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Geothermal Source Potential and Utilization for Alcohol Production

MASTER

John C. Austin

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EG&G Idaho

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GEOHERMAL SOURCE POTENTIAL AND UTILIZATION FOR ALCOHOL PRODUCTION

John C. Austin

Published November 1981

**CH₂M Hill
Boise, Idaho**

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PREFACE

This report was prepared for EG&G Idaho by CH₂M Hill on Subcontract No. K1538, Modification 4, under the Department of Energy's Outreach Program. It is now being reissued

without modification as an EG&G formal report in order to make it available to others that may be interested in this geothermal application.

ABSTRACT

A study was conducted to assess the technical and economic feasibility of using a potential geothermal source to drive a fuel grade alcohol plant. Test data from the well at the site indicated that the water temperature at approximately 8,500 feet should approach 275°F. However, no flow data was available, and so the volume of hot water that can be expected from a well at this site is unknown. Using the available data, numerous fuel alcohol production processes and various heat utilization schemes were investigated to determine the most cost effective system for using the geothermal resource.

The study found the direct application of hot water for alcohol production based on atmos-

pheric processes using low pressure steam to be most cost effective. The geothermal flow rates were determined for various sizes of alcohol production facility using 275°F water, 235°F maximum processing temperature, 31,000 to 53,000 Btu per gallon energy requirements, and appropriate process approach temperatures. It was determined that a 3 million gpy alcohol plant is the largest facility that can practically be powered by the flow from one large geothermal well.

An order-of-magnitude cost estimate was prepared, operating costs were calculated, the economic feasibility of the proposed project was examined, and a sensitivity analysis was performed.

TECHNICAL AND ECONOMIC FEASIBILITY

**GEOHERMAL SOURCE
POTENTIAL AND UTILIZATION
FOR ALCOHOL PRODUCTION**

PREPARED FOR
RICHARD OBENDORF

CH₂M HILL

SEPTEMBER 1980

TECHNICAL AND ECONOMIC FEASIBILITY
GEOTHERMAL SOURCE POTENTIAL AND UTILIZATION
FOR
ALCOHOL PRODUCTION

Prepared For

RICHARD OBENDORF

Prepared By

CH2M HILL
Boise, Idaho

September 1980

SUMMARY AND CONCLUSIONS

A study was conducted for Richard Obendorf to assess the technical and economic feasibility of utilizing a potential geothermal source to drive a fuel grade alcohol plant. Test well data from the Highland L&L well located at the site indicate that the water temperature at approximately 8,500 feet should approach 275°F. However, no flow data is available from the test well, so the volume of hot water that can be expected from a well at this site is unknown. Based on the available data, numerous fuel alcohol production processes and various heat utilization schemes were investigated to determine the most cost effective system for utilizing the geothermal resource.

The study found that the direct application of hot water for alcohol production based on atmospheric processes which use low pressure steam is most cost effective. The geothermal flow rate for various size alcohol production facilities was determined based upon 275°F water, 235°F maximum processing temperature, 31,000 to 53,000 Btu per gallon energy requirements, and appropriate process approach temperatures. It was determined that a 3 million gallon per year alcohol plant is the largest facility that can practically be powered by the flow from one large geothermal well.

Numerous atmospheric alcohol production processes exist and no attempt was made in this study to select a single process. All processes are similar in design and operation. The optimum system should be one of the subjects of the project's preliminary design. Based on information gathered from several vendors, an order-of-magnitude cost estimate

was prepared for the proposed project. The project, including the alcohol production plant, geothermal well, and wastewater disposal facilities, is estimated to cost approximately \$6,950,000, based on September 1980 prices.

The operating costs are calculated for a facility based on a corn feedstock. While it is anticipated that the proposed facility will have the capability to use a variety of feedstocks, it is assumed that the average feedstock cost will approximate \$1.20 per gallon, of alcohol produced, which is equivalent to the corn feedstock in this study. The total operating and maintenance cost associated with the proposed project is estimated at approximately \$5,000,000 per year.

The study assumed that the sale of alcohol at \$1.80 per gallon will yield \$5,400,000 per year and the sale of dried distillers grain at \$3 per bushel will yield \$720,000.

The economic feasibility of the proposed project was examined by calculating a simple payback period. It should be noted that there is no absolute value which indicates an acceptable project payback period. The calculations shown in the financial and sensitivity analysis are merely relative indicators which may be used in comparing several alternative investments. An acceptable payback period must be determined in the context of other alternate investment options and the projected risk associated with the proposed project. In addition, a detailed financial analysis must obviously consider financing costs, investment tax credit, and depreciation.

A sensitivity analysis was performed to determine how the feedstock cost, alcohol, and dried distillers grain sale price affects the payback of the proposed project.

Examination of the data indicates that a small change in the cost of the feedstock or the selling price of the alcohol produces a large change in the profitability of the project. Changes in the selling price of the dried distillers grain is not nearly as significant as changes in the other two items.

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BACKGROUND

Richard Obendorf recently leased land surrounding the Standard Oil Company of California Highland L&L test well which was drilled for the exploration of oil. While no oil was found, the well logs indicated the presence of very high temperatures at a depth of 10,000 feet. However, the presence of water or flow data were not available from the test well logs. Mr. Obendorf reasoned that if water were available at the site, the temperature of that water might be sufficient for industrial process application.

In order to better ascertain the geothermal potential of the site and to determine how the geothermal water, if available, could be used, Mr. Obendorf applied for and received a technical assistance grant from EG&G in Idaho Falls, Idaho. Under the Technical Assistance Grant, the University of Utah Research Institute was to provide an assessment of the geothermal potential of the site based on known data. CH2M HILL was commissioned to conduct a study to determine the technical and economic feasibility of applying the geothermal energy to drive an alcohol fuel production facility. The study was to examine the various alcohol production processes and energy utilization schemes commercially available and to recommend the most cost effective alternative. Based on the data collected during the study, the economic viability of the proposed project was to be examined.

The data and conclusions collected during the study are contained in this report.

INTRODUCTION

The geothermal potential of the Standard Oil Company of California Highland L&L petroleum test well (T. 6N, R5W, Sec. 24, Payette County, Idaho) and the area near the well can be evaluated by an analysis of the existing suite of logs for the Highland well. In considering a second drill site near the Highland L&L well, it is reasonable to assume that both the temperature regime and the production characteristics of the Highland L&L well are representative of the conditions at depth that would be encountered by a second nearby well. Thus, a thorough study of existing well logs is the first step in determining the geothermal potential of the area.

TEMPERATURE CHARACTERISTICS

The thermal potential of the Highland L&L No. 1 well can be estimated from the available well logs. Most of these borehole logs record the maximum temperature obtained during logging procedures. A list of the available logs and the maximum recorded temperature for each log is included as Table 1. In most cases, the maximum recorded temperature reflects the temperature at the bottom of the logged interval. It should be noted that these temperatures are not equilibrium temperatures since they were measured during the drilling operation and were subjected to thermal disequilibrium due to drilling effects. The equilibrium bottom hole temperature may therefore be higher than those temperatures recorded by the well logs. However, the thermal

Table 1
 MAXIMUM TEMPERATURES RECORDED ON GEOPHYSICAL LOGS OF THE
 STANDARD OIL COMPANY OF CALIFORNIA HIGHLAND L&L WELL
 (NE"4, SE"4, NW"4, Sec. 24, T. 6N, R. 5W, Payette County, Idaho)

<u>Type of Log</u>	<u>Date Logged</u>	<u>Logged Interval (ft.)</u>	<u>Maximum Recorded Temperature (°F)</u>
Dual Induction Laterolog	3/10/73	44- 1,072	83
	3/17/73	1,057- 3,013	118
	4/12/73	3,030- 7,417	220
	5/2/73	7,177-10,676	252
Borehole Compensated	3/10/73	44- 1,072	84
Sonic Log (with caliper)	3/15/73	1,057- 3,008	116
	4/12/73	3,030- 7,420	263
	5/2/73	7,170-10,681	271
	6/5/73	10,396-11,947	290
Compensated Formation	3/16/73	1,057- 3,012	116
Density Log (Gamma-Gamma)	4/12/73	3,032- 7,420	267
	5/3/73	10,861-10,862	296
	5/23/73	10,340-11,960	315
Continuous Dipmeter Survey	3/15/73	1,057- 3,008	116
	4/12/73	3,030- 7,420	284
	5/3/73	7,217-10,680	310

disturbance at the bottom of the hole is probably minimal since the amount of time elapsed while drilling on bottom is relatively short. Thus, the temperatures recorded at the bottom of the hole are reasonable estimates of the actual bottomhole temperature, but may be somewhat depressed. From these data it appears that approximately 300°F temperatures are obtainable at depths of about 10,000 feet and deeper.

PRODUCTION (FLOW) CHARACTERISTICS

The flow potential of the Highland L&L well cannot be estimated with as much certainty as the temperature potential. The well was originally drilled for hydrocarbons; any warm water entries into the wellbore were considered a nuisance and were sealed off with drilling mud. Thus, the well's water producing capacity was not tested.

The production capacity of a well depends upon a number of factors which include porosity, permeability, and thickness of the lithologies encountered in the wellbore and/or the presence of permeable fractures. A quantitative analysis of the geophysical logs can yield information on porosity and the presence of fractures; permeability cannot be measured directly from the logs. An analysis of the geothermal potential of this well and of the surrounding area should include this type of geohydrologic study to determine whether any permeable zones exist at depth capable of supplying sufficient quantities of water at the target temperature. The flow potential of the well and the production characteristics of the rocks at depth remain the largest unknown. Temperature predictions for the area are fairly reliable. At a depth of about 10,000 feet, the temperature will be about 300°F. Whether the rocks at this depth are capable of producing sufficient amounts of water is presently unknown.

The geothermal division of Chevron (Standard Oil of California) did investigate the geothermal potential of the Highland L&L well. They may have equilibrium temperature logs and flow tests for the well. Perhaps they would share or sell this information.

ALCOHOL PRODUCTION PROCESS DESCRIPTION

The production of alcohol via fermentation is a well established process consisting of five basic steps: grain preparation, saccharification, fermentation, distillation, and dehydration (see Figure 1). The following description gives a general outline of each process step. It should be noted that there are innumerable variations within each of these steps and that the following descriptions are merely representative of common operating conditions.

GRAIN PREPARATION

Grain preparation consists of transporting the grain over a series of vibrating screens and magnets to remove any foreign material. The grain is then transported to a roller or hammer mill where it is crushed to a fine mesh. The final size of this finely ground material, called meal, varies considerably from process to process. In general, the finer the material, the more efficient the saccharification process. However, finer material increases the difficulty of separating and drying the distillers grain contained in the spent beer. Grain is typically not ground finer than 20 mesh.

SACCHARIFICATION

Saccharification is the process in which the starch contained in the grain feedstock is converted into simple sugars which can be fermented into alcohol. The saccharification process consists of several steps including slurring, precooking, cooking, and final conversion.

FIGURE 1

**OVERALL SCHEMATIC DIAGRAM
OF ALCOHOL PROCESS**

The meal is metered into a slurry tank where water is added with agitation to produce the grain slurry. Some processes slurry the grain with cold water and then pump the slurry to the precook tank where the temperature is raised to approximately 170°F, alpha amylase is added, and the pH is adjusted to 6.0 to begin the conversion process. Other processes combine the slurry and precooking step by slurrying with hot water and adding the alpha amylase in the slurry tank.

