Churchill Co.-general
Item 16 Earth Resources Company 5920 McIntyre Street Golden, Colorado 80401 303/279-7631 980 000 larch 29, 1978 Frank J. Allen, Esq. Clyde & Pratt. 351 South State Street Salt Lake City, Utah 84111 Re: Carson Sink Salt Proposal Churchill County, Nevada Dear Frank: Returned herewith are the two principal reports by Resource Industries International, Ltd. (Sept. 1976), and Ford, Bacon & Davis Utah Inc. (Aug. 1977). After a lengthy study, we have decided not to pursue the Carson Sink proposal. The more we dug into the matter, the more things we uncovered that convinced us that Earth Resources is not well equipped to develop the project into a profitable salt producer. We believe that the development time and technical problems have been significantly underestimated; particularly, the environmental obstacles are not small. realize, however, that many of these considerations are only matters of opinion. I do appreciate your giving us the opportunity to have a shot at the project, and I wish you every success in finding a suitable investor. Kindest regards, W. C. Cole General Manager-Mining Group WCC:dp encls. xc's: D. M. Krausse 2 plates enclosed J. J. Ringer W. B. MacKenzie D. A. Rhoades DMK & JJR - Dave Rhoades attached memo sums BLIND NOTE: it up.

Bill:

Attached is Dave's memo on the Conson SINK project. Neither of us has studied the problem in great detail, but I agree with Dave's comments.

I think that the project might be a lot of fun and educational as well - but possibly an expensive education!

Until we learn considerably more about industrial minerals, we would have to depend on outside help for a project like this. 1 recommend that we drop it.

Bruce

MEMO EARTH RESOURCES COMPANY March 21, 1978 W. Bruce MacKenzie TO: David A. Rhoades FROM: RE: Brines, Carson Sink, Nevada CONCLUSIONS It is felt that Earth Resources Company should not further consider the Carson Sink brine project. Earth Resources has no particular expertise in brine exploration, salt extraction, salt marketing, or evaporation processes and thus we would have no technological advantage over a company such as Utah Salt. INTRODUCTION In January 1978, Jules Ringer of the Earth Resources Dallas office, received a letter from Frank J. Allen, an attorney from Salt Lake City. Mr. Allen was proposing that Earth Resources consider participation in brine production from Carson Sink, Nevada. Mr. Cole has discussed this proposal with Page Edwards. Our most recent correspondence from Mr. Allen is dated March 1, 1978 and answered several questions put to him by Mr. Cole I reviewed the Carson Sink file, but did not do extensive research on the area or potential brine markets. COMMENTS The following comments and questions seem, in aggregate, to indicate that this is not a project for Earth Resources: Environmental problems could be significant, since the draw-down of brine water may affect the water level in the adjacent wildlife reserves. A problem could arise if brine production draws down the local water level and therefore affects domestic and ranch water supplies. The chemistry of the mineral recovery is a process basically unfamiliar to ERC. Much of the investigation will pertain to chemical, rather than mining or engineering problems.

Brines, Carson Sink, Nevada March 21, 1978 page 2. The ownership of the properties appears rather complex. At this time, we are not familiar with market conditions for salt, soda ash and sodium sulfate. It is hard to imagine this material being competitive on the west coast with west coast sources at San Francisco Bay, Napa and Searles Lake. The hydrology of the system is a major unknown. The determining of "grade and tonnage" will be complex. Much of this investigation will be hydrological. Note that Ford, Bacon & Davis had to change their pumping test location because the initial site had unsatisfactory aquifer conditions. The recharge capabilities of the system are unknown. At the initial test site of Ford, Bacon & Davis, the recharge was insufficient and the sand was not fully saturated. Ford, Bacon & Davis concluded that the sand aquifer, which uniformly underlies the test site, has low permeability. 8. There is a potential seismic danger in this area. There will be complex Federal, State and local laws, regulations and controls to satisfy. Funds would have to be provided for exploration, for 10. chemical testing, and for evaporation testing. Why is this property still available after it was tested by Solar Resources in 1967-69 and Utah Salt? It would seem that since Utah Salt is in the salt business, with brine ponds at Wendover, that they would be in a much better position than ERC to determine the feasibility of this project. Reportedly, Solar Resources had problems with flooding and sand blowing into the ponds. Water has stood as deep as 10 feet in the sink. David a Phoaler DAR: dp

9-10 March 78 -1-Asket about Poteoil Willife Refuge? Many Bombing SI tos? Ly hy is it still anail ofte all the other have

total it - AMAX (1979) - motals explor Gibbons + 80 od -15%

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If to corterie : 1. neet principale r. lot at all then let 3 visit Utah Salt's Wendover go. 4 sit 5. discuss of USGS, water Res. Group in Canor city. 6. Pon. renote sensing inogeny 7. get couch or ail welle 8. get AMAY data

Production

1,000,000 TPY Salt (Nacl, Halitz)

280,000 TPY Sada ash (NazCaz, Trona, Natron)

185,000 TPY Salt cake (Sadium sulfate, Thenaidite)

Bring

6.19 % Na Cl (Halitr)

0.82 % total alkalinity as Non Coz. (Soda Ash)

0.98 % Nan Soy (Thenarditr)

0.14 % Kell (Sylvitr)

0.14 % Nan By O7 (Borax)

Capital #20 million

Octrol = 24.8% Poport = 5 yrs

Shallon sands = (<35') + 3.6 million tous recoverable Nac1.

AIM test for Solar Resources

17 million gallons
6,500 tons NaCl (9%)
550 tons Nan Soy (1%)
149 tons Nancos (0.2%)

unter - 62.4 1b/co ft. __ - 5
gallms x 8.33= 1b of water

6.14%=

10 x = 2,916.667 = 02 + 1/790 02

17 m. Ylian gallons = 141.61 m. Illion 16 unter 141.61 + 2000 = 70,805 tens

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1.0872576 x10" lb = 5.4,362,880 tons

6% = 3.26 million tons Nacl
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Conclusions This is not the beginn for ERCy brings no expertise to lease ERCy brings no expertise to b) solt entraction c) solt marketing d) evaporateos provessar + thus has no advertige one Altal Last FB+D (Aig. 77) Sand arguifer which eniformly enderlier test site has low perseability. Frax deandown will be minimal + will not green 1000, ever after 2 yer. of continual pumping.

PAGE L. EDWARDS 2580 PARFET STREET LAKEWOOD, COLORADO 80215

March 3, 1978

Earth Resources Company 5920 Mc Intyre Street Golden, Colorado 80401

APPROVED FOR

For Services Rendered:

Review Carson Sink, Nevada File including reports, USGS Library work, conference.

February 1978

2 days

@ \$250.00

\$500.00

Mary Acquisitions.



