment of the emerging future, he held, is a product of several major revolutions which we are
only beginning to recognize fully for the forces they really have been. Technological revolutions have been a commonplace of the immediate past and the present. He asserted that, technically, three percent of the world population is all that is required to feed the rest of the world right now. Three percent of the world population will soon be all that will be required to manufacture all the other material things which the world population needs. The revolutions in transportation and communications have reached a fever pitch in their annihilation of time and distance.

In the emerging environment produced by these revolutions, the future of the individual citizen will be characterized by two factors: mobility and freedom. The citizen will be mobile because it will be necessary to be so in order to meet the vocational changes with which he will be faced in his lifetime and to move from one part of the earth's surface to another. It will not only be necessary to be mobile but it will be highly feasible to be mobile, given the transportation and communications revolutions.

The second characteristic, freedom, is neither a necessity nor a certainty but it is an ideal and a possibility. In a future in which mobility will be the hallmark, the freedom of the individual could be greatly expanded. A person can and should be able to do with his life more than was possible in the past. This will require other revolutions, an educational revolution for one thing. Our undergraduates are indicating some dissatisfaction, to put it mildly, with our institutions of higher learning. They are pointing up the shortcomings of higher education in the traditional
sense in ways that insist upon answers and change. They want education not for something, not for a job, but education to be somebody. And this is the sort of thing which will be required if the individual is to realize the maximum freedom which is being made possible. There will be need for a vocational revolution. Our children can expect at least three major careers in their normal lifetime. There will be need for training and retraining, not only in technical skills, but in the development of personal adaptability and flexibility.

The symposium developed momentum and in considering the North in this context, settlement in the traditional sense seemed out of place. Development will take place through a transient population providing technical skills and labor as and where needed and for as long as needed. This would be true not only of the North, but of the developed nations as a whole. Their technicians, their skilled workers would be constantly moving from one end of the country to another in response to the development and emergence of needs for their specialized knowledge and skills. As urbanization increases to the point of overcrowding and as the transportation revolution advances, the space and freedom of the North will become valuable economic resources in themselves. The North would become a place for the individual to escape temporarily from the overwhelming pressures of concentrated intensive urban living.

In both these senses, increased mobility and urbanization, the symposium felt the North would become more intimately integrate into the national systems, although permanent population may not
increase and indeed decrease in the decades immediately ahead. The paradox posed is an interesting and stimulating one, if puzzling. Personally, I found it a means of dispelling any gathering gloom I had felt over the increasing evidence of out-migrations of people from parts of Alaska. Is permanent settlement really necessary?

The Human Condition--Some Immediate Concerns

This is pretty far out speculation, but I would like to close my talk on some matters of more immediate concern. These relate to Alaska's human condition and this in turn to two other factors which were listed in my opening remarks. The first is the joining together of economic and social development within Alaska today and the day after tomorrow, as well as in the long-run future. This involves the assurance of the opportunity for all Alaskans to share in the fruits of whatever progress is being made within our State. This has certainly not been the case in Alaska's past nor at present. The experience of Alaska's native peoples living in the more remote regions of our State is that economic development is something that passes them by, even when aspects of it occur right within their village areas. They are not prepared vocationally or otherwise to take advantage of the opportunities that open up, or are being opened up, for gainful employment and for the realization of more satisfying, fuller lives. They are not equipped to make a painless transition from their home regions of the State into the centers "where the action is."

At an earlier discussion in this series, I understand that you have considered in some depth the economic and social condition of Alaska's native peoples so I will not cover this material again.
I will close with some observations on the urgency of seeing that our economic and social development objectives move forward in step and that the avenues for Alaska's future development are open for all to follow.

Whatever terms we may care to use in measuring the well-being of these peoples, we find these levels to be too far below that of other Alaskans and citizens of the United States to be a matter of indifference. Economic development is sometimes advanced as an automatic cure for poverty. Walter Heller's statement at the hearings on the "Economic Opportunity Act of 1964" noted, however, "Clearly, we cannot rely on the general progress of the economy--or on job creating programs alone--to erase poverty in America." New jobs would increase the number of exits from poverty, of course, "But open exits mean little to those who cannot move--to the millions who are caught in the web of poverty through illiteracy, lack of skills, racial discrimination, broken homes, and ill health--conditions which are hardly touched by prosperity and growth."

As related to poverty among Alaska's natives, the prospect of future economic development provides even less cause for complacency. In addition to adverse factors of lack of education and skills, racial discrimination, etc., the present geographic distribution of native population is heaviest in areas of the State which are away from the centers of recent economic development and anticipated future growth. Although there has been evidence of increasing geographic mobility among Alaska's natives, they have traditionally remained within the major regions in which their
ancestors lived. They also appear to be occupationally immobile, as the recent experience of the introduction of a new forest products industry in southeast Alaska has indicated.

Coupled with the relatively high labor immobility of Alaska's natives, their recent rates of natural increase further work against the probability that general economic development will automatically take care of their condition of poverty. During the period from 1950 through 1963 rates of natural increases have been close to four percent per year for the state as a whole, and approach five percent in the southwest and interior regions. If we define economic progress in terms of per capita income growth, these rates of population increase far outstrip even the most optimistic projections of rates of economic output for the State.

The attack on poverty in Alaska must focus upon the special conditions and characteristics of the native population. There is no simple way to a solution of the problem. For Alaska's native population, caught in the backwash of economic development, it must involve more meaningful education and vocational training and retraining, intelligent and sympathetic population relocation, family assistance, etc. It is a matter of the highest concern for all Alaskans and for Alaska's future. Alaska cannot move forward into the avenues to general development which will be opening up if we are burdened with a major and expanding poverty problem.