Alpha amylase is an enzyme which converts starch into complex sugars called dextrins. The precooking step begins the conversion of the readily available starch. The time required for this conversion is dependent upon the temperature and the particular strain of enzyme being used. When sufficient time has lapsed so that the free starch has been converted into dextrin, the slurry is pumped to the cooker where the temperature is raised. Atmospheric cookers raise the slurry temperature to approximately 200°F, while pressurized cookers may raise the temperature to as high as 320°F. This increase in temperature releases the starch contained within the grain cells and allows the enzyme to convert this newly released starch into dextrin. This two step process (pre-cooking, cooking) prevents excessive viscosity buildup in the slurry during the conversion step.

When sufficient time has lapsed so that the majority (>95 percent) of the starch originally contained in the grain is converted into dextrin, the mash is pumped to the saccharification tank where it is cooled through either heat exchangers or cold water dilution to approximately 151°F, and the pH is adjusted to 4.5. Another enzyme, gluco-amylase, is then added to the mash which converts the complex sugars, dextrins, into simple fermentable sugars. Upon completion of this conversion step, the saccharification process is

complete. While conversion times are temperature dependent, atmospheric conversion systems typically required approximately 24 hours to convert 95 to 98 percent of the starch available in the grain to fermentable sugars. Pressurized cooking schemes require less time.

FERMENTATION

The sugar solution produced in the saccharification process is converted to alcohol in the fermenters. Fermentation is promoted by yeast cells which feed on the sugar and produce alcohol and CO₂, as expressed in the following equation:

Thus, if complete conversion is attained, about 51 percent of the sugar has been converted to alcohol and 49 percent to CO₂.

Other minor byproducts formed include succinic acid, fatty matter, glycerine, and cellular matter. The cellular matter is contributed by the continual propagation of yeast in the fermenters. The actual quantity of byproducts formed will vary at each facility and is dependent on the yeast strain used and other substances present in the feed mash.

Inasmuch as the yeast is self-propagating in the fermenters, new yeast is added only on a limited basis to maintain yeast viability.

In the past, the fermenters have normally been operated in a batch mode. In this mode, the mash is cooled to 90°F and the necessary yeast is added to the fermenting vessel. Fermentation requires 20 to 48 hours, depending on the

actual operating conditions. Upon completion of this cycle, the alcoholic solution, commonly called beer and containing up to 12 percent alcohol in water, is removed and sent to the distillation section. The fermenting vessels are then sterilized with steam before being recharged for another fermentation cycle.

The normal batch fermentation consumes both time and energy inefficiently. The continuous process is a more effective approach to fermentation. In the continuous process, the sugar solution flows into a fermenting vessel, or into several vessels operated in series, with a total residence time sufficient to complete fermentation.

Fermenters are simply steel vessels with sloping bottoms, closed tops, and vents to permit CO_2 removal. In addition, cooling coils are provided to maintain the 90°F fermenting temperature, since the conversion of sugar to alcohol is an exothermic reaction. The necessary amount of cooling water for the fermenters is highly dependent on the strain of yeast used and other operating parameters.

The beer from the fermenter contains solids in the alcohol-water stream. For the case of corn, these solids consist of spent yeast, unconverted starch, and fiber from the raw material.

DISTILLATION

The beer stream leaving the fermenter contains 8 to 12 percent alcohol. Almost all of the water and essentially all of the impurities contained in this beer are removed in the distillation section. The beer leaving the fermenter at its

fermentation temperature, 90°F, is preheated by the spent beer leaving the column bottoms to approximately 170°F. This hot beer is then pumped into the distillation stripping column where virtually all of the alcohol and some of the water is stripped from the beer. The alcohol-water solution exits from the top of the column and spent beer exits from the bottom of the column. The composition of the alcohol-water leaving the stripping column can vary widely, depending upon the design of the system. This stream typically ranges from 80 to 160 proof.

The alcohol-water stream leaving the stripping column enters the rectification column where distillation continues to separate the alcohol from the water. An azeotrope between water and alcohol prevents the alcohol from being concentrated past 192 proof in a simple distillation system, and in practice, 190 proof is normally achieved. The 190 proof alcohol leaves from the top of the rectification column while the water leaves from the bottom.

The above description of the distillation process is very simplistic and, in fact, a distillation process in an alcohol production facility is much more complex. While some systems do use relatively simple flow and energy schemes, other systems use highly integrated recycle streams, vacuum systems, and vapor recompression systems to improve column performance and reduce energy consumption.

DEHYDRATION

The final step in the production of absolute alcohol is the dehydration process which removes the remaining 5 percent water in the alcohol-water mixture. Breaking the alcohol-

water azeotrope can be accomplished by either ternary azeotropic distillation, entrainment distillation, molecular sieves, or vacuum distillation.

The most common method currently in use to produce anhydrous alcohol is ternary azeotropic distillation. In this process, another component, such as benzene, is added to the alcohol-water azeotrope to form a ternary azeotrope. Distillation of this minimum-boiling ternary azeotrope allows the anhydrous alcohol to separate from the water-benzene mixture and exit the bottom of the column. The water-benzene stream is then treated to recover the benzene. This system allows continuous recycle of the benzene and losses of this material usually do not exceed 0.05 percent, based on the volume of the absolute alcohol produced. Again, the above discussion is somewhat simplistic. Actual operation of a dehydration unit is more complex than described here.

Recently, a system which uses extractive distillation was patented which could potentially simplify the dehydration process and reduce its energy requirements. In extractive distillation, a material is introduced at the top of the rectifying column, which breaks the alcohol-water azeotrope by absorbing the water and allows anhydrous alcohol to exit from the top of the rectifying column. This material works its way down the column and exits with the column bottoms. Usually the material is recovered and processed for reuse. While this extractive distillation system has been patented, it has not yet been commercially demonstrated.

Molecular sieves can also be used to entrain the water in the alcohol-water azeotrope and, thereby, produce anhydrous alcohol. In this case, the azeotrope is passed through a column that is packed with molecular sieves. The sieves act

as a water sponge and soak up the water while leaving the alcohol unaffected. As the alcohol-water mixture passes down the column, the alcohol becomes enriched as the water is absorbed. The stream leaving the column is virtually anhydrous. When the column efficiency drops to a predetermined level, the column can be drained and recharged by passing hot gases or steam up through the molecular sieves. While this system offers simplicity of design, the initial capital cost is comparatively high and the operating energy requirements are not as good as some other systems.

The water-alcohol azeotrope can be broken under vacuum conditions. However, as the pressure in the distillation column is reduced, the column diameter and number of plates increase. Numerous studies have indicated that while the production of anhydrous alcohol is possible using various vacuum systems, the dramatic increase in the column size prevents this technique from being a practical alternative.

STILLAGE

The most significant waste stream from the alcohol production process is the stillage which is removed from the bottom of the stripping column. The stillage consists of water, dissolved and suspended solids, and a small amount of alcohol. The solids contained in the stillage consist of approximately one-third of the initial feedstock material and are a valuable animal feed which must be recovered in order to obtain an acceptable economic return on the alcohol plant.

The stillage is usually passed through a belt press or centrifuge to remove the suspended solids which are approximately 60 percent of the total solids contained in the

stillage. These separated solids, called light distillers grain, can be pressed to approximately 30 percent solids and then dried in a rotary dryer to 90 percent solids.

The dissolved solids contained in the stillage can be collected by evaporating the majority of the stillage to form a syrup and then adding the syrup to the distillers grain in the rotary dryer to produce dark distillers grain. This process, while technically sound is not economically attractive for smaller production facilities due to the high energy requirements and capital equipment costs associated with the process.

The thin stillage containing the dissolved solids can be treated in an anaerobic digester or filter to reduce the BOD and COD of the stream while producing methane which can provide some of the energy requirements of the alcohol process. This waste treatment process is not currently in wide spread use but is gaining in acceptance as energy costs continue to climb.

Finally, the thin stillage can be treated as a waste stream and sewerred.

ENERGY SYSTEM

Steam is typically used to provide energy for the process described above. However, this study assumes that water is available which is sufficiently hot to provide this energy. The hot water would be pumped from the well and through heat exchangers located in the various unit operations. The temperature drop across the heat exchanger would provide the necessary process energy. The cooler water that exits the process will be cooled and pumped into surface waters or pumped down reinjection wells.

ENERGY BALANCE

The energy requirements to drive a process can be described by the quantity of energy required (Btu/unit) and the quality of that energy (temperature). Because the system under study will be powered primarily by geothermal water (assumed 275°F), several process systems which can use lower grade heat were examined.

Figure 2 shows the material and energy balance to produce 1 gallon of alcohol in a typical atmospheric alcohol production scheme which uses a conventional distillation system. In the figure, no energy recycle is assumed and an optional methane digester to treat the distillers solubles and produce methane is included. As seen in the figure, energy is added to the system in heat exchangers 1, 2, 4, and 7; the reboiler; and the grain dryer. Energy is removed from the system in heat exchangers 3, 5, 6, 8, and 9. Additional energy can be obtained from the system in the form of methane produced by the methane digester. This energy balance is summarized in Table 2.

Assuming no energy recycle, 58,185 Btu are required to produce 1 gallon of alcohol and 12,675 Btu are required to dry the associated distillers grain for a total of 70,860 Btu. However, 20,437 Btu are removed from the system and are potentially available for reuse. Using cold (60°F) water to cool the mash in heat exchanger No. 5 and then using the same water to cool the mash in heat exchanger No. 3 will provide over 90 percent of the 170°F water for

FIGURE 2
PROCESS ENERGY BALANCE

Table 2
ALCOHOL PROCESS THERMAL REQUIREMENTS

<u>Device^a</u>	<u>Flow lb/gal-Etoh</u>	<u>Temperature in °F</u>	<u>Temperature out °F</u>	<u>Btu per Gallon Alcohol</u>
H.E. 1 ^b	44.53	60	225	+ 7,362
H.E. 2	66.93	170	200	+ 2,008
H.E. 3	66.93	200	145	- 3,681
H.E. 4	20.88	60	170	+ 2,297
H.E. 5	87.81	151	90	- 5,356
H.E. 6	undetermined	60	84	undetermined
H.E. 7	84.48	90	170	+ 6,518
Reboiler				+40,000
H.E. 8	6.6	173	100	- 2,847
H.E. 9	74.88	135	120	- 8,558
Dryer				+12,675
Methane Digester				- 7,000

^aRefer to Figure 3 for the process location and function of each device

^bH.E. = heat exchanger

the slurry and conversion tank, thus saving 9,037 Btu. The spent beer leaving the stripping column at 235°F can be used to heat the slurry entering the cook tank to 200°F, and then be used again to preheat the beer in heat exchanger No. 7 to 170°F. This energy reuse will save 8,526 Btu. The energy reuse schemes described above will save a total of 17,563 Btu, leaving the conventional distillation energy, 40,000 Btu, as virtually the only energy requirements to produce the alcohol, excluded drying of distillers grain.

The energy removed from the fermentation tank to maintain a 90°F operating temperature will vary with the ambient conditions. The cooling water used to maintain this operating temperature will enter the fermenter at 60°F and exit at 80°F. Heat exchanger No. 6 will cool this water from 80°F to 60°F for reuse in the fermenter. It is doubtful that this energy, the quantity of which is undertermined, will be useful due to its low temperature range.

