CEC No. 02-AFC-02

SALTON SEA GEOTHERMAL UNIT 6 POWER PLANT PROJECT

RESPONSES TO:

CALIFORNIA UNIONS FOR RELIABLE ENERGY DATA REQUESTS, SET FOUR (NOS. 276 - 358)

Application for Certification (02-AFC-02) for Salton Sea Geothermal Unit 6 Power Plant Project

Submitted by:
CE OBSIDIAN ENERGY LLC

Submitted to:
California Energy Commission
1516 Ninth Street, MS-4
Sacramento, California 95814-5512

File date: March 6, 2003

Table of Contents

Page

AIR QUALITY....4
WASTE MANAGEMENT....32
WATER RESOURCES....41
BIOLOGY....56
HAZARDOUS MATERIALS....82

GENERAL OBJECTIONS AND QUALIFICATIONS

1. The following responses to data requests are made solely for the purpose of the application before the California Energy Commission.

2. Each response is subject to all appropriate objections, including, without limitation, objections concerning relevancy and materiality. All such objections and grounds for objection involving or relating to the matters raised herein are reserved and may be introduced at the time of hearing.

3. Applicant objects to each and every data request to the extent that it calls for the disclosure of information protected by the attorney client privilege, attorney work product doctrine, or other applicable privilege. To the extent that an individual data request may be construed as seeking such privileged information, Applicant claims such privilege and invokes such protection.

4. Applicant qualifies the responses to data requests by noting that it has not completed its investigation. To the extent that Applicant's future investigation may disclose the existence of additional responsive information, Applicant's responses are made without prejudice to its rights to utilize, produce or introduce at hearing information or documentation which is inadvertently omitted, not yet known, or not yet ascertained, discovered, identified or located by Applicant in responding to the data requests. Without obligation, Applicant hereby reserves the right to supplement, amend or modify the data request responses contained herein.

5. Applicant objects to each and every data request to the extent that it calls for information that is not reasonably relevant to the proceeding or decision. Furthermore, Applicant objects to each and every data request to the extent it calls for information that is readily available and can otherwise be obtained.

6. The foregoing objections and qualifications apply to each and every data request herein, and are incorporated by reference to the extent applicable in each of the specific responses set forth below as though fully set forth therein. The failure to mention one of the foregoing objections in any of the specific responses set forth below shall not be deemed a waiver of such objection.

Air Quality

276. The applicant estimated construction fugitive dust emissions using an emission factor of 0.011 tons of PM10 per acre-month, based on a 1996 MRI Report. The original calculations in Table G-1 applied the 0.011 ton/acre-month general construction emission factor to 100% of the disturbed area, or up to 224.4 acres. CURE Data Requests 1 and 2 pointed out that the applicant had misused this emission factor by excluding certain additional emissions. The procedure that the applicant used in the AFC, which is based on the 1996 MRI Report, uses on 0.011 ton/acre-month for "general construction" *plus* additional emissions of 0.059 ton/1,000 yd^3 for on-site cut/fill *plus* 0.22 ton/1,000 yd^3 for off-site cut/fill. The 0.011 ton/acre-month emission factor for "general construction" includes emissions from both on-site and off-site sources for everything but earth moving. (See MRI 1996, pp. ES-3, 4-3 to 4-4.)

(a) The applicant responded with a revised calculation of construction fugitive dust emissions, which again misapplies the MRI procedure. The revised calculations provided in response to CURE Data Request 1 only apply the 0.011 ton/acre-month emission factor to the 80-acre plant site, omitting the laydown area, park area, access road, well pads, well pad access, pipeline route, and transmission line route. Thus, the "general construction" emissions currently in the AFC in Table G-1 are correct and should not be revised by reducing the area used to calculate them. Please state whether the applicant agrees that the 0.011 ton/acre-month emission factor for "general construction" includes emissions from both on-site and offsite sources for everything but earth moving and thus, the general construction emissions in Table G-1 of the AFC are correct. If the applicant does not agree with this position, please explain why not, citing specific pages of the 1996 MRI Report to support your answer.

Response:

The Applicant did not revise the AFC calculations of construction fugitive dust emissions. The refined approach used in the AFC is an acceptable and conservative method of evaluating the onsite fugitive dust emissions during construction. There are other methods, including the approach proposed by CURE. The Applicant, in responding to CURE on this issue, used CURE's proposed method that gave nearly identical results to those in the AFC.