RECEIVED MAR 0 6 1978 GLYDE & PRATT EDWARD W. CLYDE ATTORNEYS AT LAW ELLIOTT LEE PRATT 351 SOUTH STATE STREET WILLIAM G. GIBBS SALT LAKE CITY, UTAH 84111 FRANK J. ALLEN ROLAND R. WRIGHT JOHN T. EVANS RICHARD C. CAHOON RODNEY G. SNOW MICHAEL M. QUEALY March 1, 1978 STEVEN E. CLYDE W. C. Cole General Manager-Mining Group Earth Resources Company 5920 McIntrye Street Golden, Colorado 80401 Carson Sink Salt Proposal Re: Churchill County, Nevada Dear Bill: I have your letter of February 20th. I will endeavor to answer the questions you have posed, although I have some fundamental training deficiencies of which you are aware. I have no reluctance to answer any questions or to introduce you to the principals in this project so that you can review all of the raw data and question the people who have made the resource investigation decisions directly. Anyway, here are the answers to your questions as fully as I am capable of providing them: The land position being offerred includes all of the federal sodium prospecting permits (in process of conversion to leases) and all of the Churchill County leases to which reference is made at page 5 of the Feasibility Study I sent you. Utah Salt Company is the primary principal because it Holds the Churchill County leases (2) Holds its full quota of federal permits (3) Has been and is conducting a profitable salt business by producing from brine aquifers in the Wendover desert (4) Has an understanding (based on close personal relationships) with the holders of all the other sodium permits 3. Bill Colman has no direct position that I know of. He has been interested in the Sink for some years and was consulted by the AIM group. He is also a shareholder in Westco. He may have some other hidden interest, but I can't imagine what it would be.

W. C. Cole General Manager-Mining Group Earth Resources Company March 1, 1978 Page 2 4. We have to enter into an operating agreement with all the lessees under which Earth is the operator, controls the operation and has the right to occupy whatever land it chooses. Obviously, the law and its regulations were not designed for the kind of resource the Sink represents, but a unit agreement for this kind of operation is not without precedent. It would require BLM approval which would not be probable unless the committing lessees retained some minimal interest in production. I can only represent that an operating agreement can be made, and I wouldn't expect Earth to make any commitment until it was satisfied. Earth may not require all of the leases, but they are all available. Earth can acquire all the county leases and federal leases up to its acreage limitations. There is a limitation on overrides, but we don't propose to approach, let alone exceed, the limitations. 6. The test site was actually selected by the USGS as the site which would be the most likely to demonstrate an adverse influence on the surface water resource. If the removal of brine from that site had no detrimental influence on the surface water, then brine recovery at the locations controlled by Utah Salt could not possibly have adverse influence. The Ford, Bacon & Davis engineers are satisfied, however, that the information about well characteristics developed in the test is just as valid for the area controlled by Utah Salt Company as it is for the test site. It is simply not economically feasible to test every quarter section in the hundred and forty odd square miles of area which make up the proposed project area. 7. Evaporation tests were done through three evaporation seasons (from June of 1967 through September of 1969. The testing was done by the AIM group in Section 21 of Township 22 North, Range 29 East. The deeper aquifers have been tested. Kenametal drilled into the Sink exploring for fresh water in about 1968. Kenametal's deepest test was about 1100 feet, but they always got salt water. The water at that level was stronger in carbonates and lower in chlorides and was about two-thirds as heavy as the surface brines. We also have some information from oil and gas wells drilled before 1967 by Churchill County Oil & Gas, by Falcon Oil & Gas, and by Standard-Cal. The completion cards indicate brines down to about 500 feet. Standard of Cal drilled

W. E. Cole General Manager-Mining Group Earth Resources Company March 1, 1978 Page 3 at a location northeast of Lone Rock to about 11,000 feet and was apparently still in lake sediments. The logs of that well are published. 9. Pat Clancy and James Harrill of the Water Resources Division of the USGS in Carson City have done a lot of work and published at least one paper on the recharge capacity of the Without question, a lot of water enters the Sink every The materials in formation which contain the salt are described as clays as well as silts and sands. The Ford, Bacon & Davis report includes a very careful soil analysis at each of the locations where any monitoring was done in connection with the test. In any event, I am advised that water percolating through any of this material will leach salt from it. 10. Gibbons & Reed Construction Company in Salt Lake has the other 15%. I don't have any kind of understanding with Gibbons & Reed. 11. AMAX drilled at least 207 holes, and all their data are available. 12. I am not sure that we know of all the holes that AMAX drilled. To comply with the permit requirements, Utah Salt has dug at least twenty fifteen foot trenches and has drilled at least fifteen five hundred foot holes. The test locations may not show on the maps you have, but you can certainly look at any data Utah Salt has. 14. AIM stands for Agricultural & Industrial Minerals, It's a consulting group out of Palo Alto which includes brine chemists. The people in the AIM group of whom you have probably heard are Alfred Nylander and a fellow named Rodriguez. I don't have a copy of the AIM feasibility report. If I can get one I'll send it to you. 16. There is a salt company called Huck Salt Company operated by a fellow named Elmer Huckeby at a location known as Salt Wells. The company evaporates surface run-off under a lease from Leslie Salt. The production will vary depending on the precipitation in any year. The maximum production is

W. E. Cole General Manager-Mining Group Earth Resources Company March 1, 1978 Page 4 about fifteen thousand tons per year, and the company has always sold its total production. 17. I don't believe the operating and capital costs were projected from Utah Salt's Wendover operation although I observe that Morrison, in talking about capital costs, appears to be more trench oriented than well oriented. In any event, Resource Industries International should be able to defend its capital cost projections and particularly any extrapolations from the Wendover experience to the Carson Sink situation. Mr. Lawson insists that he was always "conservative" when he incorporated conclusions in the feasibility report, but I have never heard an investigator make any different claim about his product. I don't have any hesitation to introducing you to the principals in the Carson Sink project. The person who would be most informative is Mr. apRoberts, the president of Utah Salt Company. If you come to the conclusion that a profitable operation can be based on the resource which the Carson Sink represents, I believe we can satisfy you with regard to ownership and operating rights. I don't think Earth should spend any real money on the project unless it feels comfortable with the physical facts and the marketing facts. So far as the physical facts are concerned, I can't agree that there is any severe lack of data. If anything, we have a superabundance of information. Please let me know if you or anyone in your organization would like to meet Mr. apRoberts, Mr. Colman, or the Gibbons & Reed people who are interested in the project. So far as I know now, there isn't any data which can't be made available to you. Very truly yours, RANK J. ALLEN FJA/bg

File: Carson Suk Frank allended 2/27 Buy puot. somede lite - you count when to dull - USGS told them to dult there. words pomble place to test effect on ducks. What land is being offerhed?
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Water Resources DIV - RED Carson City That year that gets in That stuff will look: It does at Wendover: Other 156 4 6 thors of Read -Frank has a commitment from Vall Sall.
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ATTORNEYS AT LAW
351 SOUTH STATE STREET
SALT LAKE CITY, UTAH 84111

February 17, 1978

PHONE 322-2516
AREA CODE 801 EDWARD W. CLYDE ELLIOTT LEE PRATT WILLIAM G. GIBBS FRANK J. ALLEN ROLAND R. WRIGHT JOHN T. EVANS RICHARD C. CAHOON RODNEY G. SNOW MICHAEL M. QUEALY STEVEN E. CLYDE FEB 8 1 1978 Mr. Bill Cole, General Manager Mining Group Earth Resources 5920 McIntyre Golden, Colorado 80401 Dear Bill: I enclose the data evaluation submitted by Ford, Bacon & Davis on February 25, 1977, with supplement of March 4th. Your secretary recently requested this information. Duane Whiting, who prepared this report, advises me that it was oriented to this testing which was then in contemplation and has not been completed. Some of the data deficiencies of a year ago have now been supplied. The area is so large, however, that some reliance on inference in reaching hydrologic conclusions is a practical necessity. Very truly yours, Frank J. Allen m **FJArm** enc.