Recently, distillation systems which use vapor recompression to reduce distillation energy requirements have been developed. While these systems have been quoted at a wide range of energy savings, a conservative estimate is that the distillation thermal energy requirements can be reduced to approximately 18,000 Btu per gallon of alcohol produced. Assuming the energy reuse schemes described above, vapor recompression distillation, and allowing no credit for methane generation, the total energy required to produce a gallon of alcohol and dry the distillers grains is approximately 31,000 Btu. The application of the energy derived from methane digestion could potentially reduce the total energy requirements to 24,000 Btu.

The above discussion indicates that the energy requirements to produce 1 gallon of alcohol and dry the associated distillers grain can range from 71,000 to 24,000 Btu depending on the level of energy reuse. Also, the maximum processing temperature is 235°F in the distillation column reboiler. This study assumes that 275°F water will be available to drive the process and that the availability of this water will limit the size of the facility.

Assuming that energy recycle and reuse is adequate to supply all of the process energy needs except for the distillation operation, a conservative estimate is that 40,000 Btu will be required to produce each gallon of alcohol. Assuming that a 15 degree approach temperature is required for heat transfer in the reboiler, approximately 192 gallons of 275°F water will be required to provide the distillation energy for each gallon of alcohol produced. Assuming that grain drying which uses approximately 13,000 Btu for each gallon of alcohol produced requires an 18 degree approach temperature, approximately 35 gallons of 275°F water will be needed to provide the necessary drying energy. Based on the above assumptions, 227 gallons of geothermal water will be required to provide the energy necessary to produce a gallon of alcohol and dry the associated distillers grain.

Using the same basic data, but assuming that vapor recompression distillation is utilized which reduces the distillation energy requirements to 18,000 Btu per gallon of alcohol produced, geothermal water requirements for distillation are reduced to approximately 86 gallons. Adding the geothermal water required for grain drying results in a total geothermal water requirement of 121 gallons to produce 1 gallon of alcohol and dry the associated distillers grain.

Table 3 outlines the projected geothermal flow rates for alcohol plants of various capacities. As is seen in the table, a 1 million gallon per year alcohol plant would require approximately 454 gallons per minute of geothermal water for the high energy distillation case. This geothermal water flow rate increases incrementally as the plant capacity increases so that a 5 million gallon per year alcohol plant requires a geothermal water flow rate of 2,270 gallons per minute. As indicated in Table 3, the geothermal flow rate for the low distillation energy case varies from 242 to 1,210 gallons per minute for plant capacities from 1 to 5 million gallons, respectively.

The flow rate for geothermal wells is dependent upon the geothermal source and the size of the well. A good geothermal source will seldom exceed 2,000 gpm from a 16-inch well and the flow rate generally ranges between 500 and 1,000 gpm. For this reason, it is estimated that a 3 million gallon per year alcohol plant is the maximum that could be reasonably considered for this study.

Table 3
GEOTHERMAL SOURCE FLOW RATES

<u>Plant Capacity</u> <u>gal/yr</u>	<u>Flow Rate - gpm</u>	
	<u>High Distillation Energy</u> <u>(40,000 Btu/gal alcohol)</u>	<u>Low Distillation Energy</u> <u>(18,000 Btu/gal alcohol)</u>
1	454	242
2	408	484
3	1,362	726
4	1,816	968
5	2,270	1,210

MASS BALANCE

The proposed alcohol production facility will be designed to convert corn into alcohol, carbon dioxide, and dried distillers grain. The mass balance assumes that a bushel of corn (56 pounds, 14 percent moisture) produces 2.5 gallons of alcohol.

Figure 3, the process schematic for corn derived alcohol, shows 204,000 pounds of corn per day converted into 60,000 pounds (9,090 gallons) of alcohol, 57,600 pounds of carbon dioxide, and 681,400 pounds of stillage at approximately 8.5 percent solids. The stillage is screened and the distillers grain which is collected is pressed to 30 percent solids. This moist cake is dried in a rotary drum dryer to produce 38,500 pounds of dried distillers grain at 90 percent solids. The thin stillage that leaves the screen and press contains 23,100 pounds of distillers solubles and 542,600 pounds (65,000 gallons) of water per day. Half, or 32,000 gallons, per day will be recycled as mash makeup water. The remaining stillage (33,000 gallons) will receive treatment through an anaerobic filter and/or septic tank before final disposal in a drainfield system.

Based upon the above mass balances and assuming a 330-days-per-year production schedule, approximately 3 million gallons of alcohol will be produced per year. It is assumed that the carbon dioxide is not collected, although this may be advantageous after a local market is identified.

**FIGURE 3
PROCESS MASS BALANCE**

PLANT COST

Table 4 shows the breakdown of the capital cost for a 3 million gallon per year alcohol plant. The general process equipment, including the grain preparation system, saccharification, fermentation, distillation, and dehydration system, will cost approximately \$3,020,000. All components of this system exposed to corrosive conditions are constructed of stainless steel.

The dryer required to dry the distillers grain will cost approximately \$280,000.

The system is thoroughly instrumented and computer controlled in order to improve system operation and reduce labor costs. This instrumentation package is estimated to cost approximately \$340,000.

It is estimated that a building 30 feet high and containing 14,000 square feet will be required to house the alcohol facility. Based upon these figures and assuming a cost of \$25 per square foot, the building cost is estimated at \$350,000.

Sufficient storage is provided to store the anhydrous alcohol and associated distillers grain for 10 days. The cost for these storage facilities will be approximately \$150,000.

The cost for site work and utilities is difficult to estimate since the necessary geographical and soils information is unavailable. Therefore, a cost allowance of \$150,000 has been included in the project cost estimate for site work. Actual costs could vary substantially from this allowance.

Table 4
CAPITAL COST ESTIMATE
(1980 prices)

Grain Preparation	\$ 150,000
Saccharification and Fermentation System	920,000
Distillation and Dehydration System	1,950,000
Distillers Grain Dryer	280,000
Instrumentation	340,000
Building	350,000
Alcohol and DDG Storage	150,000
Site Work and Utilities	<u>150,000</u>
SUBTOTAL	\$4,290,000
Geothermal Resource Development	<u>1,200,000</u>
SUBTOTAL	\$5,490,000
Construction Contingencies (15%)	<u>825,000</u>
TOTAL CONSTRUCTION COST	\$6,315,000
Engineering and Administrative (10%)	<u>630,000</u>
TOTAL PROJECT COST	\$6,945,000

The plant under consideration will use geothermal energy to drive the alcohol process and dry the distillers grain. From available data, it is assumed that a well depth of approximately 8,500 feet will be required to obtain water in the desired temperature range. The estimated cost to develop a production well at this depth is approximately \$1,200,000.

Totalling the above costs results in a subtotal of \$5,490,000. Construction contingencies (included at 15 percent) and engineering and administrative costs (assumed at 10 percent) have been added to the cost estimate to produce a total project cost of \$6,945,000.

Cost estimates in studies of this type are normally classified as order-of-magnitude estimates. These estimates carry an accuracy range of +50 to -30 percent. That is, the actual construction cost of the project, if it is constructed in 1980, could vary from 50 percent more to 30 percent less than the initial order-of-magnitude estimate. The quality of the project desired and the method of construction chosen will have the largest impact on the final project cost.

OPERATING COST

Table 5 shows a breakdown of the estimated yearly operating costs in 1980 dollars for the proposed 3 million gallon per year alcohol plant.

LABOR

Labor costs assume a four-shift operation. One shift will use three men for production while the remaining three shifts will use two men per shift. In addition, two grain handlers and two mechanics are included in the labor costs. The salary of the above personnel is assumed to be \$12,000 per year. One secretary/bookkeeper is also included at a salary of \$12,000 per year. It is assumed that a plant superintendent and the general manager will receive an annual salary of \$30,000. All of the above labor costs are increased by 40 percent to cover payroll taxes and fringe benefits.

Based on the above assumptions, the annual labor costs for the alcohol production facility will be \$428,400.

FEEDSTOCK

Corn at a cost of \$3 per bushel is assumed to be the primary feedstock for the alcohol plant. Based on this price and the consumption of 1.2 million bushels of corn each year, the annual cost of feedstock will be \$3,600,000.

ENZYMES AND CHEMICALS

The enzymes required for the alcohol production process include alpha-amylase, gluco-amylase, and those enzymes

Table 5
ALCOHOL PLANT OPERATING COST
(1980 PRICES)

	<u>\$/yr</u>	<u>\$/gal</u>
Labor	428,000	14.3
Feedstock	3,600,000	120.0
Enzymes and Chemicals	555,000	18.5
Repairs and Maintenance	150,000	5.0
Insurance	75,000	2.5
Utilities		
Electricity	180,000	6.0
Other	<u>20,000</u>	<u>0.7</u>
TOTAL	5,008,000	167.0

produced by the yeast. The first two enzymes convert the starch contained in the grain into simple sugars. The enzymes provided by the yeast convert the simple sugars into alcohol and carbon dioxide. The bulk cost for the two enzymes F.O.B. the dealer is approximately 6 cents per gallon of alcohol produced. Yeast cost is approximately 2.5 cents per gallon of alcohol produced.

The chemicals required for alcohol production include acids such as phosphoric and sulfuric acid, and bases such as ammonium hydroxide, denaturants, biocides, and anti-foam agents. The requirements for these chemicals can vary, depending on the process chosen and enzymes used. However, most sources indicate that the requirements for these materials average approximately 10 cents per gallon of alcohol produced.

Based on the above data, the total cost of enzymes and chemicals for alcohol production will be 18.5 cents per gallon of alcohol produced, or \$550,000 per year.

REPAIRS AND MAINTENANCE

Repairs and maintenance are estimated to total \$150,000 each year for the proposed facility.

UTILITIES

Approximately 2 kWh of electricity for pumps, motors, and lights will be required to produce a gallon of alcohol. On this basis and a power cost of \$0.02 per kWh, the yearly electric cost for these items will be \$120,000. It is estimated that the additional electrical energy required to operate the geothermal water handling system and associated equipment will total approximately 1 kWh which will cost \$60,000 annually.

Based on the above data, the annual electrical costs for the alcohol facility are \$180,000.

An allowance of \$20,000 has been included for miscellaneous utilities such as telephone, water, and wastewater.

INSURANCE

Insurance costs are estimated at 1.5 percent of equipment cost. Based on this estimate, the annual insurance cost is approximately \$75,000 per year.

Totalling the above operating costs results in an estimated annual operating cost of \$5,008,000, or \$1.67 per gallon of alcohol produced.

REVENUE

The proposed plant will produce 3 million gallons of anhydrous alcohol per year. Based on the selling price of \$1.80 per gallon, the annual revenue from alcohol sales will be \$5,400,000.

Distillers dried grain (DDG), a byproduct of grain based alcohol production, is a valuable commodity and contributes significantly to the profitability of the proposed project. The value of distillers grain is subject to debate. While the component analysis and various feeding studies indicate that DDG is superior to corn, the sale price of this material may not reflect this advantage. For this analysis, it is assumed that DDG sells for the same price as corn. At that price, \$3 per bushel, the revenue from the sale of DDG from the alcohol facility will be \$720,000 per year.