(b) The MRI procedure that the applicant relied on requires that cut and fill emissions from on-site and off-site sources be added to the general construction emissions estimated in Data Request 276a. (MRI 1996, Table 7.) The on-site cut and fill emissions are

calculated from 0.059 ton/1,000 yd^3 of "on-site cut/fill." (MRI 1996, Table 7.) The response to CURE Data Request 1 calculates on-site cut and fill emissions using only 105,000 yd^3. However, the AFC, p. 5.3-8 and attachment CDR-2 both indicate that this is only the total cut for the project site. The cut and fill emission factor is based on the sum of cut and fill, not just cut. The total fill is 167,000 yd^3. Thus, the on-site cut and fill emissions should have been based on 272,000 yd^3. Please correct this error, or explain why you believe only cut need be used, citing specific pages of the 1996 MRI Report to support your answer.

Response:

CURE's proposed interpretation of the MRI Report is incorrect. The calculations performed by the Applicant are accurate and do not need modification. The factors for determining on-site and off-site cut/fill emissions include both cut and fill activities. These are not separate activities with separate emission factors as stated by CURE. There are 167,000 cubic yards of total on-site fill; 105,000 cubic yards coming from on-site and 62,000 cubic yards coming from off-site. Using the value 272,000 cubic yards proposed by CURE would overestimate the amount of fill necessary, and therefore, overestimate the fugitive emissions.

(c) The cut and fill emissions from off-site sources are based on 0.22 ton/1,000 yd^3 "of off-site cut/fill." (MRI 1996, Table 7.) The Response to CURE Data Request 1 calculates offsite cut and fill emissions using 62,000 yd^3, citing Section 5.3.2.1.1 of the AFC. However, we were unable to locate this figure anywhere in the AFC. CURE Data Request 2 requested support for the volumes of cut and fill assumed in the revised fugitive dust emissions. Thus, please provide support for the 62,000 yd^3 of off-site cut and fill, comparable to that provided in attachment CDR2 for onsite cut and fill.

Response:

Please review CDR-2 again. Total fill required at the site is 167,000 cubic yards. Total cut at the site is 105,000 cubic yards. The cut will be used as fill. This means 62,000 cubic yards will need to come from off site (167,000 minus 105,000 equals 62,000).

(d) The support for the cut and fill calculations in attachment CDR-2, provided in response to CURE Data Request 2, cites information not in the record that is critical for following and understanding the provided calculations. Thus, please provide references 3 and 4 cited in CDR-2, page 4 of 4

Response:

References 3 and 4 cited in CDR-2, page 4 of 4 is provided in Attachment CDR-276.

277. The Project site will be enclosed by an 8-foot high perimeter berm for flood control. According to the Geotechnical Report in Appendix J of the AFC, the north and west portions of the berm already exist. The cut and fill calculations in attachment CDR-2 indicate that the existing north road and dike will be replaced completely. The new volume of this road and dike is included in the fill calculations. However, there is no corresponding cut volume for removal of the existing road and berm. Further, the AFC did not reveal that the north berm would be removed in its entirety. Please respond to the following questions on this issue:

(a) Will the existing north berm be removed and replaced by a new berm? If your answer is yes, please revise the cut and fill calculations in CDR-2 to include removal of the existing berm. If your answer is no, please explain the significance of the fill calculations on page 2 of attachment CDR-2.

Response:

The existing north berm will not be removed and replaced by a new berm. The fill calculation on Page 2 of Attachment CDR-2 represents the quantity of fill that will be added to the existing berm to bring it up to the elevation required for flood protection.

(b) What assumptions were made in the construction emission calculations and cut and fill calculations about repairs to the existing west portion of the berm?

Response:

No repairs were assumed in the cut and fill calculations for the referenced berm. Therefore no construction emission calculations were conducted.

(c) Historically, filter cake was used to construct roads and berms in the area. If the response to subpart (a) is yes, please provide chemical composition data for the existing north berm that would be removed. This data is required to prevent construction worker exposure to potentially contaminated soils and to assure that the soils are properly disposed.

Response:

Not Applicable.

(d) Please provide a construction schedule and equipment usage schedule for construction of the berms.

Response:

The berms will be constructed during months 8 through 12 inclusive, commensurate with Civil/Sitework Crews identified in Table 3.4-1 of the AFC. Equipment that will be employed at various times during this period for this purpose includes dump trucks, water truck, grader, dozer, loader, vibratory roller, and compactor, all of which have been accounted for, and are included in the general categories provided in the AFC.