Ford, Bacon & Pavis Utah, Inc. The energy engineers



375 CHIPETA WAY, SALT LAKE CITY, UTAH 84108 • 801 - 583-3773 SINCE 1894

Ford, Bacon & Davis Utah Inc. ENGINEERS - CONSTRUCTORS A SUBSIDIARY OF 375 Chipeta Way P. O. Box 8009 Ford, Bacon & Davis Salt Lake City, Utah 84108 801-583-3773 3ncorporated February 25, 1977 Utah Salt Company, Inc. 1865 South Main Street Salt Lake City, Utah 84115 Attention: Mr. George E. apRoberts Reference: Carson Sink Hydrogeologic Data Evaluation and Future Hydrologic and Environmental Study Recommendations Dear George: Persuant to our agreement of December 21, 1976, information made available from your office relative to the proposed project site has been reviewed. Purpose of the review was to evaluate the potential availability and recovery of subsurface brines contained in the Carson Sink located near Fallon in western Nevada. An agreement was made to perform the data review and make applicable recommendations at the rate of \$25 per hour plus secretarial time and copying. Since the original agreement date, three progress meetings have been held in your office to discuss various aspects of the area and to update the data with current information derived from your recent drilling program at the site. present at the discussion meetings was Mr. Bill Coleman, a private consultant to Utah Salt Company, Inc. Attached are two (2) copies of our report entitled "Carson Sink Hydrogeologic Data Evaluation and Future Hydrologic and Environmental Study Recommendations.

Iford. Bacon & Davis Utah Inc. SALT LAKE CITY, UTAH Page -2-Utah Salt Company, Inc. Attn: Mr. George E. apRoberts February 25, 1977 Thank you for the opportunity to have been of service on this interesting study and promising project. Should you have any questions, please notify. Ford, Bacon & Davis Utah Inc. would be pleased to work with Utah Salt Company, Inc. on any phase of additional site evaluation and design development and construction of future project facilities. Sincerely yours, FORD, BACON & DAVIS UTAH INC. Duane L. Whiting, Senior Hydrogeologist DLW/qc Attachments Mr. Kent E. Hatfield Mr. Loren W. Weyand Mr. Vern C. Rogers

Ford, Bacon & Pavis Utah Inc. ENGINEERS - CONSTRUCTORS A SUBSIDIARY OF 375 Chineta Way P. O. Box 8009 Mord, Bacon & Davis Salt Lake City, Utah 84108 801-583-3773 February 25, 1977 Utah Salt Company, Inc. 1865 South Main Street Salt Lake City, Utah 84115 Attention: Mr. George apRoberts Reference: Hydrogeologic Data Evaluation of the Carson Sink near Fallon, Nevada and Future Hydrologic Study Recommendations Gentlemen: INTRODUCTION In accordance with our agreement of December 21, 1976, information made available from your office relative to the proposed project site has been reviewed. Observations from the review considered important to the proposed project evaluation and development are presented in this report. Purpose of the review was to evaluate the potential availability and recovery of subsurface brines contained in the Carson Sink, a playa basin located about 25 miles north of Fallon in western Nevada. We understand that Utah Salt Company, Inc. has exploration rights or owns approximately 144 square miles of land within the Sink boundaries and proposes to develop a brine extraction facility from subsurface waters contained in the basin aquifer system. Considerable information has been obtained by Utah Salt Company, Inc. over the past several years. Many test holes and wells have been drilled and pits and ditches excavated. However, this report only represents an evaluation of the data listed and is not a comprehensive evaluation of all available on-file data of the company.

DATA REVIEW OBSERVATIONS

A list of the information reviewed is as follows:

- 1. "Lake Lahontan: Geology of Southern Carson Desert, Nevada". U.S.G.S. Prof. Paper 401 (1964)
- 2. "Water-Resources Appraisal of the Carson River Basin, Western Nevada". U.S.G.S. Water Resources-Reconnaissance Series Report 59 (1976)
- 3. "Carson Sink Brine Project, Brine Recovery Methods and Reserves". W.W. Poulsen, Consulting Geological Engineer (1969)
- 4. "Carson Sink Initial Hydrogeologic Investigations". W.O. Lockman, AMAX, Inc. (1974)
- 5. "Carson Sink Brines, Feasibility Study for Production of Salt, Soda Ash and Sodium Sulfate". Resource Industries International, Ltd. (September 1976)
- 6. "Miscellaneous Maps, and Cross-Sections of Utah Salt Company, Inc.".

REPORTS 1 AND 2 (LAKE LAHONTON AND WATER RESOURCE APPRAISAL)

These reports afforded the most comprehensive review of the general physiogeographic conditions inherent to the site. Detailed hydrologic and geologic data was presented and discussed where available. Detailed data specific to the subsurface waters of the Sink itself was lacking. However, Report 2 lists estimates and measured rates of surface flow and potential recharge to the Sink. Storage capacity of the Sink was estimated in Table 1 of the report as being 8 million acre-feet, a significant figure since it applies only to the upper 100 feet and does not include potential recharge from groundwater estimated at near 1,500 acre-feet/year. Also, it is interesting to note that the report lists average annual water inflow into the entire Carson River Basin as near 2 million acre-feet/year whereas, total average outflow including evapotransportation and irrigation is listed at less than

Ford. Bacon & Davis Utah Inc. SALT LAKE CITY, UTAH 1 million acre-feet/year. This comparison indicates that considerable amounts of water are being stored in the subsurface alluvial soils and bedrock aquifer systems all which contribute to the recharge of the lowest lying areas, the basin sinks. Other observations of importance in Reports 1 and 2 are as follows: Carson River Basin and Sink are undergoing current changes which could effect the hydrologic regime and possibly have an impact on future brine extraction operations. The sink itself represents an active deposit with recorded movements and cracking apparently due to deep seismic activity and/or isostatic adjustments within the saturated sediments due to variable recharge rates and resultant water level fluctuations. Construction of flood control or irrigation dams would have an effect on the recharge rates and available brine source. Of additional significance to the proposed project is 2. the reported thickness of soil sediment in the Carson Desert and Sink. Oil test logs indicate that several thousand feet with localized zones as high as 8,000 feet of unconsolidated sediment exists. The potential for existence of several aquifer zones is highly probable. Identification and suitability of these zones is currently unknown. As would be expected, groundwater flow in the Carson 3. Basin is generally from aquifers of higher elevation to those in the lower valley regions. Natural flow is reported as usually in the same direction as surface flow terminating in discharge areas such as the Carson and Humboldt Sinks, Carson Lake and extended flat areas. Some interchange of groundwater is likely to occur between valleys through bedrock aquifers also. It is

Iford. Bacon & Pavis Atah Inc.

shown from water well level plots in the Carson
Desert and other areas that regional groundwater
flow gradient is controlled by surface water flow
patterns especially in the area downstream and north
of the Lahonton Dam towards the Carson Sink.

- Water quality information, particularly groundwater, is not abundant and is severely lacking in key drainages which recharge the Carson Sink. Report 2, page 3, warns that abnormally high levels of mercury is contained in the river bottom sediments of two up-gradient valleys, Dayton and Churchill. This highly toxic element source is believed to be from abandoned mine and milling operations in the 1800's. It is common knowledge that most valley and desert groundwaters are brackish to various degrees with especially high concentrations in the sinks. The dissolved-solid concentration of Carson River water is reported as being higher than groundwater from the Fallon City and U.S. Naval Air Station wells in the basalt at a 500 foot depth but considerably less than shallow valley-fill well water.
- 6. Inflow to the Carson Sink is predominantly from precipitation runoff originating from snow melt in the higher elevations of the Sierra Nevada's. Also, contributing to the inflow is runoff from local precipitation within the Carson Basin and from adjacent valley transfer for irrigation purposes. It is significant to note that Carson Desert receives surface inflow from the nearby Humboldt River Sink during overflow periods. Groundwater flow from the Humboldt Sink is also likely. Surface flow from the Humboldt is reported as 1,000 acre-feet/year, but has been questioned by available data and field observations of Utah Salt Company, Inc. personnel. Estimates indicate that flow could be as

Aford. Bacon & Davis Atah Inc.

high as 50,000 acre-feet/year.