Additional revenue may be generated through the sale of carbon dioxide. Because the sale of this material is highly dependent on local markets, no revenue from its sale has been included in this study. Should a local market be identified for this material, approximately 57,000 pounds will be available for sale each day.

Summing the revenue from alcohol and DDG sales results in an annual revenue of \$6,120,000.

SIMPLE PAYBACK

Payback period is defined as the minimum length of time theoretically necessary to recover the original capital investment in the form of cash flow to the project based on total income minus all costs except depreciation. This method generally neglects interest effects.

Subtracting the annual operating and maintenance cost, \$5,008,000, from the annual revenue, \$6,120,000, results in a gross annual profit of \$1,112,000. Dividing the gross annual profit into the estimated project cost, \$6,945,000, results in a simple payback period of 6.25 years. The above data is summarized in Table 6.

It should be noted that there is no absolute value for payback period which indicates an acceptable investment. This calculation is merely a relative indicator used in comparing alternative investments. An acceptable payback period must be determined in the context of these alternate investment options and the projected risk associated with the proposed project.

Table 6
SIMPLE PAYBACK PERIOD

Revenue	
Alcohol	\$5,400,000
DDG	720,000
	<u>\$6,120,000</u>
Operating and Maintenance Cost	<u>5,008,000</u>
Annual Gross Profit	\$1,112,000
Estimated Project Cost	\$6,945,000
Payback Period	6.25 years

The previous simple payback analysis was calculated using the best available data at this time. However, grain commodity markets can be quite unstable. Small changes in the feedstock costs can significantly affect the economics of the proposed project since that cost is approximately 75 percent of the total operating cost. Also, the value of dried distillers grain is subject to question and may vary significantly from the value presented in the analysis. The selling price of anhydrous alcohol is currently \$1.80 per gallon. Undoubtedly, this price will increase in the future.

In order to examine the effects that changes in the costs of these items might have on the proposed project, a sensitivity analysis was performed. In this analysis, corn was allowed to vary between \$2.50 and \$3.50 per bushel which is a 50-cent deviation from the previous analysis. Distillers dried grain was allowed to vary over the same range as the corn. Because it is very doubtful that the price of alcohol will drop in the future, this price ranged from the current \$1.80 to \$2.20 per gallon. Table 7 shows the cases that were studied. For each case, the operating cost, revenue, operating profit, and simple payback were calculated.

As seen in Table 7, the simple payback varies from 2.3 to 17.7 years. This wide range of payback illustrates the economic sensitivity of the project. Examination of the table indicates that a small change in the cost of corn or the selling price of alcohol produces a large change in the project's profitability. Changes in the selling price of the distillers dried grain is not nearly as significant as changes in the other two items.

Table 7
PROJECT SENSITIVITY ANALYSIS
ON
SIMPLE PAYBACK

Feedstock Cost (\$/bu)	3.00	2.50	2.50	2.50	2.50	3.50	3.50	3.50	3.50
Alcohol Sale Price (\$/gal)	1.80	1.80	2.20	2.20	1.80	1.80	1.80	2.20	2.20
DDG Sale Price (\$/bu)	3.00	2.50	2.50	3.50	3.50	2.50	3.50	2.50	3.50
O&M Cost (x 1000)	5,008	4,408	4,408	4,408	4,408	5,608	5,608	5,608	5,608
Alcohol Revenue (x 1000)	5,400	5,400	6,600	6,600	5,400	5,400	5,400	6,600	6,600
DDG Revenue (x 1000)	720	600	600	840	840	600	840	600	840
Operating Profit (x 1000)	1,330	1,592	2,792	3,032	1,832	392	632	1,592	1,832
Simple Payback (years)*	6.2	4.4	2.5	2.3	3.8	17.7	11.0	4.4	3.8

*Based on a project capital cost of \$6,945,000.

Currently, there are numerous state and Federal tax incentives to support and encourage the development of alcohol fuels. Two Idaho State laws which could potentially impact the proposed project include the following:

- o Senate Bill 1245 provides that 50 percent of the claims made against the Motor Fuels Refund Account be transferred into the new Gasohol Refund Account and that any distributor of motor fuels may file claims of 4 cents per gallon of gasohol sold against the Gasohol Refund Account.
- o Senate Bill 1247 allows a property tax credit for any personal property or improvement used or constructed to manufacture alcohol for use in gasohol.

Full provisions of the above laws are located in the Appendix (page 25).

Federal tax incentives supporting fuel alcohol production include the following:

- o The Energy Tax Act of 1978 exempts alcohol-gasoline blends from the 4 cents per gallon Federal motor fuel excise taxes. The Windfall Profit Tax Act extends this exemption through 1992 and provides for a tax refund for the excise paid on any gasoline which was subsequently used to blend gasohol. See page 4 in the Appendix for further details.

- o The Windfall Profit Tax Act provides for a 40 cents per gallon alcohol tax credit for a blender of gasohol. However, this tax credit is reduced by the amount of Federal excise taxes exemption applicable to the blended fuel. For further details, see page 5 in the Appendix.
- o The Windfall Profit Tax Act extends the provision of the Energy Tax Act of 1978 which allows a 20 percent investment tax credit to be applied to fuel alcohol plants. For further details, see page 10 in the Appendix.
- o The Economic Regulatory Administration amends the Crude Oil Entitlements Program to allow entitlements to be granted to certain petroleum substitutes including fuel alcohol. The entitlements earned by eligible firms are equivalent, on a Btu basis, to the entitlements earned on uncontrolled crude oil (i.e., approximately 5 cents per gallon of alcohol at current entitlement levels). For further details, see page 19 in the Appendix.
- o The Windfall Profit Tax Act simplifies the statutory and regulatory requirements to obtain a permit for operation from the Bureau of Alcohol, Tobacco and Firearms. For details, see page 20 in the Appendix.

Due to the complex interrelationships of these various incentives, a competent tax lawyer should be consulted to determine how these regulations will affect each individual's tax position.

APPENDIX

Public Law 96-223

96th Congress

An Act

To impose a windfall profit tax on domestic crude oil, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,

SECTION 1. SHORT TITLE.—AMENDMENT OF 1954 CODE TABLE OF CONTENTS.

(a) SHORT TITLE.—This Act may be cited as the "Crude Oil Windfall Profit Tax Act of 1980."

Alcohol Fuels Tax Incentives

A Summary

Alcohol Fuels Provisions of the Crude Oil Windfall Profit Tax Act

Subchapter C of Chapter 1 of the Internal Revenue Code is amended by inserting after section 401 the following new section:

SEC. 402. ALCOHOL FUELS CREDIT.

(a) CREDIT.—There shall be allowed as a credit against the tax imposed by this chapter for the taxable year an amount equal to the amount of—

(1) the alcohol mixture credit, plus

(2) the alcohol fuel credit.

(b) DEDUCTION OF ALCOHOL MIXTURE CREDIT AND ALCOHOL FUEL CREDIT.—For purposes of this section—

(1) ALCOHOL MIXTURE CREDIT.—

(A) IN GENERAL.—The alcohol mixture credit of any taxpayer for any taxable year is 40 cents for each gallon of alcohol used by the taxpayer in the production of a qualified mixture.

(B) QUALIFIED MIXTURE.—The term "qualified mixture" means a mixture of alcohol and gasoline or of alcohol and a special fuel which—

(i) is sold by the taxpayer producing such mixture to

any person for use as a fuel, or

(ii) is used as a fuel by the taxpayer producing such mixture.

(C) SALE OR USE MUST BE IN TRADE OR BUSINESS, ETC.—

Alcohol used in the production of a qualified mixture shall

be taken into account—

(i) only in the sale or use described in subparagraph

(B) as a trade or business of the taxpayer; and

(ii) for the taxable year in which such sale or use

occurs.

(D) CASUAL OR FARM PRODUCTION NOT ELIGIBLE.—No

credit shall be allowed under this section with respect to any

casual or farm production of a qualified mixture.

(E) CREDIT.—

(i) IN GENERAL.—The alcohol credit of any taxpayer for

any taxable year is 40 cents for each gallon of alcohol which

is used by the taxpayer as a fuel in a trade or

business.

(ii) CASUAL OR FARM PRODUCTION NOT ELIGIBLE.—No

credit shall be allowed under this section with respect to any

casual or farm production of a qualified mixture.

(iii) CREDIT.—

(A) IN GENERAL.—The alcohol credit of any taxpayer for

any taxable year is 40 cents for each gallon of alcohol which

is used by the taxpayer as a fuel in a trade or

business.

(B) CASUAL OR FARM PRODUCTION NOT ELIGIBLE.—No

credit shall be allowed under this section with respect to any

casual or farm production of a qualified mixture.

(C) CREDIT.—

(i) IN GENERAL.—The alcohol credit of any taxpayer for

U.S. National Alcohol Fuels Commission

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Deputy Executive Director

Washington, D. C.
April 1980

The Crude Oil Windfall Profit Tax Act of 1980 provides significant tax incentives for producers, blenders, marketers, and users of alcohol fuels.

These incentives respond to our needs for domestic energy production in every area of the Nation. Agricultural communities and rural areas are aided through incentives to encourage alcohol fuel production on the farm, from agricultural feedstocks and other forms of biomass. Urban areas are assisted through incentives to encourage alcohol fuel production from municipal solid waste. And all Americans will be aided by alcohol fuels extending our scarce supplies of liquid fuels and reducing our reliance on imported petroleum.

However, if the Act is to achieve the goal of increased domestic alcohol fuel production, potential alcohol fuel producers and investors must become aware of these incentives. For that reason the U.S. National Alcohol Fuels Commission has prepared this summary of the alcohol fuel provisions of the Crude Oil Windfall Profit Tax Act of 1980.

Birch Bayh
Chairman

Robert A. Roe
Vice Chairman

Questions regarding this report and its availability should be directed to Curtis Deane, Legislative Affairs Director, U.S. National Alcohol Fuels Commission, 112 First Street, South East, Washington, D. C. 20003, telephone (202) 426-6490.

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Introduction

The Crude Oil Windfall Profit Tax Act of 1980 (Public Law 96-223) was signed into law by the President on April 2, 1980. The Act contains several provisions which will affect persons or firms producing, blending, marketing, or using alcohol fuels. These include:

- Continuation from 1984 through 1992 of the exemption from the four cent per gallon federal excise taxes for alcohol-gasoline blends containing at least 10 percent alcohol
- Refunds for excise taxes paid on gasoline blended with at least ten percent alcohol
- New income tax credits for blenders of alcohol-gasoline blends, and for users of straight alcohol fuel
- Continuation through 1985 of the Energy Investment Tax Credit for alcohol fuel production equipment
- Authority for simplification of Bureau of Alcohol, Tobacco and Firearms regulation of alcohol fuel producers
- Tax-exempt status for certain industrial development bonds for financing alcohol fuel production facilities
- Federal study on imported alcohol fuel

These provisions of the Act are intended to lessen this Nation's dependence upon imported petroleum by encouraging the construction of domestic alcohol fuels production facilities. This summary is a brief guide to alcohol fuel producers, blenders, and marketers—large and small scale—who may qualify for these tax incentives.

For persons considering alcohol fuel production, blending, or marketing, and who believe they may qualify for the tax provisions described, this report should be supplemented by professional tax counsel.