278. CURE Data Request 4 asked for support for the assumed 80% control efficiency used to calculate fugitive dust emissions and specifically requested a fully documented engineering calculation that identifies all assumptions. The response does not provide an engineering calculation, but instead cites a 2001 Muleski and Cowherd report, which is alleged to support the 80% control efficiency. We have reviewed this report, and it does not appear to support the assumed control efficiency. First, the tests were conducted in Missouri, which has much lower temperatures than the Project site. The higher the temperature, the higher the evaporation rate and the more water required to reach a given control efficiency. The Muleski and Cowherd report does not address this issue. The highest temperature that was considered was 80 F, which is much lower than typical construction season temperatures in the area. Second, the report only addresses scraper transit, which accounts for only a small portion of fugitive dust emissions, but not the more substantial cutting and filling operations on either end of the transit. Thus, even if the report supported an 80% control efficiency, it would only apply to scraper movement and not other sources of fugitive dust. Finally, the report demonstrates that control efficiency declines sharply with time from water application. The response claims the report supports a 4-hour application frequency, but the data in the report only covers 2 hours. The relationship between control efficiency and time after watering is nonlinear. Thus, the data in the report cannot be readily extrapolated to the 4 hour frequency claimed in the data response. Further, using the 1988 MRI equation, 0.14 gal/yd^2 yields 0% control and 1.1 gal/yd^2 yields 72% control. Therefore, please provide the following additional information to support an overall 80% control efficiency:

(a) Response to CURE Data Request 4 states: “According to the test results [Muleski and Cowherd 2001], to achieve an average control efficiency of 80% from watering it would be necessary to dispense anywhere between 0.14 and 1.01 gal/yd^2 of water every 4 hours on exposed soil locations at the site.” Please support this statement with an engineering calculation, using the results from Muleski and Cowherd 2001. Your calculation should identify with specificity all figures, tables, or other information from Muleski and Cowherd that you rely on and identify all assumptions.

Response:

Achievement of an average control efficiency of 80% was stated in the AFC as being the total of all mitigation measures adopted by the Imperial County APCD in Rule 800 and additional mitigation measures listed in Section 5.1.4.1 of the AFC. Only one of these mitigation measures is watering. The use of the 80% reference in the applicant's response to CURE Data Request #4 is in general supported by Muleski and Cowherd (2001). In their report, the 80% control is from watering alone in the context of scraper operations under various ambient temperatures, relative humidity levels, water application rates, etc. The control efficiencies listed in the report (Figures 3-2 and 3-3) are generally above the nominal 80% control value over the first 2 hours after water application. Specifically, at water application rates of 0.54 and 1.1 gal/yd2, the control efficiencies start at 100% and then decrease to 88% and to 95% during the first two hours, respectively. The graphs show that the rate of decrease in control efficiency is fairly linear with time, therefore, the Muleski and Cowherd data suggests that the control efficiency would not reduce to 60% or less in the first four hours after application. The control efficiency would have to be below 60% after four hours in both of the above cases to result in an overall control efficiency rate below 80% over a four hour period. Thus, the value of 80% used in the AFC has been shown to be achievable via recent independent studies.

(b) Response to CURE Data Request 1 states: "An 80% control efficiency is being applied to the emission factors due to the mitigation measures that will be enforced on the Applicant during the construction period." Please support this statement with an engineering calculation, using the results from Muleski and Cowherd 2001. Your calculation should identify with specificity all figures, tables, or other information from Muleski and Cowherd that you rely on and identify all assumptions.

Response:

See the response to CURE Data Request #278 a.

(c) Response to CURE Data Request 4 states that water application could range from 59,249 to 427,440 gallons during peak usage, assuming a water rate of 0.14 to 1.01 gal/yd^2. This corresponds to 423,207 yd^2 (e.g., 59,249 gal/0.14 gal/yd^2 = 423,207 yd^2). Please provide an engineering calculation that shows how the 423,207 yd^2 was estimated and which disturbed areas are included.

Response:

The 423,207 square yards is taken directly from the attachment to the response to CDR-2. The total site area is 3,808,868 square feet (page 1 of

CDR-2 Attachment from Bibb and Associates, Inc.) which when divided by 9 square feet per square yard yields 423,207 square yards.

(d) Response to CURE Data Request 4 claims that tire cleaning controls 90% of the mud/dirt track out emissions. Please provide all information that supports this 90% control efficiency.

Response:

The statement made in the response to CURE Data Request #4 is that a control efficiency of 90% of the mass of the track out material can be achieved by tire cleaning. It does not indicate as stated by CURE in this data request that the track out emission control efficiency is 90%. This reduction in track out materials will reduce dust emissions in conjunction with other controls to the 80% value stated in the AFC.

(e) Response to CURE Data Request 4 states that the peak usage period for dust control water would be during the cut of the entire site (where cut appears to refer to both cut and fill). Please identify the beginning and ending months for this peak period and the length of time in days that it would last.