Since base flows could be expected in late summer extending through winter with maximum annual flows peaking in May and June, recharge to the Carson Desert would be highest in June and July, being increased also by irrigation runoff. Maximum evaporation periods would be during the June to September months. A net annual evaporation rate near 45 inches is applicable to the desert area based on the reported 5 inch average rainfall and approximate 50 inches of evaporation.

- 10. Flash flooding is reported as having high occurrence in the Carson River Basin. Historically, the floods occur from heavy rains and snow pack runoff. Other than the Lahonton Reservoir near Fallon, no major upstream flood control facilities exist. Flooding has occurred on the Carson River below the reservoir and Fallon resulting from localized thunderstorm activity. The highest flow on record is 130 acre-feet in 1969 which terminated in Carson Sink and the Stillwater Wildlife Management area. A significant factor is the potential for evaporation pond dike integrity loss and product contamination.
- 11. Report 1 indicates that the Carson Sink represents the largest fault controlled structural depression in the Nevada section of the Basin and Range geologic province. Most major faults are pre-sediment deposition in age, trend N-NW and are believed to be related to volcanic activity in the area. Displacements vary between a few inches to hundreds of feet. More recent faulting has also occurred in Quaternary and recent times and also trend northeast through northwest. The traces are rarely exposed being covered by younger deposits. The fault traces in the Carson Desert are identified by dislocated shore lines, abrupt changes in formation attitudes,

and springs and seeps. Most of the shallower more recent faults are known to be associated with the older and deeper faults that formed the desert basin. The largest fault zones in the area are the Wildcat Zone on the southern edge of the Carson Desert and the Sogouspe Zone within the desert between the Sogouspe Dam and the Upsal Hogback. With the exception of an occasional exposed scarp and mud crack type fractures, all fault traces are covered by eolian sand and lake sediments. A significant factor is the extension of the Sogouspe Zone into the proposed area of the Carson Sink where near surface sediments could be affected. The report illustrates visible surface cracks on the surface of Carson Sink believed to be earthquake in origin.

Historically, the Carson Desert vicinity is a seismically active earthquake zone. Shocks associated with quakes in recent times (July 6 and August 23, 1954) were reported to have had epicenters in the Carson Sink - Lovelock area. Surface breakage of sediments and bedrock were reported along Rainbow Mountain to Stillwater Point Reservoir forming a vertical scarp from 1 to 12 inches high. The faulting paralleled early faults in the same vicinity. Considerable damage of buildings, canals, and highways resulted between Fallon and Carson Lake in a zone about 6 miles wide.

Of particular importance, is the effects of the August 1954 quake where a 6.8 Richter scale reading was received and surface breakage occurred from Stillwater Point Reservoir north 12 miles into the southeast section of the Carson Sink. Vertical displacements were measured at a maximum of 18 inches in the mile wide fracture zone. (Refer to pages 95-96 of the report for full details).

Aford, Bacon & Davis Mtah Inc.

In conclusion, it is obvious that the area is located in an area of high seismic risk. Activity along any of the major fault zones in the Carson Desert could have significant impact on the proposed project facilities and operation.

REPORT 3 (SOLAR RESOURCES, INC.)

The major concern after reviewing the report was the exclusive use of assumed values in predicting hydrologic characteristics which are highly critical to project evaluation and development. Even though acceptable grain size and other comparative techniques were used in most cases to arrive at the values, many decisions and design recommendations appear to be premature, i.e., permeability values used to predict quantities of recoverable brine and to determine the number and spacing of recovery wells plus extraction time periods were calculated without the benefit of actual pumping test data. Assumptions were also made to distinguish between an upper brine zone within 35 feet of the surface and a lower brackish zone at greater depths. These zones were identified apparently by grain size analysis only without aquifer information or a complete water quality analysis. Little mention is made of water quality data other than the zone distinctions.

Likewise, in determining the estimated flow into or from collection ditches, brine entry was calculated using assumed permeability values. However, the ditch flow data is somewhat more actual since water level fluctuations were monitored by piezometers installed along the ditch and flow measurements were taken.

Realistically, and in all fairness to the report writer who recognized the inadequacies in the predictions and used the conservative value in most cases, the estimates presented may lie in the true value range. But due to the many unknowns, the predictions could be off by several magnitudes in either direction.

Estimates made as to the thickness and extent of basin aquifer zones, permeability characteristics and recharge rates are also lacking, as recognized, in specific stratigraphic relationship and description. Therefore, assumptions presented as to interconnection of identified aquifers with

other potential aquifer zones in and adjacent to the sink are unfounded. Likewise, assumptions as to the degree of vertical transfer of solutions is unpredictable without proper testing and evaluation.

The report identifies the Wyemaha Formation of the Pleistocene Age consisting of alternating layers of sands, silt and clays and comprising a thickness near 150 feet, as containing the desirable brine and brackish solutions. However, due to the reported wide spread existence of the formation in other reports and probable interbedding with sediments originating from various different drainage basins surrounding the sink, actual aquifer continuity is questioned. Compounding the issue of aquifer continuity are the potential interbedding of windblown and lake sediments deposited sporatically as conditions exist.

Another concern is the lack of a comprehensive water level gradient map based on piezometric water levels in drill holes and wells across the site. Figure 5 is presented as a groundwater contour map but lacks reference to well locations, depths and season. Also, missing are the gradient flow paths. A rough gradient can be predicted from the figure at slightly less than 0.1 percent in a northeast direction, but specific information as the writer was probably aware, is lacking to make suitable evaluations.

Therefore, based on the preceding discussions, the design and location of the proposed pilot plant, ditching and well field should not be considered final or feasible until additional data is made available to confirm the plans.

Finally, as to cost estimates for recovery well and pump installation, total prices could be expected to at least triple due to increases in material and labor costs.

REPORT 4 (AMAX, INC.)

The report recognizes the need for specific hydrologic test data from the basin aquifer zones. The writer also acknowledges that the limited data received from the brief testing program was only intended to provide preliminary information. A review of the pumping test program and results indicates that the information received cannot be considered adequate or dependable for predictive aquifer analysis primarily due to the short-term 8 hour test period; low pumping rate (2.5 gpm); unknown but assumed inadequate well design, small diameter slot perforated casing, no gravel packing; and probable inadequate pump submergence.

However, results of the test do indicate a relatively high vertical drawdown in the test well and significant drawdown cone radius in the observation wells. Considering the short-term test duration and low pumping yield, indications are that well production, especially in shallow zones with thin aquifers, will be low with significant drawdown influence of 100 feet and possibly more under sustained pumping rates. Such information, in a properly constructed well, would indicate relatively low hydraulic conductivity, high drawdowns and limited yields. But the limitations as previously discussed are a factor and must be considered in this test. The test data also indicates, that the recharge rates are only moderate with the test well and closer observation wells achieving between 70 and 90 percent recovery within an approximate 2 hour period. Slight artesian pressure was recorded in observation well #9 at a distance of 278 feet from the test well but does not indicate high confining pressures.