Interested persons may obtain a copy of Public Law 96-223, or the *Conference Report, Crude Oil Windfall Profit Tax Act of 1980*, U.S. House of Representatives Report No. 96-817 96th Congress, 2nd Session, through their U.S. Senator at the United States Senate, Washington, D.C. 20510, or their U.S. Representative at the House of Representatives, Washington, D.C. 20515.

Four Cent Per Gallon Excise Taxes Exemption

The Exemption

Under the Energy Tax Act of 1978 (Public Law 95-618), alcohol-gasoline blends are exempt from the four cent per gallon federal motor fuel excise taxes until October 1, 1984. To qualify for this exemption the blend must contain at least ten percent alcohol of at least 190 proof. Alcohol is defined as ethanol and methanol, but does not include alcohol produced from petroleum, natural gas, or coal. The Windfall Profit Tax Act *continues this exemption through December 31, 1992.*

It also includes procedures for determining the proof and volume of alcohol that qualifies for the exemption. It provides that the *proof* of alcohol used to make alcohol-gasoline blends shall be determined prior to the addition of any denaturants (except for those processes that also use the denaturant as a drying agent). With regard to determining the *volume* of alcohol in the blend, any denaturants (including gasoline) which are added under any formula approved by the Secretary of the Treasury are considered alcohol to the extent that such denaturants do not exceed five percent of the volume of the alcohol (including denaturants).

Refund of Tax on Gasoline Blended With Alcohol

The Energy Tax Act of 1978 (Public Law 95-618) allows gasoline to be sold free of the four cent per gallon federal excise taxes when blended with at least ten percent alcohol of at least 190 proof. However, that law does not provide for a credit or refund of the tax paid on gasoline if that gasoline is subsequently used to make tax-exempt alcohol-gasoline blends by blenders.

The Windfall Profit Tax Act corrects this situation. A person who purchases tax-paid gasoline and uses it to make a tax-exempt alcohol-gasoline blend may now claim a refundable income tax credit equal to

the taxes paid on such gasoline. Additionally, if the taxes paid on such gasoline total at least \$200 during any of the first three quarters of the year, the person may file for a refund on a quarterly basis rather than wait until he files his annual tax return.

This provision applies retroactively to January 1, 1979. Tax-paid gasoline used to make a tax-exempt alcohol-gasoline blend between January 1, 1979, and April 2, 1980 (the date of enactment of the Windfall Profit Tax Act) shall be treated as having been sold or used on April 2, 1980.

Income Tax Credits

Blended Fuels

For the period October 1, 1980, through December 31, 1992, a person who blends alcohol fuel with gasoline or any other liquid fuel suitable for use in an internal combustion engine may claim an income tax credit. To qualify the blender must, in the course of his trade or business, sell the blended fuel for use as a fuel, or use it as a fuel himself. For example, a farmer who blends his own alcohol-gasoline fuel would qualify for the income tax credit.

The Act specifically states that "casual off-farm production" of alcohol-gasoline blends does *not* qualify for the tax credit. The Act does not define what constitutes "casual off-farm production," and interpretation of this provision will be the responsibility of the Internal Revenue Service, U. S. Department of the Treasury.

Alcohol is defined as ethanol and methanol, but does not include alcohol produced from petroleum, natural gas, or coal.

The credit is *forty cents per gallon of alcohol of at least 190 proof, and thirty cents per gallon of alcohol of at least 150 proof but less than 190 proof.*

The tax credit is reduced by the amount of federal excise taxes exemption applicable to the blended fuel.

The accompanying chart has been prepared to illustrate computation of the income tax credit. For example, alcohol-gasoline blends containing at least ten percent alcohol are exempt from the four cent per gallon motor fuel excise taxes (the federal gas tax). If a person blends 85 gallons of gasoline (Column A of the chart) with 15 gallons of alcohol (Column B) of at least 190 proof, the resulting 100 gallons of blended fuel (Column C) would be exempt from \$4.00 in federal excise taxes (100 x .04 = \$4.00).

To compute the income tax credit, multiply the amount of alcohol blended by \$.40 (15 gallons x .40 = \$6.00) and reduce it by the amount of the excise tax exemption (\$4.00). In this example, the blender ends up with a net income tax credit of \$2.00 on 100 gallons of blended fuel—\$6.00 (gross tax credit) minus \$4.00 (excise taxes exemption) equals \$2.00.

The accompanying chart shows the total tax credit for 100 gallons of alcohol-gasoline blends that contain from one percent to ninety percent alcohol. It is important to note, however, that blends containing less than ten percent alcohol are not exempt from the federal excise taxes of four cents per gallon. In these cases, an income tax credit can be claimed, but the excise taxes must also be paid.

The tax credit is both nonrefundable and taxable. The credit is *nonrefundable* in that if the tax credit totals more than a taxpayer's total income tax liability (the amount of income tax that would otherwise have to be paid), the taxpayer *cannot* receive a federal tax refund for the difference (the amount the tax credit exceeds the tax liability). The taxpayer can, however, carry forward the excess value of the tax credit to the tax liability in the next tax year. This carry-forward provision applies to the seven tax

Column A	Column B	Column C	Column D	Column E	Column F
Gasoline Content (in gallons)	Alcohol Content (in gallons) (190 proof)	Total Gallons of Blended Fuel (Add A to B)	Gross Tax Credit Gallons of Alcohol multiplied by 40¢ (40¢ times B)	Value of Tax Exemption Gallons of Blended Fuel multiplied by 4¢ (4¢ times C)	Net Tax Credit 100 gallons Blended Fuel (D minus E)
99	1	100	\$.40	\$0.00*	\$.40*
98	2	100	.80	0.00*	.80*
97	3	100	1.20	0.00*	1.20*
96	4	100	1.60	0.00*	1.60*
95	5	100	2.00	0.00*	2.00*
94	6	100	\$ 2.40	\$0.00*	\$ 2.40*
93	7	100	2.80	0.00*	2.80*
92	8	100	3.20	0.00*	3.20*
91	9	100	3.60	0.00*	3.60*
90	10	100	4.00	4.00**	0.00**
89	11	100	\$ 4.40	\$4.00**	\$.40**
88	12	100	4.80	4.00**	.80**
87	13	100	5.20	4.00**	1.20**
86	14	100	5.60	4.00**	1.60**
85	15	100	6.00	4.00**	2.00**
84	16	100	\$ 6.40	\$4.00**	\$ 2.40**
83	17	100	6.80	4.00**	2.80**
82	18	100	7.20	4.00**	3.20**
81	19	100	7.60	4.00**	3.60**
80	20	100	8.00	4.00**	4.00**
70	30	100	\$12.00	\$4.00**	\$ 8.00**
60	40	100	16.00	4.00**	12.00**
50	50	100	20.00	4.00**	16.00**
40	60	100	24.00	4.00**	20.00**
30	70	100	\$28.00	\$4.00**	\$24.00**
20	80	100	32.00	4.00**	28.00**
10	90	100	36.00	4.00**	32.00**
0	100	100	40.00	4.00**	36.00**

Δ This chart is based on the *Conference Report, Crude Oil Windfall Profit Tax Act of 1980*, U. S. House of Representatives Report No. 96-819, 96th Congress, 2nd Session, pages 142-3

* Alcohol-gasoline blends that contain less than ten percent alcohol are not exempt from the four cent per gallon federal motor fuels excise taxes. Therefore, the gross tax credit is not reduced in these cases, but the federal excise taxes of four cents must be paid on each gallon of motor fuel.

** If alcohol-gasoline blends or straight alcohol fuel are sold to certain purchasers exempt from all federal motor fuel excise taxes, then the gross tax credit is not reduced by the value of the excise taxes exemption. Such exempt purchasers are farmers who use the fuel for on-farm use, and units of local government.

U.S. National Alcohol Fuels Commission Report:
Alcohol Fuels Tax Incentives, A Summary:
Alcohol Fuels Provisions of the Crude Oil Windfall Profit Tax Act of April, 1980

*** The gross tax credit for straight alcohol fuel sold at retail is reduced by the value of the excise taxes exemption (as shown in the chart). However, if straight alcohol is used as a fuel by the producer of the alcohol, neither the excise taxes nor the exemption from those taxes apply. Therefore, the gross tax credit is not reduced in this case. For example, a farmer who produces his own 190 proof alcohol, and uses it as a fuel, is eligible for the full tax credit of 40¢ per gallon of 190 proof alcohol.

years after the year during which the credit was originally earned. However, no credit may be carried forward to tax years beginning after December 31, 1994.

The credit is *taxable* in that the amount of tax credit claimed must be added to the blender's gross income on which tax liability is based. In essence, the tax credit is added to his income, then tax owed calculated on that income, and then the tax credit subtracted from the tax owed.

For determining the proof, volume of alcohol, and the amount of denaturants used in alcohol (either blended or straight) qualifying for income tax credits, the same procedures are used as in the case of alcohol used in blends qualifying for the excise taxes exemption. These procedures are explained earlier on page 4 of this report under "Four Cent Per Gallon Excise Taxes Exemption."

Straight Alcohol Fuel

For the period October 1, 1980, through December 31, 1992, a person (1) who uses straight alcohol fuel (one hundred percent alcohol) as a fuel in his trade or business, or (2) who sells straight alcohol fuel "at retail to a person and placed in the tank of such person's vehicle," may claim an income tax credit. In situations where the retail seller is eligible for the credit, no credit is allowable for the user. Alcohol includes ethanol and methanol, but does not include alcohol of less than 150 proof, or alcohol which is produced from petroleum, natural gas, or coal.

The tax credit is forty cents per gallon of alcohol of at least 190 proof, and thirty cents per gallon of alcohol of at least 150 proof but less than 190 proof. As in the case of the income tax credit for alcohol blended with other motor fuels, the tax credit for straight alcohol fuel is taxable and nonrefundable, and the same seven-year carry-forward provision applies. The tax credit is reduced by the amount of federal excise taxes exemption applicable (such as in the case of retail sale).

Alcohol Fuel Producer Eligibility

The Windfall Profit Tax Act does not specifically address the subject of alcohol fuel producer eligibility for income tax credits. However, the issue of producer eligibility was discussed during Senate debate on the Act. Three examples of potential producer eligibility for the income tax credit were outlined. An alcohol producer may qualify if:

- "He owns all of the ingredients of the alcohol fuel mixture at the time of the blending process . . ."
 - He "could arrange for the blending to take place at a facility operated by the gasoline supplier, or at some other facility . . ." or if
 - He would "participate with other parties in a partnership or joint venture to blend and distribute alcohol mixture fuels thereby qualifying for its distributive share of the credit in accordance with the partnership agreement and the tax rules relating to partnerships . . ."
- (Source: March 26, 1980, *Congressional Record*, page S 3034.)

These examples of producer eligibility do not have the force of law, but insofar as they are part of the legislative history of the Act, they should influence the regulations governing implementation of the income tax credits.

Energy Investment Tax Credit for Biomass

The Credit

Under the Energy Tax Act of 1978 (Public Law 95-618), the ten percent Energy Investment Tax Credit is available through 1982 for boilers, burners, and related pollution control and fuel handling equipment that use primarily fuels (such as biomass) other than petroleum or natural gas. Also eligible is equipment that converts alternate substances like biomass into a synthetic solid, liquid, or gaseous fuel. However, the Energy Investment Tax Credit does not apply to land involved with alcohol fuel production.