Response:

The AFC provides these data in Table G1.5. The peak months are from Month 7 through Month 9 or for a total of 90 days.

(f) Response to CURE Data Request 4 states: "The 80% control efficiency is a combination of all mitigation measures listed in Section 5.1.4 of the AFC..." Please explain how the overall 80% control efficiency was determined. Your answer should identify each mitigation measure, the amount of PM10 due to the controlled and uncontrolled emission, and the control efficiency for each mitigation measure. Your response should address wind erosion emissions, which occur 24-hours per day, while watering only occurs during work hours.

Response:

The 80 percent control figure and its support has been addressed in the AFC and in several responses to CURE Data Request #'s 3, 4, and 278a. The level of detail requested by CURE is not reasonably feasible. As evidenced by the studies that have been conducted by, and for, the EPA as well as for other concerns, total fugitive dust emissions are the ensemble of all dust generating activities. Separating out each activity, and studying them exhaustively, will result in an imprecise analysis as is evident in the recent study by Muleski and Cowherd, 2001. Applicant has

provided sufficient detail to allow meaningful understanding and consideration of the issue. Applying the specific methods as stipulated in Rule 800 and the Applicant's proposed mitigation measures will ensure that fugitive dust emissions will be reduced by the required amounts.

(g) Response to CURE Data Request 4 averages the range of peak water usage, 59,249 to 427,440 gallons, over the 20 month construction period and concludes the peak water usage would be 148 to 1,069 gallons per day. However, water is used throughout the 20-month construction period, not just during the peak period. Please estimate water use for non-peak periods and use them to estimate the annual average water use over the entire 20-month construction period.

Response:

The use and amount of water for dust control is dependent upon the specific construction activities being performed. For instance, unpaved roads and similar areas can be controlled with dust suppressant products with minimal water demands. Appendix G-3 of the AFC lists several products and studies showing their effectiveness. In one study (copy is included in Appendix G-3 (Watson et al., 1996)) prepared for CARB, one suppressant "Soil-Sement" exceeded 80% on average, 12 months after application. This means watering for dust control is not necessary for 12 months for these areas. Most of the construction activities for the project occur on these types of areas. For cut and fill operations which are limited to about 6 months of the 20 month construction schedule, extensive watering may be the best approach. After the cut and fill operations, the suppressant can again minimize water usage if necessary. The use of 2500 gallons of water per day is a reasonable estimate of water usage as the Applicant has demonstrated. To assess water usage in more detail for construction activities is not reasonably feasible, and applicant has provided detail sufficient to allow meaningful understanding and consideration of the issue.

279. The background statement for CURE Data Requests 6 to 9 noted that drill rig emissions were based on Caterpillar 3213DITTA emission factors that could only be met by new engines. CURE Data Request 7 asked whether the applicant would be willing to use drill rigs equipped with these engines. The applicant responded no, but clarified in the January 9, 2003 workshop that it may be willing to commit to using low-emission engines if the data request were not tied to a specific engine type.

(a) Thus, would the applicant be willing to accept a COC that required the use of drill rig engines and fuel that meet the following emission factors that were used in Table G-2 to estimate drill rig emissions: NOx, 6.55 g/bhp-hr; CO 0.8 g/bhp-hr; VOC 0.09 g/bhp=hr; SOx 0.184 g/bhp-hr; and PM10 0.27 g/bhp-hr?

Response:

No. This question was asked earlier in CURE Data Request #8. Analysis of the potential impacts of a project necessarily requires that certain reasonable assumptions be made about future activities. Given the conservative nature of the analysis contained in the AFC, it is reasonable to conclude that future activities will not have a more significant impact on the environment that what has been assumed in the analysis. Nevertheless, it is possible that certain specific assumptions may prove to be incorrect, and that impacts on the environment will be greater than assumed in the analysis. While this possibility cannot be eliminated entirely, given the conservative nature of the analysis set forth in the AFC, the possibility is remote. Furthermore, in the event that certain assumptions are not borne out, the conservatism built into other assumptions will more than offset any unexpected environmental impacts. Based on speculation about whether or not applicant's assumptions are reasonable, CURE requests that various assumptions underlying applicant's analysis be reflected in Conditions of Certification. Doing so would unduly hinder future development and operation of the project, and would serve no useful purpose in protecting the environment.

(b) If the answer to subpart (a) is yes, would the applicant be willing to verify compliance with the condition in subpart (a) by source testing each drill rig used at the site? If the answer to subpart (b) is no, please explain how the applicant proposes to verify compliance with this condition.

Response:

See the response to CURE Data Request #279a.