In conclusion, as initially mentioned, results of this testing program are inconclusive and can only be considered as a preliminary localized indication of true aquifer conditions.

Ford. Bacon & Davis Atah Inc.

REPORT 5 (RESOURCE INDUSTRIES INTERNATIONAL)

The report represents a very comprehensive and complete evaluation of the proposed project objectives, site conditions, data limitations, brine development potential, market appraisal and profit margins. The conclusions and recommendations appear sound as to continued site evaluations and future project development. The recommendation made to conduct an additional hydrologic data collection program is favorable to our own evaluation but should eventually be expanded beyond the "modest" program as suggested. Additional studies and data analysis of FBDU are listed in the Recommendation Section of this report.

A key observation pointed out by the report is the critical need for both shallow and deep soil and hydrologic data in the structually low portion of the sink and adjoining areas owned by Utah Salt Company, Inc. To this we fully agree, and stress that the information be obtained as expediently and efficiently as possible. Procurement of the information will not only serve to fill an important data gap between existing holes of Amax, Inc., but will serve to satisfy U.S.G.S. and Federal prospecting permit requirements. Results of long-term tests will assist in determining the effect on the Fallon and National Wildlife Refuge and Stillwater Wildlife Management areas during proposed project operations. The location and testing program of tests specific to establishing the adjacent area impacts can be determined after near basin center tests have been completed.

In conclusion, we also support the observation that the Carson Brine Sink Project appears to have high potential for success based on current information. However, overall long-term success of the project is questionable without knowledge of specific aquifer recovery and recharge characteristics and without definitive water quality analysis under static and dynamic extraction conditions. Other concerns as to

Aford, Bacon & Davis Atah Inc.

project viability based on FBDU limited knowledge of the brine market, center around Utah Salt's ability to market the quantities (584,000 tpy) of crude salt within the allotted time frame. Concern is also expressed for the success in design and construction of adequate evaporation pond dikes to prevent excessive seepage and withstand moderate to high intensity shocks from local seismic activity and fluid transfer displacement. Unpredictable occurrence of extensive cracks in the pond basins could also result in excess brine and product loss.

MISCELLANEOUS DATA

A cursory review of supplementary maps, cross-sections and drill logs was made to support established data. Time did not permit complete evaluation of drill log and geophysical log data or construction of cross-sections. However, it was noted that much of the drill log data is not definitive enough to establish true sediment classifications or source/ and areas to determine strata continuity between test wells or holes.

Ford. Bacon & Pavis Utah Inc.

ADDITIONAL HYDROLOGIC AND ENVIRONMENTAL STUDY RECOMMENDATIONS

Based on our review of available information, the following statement and concluding recommendations are made. Recommendations and primary objectives of the additional data collection program as presented by Resource Industries International, Ltd. on pages 10 and 11 of their September, 1976 report, are basically agreed to but with the following additions and/or exceptions. Also, it is requested that a site visit be granted prior to finalization of any recommendations made in this report:

- Prior to or during development of additional hydrologic 1. and soil data, the review and evaluation of all existing and proposed State and Federal laws/controls be completed to provide an overall present and futuristic view of project development constraints and required environmental impact studies. We understand that an environmental impact report was made of the area but that current negotiations with the U.S.G.S. and U.S. Bureau of Land Management are requiring additional environmental assessments to be made as to the impact of exploration drilling. Other restraints may also be awaiting the project development from governing agencies and/or private environmental and public groups, especially those associated with the nearby wildlife management refuges. Some resistance could also arise from local land owners and municipal water suppliers, as to the impact on water well supplies for irrigation and culinary use.
- 2. Before or during additional drilling operations, now partially underway, analysis should also be made of the peizometric surface (groundwater gradient) across the sink where existing data is available. This evaluation will provide information critical to determining the recharge sources for the basin, flow direction patterns, and will assist in making decisions as to the most probable drilling locations for determining maximum aquifer thicknesses.

Ford. Bacon & Davis Utah Inc. SALT LAKE CITY, UTAH Another exercise that is recommended for completion during the initial supplemental drilling program, is construction of several cross-sections across the sink where data exists. Again, information from the cross-sections will be valuable in determining new drill locations and in strata correlation. In conjunction with this effort, geophysical well log data should be evaluated and used to supplement drill-log data wherever possible. Research is recommended into the possibility of using high altitude imagery photographs and standard color, infrared or thermal photographic techniques to further delineate sediment and/or aquifer conditions conclusive to recharge evaluations and brine storage and concentrations zones. Using the above developed data design and complete the aquifer/soil/brine evaluation program on company controlled property as defined in a phase approach by the Resource Industry report, with the following changes and/or additions: Phase I a. Deep Exploration 1. Rotary-wash drill, a 4 inch diameter test hole, extracting undisturbed drive samples at 10 - 20 foot intervals of major strata change and geophysically log a 500 to 1,000 foot deep test hole near the center of T23N-R31E. (T.D. dependent upon strata conditions, drilling feasibility and brine concentration decrease. Revert-type drilling mud should be used and casing driven where caving persists. Chemical analysis of extracted soil and water samples should be made on site. Well logging technique will depend upon extent of casing driven). Ream test hole number 1 or rotary drill a second hole at a new location within 25 feet of hole number one without taking samples or geophysical logging. Depth of a second hole will be dependent upon aquifer

ord. Bacon & Davis Utah Inc. SALT LAKE CITY, UTAH conditions identified in the first hole. Diameter of the new or reamed hole should be sufficient to provide suitable yield and data from a long-term pumping test and will be determined after test hole drill and well log evaluations. (Undesirable aquifer zones should be cased or blocked off with a packer to prevent interference. Casing should be installed and PVC well screen located at identified aquifer zones. Gravel pack should also be used).

- Install sufficient diameter, PVC cased and screened 3. observation wells to appropriate depths in an expanding N-S-E-W radial pattern around the test well. Three wells in each direction at 25, 150 and 300 foot intervals is initially suggested.
- Temporarily install an adequate (500-1,000 gpm) submersible or surface high capacity pump. Test pump in short and long-term stages to properly develop and test for aquifer characteristics. Final evaluation should be made from a continuous minimum 7 day test program.
- 5. Individually and/or collectively test each aquifer identified as having recovery potential and suitable permeability ranges. Utilize an expanding packer system to isolate aquifer zones during testing.
- 6. Evaluate data as to aquifer characteristics, drawdown and recovery conditions, and specific yield potential. Establish time and distance drawdown plots for well field development design.

Testing of this magnitude may be required at NOTE: more than one location to determine the feasibility of extracting from deep brine zones.

1ford, Bacon & David Utah Inc.

- b. Shallow Exploration
- 1. Rotary-wash drill, undisturb sample on 5 to 10 foot intervals or at major strata charges and electric log a presently undetermined number of 25 to 50 foot deep holes in the areas indicated by Resource Industries on page 11 of their report provided that these recommendations have not already been performed.

 A review of the company's "Prospecting Plan For The Carson Sink" dated October, 1976 indicates a reasonable attempt to obtain information in critical areas both from drill hole and trench studies. However, additional studies may be recommended upon review of the new and other on-file data and after a site inspection
- 2. Install trenches and sumps for near surface brine recovery observations and future production technique evaluations. Additional evaporating pond pilot plant studies should also be considered at locations where feasible.