The Windfall Profit Tax Act retains through 1982 the ten percent Energy Investment Tax Credit for "alternative energy property," and creates for the period January 1, 1983, through December 31, 1985, a new eligibility section for "biomass property." Both of these sections apply to equipment that converts biomass into alcohol fuel. The Congress intended that equipment that converts biomass into alcohol fuel be eligible for the ten percent Energy Investment Tax Credit from January 1, 1983, through December 31, 1985, but only if the equipment producing the alcohol uses a primary energy source (i.e., more than fifty percent of the full energy requirement) other than oil, natural gas, or a product of oil or natural gas. The effective date of this limitation on the primary energy source was explained by Senator Russell Long, Chairman of the Senate Finance Committee, during the Senate's Windfall Profit Tax Act debate (see March 27, 1980 *Congressional Record*, page S 3135).

Biomass is generally any organic substance other than oil, or natural gas. Biomass includes waste, sewage, sludge, grain, wood, oceanic and terrestrial crops, and crop residues.

Beginning January 1, 1983, coal may *not* be used as a feedstock if the ten percent Energy Investment Tax Credit is claimed.

Boilers or burners which use biomass, and biomass fuel or feedstock handling, storage, and preparation equipment and pollution control equipment are also eligible for the extended ten percent Energy Investment Tax Credit.

For the period from January 1, 1980, through December 31, 1985, equipment that stores fuel derived from garbage at the site where the fuel is produced is eligible for the ten percent Energy Investment Tax Credit. This is a new provision not included in earlier federal law.

It should be noted that the permanent business investment tax credit of ten percent continues to apply in addition to the ten percent Energy Investment Tax Credit. *This means a total investment tax credit of twenty percent may be claimed for eligible investments.*

Reduction of the Energy Investment Tax Credit

The Windfall Profit Tax Act provides that to the extent property (excluding land) is financed by tax-exempt industrial development bonds or certain other government subsidized energy financing, the Energy Investment Tax Credit is not available. For example, a property, fifty percent of which is financed by tax-exempt bonds, would qualify for only fifty percent of the Energy Investment Tax Credit.

This does not, however, apply to loan guarantees.

In general, this provision will be effective January 1, 1983. However, in the case of the Energy Investment Tax Credit for equipment that stores fuel derived from garbage, it becomes effective January 1, 1980.

Alcohol Fuel Plant Operating Permits

Regulatory Simplification

The Windfall Profit Tax Act creates a new section in the Internal Revenue Code which classifies separately distilled spirits for use as a fuel, and distilled spirits for use as a beverage.

In issuing regulations under this new section, the Secretary of the Treasury is directed to take steps to expedite the processing of applications, establish a minimum bond, and generally encourage and promote the production of alcohol for fuel purposes.

Under the broad authority given the Secretary by this section, it is expected that the regulation of alcohol fuel production will be simplified. This is likely to include shortened application procedures and forms, reduced recordkeeping and reporting requirements, and lower bonding requirements.

This new section becomes effective July 1, 1980. However, the Bureau of Alcohol, Tobacco and Firearms, acting for the Secretary of the Treasury, must issue regulations before this new legal authority can be implemented. Under these new regulations, it is expected that three new categories of operating permits will be established: small, medium, and large. The current categories of experimental and commercial operating permits may also be continued. However, the Act only requires the establishment of a small plant category. For information on operating permits contact: Bureau of Alcohol, Tobacco and Firearms, U.S. Department of the Treasury, Washington, D.C. 20226, telephone (202) 566-7531.

Small Plants

The Windfall Profit Tax Act defines a small plant as having a maximum annual production capacity of 10,000 proof gallons of alcohol. The law requires the Bureau of Alcohol, Tobacco and Firearms to approve or reject a properly completed small plant operating permit application within sixty days, or else the application is legally deemed approved. No bonding requirements are to be established for a small plant.

Tax-Exempt Bonds for Alcohol Fuel from Solid Waste

Prior to enactment of the Windfall Profit Tax Act, federal law permitted the financing of solid waste disposal facilities through tax-exempt industrial development bonds. The Windfall Profit Tax Act expands the definition of solid waste disposal facilities to include property which is used primarily to process solid waste into alcohol.

For a facility to be a "qualified alcohol-producing facility" under this provision it must satisfy three requirements:

- The primary product obtained from the facility must be alcohol (the Act does not require the alcohol to be of any minimum proof)
- More than half of the feedstock used in the production of alcohol must be solid waste or a feedstock derived from solid waste
- Substantially all of the solid-waste-derived feedstock must be produced at a facility located at or adjacent to the site of the alcohol-producing facility, and both facilities must be owned and operated by the same person. (A person "owns" such facilities if the facilities are owned for tax purposes by that person.)

A facility need not satisfy the last of these requirements if two conditions are satisfied:

- Substantially all of the solid-waste-derived feedstock used must be from a facility that went into production during 1977, is located within the limits of a city, and is in the same metropolitan area as the alcohol-producing facility

- Prior to March 1, 1980, negotiations were under way between a government authority and an educational, scientific, or similar non-profit organization regarding the use of a special alcohol production process

These conditions can be satisfied only if the total obligations issued for a project do not exceed \$30 million, and if the obligations are issued prior to January 1, 1986.

The new provisions governing tax-exempt industrial development bonds for financing solid waste disposal facilities that produce alcohol apply to obligations issued after October 18, 1979. The Windfall Profit Tax Act also provides that such bonds will *not* be tax exempt if the bonds are guaranteed by the federal government, or if any payment of the principal or interest is made with funds from a federal, state, or local energy program.

The Windfall Profit Tax Act also expands the definition of a solid waste disposal facility that can be financed through tax exempt industrial development bonds to include solid waste disposal facilities that produce steam or electricity. The requirements for such steam or electric facilities are similar to, but not in all cases the same as, the requirements for a qualified alcohol-producing facility.

State Financing of Renewable Energy Property

The Windfall Profit Tax Act defines "renewable energy property" as property used to produce energy (including heat, electricity, and substitute fuels) from renewable energy sources (including wind, solar, and geothermal energy, waste heat, biomass, and water).

The Act provides that industrial development bonds used to finance renewable energy property will be tax exempt if four conditions are met:

- The bonds must be general obligations of a state
- Taxes must be levied in sufficient amount to provide for the payment of principal and interest on the bonds
- The amount of all obligations (whether or not industrial development bonds) under the state program for renewable energy property may not exceed \$500 million or one-half of one percent of the value of all property within the state, whichever is smaller
- The state constitution permits state financing of small-scale energy projects. (A constitutional amendment to permit such financing must have been approved by the legislature before October 18, 1979).

These provisions of the Windfall Profit Tax Act apply to obligations issued after the date of enactment of the Act, April 2, 1980.

The Windfall Profit Tax Act also provides that such bonds will *not* be tax exempt if the bonds are guaranteed by the federal government, or if any payment of the principal or interest is made with funds from a federal, state, or local energy program (other than the state-issued bonds in question).

When the Windfall Profit Tax Act was enacted on April 2, 1980, the only state known to qualify under this provision of the Act was the State of Oregon.

Study of Imported Alcohol

The Windfall Profit Tax Act requires the Secretary of the Treasury to send Congress by October 2, 1980, a report on imported alcohol fuels. The report is to include the Secretary's recommendations on what methods may be used to limit alcohol fuels imports, including, but not limited to:

- Denial of federal motor fuels excise taxes exemption and income tax credits to fuels produced from imported alcohol
- Import quotas and duties on alcohol fuel
- Strict surveillance of alcohol fuels imports to monitor their effect on the domestic alcohol fuel industry

This report is to be provided to the Senate Committee on Finance and the House of Representatives Committee on Ways and Means, which have jurisdiction over foreign trade matters.

Annual Reports on Alcohol Fuels

On April 1 of each year, beginning in 1981, and ending in 1992, the Windfall Profit Tax Act requires the Secretary of Energy to submit to Congress a report on the use of alcohol fuels. The report is to include:

- A description of the firms engaged in the alcohol fuel industry
- The amount of alcohol fuels sold in each state, and the amount of gasoline saved in each state by reason of the use of alcohol fuels
- The revenue loss resulting from the federal motor fuels excise taxes exemption and the income tax credits for blended and straight alcohol fuels, and the loss of revenue to the Highway Trust Fund resulting from the excise taxes exemption
- The cost of production and the retail cost of alcohol fuels as compared to gasoline and special fuels not mixed with alcohol

The Secretary of Energy is to prepare each annual report in consultation with the Secretary of the Treasury and the Secretary of Transportation.

Entitlements for Alcohol/DOE

Description of Program (Subsidy for Alcohol producers)

- The Economic Regulatory Administration (ERA) of the Department of Energy (DOE) administers the Crude Oil Entitlements Program which is intended to equalize the average cost of crude oil among all refiners. It is accomplished through a system of monthly cash transfers whereby firms which have access to low cost, domestic price controlled oil make payments to firms which purchase expensive imported or domestic uncontrolled or upper tier priced oil. Because the price regulations and the entitlements program have the combined effect of holding average crude oil prices in the United States below world market prices, petroleum substitutes have been less competitive in relation to crude oil than would be the case if crude oil were not controlled. Also, because the entitlements program essentially subsidizes imported oil, ERA has determined that alcohol fuel, which displaces foreign oil, should receive the same subsidy as foreign oil.

In an effort to remove the regulatory disincentive to the production and use of petroleum substitutes caused by the crude oil price regulations, ERA amended its regulations in May of 1978, to provide entitlements benefits, on a case by case basis, for certain petroleum substitutes, including non-petroleum based ethanol used as blend stock for gasohol. (43 FR 21429, May 18 1978; effective date July 1, 1978.) Archer-Daniels-Midland Corporation was the first firm to apply for and be awarded entitlements treatment for its ethanol production. (ERA Decision and Order, Docket #ERA-APS-78-2, August 23, 1979.)

On October 31, 1979, ERA amended the entitlements program further to extend the benefits available to alcohol producers automatically, rather than upon application. (44 FR 63515, November 5, 1979.) A second firm, Midwest Solvents, began receiving entitlements for ethanol and more firms are expected to begin receiving these payments in the coming months. The benefits are available for ethanol derived from domestic biomass which is mixed with gasoline for use as fuel in the United States. The entitlements earned by eligible firms are equivalent, on a b.t.u. basis, to the entitlements earned on uncontrolled crude oil, i.e., approximately five cents per gallon of alcohol at current entitlement levels.

- Responsible Officials for Further Information

Peter Antonelli (202) 254-7434, David Welsh (202) 254-3336
2000 M St. phone no., etc.

Description of the Program● Authorizing Legislation

Section 222(a) of Title II of the Community Services Administration Act which establishes the Emerging Energy Conservation Services and provides authority for this program. The program will address the energy needs of low income people with the goals of lessening the impact of the high energy costs on the poor and reducing both individual and family energy consumption.

● Types of Funding

Direct grants to public and private non-profit organizations and agencies for research, development and demonstration of energy sources. Alcohol fuels qualify as an "energy source".

● Funding Limits

\$3.7 million has been appropriated for the implementation of this program in FY 1980.

● Eligibility Criteria

CAA's, non-profit CDC's, SEDCO's and other public or private non-profit organizations and agencies that meet CSA eligibility criteria may apply. Grant awards must be directed to addressing the needs of the poor and near poor.

● Application Procedure

Applications should be submitted to the Community Services Administration, Office of Program Development, 1200 19th Street, N.W. Washington, D.C. 20506.