(c) If the answer to subpart (a) is no, please (i) provide all justification for your answer and (ii) revise the emission calculations in Table G-2 and the dispersion modeling in Tables 5.1-38 to 5.1-84 to use the emission factors in U.S. EPA AP-42, Table 3.4-1, which is the general reference for estimating emissions when there is no commitment to a specific engine type and accompanying vendor data.

Response:

In response to Item i., refer to "a" above. In response to Item ii., no revisions are required (refer to "a" above).

(d) The response to CURE Data Request 9 states that the emission factors used to derive well drilling emissions "are based upon manufacturer's data sheets and confirmed with actual stack emission tests of equipment that is routinely used for drilling in Imperial County." Please provide copies of all manufacturer's data and stack tests cited in your response that confirm the emission factors that were used.

Response:

Refer to CURE Data Response 242 where this request was made earlier.

(e) The applicant relied on information from drill rig contractors to characterize the rigs for modeling. Are the rigs used by these drilling contractors comparable to those that would be used to drill the Project's production and injection wells? If your answer is no, please identify all differences and explain their impact on emissions and modeling assumptions.

Response:

Yes, they are expected to be comparable.

280. The drill rig modeling assumed that rig engines would have a stack height of 14 feet, a stack diameter of 8 inches, a stack velocity of 114 ft/sec, and a gas flow rate of 2,340 acfm. CURE Data Request 10 sought all information that supported these assumptions. The applicant responded that the stack diameter and fuel use rate were provided by a licensed well drilling contractor and the exhaust flow rate was based on a fire pump engine data sheet that was provided in attachment CDR 10. Our follow-up questions on this issue are:

(a) Please identify the drill rig contractor that provided the information cited in your responses to CURE Data Requests 10, 11, and 16 and provide contact information (name, phone number) and a record of the conversation with the contractor.

Response:

Carl Hathaway of Kenai Drilling was contacted (located in Orcutt, California, Phone 805-937-7871) on November 29, 2002 to discuss the drill rig equipment specifications. During the conversation, the Applicant's consultant confirmed the exhaust stack height is a 14 foot with a vertical exit, the rain caps are removed when the engine is in operation, that the contractor send fuel use data annually to the applicable regulatory

agency, and that the contractor will transmit a CARB application package and manufacturer's specification sheet.

(b) Would the applicant be willing to arrange a conference call between this contractor, the CEC, and CURE? If your answer is no, please explain why not.

Response:

No, see response to 279a above.

(c) Please identify the source of the assumed stack height.

Response:

The drilling contractor listed in Data Request #280a above.

(d) The response to CURE Data Request 10 indicates that the stack temperature and exhaust gas flow rate assumed for the drill rig engines was based on information for a fire water pump provided in attachment CDR-10. Please provide all information that supports the assumption that the engines on the fire pump and drill rig engines are sufficiently similar to warrant this substitution.

Response:

All available information has been supplied. Refer to CURE Data Response #242.

(e) We observed a drill rig in operation at the Leathers facility from January 7 through January 10, 2003. During much of this time, there was very little wind. We observed dark black puffs of smoke and very little plume rise. Both conditions are inconsistent with the assumptions used to model drill rig emissions in the AFC. Please reconcile the discrepancy between the PM10 emission factor of 0.27 g/bhp-hr, assumed exhaust temperature and flow rates, and the presence of a visible, black plume and absence of significant plume rise.

Response:

Without further information, it is impossible to evaluate any possible differences between Applicant's assumptions and what CURE claims to have observed. Nor is there any basis for concluding that what CURE claims to have observed is in any way relevant to evaluation of the potential impacts of the project.

(f) The response to CURE Data Request 16 indicates that drill rig modeling assumes that the rig engines operate at 44.3% of full load.

This would result in lower stack gas temperatures, exhaust flow rates, and thus plume rise, than assumed in the modeling. Please provide all information, including the cited contractor's data that justifies the use of 100% load stack parameters and 44.3% load for emission calculations.

Response:

The modeling parameters were based upon 100% engine load. The short-term emissions were based upon 100% load. The long-term emissions were based upon a 44.3% fuel usage factor. This issue was discussed in detail in the response to CURE Data Request #16. CURE has mistakenly interpreted a load factor as a fuel usage factor.