Phase II

- a. Deep Exploration
 - 1. Locate, install and test pump additional wells, as necessary, using similar testing techniques as used in Phase I with modifications as required.
 - 2. Evaluate total data developed and design adequate well field, if data supports deep well recovery practices.
- b. Shallow Exploration
 - 1. As knowledge becomes available, expand soil/ aquifer/brine exploration program as applicable to increase or maintain product recovery rates.
 - 2. Continually update data evaluation to refine recovery systems.
 - 3. Design and construction of relatively large

Ford. Bacon & Davis Utah Inc. SALT LAKE CITY, UTAH scale collection and evaporation pond pilot plants in suitable areas. Environmental Impact Pending viability of project development due brine extraction at this time of data evaluation, analyze all data as to potential impact to adjacent wildlife refuge management areas and local aquifer supplies suitable to domestic use. 2. Design and propose an adequate testing and evaluation program in a closer proximity to the refuges where the likelihood of impact from brine extraction is greatest. Coordinate the effort with appropriate officials and the public to ensure the company's interest to preserve national ground and surface water conditions during proposed production is known. 3. Redesign production facilities should testing results indicate encroachment on adjoining properties of concern. Install monitoring wells and surface measuring devices where applicable to ascertain and foretell of possible impact on natural conditions. 5. Develop and maintain on a regular schedule, a sampling and analytical testing program in accordance with local and Federal agency requirements. Aquifer Depletion Monitoring d. 1. Equip select observation and/or test wells with piezometer devices to monitor rate of aquifer depletion and recharge. 2. When suitable data becomes available, develop a mathematical model to monitor the effects of pumping on the quantity and quality of the brine aquifers. The model can be used to control recovery from depleting zones or in assuring continual high quality brine

Ford, Bacon & Davis Utah Inc. SALT LAKE CITY, UTAH extraction. The program can also be used effectively as an efficient data storage and recovery tool. Thank you for this opportunity to have been of service. Should you have any questions or require additional information,

please notify.

Ford, Bacon & Pavis Utan Inc. ENGINEERS - CONSTRUCTORS A SUBSIDIARY OF 375 Chipeto Way P. O. Bex 8009 Salt Lake City, Utah 84108 801-583-3773 Ford, Bacon & Davis Jacorperated March 4, .1977 Utah Salt Company, Inc. 1865 South Main Street Salt Lake City, Utah 84115 Mr. George E. apRoberts Addendum to February 25, 1977 Report entitled Re: "Carson Sink Hydrogeologic Data Evaluation and Future Hydrologic and Environmental Study Recommendations: Dear George: As discussed by telephone on February 28, 1977, additional information concerning the hydrologic study recommendations of the referenced report are being forwarded for your consideration. Two aspects of the proposed aquifer testing program which were discussed in progress meetings but not alluded to in the report are alternate methods of drilling and aquifer testing. An awareness of these techniques is presented as follows so that evaluation can be made should initially planned methods not be satisfactory: Drilling Techniques Rotary-wash type drilling was recommended in the report for both soil sample extraction and test well installation. However, depending on the success of this technique, an auger or bucket-rig method may be more advantageous depending upon the purpose of the hole being drilled. Since augers (hollowstem and conventional screw-type) have been used at the site, their relative success is known. Bucket-rigs have the advantage of forming a large diameter (up to 54-inch) hole without using drilling fluids - enabling accurate strata measurements and observations. Either technique should be suitable for hole drilling where caving is minimal and only aquifer depths are desired. Measurements of artesian flow could also be made using these methods but may require a casing installation.

Mord, Bacon & Pavio Line 2016. Page -2-SALT LAKE CITY, UTAH Utah Salt C apany, Inc. Attn: Mr. George E. apRoberts March 4, 1977 Aquifer Testing -Short and/or long term pumping tests were recommended in the report to determine deep and shallow aquifer conditions. Considering the exceptionally flat surface terrain of the sink, a major inhibiting factor in performing the tests is the disposal of discharged water without allowing re-entry into the test or observation wells. Extensive diking or piping would be required to prevent re-entry and to prevent trafficability problems unless waters could be diverted away by the existing grade or into local low areas. Should diversionary techniques prove futile, other testing techniques should be used. Permeameter tests which involve injection of water into the aquifer by either maintaining a constant or falling head in the test well are recommended. Special bore hole packer or bentionitic seals are required to insure aguifer isolation and prevent by-pass. A simple piezometer or pressure gauge is used to monitor injected rate. Once the hole is drilled, testing can usually be completed in a 24-hour period. Diameter of test holes are usually 4-inch with 2-inch PVC injection pipe being used. These techniques are commonly used where conditions exist making standard pumping tests impracticable. Resultant data are fully acceptable but in this instance would not be as valuable as pumping test information. Artesian flow measurements should also be made where confined flow exists. Techniques for open pressurized flow measurement will vary but normally involve installation of a pipe or barrel measuring device on the surface equipped to monitor flow over an extended time period. We also wish to call your attention to two typographical errors in the report. Please note that under item I.a. of Phase I "Recommendations Section", line 3 - the word "on" should be "or". Also, under item 1.b. of Phase I, line 2 - the word "charges" should be "changes". Thank you again for the study opportunity. We apologize for the errors in text and for any inconvenience the submittal of delayed information has caused. Sincerely yours, FORD, BACON & DAVIS UTAH INC. Senior Hydrogeologist DLW/gc

Earth Resources Company 5920 McIntyre Street Golden, Colorado 80401 303/279-7631 February 20, 1978 Frank J. Allen, Esq. Clyde & Pratt 351 South State Street Salt Lake City, Utah 84111 Re: Carson Sink Salt Proposal Churchill County, Nevada Dear Frank: We have completed a preliminary review of the data of the Carson Sink proposal, and have come up with more questions than we started with. These are: Just exactly what is the land being offered? 2) What is Utah Salt's position in the matter? 3) What is William Colman's position in the matter? 4) Since the government has a limitation on acreages involved in saline leases, how do you propose we get around that? 5) Does not the government also have a limitation on overrides? 6) On the one pump test that was made, why was it done so far west of the land controlled by Utah Salt? 7) Were there any "on site" evaporation tests conducted? 8) Has anyone drilled to test the deep aquifers? 9) Does anyone have any idea about the possible source of recharge in the Basin? 10) Who has the other 15% in the deal? 11) Do you know of any exploration drilling that has been done in the NE part of the Sink?

Frank J. Allen, Esq. Carson Sink Proposal February 20, 1978 page 2. 12) Are you sure that we know of all the holes that AMAX drilled? 13) No drilling is noted by Utah Salt in all the years that they seemed to have been involved on the land. Could you tell me why they have not drilled any holes? During 1967-1969, Solar Resources hired an outfit named AIM, Inc. 14) Who is that? 15) AIM produced a feasibility report. Do you have a copy? There is an operation south of Fallon making salt. Do you 16) have any information on it? The operating and capital costs projected, seem to be based on Salt's operation (near Wendover ?) - where they trench for near-surface water. How could someone transfer those operating costs to a well pumping operation? Frank, you may not wish to try to answer all these questions; if so, just let me know and I will return the data to you promptly. I do appreciate your bringing this proposal to our attention; but it has so many unknowns, that it looks like a raw piece of meat to me. Kindest regards, EARTH RESOURCES COMPANY W. C. Cole General Manager-Mining Group WCC:dp xc's: D. M. Krausse J. J. Ringer bxc: W. B. MacKenzie

Page Edwards - 3 W they definot do a major pumping test to FB&D ded one test on one section -My ded they go so for west of the land controlly by Vah Scalt pe that test? One section - todnews - no pumping rate -then moved to See 29 - [a red flag!] an economic analysis. they mention an accomplete eraprate but don't describe any tests. — an extremely important attended Hotre record of summe activity - Benove! Surface flooding-has occurred - Hore to build the dikes gut high -Operating cost - unsufficiently background.