● Status

The FY 1980 allocation to CSA's energy programs has been obligated and no other funds are available at this time.

CSA has awarded a \$150,000 grant to the National Center for Appropriate Technology (P.O. Box 3868, Butte, Montana) to design five prototype, portable, small-scale fuel alcohol stills, suited to on-farm use by low-income farmers. Should funds become available, CSA will award up to five small grants to five rural energy grantees to field-test the stills and train local low-income people in construction, operation and maintenance of the stills. Once proven at these sites, it is expected that the stills will be promoted for on-farm use by low-income farmers through Farmers Home Administration or other financing sources.

● Responsible Officials for Further Information

Richard M. Saul, Energy Programs, Room 334
Community Services Administration
1200 19th Street, N.W., Washington, D.C. 20506
(202) 632-6503

Bureau of Alcohol, Tobacco & Firearms

Department of the Treasury

Description of the Program

The Bureau of Alcohol, Tobacco and Firearms (ATF) is responsible for administering the laws in the Internal Revenue Code that relate to distilled spirits (alcohol). ATF impacts upon the production and sale of alcohol fuel in one of four different ways: permit approval or licensing, bonding, denaturing, and regulations on imported alcohol.

● Permit Approval

Section 5171 (c)(1) of the Internal Revenue Code (Code) provides that every person must make an application to register with ATF before commencing the operation of a distilled spirits plant. Section 5171 (d)(1) of the Code requires each person to apply for and obtain a permit from ATF in order to engage in the operation of a distilled spirits plant. Section 5002 (a)(8) defines "distilled spirits" as ethyl alcohol, ethanol, or spirits of wine that include all dilutions and mixtures from whatever source or by whatever process produced.

The law provides for two types of distilled spirits plant (DSP) permits:

1. Operating or commercial permit. This permit authorizes alcohol to be produced for sale or any nonexperimental purpose. Qualifying for an operating permit is an extensive procedure that requires preparation of numerous forms and involves investigations by ATF to determine whether operation of the DSP can be legally approved.

2. Experimental DSP permit. This permit authorizes the experimentation and development of the distillation and industrial uses of alcohol, and does not authorize the sale of alcohol. Because an experimental DSP permit authorizes the production of alcohol for personal fuel use and not for sale, qualifying for this permit is a more abbreviated process. There are no prescribed application forms. A taxpayer need only write a letter containing his name, address, and telephone number to the Regional Regulatory Administrator for the region where the alcohol plant is to be located (see Appendix I for a complete list of addresses and phone numbers of all ATF regional offices). In addition, each letter must completely describe all land, buildings, and equipment (including stills, vats, and tanks) to be used in producing alcohol; the planned uses of the alcohol (for example, as heating fuel, lawnmower, tractor, or other engine fuel); the property on which vehicles using the alcohol as fuel will be operated; the process used to produce alcohol including feedstocks, yeasts, enzymes, and distillation method; how the solid and liquid waste from the alcohol plant will be disposed of for environmental impact purposes; and the type of security used to protect the alcohol produced from theft or other unauthorized removal from the plant premises. The letter should also include an estimate of the amount of alcohol an applicant intends to produce during a 15 day period.

Since January 1, 1979, ATF has received more than 6,000 inquiries concerning alcohol fuel production. Farmers, small businessmen, private citizens, corporations, and others interested in developing alternative fuels have maintained that fuel alcohol is an important contribution to the United States' energy resources.

Current law, however, does not include the necessary provisions to accommodate these interests. (See Subtitle E, Chapters 51-53 of the Code.) The law is too cumbersome for this new alcohol fuel industry and many potential alcohol producers find that the overall ATF requirements for alcohol production are prohibitively expensive and time-consuming.

Proposed legislation contained in §236 (e) of H.R. 3919, the Crude Oil Windfall Profit Tax Act of 1979 (Act), would simplify statutory and regulatory requirements. Initiated by the Department of the Treasury and ATF, this legislation was introduced in the Senate on May 22, 1979, by Senator Birch Bayh (D-Ind.), Chairman of the National Alcohol Fuels Commission (NAFC) as S.1200, and in the House of Representatives on May 23, 1979, by Ways and Means Chairman Al Ullman (D-Wash.) as H.R. 4215.

As proposed, the legislation would simplify the permit application process by which an individual can establish a distilled spirits plant intended to produce alcohol for use as fuel. For example, §236 (e)(1) of the Act would create a new §5161 of the Code (relating to distilled spirits for fuel use). Subsections (a)(1) and (3) empower the Secretary of the Treasury (Secretary) to expedite all applications to establish a distilled spirits plant for the purpose of producing, processing, storing, using, and distributing distilled spirits to be used exclusively for fuel use and generally to encourage and promote the production of alcohol for fuel purposes. Subsection (b) gives the Secretary authority even to waive the permit application requirement if it is necessary to carry out the provisions of new §5161. As noted above, under subsection (c)(1)(A), an application for an operating permit for an eligible distilled spirits plant (defined in subsection (c)(4) as a plant that is used to produce distilled spirits exclusively for fuel use where production does not exceed 10,000 proof gallons per year) shall be simplified to the greatest extent possible so as to expedite the issuance of such permits.

● Bond Requirements

Individuals entering the business of distilling alcohol are required to file a bond to cover the liability for the excise taxes on the alcohol produced. This bond and the security requirements are designed to:

- prevent the loss of any tax revenue, and
- assure the alcohol produced is not diverted to illegal purposes.

ATF ascertains the bond by determining the volume of alcohol produced at a specific proof level over a specific period of time. The present rate is \$10.50 per (100 proof) gallon produced over a period of 15 days. In general, the formula used to determine the bond is designed to minimize the financial burden on the producer and also to minimize the risk the Government takes regarding potential loss of tax revenue. The producer, in actuality, pays an annual premium which is less than the actual tax liability by securing a surety bond for the tax liability with an approved Treasury bonding company.

Small Producer: There is no bond requirement for this producer. It is believed the risk to the revenue by this producer is limited because of the volume of alcohol production (10,000 100 proof gallons) and the probability of detection if significant quantities of production are diverted to illegal purposes.

Medium Producer: ATF will determine the bond based on the potential tax liability incurred by the producer during 15 days production of distilled spirits. For example, if the producer produces 100,000 (100 proof) gallons annually (the maximum allowable under this category) his tax liability will be \$60,576. The approximate cost of a surety bond to the producer is \$730 annually.

Large Producer: ATF will determine the bond requirement for this producer based on the potential tax liability incurred by the producer during a 15 day period. For example, if he produces 200,000 proof gallons annually, his potential tax liability is \$121,154. However, the maximum sum of the bond would be \$1,200. (Note: the above may be changed prior to passage of H.R. 3919).

● Records and Reporting

ATF will require each producer to maintain records of his production process and the disposition of the alcohol. At regular intervals, the producer will provide information to ATF for verification and auditing. ATF will not require the producer to maintain a separate set of records if he maintains commercial records that contain the needed information. Commercial records maintained for accounting and tax purposes will suffice.

Small Producer: This producer would be expected to maintain records of:

- the quantity and proof of alcohol produced,
- the quantities and types of materials added to the alcohol to destroy the beverage character of the alcohol, and
- the disposition of the denatured alcohol.

Once a year the small producer will file a report with ATF stating the volume and proof of alcohol produced annually and the disposition of the denatured alcohol.

Medium Producer: This producer will maintain records of:

- the volume and proof of alcohol produced,
- the quantities and types of materials used to destroy the alcohol's beverage character, and
- the disposition of the denatured alcohol.

Twice a year, the producer will file a report with ATF delineating the volume and proof of alcohol produced monthly, and its disposition.

Large Producer: This producer will maintain records of:

- the materials received and used to produce alcohol,
- the volume and proof of alcohol produced,
- the quantities and types of material added to the alcohol to alter its beverage character, and
- the disposition of the denatured alcohol.

Four times a year, the producer will file a report with ATF delineating the volume and proof of alcohol produced monthly and its disposition.

● Destruction of the Alcohol's Beverage Character (Denaturing)

ATF will require all producers of alcohol for use as a fuel to add substances to the alcohol destroying its beverage character - make it unfit for human consumption. This technique is called denaturing the alcohol. All alcohol produced by the producers must be denatured before it leaves the premises on which the production facilities are located.

There are many substances such as gasoline, kerosene, or other chemicals, which can destroy the beverage character of the alcohol. In addition, there are several different formulas for the destruction of the beverage character of alcohol. ATF, however, is willing to work with a producer to develop an acceptable formula which will meet his specific needs.

For example, two ATF published formulas for denaturing alcohol for sale are Formula No. 18 and Formula No. 19, both of which involve expensive chemicals e.g. methyl isobutyl ketone. (27 CFR Part 212, Subpart C). However ATF has a proposed less expensive formula (CDA-20) which provides for the addition of five gallons of gasoline to each 100 gallons of alcohol, which is currently permitted on a case-by-case basis.

IN THE SENATE

SENATE BILL NO. 1245

BY WATKINS

AN ACT

RELATING TO REFUNDS TO DISTRIBUTORS OF GASOLIN; AMENDING SECTION 63-2432, IDAHO CODE, TO PROVIDE THAT CLAIMS AGAINST THE MOTOR FUELS REFUND FUND SHALL BE PAID IN THE AMOUNT OF FIFTY PER CENT OF THE CLAIM AS ALLOWED, AND TRANSFERRING THE BALANCE OF THE REFUND AMOUNT TO THE GASOLIN REFUND ACCOUNT; AMENDING CHAPTER 24, TITLE 63, IDAHO CODE, BY THE ADDITION OF A NEW SECTION 63-2432A, IDAHO CODE, TO CREATE THE GASOLIN REFUND ACCOUNT AND PROVIDE FOR PAYMENTS OF REFUNDS FROM THE ACCOUNT.

Be It Enacted by the Legislature of the State of Idaho:

SECTION 1. That Section 63-2432, Idaho Code, be, and the same is hereby amended to read as follows:

63-2432. DISTRIBUTION OF TAX REVENUES. (1) The revenues received from the taxes imposed by sections 63-2403 and 63-2406, Idaho Code, and any penalties, interest, or deficiency additions, shall be paid over to the state treasurer by the commission, to be distributed as follows:

(a) An amount of money equal to the actual cost of collecting, administering and enforcing the motor fuel tax act by the commission, as determined by the commission and certified quarterly to the state auditor, shall be transferred back to the commission; provided, that the amount so transferred back to the commission shall not exceed the amount authorized to be expended by regular appropriation authorization.

(b) 1. An amount of money shall be transferred to the motor fuels refund fund, which is hereby created, sufficient to pay current refund claims; provided that during the period July 1, 1980, to June 30, 1984, each claim shall be treated as follows: (i) each claim shall be paid in the amount of fifty per cent (50%) of the claim as filed and allowed; and (ii) an amount equal to fifty per cent of the claims paid shall be transferred, no less frequently than quarterly, to the gasohol refund account, created in section 63-2432A, Idaho Code. All refunds authorized to be paid by this act shall be paid from the motor fuels refund fund.

2. At the end of each fiscal year, if claims against the gasohol refund account exceed the revenue in the account, an amount of money shall be transferred to the gasohol refund account sufficient to pay outstanding claims against the account.