281. The applicant indicated in response to CURE Data Request 14 that it would not be willing to accept a COC that requires the use of drill rig equipment consistent with the Applicant's modeling assumptions, e.g., four 450-hp engines with a 14-foot high, 8-inch diameter stack, exhausting 2,340 acfm at 955 F. In response to CURE Data Request 15 for an explanation of why the Applicant is unwilling to accept its modeling assumptions as a COC, the applicant refers to its response to CURE Data Request 9. However, the response to CURE Data Request 9 only addresses drill rig emissions, not drill rig modeling parameters. If the applicant is confident that its characterization of drill rig modeling parameters is accurate, it is not obvious why the applicant would not be willing to accept these as a COC and verify them through a source test. Thus, please explain with specificity why the applicant is not willing to accept its modeling input assumptions as COCs. Please support your answer with source tests, permits, and all other relevant information.

Response:

No, Refer to the response to CURE Data Request #279a. This question was asked earlier in CURE Data Request #14.

282. CURE Data Request 23 pointed out that there was a discrepancy between the number of pieces of equipment assumed in Tables G3.1 and 3.4-2. The response claims that transmission line emissions are included in Tables G-3.1 to G-3.5 but excluded in Table 3.4-2, accounting for the discrepancy. However, the AFC does not contain an equipment inventory nor equipment usage schedule for the transmission line. However, this claim is not consistent with the construction schedule in Table 3.4-1, the construction equipment usage in Table 3.4-2, nor the emission inventory in Table G-3. For example, the response to CURE Data Request 31 indicates that the following equipment is included in the emission

inventory for the transmission line: pickup trucks, fuel truck, flatbed trucks, dozer, trencher/backhoes, crane-45T, and compressors. As discussed below, comparing Tables G-3 with the schedule in Table 3.4-1 and the equipment usage in Table 3.4-2 indicates that the equipment used to construct the transmission line does not appear to be included in Table G-3 emissions. Examples of the inconsistencies follow.

Table 3.4-1 indicates that excavation, foundation preparation, and structure assembly for the transmission line would occur in months 8 through 15. These activities require the use of dozers, trenchers/backhoes, compressor, and cranes. However, Tables G-3 indicate that the emissions from this equipment during this period are based on only the number of dozers, trenchers/backhoes, compressor, and 45T cranes shown in Table 3.4-2, which, according to the Applicant, lists the equipment to construct everything but the transmission line. Because Table 3.4-2 excludes transmission line equipment, Tables G-3 and 3.4-2 combined indicate that no dozers, trenchers/backhoes, 45T cranes, or compressors would be used to construct the transmission lines, contrary to applicant's claim in response to CURE Data Request 31. However, more equipment is included in the emission inventory in Tables G-3, than shown in Table 3.4-2, for months 18 to 26, a period when Table 3.4 - 1 indicates that most transmission line installation will be complete. Other transmission construction activities, including shieldwire and conductor stringing and cleanup only occur in months 16 to 18 and would not require any dozers, trenches/backhoes, cranes, or compressors, but rather a large number of specialized trucks that are not shown anywhere in the inventory. Dozers, however, may be required for cleanup and rehabilitation, occurring in months 19 to 21. Thus, apparently, there is an error in the schedule shown in Table 3.4-1, or the emission inventory does not include transmission line emissions.

Further, the emissions in Tables G-3 are based on two more pickup trucks and one more flatbed truck than shown in Table 3.4-1, while the same number of fuel trucks and water trucks are shown, suggesting the transmission line would be built with only two pickup trucks and one flatbed truck. As previously noted in CURE Data Request 31, construction of the transmission line would require concrete delivery trucks, pole delivery trucks, cable/conductor delivery trucks, bucket trucks, drum puller trucks, dual tensioner trucks, and at least two cranes. The use of only two more pickup trucks and one more flatbed truck is also inconsistent with Figure 3.4-1, which shows many more trucks are used in conductor stringing, including five drum pullers, a rope puller, a tensioner, and a conductor reel truck. Further, the Project schedule in Figure 3.4-1 shows that construction of the Project site, wells, pipelines, and transmission lines would all overlap. As a result, a single water truck and fuel truck could not service all construction sites simultaneously.

Please provide a construction equipment usage table, comparable to Table 3.4-2, for the transmission line and please revise the emissions in Tables G-3 to include all of the additional equipment.

Response:

Table 3.4-1 has a transmission line construction schedule starting month 1 and ending month 21 for the workforce. For air quality purposes, a conservative condensed schedule starting month 15 and ending month 26 was used. Emissions from the construction of the transmission line have been assessed and reviewed. There is no need to revise the emission tables. With regard to an equipment table, the equipment inventory data presented in the AFC is misquoted and misinterpreted by CURE. CURE states that Table G-3 includes only one flatbed truck and two pickup trucks and these are the only pieces of equipment that are used in constructing the transmission line. The air quality analysis equipment inventory is actually in Table G-1.4, not Table G-3 as stated by CURE. The inventory includes the flatbed truck and the two pickups but also includes a fuel truck, dozers, trenchers, a crane, and compressors. Finally, the equipment list shown in Table G-1.4 contains equivalent categories of equipment and therefore, a listing of specialized equipment is not necessary when it can be placed in an equivalent category.