Why havit somewe dulled deeply, and test deeper deaper ? Upperacquifer - shallow -Palph Barand - know him - good man -Salt- 5% not too bad - not really the problem bonnerelle 2 We do not know the source of recharge in the losin - that affect the reserve estimate. Place hasn't been green a good Chance. Lock I duection to activity. p16 - Final cord - FBJD - wrobes the limitation of the test data Very Guarded Statement - that fine for the Bureaucras but not for us-Seepase, flow rate in heisten Data carment be used for 2 (Ne really (1. 3% vad. bury 3 2, 20 gpm.

Ventury 3. mox men well dest 1000 april

They dedut really sample the salt content alfects of the pumping test. Allen is saying he can deline 856 - Who has the other 15%? Colinari, Probably wit enough in the shallow acquire wo a tremendous recharge. MM tow / Salt Stat or salt - then add evaluate that only Morrison - Morbet study good - reads believestly Didn't really spend much time w abakan Sadan. NO BACKUP FOR CAP OR OP COSTS! Speciff to say it came how that salt when operations . We would pump. They say they contest 180 sq me - Wal Salt 6 roups How ded they get nound the across limitation in Saline lesses. [Red Flag!] see p 6 - of they Fear. Report

That really limite a thin acquifer situation, No brown exploration dulling in NE part of Sink Why Not? Did Amay dull dispholes we don't know about? p3 glof summany.

serval provate expl holes - dulled in part.

these shallow saids - 3.6 MM T. of NaCl.

+ in 25 sq. miles. How can he say had to believe Utich Salt defent really dull a bush of holes elu 3 Eyeas we may be out of business !!! How does he know evap rate _ probably horn Gast Data - concerning - Not based on site george Late Proj. 6 years old!

No front money -Statt export ground 300 - develop Horning 5 to Nord and pumping 5 to local - one Z different things Some deep wells mentioned P.7 poruous expl See you can find more info then what he is telling is US65 dulling - E Z/N R 30 E 15 me pour center of where we are intersted 3 wells - 2800-3700 in TZZN, R 30 E artesian weak him from indepth. 1967-69 - Solar Resources -Consult aIM clue. who is the? where Amax aules. evap in TZZV. EZGE Shallow augus holes -7% Na Cl. 20 acre evap plant-17 MM gab bine -6500 hous salt -5pm would have to be 1.5 Page cole to 5545

Then conclusion - ATM Fromhlet, Report (We should have that & and don't) est: gal from shallow sand - 5W portion 1 sente. 50% recovery - works out to 9.2 MM fons. Salt 9 years - mel NO RECHARGE eln 25 sedios Very 3.6 MM tot 108- prod 1 IMMT Salt form 68 home would require 10,500 gpm operating 8 months Page agrees. Hower assumy 25% yell, 50% secdepletion would be too great unless theo is a matural replenishment of brine. " a party rapid recharge would be important. Fort - See Apr 1970 - E&MS articles 185gpm_ _ (50-500) Carrin Suk only 20!!!

What who land being offered? What don't you send us something that his to do w the good of hydrold the area curder consideration ?? pel p8, E-para 27 wells pa sa 20 gpm 13 billen gats brens 25 Sec = 520 MM gal/sec 5 540 gpm / see. × 1440 mu/day = takes 22 months to elhaust to sec. Post 1 Fore to pump for left on you will core in things

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Why wit Rawa selling salt -Gov't doesn't a hos a limitation or I What position does Colmon hold in V

FEB 15 1978 GLYDE & PRATT EDWARD W. CLYDE ATTORNEYS AT LAW ELLIOTT LEE PRATT 351 SOUTH STATE STREET WILLIAM G. GIBBS SALT LAKE CITY, UTAH 84111 FRANK J. ALLEN ROLAND R. WRIGHT PHONE 322-2516 JOHN T. EVANS AREA CODE 801 RICHARD C.CAHOON RODNEY G. SNOW MICHAEL M. QUEALY February 13, 1978 STEVEN E. CLYDE Mr. Bill Cole Earth Resources Company 5920 McIntyre Street Golding, Colorado 80401 Re: Carson Sink Dear Bill: I very much appreciate your keeping me advised of your cerebrations about the Carson Sink. I assure you again that we know you haven't made anything remotely resembling a commitment. We certainly agree that Page Edwards knows the Nevada salt system. Very truly yours, FRANK J. ALLEN FJA/bg

Earth Resources Company 5920 McIntyre Street Golden, Colorado 80401 303/279-7631 February 6, 1978 Mr. Frank J. Allen Clyde & Pratt Attorneys at Law 351 South State Street Salt Lake City, Utah 84111 Re: Carson Sink Salt Dear Frank: I met, on Friday, with a consultant to review the Carson Sink Salt matter. His name is Page Edwards and he is formerly a Director of Exploration for Foote Minerals Corp. and is very knowledgeable about the general Nevada saline situation. He is also quite busy, so I do not expect to hear from him further for about 10 days. Thank you again for giving us the opportunity to review this: and, as soon as I hear further from Page, I will let you know. Sincerely, EARTH RESOURCES COMPANY C. Cole General Manager-Mining Group WCC:dp xc's: D. M. Krausse J. J. Ringer

Chron Smith M/ Dora -Please call Frank aller Tell hun that our sonow of the Carson Sink proposal prompts us to ask for 2, references mentioned in the reports. a preliminary version of published Sala was made by Ford Bacon of Doves and submitted Feb 25, 1977. 2, The above was followed by a letter dated Man 4, 1977 2/3 2/13/18: Delephoned Frank allen & in his absence, I tacked with his Secretary & relayed above request to her. She said she woheld give Frank allen The Message: 2/14: atty allen cla & I repeated the message to him. Dora (one)

JAN 8 5 1978 CLYDE & PRATT EDWARD W. CLYDE ATTORNEYS AT LAW ELLIOTT LEE PRATT 351 SOUTH STATE STREET WILLIAM G. GIBBS SALT LAKE CITY, UTAH 84111 FRANK J. ALLEN ROLAND R. WRIGHT JOHN T. EVANS PHONE 322-2516 RICHARD C. CAHOON AREA CODE 801 RODNEY G. SNOW MICHAEL M. QUEALY STEVEN E. CLYDE January 23, 1978 Mr. Bill Cole, General Manager Mining Group Earth Resources 5920 McIntyre Golden, Colorado 80401 Dear Bill: Pursuant to our telephone conversation today, I am enclosing a copy of the Hydrogeological Study Report prepared by Ford, Bacon & Davis. If you have any questions regarding the report please call me. Very truly yours, FRANK J. ALLEN FJA/bg Enclosure P. S. As far as the sheer technical feasibility of the project is concerned, most of the questions relate to hydrology. Will the brine reservoir recharge because of water seepage through the salt impregnated sands and clays etc? The feasibility report does not assume an annual recharge, but we believe a major recharge factor should be recognized. The hydrologist who seems to be best informed on the basis of field experience at the Sink is named Wes Paulson, and his telephone number is (or was six months ago) Area Code 916, 663-2696. I don't know how eager he is to talk without prospect of fee, but he should be guardedly responsive if you want to talk to him.