(c) At the beginning of each fiscal year, the sum of one hundred thousand dollars (\$100,000) shall be transferred to the railroad grade crossing protection account in the dedicated fund, to pay the amounts from the account pursuant to the provisions of section 62-304C, Idaho Code.

(d) From the balance remaining with the state treasurer after

transferring the amounts in subsection (a), (b) and (c) of this section:

(1) one per cent (1%) shall be transferred to the waterways improvement fund, as created in chapter 15, title 57, Idaho Code;

(2) one per cent (1%) shall be transferred to the off-road motor vehicle fund;

(3) sixteen and two-thirds per cent (16.67%) shall be divided among incorporated and specially chartered cities, in the same proportion as the population of said incorporated or specially chartered city bears to the total population of all such incorporated or specially chartered cities as shown by the last regular or special federal census; and

(4) eighty-one and one-third per cent (81.33%) shall be transferred to the state highway fund, as created in section 40-2210, Idaho Code.

(2) The revenues received from the taxes imposed by section 63-2409, Idaho Code, and any penalties, interest, or deficiency additions, shall be paid over to the state treasurer by the commission to be deposited in the state aeronautics fund, as provided in section 21-211, Idaho Code.

(3) The distribution and transfers required by subsections (1) and (2) of this section shall be made as frequently as required, and the state auditor and state treasurer shall take all necessary actions to achieve such transfers and distributions.

SECTION 2. That Chapter 24, Title 63, Idaho Code, be, and the same is hereby amended by the addition thereto of a NEW SECTION, to be known and designated as Section 63-2432A, Idaho Code, and to read as follows:

63-2432A. GASOHOL REFUND ACCOUNT. There is hereby created the gasohol refund account in the dedicated fund, to which shall be credited an amount of money transferred from the refund fund, created in section 63-2432, Idaho Code, equal to fifty percent (50%) of all refunds filed against the refund fund.

(a) Any licensed distributor of motor fuel may file claims against the gasohol refund account in the amount of four cents (\$.04) per gallon of gasohol on which motor fuels tax has been paid, using forms and procedures prescribed by the state tax commission. Gasohol is defined for the purposes of this section as a motor fuel containing a minimum of ten per cent (10%) blend of anhydrous ethanol manufactured in the state of Idaho from agricultural or forest products grown in the state of Idaho or wastes of such products.

(b) On June 30, annually for the duration of this provision, any funds remaining in the account and not allocated to the payment of claims pursuant to subsection (a) of this section shall be distributed, in the full amount of the moneys remaining, in an amount proportionate to the original claim, to each claimant under the provisions of section 63-2432(b), Idaho Code.

IN THE SENATE
SENATE AMENDMENTS TO S.B. NO. 1245

AMENDMENTS TO SECTION 1

1
2 On page 1 of the printed bill, in line 26, following "1984," insert:
3 "subject to annual review by the legislature,".

4 On page 1 of the printed bill, in line 35, following the word "account"
5 insert "from the motor fuels refund fund".

6 On page 1 of the printed bill, in line 36, following the word "account"
7 insert "limited to the moneys which remain in the motor fuels refund fund".

AMENDMENT TO SECTION 2

8
9 On page 2 of the printed bill, delete lines 38 and 39, and insert in
10 lieu thereof: ".".

IN THE SENATE
SENATE BILL NO. 1247
BY WATKINS

AN ACT

AMENDING CHAPTER 1, TITLE 63, IDAHO CODE, BY THE ADDITION OF A NEW SECTION TO BE KNOWN AND DESIGNATED AS SECTION 63-105CC, IDAHO CODE, PROVIDING FOR CERTAIN PROPERTY USED FOR THE PURPOSE OF MANUFACTURING GRAIN ALCOHOL FOR USE AS GASOHOL TO BE EXEMPT FROM PROPERTY TAXES AND PROVIDING A SCHEDULE FOR SUCH EXEMPTIONS; AND AMENDING SECTION 63-2402, IDAHO CODE, PROVIDING FOR THE ADDITION OF A DEFINITION OF GASOHOL.

Be It Enacted by the Legislature of the State of Idaho:

SECTION 1. That Chapter 1, Title 63, Idaho Code, be, and the same is hereby amended by the addition thereto of a NEW SECTION, to be known and designated as Section 63-105CC, Idaho Code, and to read as follows:

63-105CC. PROPERTY EXEMPT FROM TAXATION -- PROPERTY FOR THE PURPOSE OF MANUFACTURING GRAIN ALCOHOL FOR USE IN GASOHOL. (1) Any personal property or improvements used or constructed for the purpose of manufacturing grain alcohol for use as a blend for motor fuels commonly referred to as "gasohol," as defined in section 63-2402, Idaho Code, is exempt from property taxes according to the following schedule:

(a) During the first year of use, one hundred per cent (100%) of the market value for assessment purposes of such property shall be exempt;

(b) During the second year of use, seventy-five per cent (75%) of the market value for assessment purposes of such property shall be exempt;

(c) During the third year of use, fifty per cent (50%) of the market value for assessment purposes of such property shall be exempt;

(d) During the fourth year of use, twenty-five per cent (25%) of the market value for assessment purposes of such property shall be exempt;

(e) During the fifth and succeeding years of use, none of the market value for assessment purposes of such property shall be exempt.

(2) The exemption granted under this section shall not be extended to the land upon which the property or improvements are located.

(3) Application for this exemption shall be filed with the county assessor not later than March 1 of the year for which the exemption is requested, on forms provided by the state tax commission. The application shall describe and locate the specific property or improvements to be exempted.

SECTION 2. That Section 63-2402, Idaho Code, be, and the same is hereby amended to read as follows:

63-2402. DEFINITIONS. As used in this act, the following definitions shall apply:

(a) "Motor vehicle" means every self-propelled vehicle designed for operation or required to be licensed for operation upon a public highway.

1 (b) "Motor fuel" means any substance, the chief use of which is as
2 fuel for the propulsion of motor vehicles or motor boats. Motor fuel also
3 means aircraft engine fuel when such aircraft engine fuel is used for pro-
4 pulsion of motor vehicles or motor boats. Motor fuel does not include fuels
5 as defined in subsection (e) of section 49-1230, Idaho Code.

6 (c) "Gasohol" means a motor fuel, special fuel, or aircraft engine
7 fuel containing a mixture of at least ten percent (10%) blend anhydrous
8 ethanol manufactured in the state of Idaho from agricultural or forest
9 products grown in the state of Idaho or wastes of such products.

10 (d) "Aircraft engine fuel" means any substance, the chief use of which
11 is as fuel for the propulsion of aircraft.

12 (de) "Person" means any individual, firm, copartnership, association,
13 corporation (both private and municipal) or other group or combination act-
14 ing as a unit, and the plural as well as the singular number, unless the
15 intent to give a more limited meaning is disclosed by the context.

16 (ef) "Licensed distributor" shall mean any person who receives motor
17 fuel and/or aircraft engine fuel in this state, provided he has qualified
18 with the state tax commission of the state of Idaho.

19 (fg) "Public highway" means every way or place, including a toll road,
20 generally open to the use of the public as a matter of right, for the pur-
21 pose of vehicular travel, notwithstanding that the same may be temporarily
22 closed for construction, reconstruction, repair or maintenance.

23 (gh) "Retail dealer" means any person engaged in the retail sale of
24 motor fuel and/or aircraft engine fuel to the public or for use in this
25 state.

26 (hi) "Commission" means the state tax commission of the state of
27 Idaho.

IN THE SENATE
SENATE AMENDMENTS TO S.B. NO. 1247

AMENDMENTS TO SECTION 1

1 On page 1 of the printed bill, in line 9, following "Chapter", delete
2 "1" and insert: "30".

3 On page 1 of the printed bill, in line 11, following "Section", delete
4 "63-105CC" and insert: "63-3025".

5 On page 1 of the printed bill, in line 12, delete "63-105CC. PROPERTY
6 EXEMPT FROM TAXATION --", and insert: "63-3025. CREDIT FOR VALUE OF".

7 On page 1 of the printed bill, in line 13, following the word
8 "MANUFACTURING" delete the word "GRAIN" and insert in lieu thereof:
9 "ETHANOL".

10 On page 1 of the printed bill, in line 14, following the word
11 "manufacturing" delete the word "grain" and insert in lieu thereof:
12 "ethanol".

13 On page 1 of the printed bill, in line 16, following "Code," delete the
14 remainder of the line and "erty" in line 17, and insert: "shall be allowed
15 as a credit against individual or corporate income".

16 On page 1 of the printed bill, in line 18, following "use," delete the
17 remainder of the line and all of line 19, and insert in lieu thereof:
18 "eight-tenths of one per cent (0.8%) of the value of such property shall be
19 allowed as credit, but not exceeding eight-tenths of one per cent (0.8%) of
20 the gross value of ethanol produced in that year;"

21 On page 1 of the printed bill, in line 20, following "use," delete the
22 remainder of the line and all of line 21, and insert in lieu thereof:
23 "six-tenths of one per cent (0.6%) of the value of such property shall be
24 allowed as credit, but not exceeding six-tenths of one per cent (0.6%) of
25 the gross value of ethanol produced in that year;"

26 On page 1 of the printed bill, in line 22, following "use," delete the
27 remainder of the line and all of line 23, and insert in lieu thereof:
28 "four-tenths of one per cent (0.4%) of the value of such property shall be
29 allowed as credit, but not exceeding four-tenths of one per cent (0.4%) of
30 the gross value of ethanol produced in that year;"

31 On page 1 of the printed bill, in line 24, following "use," delete the
32 remainder of the line and all of line 25, and insert in lieu thereof:
33 "two-tenths of one per cent (0.2%) of the value of such property shall be
34 allowed as credit, but not exceeding two-tenths of one per cent (0.2%) of
35 the gross value of ethanol produced in that year;"

36 On page 1 of the printed bill, in line 26, following "of the" delete
37 the remainder of the line and all of line 27, and insert in lieu thereof:
38 "value of such property shall be allowed as a credit."

39 On page 1 of the printed bill, in line 28, following "The" delete
40 "exemption" and insert: "credit".

41 On page 1 of the printed bill, in line 30, following "(3)", delete the
42 remainder of the line and all of lines 31 through 34, and insert in lieu
43 thereof: "In no case shall credit allowed under this section exceed the
44 income tax liability of the claimant."
45

AMENDMENTS TO SECTION 2

On page 2 of the printed bill, in line 4, following the word "boats" insert: ", including motor fuel containing a mixture of at least ten percent (10%) blend anhydrous ethanol commonly known as gasohol".

On page 2 of the printed bill, in line 6, following the words "motor fuel" delete ", special fuel, or aircraft engine"; and at the beginning of line 7, delete the word "fuel".

CORRECTIONS TO TITLE

On page 1 of the printed bill, in line 2, following "CHAPTER", delete "1" and insert: "30".

On page 1 of the printed bill, in line 3, following "SECTION" delete "63-105CC" and insert "63-3025".

On page 1 of the printed bill, in line 4, following the word "MANUFACTURING" delete the word "GRAIN" and insert in lieu thereof: "ETHANOL".

On page 1 of the printed bill, in line 5, following "TO BE" delete "EXEMPT FROM PROPERTY" and insert: "ALLOWED AS A CREDIT AGAINST INCOME".

On page 1 of the printed bill, in line 6, following "SUCH" delete "EXEMPTIONS" and insert: "CREDITS".