283. CURE Data Request 24 requested all justification for using on-road emission factors for off-road dump trucks. The applicant responded that a dump truck is "most appropriately characterized as a Class 7 (MHDT) diesel vehicle category for analysis with the EMFAC2002 model," but did not provide any justification for why it believes an off-road dump truck is most appropriately characterized as an onroad vehicle for the purpose of measuring emissions. On-road and off-road engines are primarily tested with steady-state test methods although steady-state operation is not always representative of the operation of engines in many off-road applications for which emissions are generally much higher. Thus, the U.S. EPA has developed factors to adjust steady state emission factors to off-road engines in transient operation. Hydrocarbon emissions increase by a factor of 1.4, CO emissions by a factor of 2.0, and PM10 emissions by a factor of 1.6.[1] Please explain why the applicant believes there is no need to adjust the Class 7 EMFAC emission factors for offroad vehicles used in non-steady-state operation.

Response:

The Applicant has previously provided justification. The dump trucks being proposed for use during construction fall under Class 7 EMFAC emission factor guidance and are not classified as off-road dump trucks.

Therefore, emission factor guidance found in the study conducted by Beardsley and Lindhjem, 1998 is not applicable. CURE has provided no support except conjecture that the dump trucks to be used for the project are off road trucks. We reiterate the response to CURE Data Request #24.

284. The background to CURE Data Request 26 explained that off-road construction equipment emissions in Table G-3 were based on the SCAQMD CEQA Handbook, Table A9-8-B, rather than Table A9-8A, as recommended in the SCAQMD CEQA Handbook. In response, the applicant argued that the data in Table A9-8-A "is no longer available as a recommended source," claiming "Table A9-8-B is more appropriate." This is not wholly accurate for two reasons. First, the U.S. EPA website at http://www.epa.gov/otaq/ap42.htm indicates that "[t]here are no current plans to update AP-42 [Compilation of Air Pollutant Emission Factors, Volume II: Mobile Sources] for nonroad emission factors. However, in response to the requirements of the 1990 Clean Air Act amendments, EPA in the early 1990s conducted the "Nonroad Engine and Vehicle Emission Study" (NEVES), in which a great deal of more recent information on nonroad mobile source emissions is presented. Information on NEVES is available at

http://www.epa.gov/otaq/nonrdmdl.htm#neves.

Second, the data in Table A9-8-B that the applicant relied on is based on the 1991 NEVES study, which itself has been superceded by a series of U.S. EPA reports found at http://www.epa.gov/OMS/models/nonrdmdl/nr-009a.pdf for compression engines, at

http://www.epa.gov/OMS/models/nonrdmdl/nr-010b.pdf for spark ignition engines and at http://www.epa.gov/OMS/models /nonrdmdl/nr-005a.pdf for information on median life, annual activity, and load factor values. These reports indicate that the steady-state diesel emission factors from the NEVES report relied on by SCAQMD must be multiplied by an in-use factor for CO, VOCs, and PM. (NEVES, Table 1, Appx. C.) Further, PM10 emission factors for off-road sources based on this more recent work are generally higher than most of the PM10 emission factors assumed in Table G-3. Finally, many of the load factors are higher than assumed in the SCAQMD tables.

(a) Please revise the construction emissions in Table G-3 and related analyses to follow the most current U.S. EPA guidance.

Response:

The Applicant used Table A9-8-B in place of Table A9-8-A because horsepower ratings for equipment were available. Therefore lb/hp-hr emission factors were more appropriate. The emission factors for each

pollutant in EPA's NEVES program are lower, and therefore less conservative, than the emission factors used by the Applicant.

There is no need to revise the construction emissions.

(b) If the applicant selects newer engines for the revised calculations in Data Request 284a than assumed in the NEVES study, please indicate whether the applicant would be willing to accept a COC requiring the use of engines that meet the assumed emission factors.

Response:

No. Please refer to the response to CURE Data Request #279a.

(c) If the applicant is not willing to accept a COC committing to the use of newer engines than assumed in the NEVES study and used in the Applicant's construction emission analysis, please explain why not.

Response:

Neither required or warranted.