He said he would try tiget Copies of said them to you. DP 2/14/18

EARTH RESOURCES COMPANY MEMO January 23, 1978 TO: Jules J. Ringer FROM: W. C. Cole Carson Sink Salt Proposal - Churchill County, Nevada RE: Thank you for sending me the data and proposal by Frank Allen on the captioned properties. It appears to be a very interesting prospect and I am purusing it further with Frank. He is sending me more data, and it may take a couple of weeks before I have sufficient information to form a judgment. I will, therefore, retain the packet you sent to me, for the time being. WCC:dp

Fronk allen returned my call 15000 - to get options. Chat Salt- at Wendorec 'producer-frenching - supports trenders Ap Poperts - got Na penuts at Parson Junk - acresy limitation rounded up prents of neighbors. Hor to dimonstrate a fearble grogram. Now in process. Unsligation has cost \$250,000 AMA Bell Moneson ded-markeling Horsher them Now W Ludwig, Lenes from Churchelle Ford, Born & Dans By area to lest

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What happens to evaporation rates in the winter? Total un 20111 What was Amox doing? Why? 1974 Why did Solar Resources gure ap : 1967-69 Is this brune too delute? what chong or the deal?

EDWARD W. CLYDE ELLIOTT LEE PRATT WILLIAM G. GIBBS FRANK J. ALLEN ROLAND R. WRIGHT JOHN T. EVANS RICHARD C.CAHOON RODNEY G. SNOW MICHAEL M. QUEALY STEVEN E. CLYDE Jules Ringer

CLYDE & PRATT

ATTORNEYS AT LAW 351 SOUTH STATE STREET SALT LAKE CITY, UTAH 84111

AREA CODE 801

p. S. - fell ful entact phanh duetty y guiling

One Energy Square Suite 1200 Dallas, Texas 75206

Re: Carson Sink Salt Proposal

JAN 1 8 1978

Dear Jules:

Earth Resources

In telephone conversation with you recently, I mentioned an opportunity for a major natural resource acquisition which is available to Western Oil Shale Corporation ("Westco") of which I am an officer and director. Westco is a public company with some substance (76,000 acres of oil shale leases and about 1 million in cash), but it is unable to undertake an operation of the magnitude involved here. I am making a proposal for Earth's acquisition with the caveat later stated.

The details of the proposal are compressed in the enclosed two page "Information Abstract" and I have also enclosed a copy of an economic feasibility report relating to the project prepared by Resource Industries International in 1976.

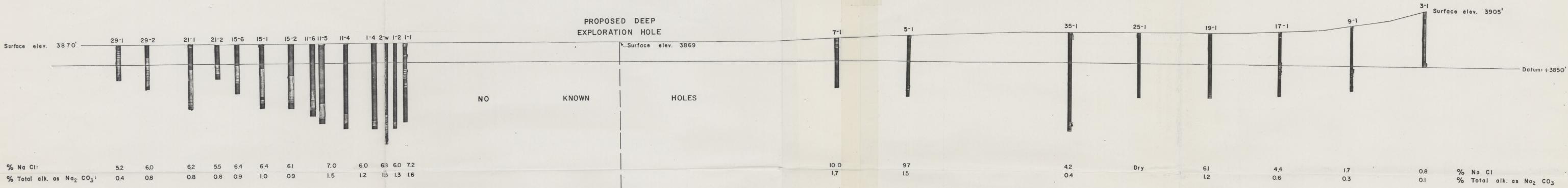
I don't know whether Earth has been in the salt business or not. Sodium chloride is, of course, pretty basic stuff, and I suspect there are several people in your organization who will feel competent to judge the feasibility report as it relates to salt. Salt cake and soda ash market analysis may call for more background. I am personally persuaded that the people who prepared the report are competent and objective.

The real beauty of this operation lies in the simplicity of the brine, the absence of ecological problem (there is virtually no life in the area, let alone any threat to it), the availability of solar energy as the principal processing energy, and the prospect for attractive return at scales ranging from 50,000 TPY of salt to the full scale, full spectrum program which the feasibility report contemplates.

Jules Ringer Earth Resources January 10, 1978 Page 2 While Westco feels it has commitments from the lease and permit Low holders which will enable it to deliver in accordance with the proposal, the confirmation of the commitments will entail some expense which Westco is unwilling to incur without serious expression of interest from someone able to fund operations. I don't present this proposal, therefore, as an offer you can simply accept but only as an opportunity I believe it is worth your time to explore. In the interests of reducing bulk, I am not enclosing a copy of the Ford Bacon & Davis report mentioned in the Information Abstract. The conclusions are favorable to operations, but the Sink is a monster area, and nobody seems willing to extrapolate wildly. All the testing has confirmed for the tested area what the hydrologists (if that'a a real word) have presumed. If this proposal is of interest, I should appreciate hearing from you. Obviously, Earth has made no promises to me; nobody expects to be rewarded if you choose to pursue an acqusition program in the Sink through Westco or anyone else, and you are not sworn to secrecy. We would prefer that you keep confidential the fact that Westco has presented this proposal, but Westco is not violating any duty by presenting it. If the proposal is not of interest to you, I would appreciate your returning the feasibility report. Thank you for your interest. Very truly yours, FRANK J. ALLEN FJA/bg Enclosures

INFORMATION ABSTRACT Utah Salt? PROPOSAL IN RE CARSON SINK SALT PROPERTIES Proposer - Western Oil Shale Corporation and individual corporate associates. 2. Nature of Properties - The leases and permits proposed to be the subject of sales transaction are federal sodium permits in process of conversion to lease (72,640 acres) and Churchill County (Nevada) leases (19,520 acres). The rights of permittees to convert to lease are well understood, and lease issuance is considered certain but is not confirmed. Federal leases continue for so long as production is maintained. Level of Production - The feasibility study* anticipates (and the brine source is inferred to be sufficient to support) 1 million TPY salt, 250,000 TPY soda ash, and 185,000 TPY salt cake, but demonstrates economic feasibility of as small an operation as 50,000 TPY salt. * See 4(e) below. Nature of Resource Investigation - The area has been the subject of extensive study by the Department of the Interior and by industry. The USGS reports include: "Lake Lahowtan: Geology of Southern Carson Desert, Nevada", USGS Prof. Paper 401 (1964) "Water Resources Appraisal of the Carson River (b) Basin, Western Nevada", Water Resources Reconnaissance Series Report 59 (1976)" and industry funded reports include: "Carson Sink Brine Project, Brine Recovery Methods (C) and Reserves", W.W. Poulsen, Consulting Geologic Engineer (1969) "Carson Sink Initial Hydrogeologic Investigation", (d) W.O. Lockman, Amax Inc. (1974) "Carson Sink Brines, Feasibility Study for Produc-(e) tion of Salt, Soda Ash and Sodium Sulphate", Resource Industries International, Ltd. (September 1976) "Hydrogeologic Study Report on a Portion of the Carson Sink, Nevada" (August 1977), Ford, Bacon (f) & Davis Utah, Inc. * The investigations to which these reports relate were funded by the Proposer or its associates. The brine chemistry for processing was developed by Abraham Sadan of Contran, Inc.

Sec. 29 T22N-R30E



LEGEND

1000 0570

Sand

Clay

Lithology and analyses from AMAX reports.

SOUTHWEST TO NORTHEAST SECTION ACROSS CARSON SINK

SHOWING WELLS DRILLED BY AMAX IN 1974

HORIZONTAL SCALE: I"= I mile VERTICAL SCALE: I"= 50 feet

SOUTHWEST TO NORTHEAST SECTION ACROSS CARSON SINK

> hurdill Co. - general Item 16

0980 0001

Sec. 3 T24N-R33E