285. The applicant estimated construction equipment emissions in Table G-3 by multiplying an emission factor in pounds per horsepower hour ("lb/hp-hr") by both a fuel usage factor and a load factor. However, the load factor is estimated from the hours of usage per year, the fuel consumption per year, and the fuel consumption rate at rated power and thus, already includes fuel usage. (See, for example, Lindhjem and Beardsley June 15, 1998 and U.S. EPA November 1991.) Therefore, the load factor already includes fuel usage, and emissions were underestimated by the additional reduction in fuel usage.

(a) Please revise the construction equipment emissions in Tables G-3 to eliminate this improper use of an additional fuel usage factor.

Response:

It may assist CURE if an example with more commonly used terms were used. For instance, a car can travel 120 miles per hour (100% load) and 24 hours per day (100% usage), however it does not normally operate at these conditions. More likely, a car travels 35 mph (29% load) and for 2 hours per day (8% usage). This same methodology was used for the construction emissions. The design engineer supplied the usage factor while the SCAQMD CEQA Handbook was the source of the load factors and methodology. Refer to the top of page A9-82 of the Handbook for additional details.

There is no need to revise the construction emissions.

(b) If you decline to revise the Table G-3 emissions in subpart (a), please justify your decision and provide all supporting information.

Response:

Refer to discussion above.

(c) If you decline to revise the Table G-3 emissions in subpart (a), please support the usage factors in Table G-3, which note 6 indicates are based on "Design Engineer." Please provide a copy of all information provided by the Design Engineer.

Response:

All information available has been submitted. The usage factors shown represent a subjective assessment based on past construction experience on other projects.

286. In response to CURE Data Request 29, the applicant stated that it would not be willing to accept the use of CARB diesel as a COC, even though the applicant uses lower PM10 factors, which assume the use of CARB diesel, in estimating off-road construction emissions, arguing that CARB diesel "is the only available diesel in California for mobile equipment." At the workshop on January 9, 2003, CURE explained that, CARB diesel is only required for on-road diesel equipment, not off-road equipment, which was the subject of CURE Data Request 29. Non-CARB diesel with much higher sulfur is available in California, Arizona, and Mexico at reduced cost compared to CARB diesel. Thus, is the applicant willing to accept a COC that requires the use of CARB diesel in offroad construction equipment, including stationary equipment? If your answer is no, please explain why not, provide all supporting information, and identify the source of the diesel that you propose to use.

Response:

There is no evidence that non-CARB diesel fuel is used at construction sites. CURE has provided no support except conjecture. CARB diesel (less than 500 ppm sulfur) is the only diesel available due to California's single fuel distribution network (CARB, 2000). There is no requirement nor is it warranted to identify the source of construction fuel for a project.

CARB, 2000, Risk Reduction Plan to Reduce Particulate Matter Emissions from Diesel Fueled Engines and Vehicles. Stationary Source Division and Mobile Source Control Division; CARB, October, 2000.

287. The response to CURE Data Request 32 indicates that the equipment required to construct the pipeline is included in Table 3.4-2. However, Table

3.4-2 does not identify many of the types of equipment normally required for pipeline construction, including pipe-stringing trucks, bending machines, welding trucks, welding rigs, coating trucks, mechanics rig, a parts van, and x-ray truck, among others. Thus, please breakout specifically the equipment that would be used to construct the pipelines in a separate equipment usage table, comparable to Table 3.4-2, and provide a description of pipeline construction methods that would be used.

Response:

A more detailed breakdown is not warranted. Some of the construction equipment mentioned by CURE in this data request such as parts van, bending machines, and coating truck is not applicable. Other items, such as pick up truck employed for radiography, are already accounted for.

A brief description of the proposed pipeline construction method is presented below:

After mobilization, a survey crew will perform field verification and layout of supports. Pipe support construction will then commence. After the support crew has installed a significant number of supports, the pipeline construction will start. Where applicable, pipes will be offloaded directly onto the pipe supports to minimize double-handling. Crews will align, set and tack the pipe into place for welding.

288. CURE Data Request 34 noted that idling emissions were only included for PM10 from delivery trucks, but not for any other construction equipment. The applicant responded that idling would be limited to 5 minutes "to the extent feasible" and that idle emission rates are included in EMFAC2000 emission factors and therefore, "idle emissions need not be separately included..."" Please respond to the following questions on this issue:

(a) If the applicant proposes to limit idling time to five minutes to the extent feasible, does the applicant agree that idling time may be longer than 5 minutes in some circumstances?

Response:

The engine will be shutdown if idle time is expected to exceed 5 minutes.

(b) If the answer to subpart (a) is yes, please explain under what circumstances idling time may be longer than 5 minutes and provide a worst case analysis.

Response:

See the response to CURE Data Request #288 a.

(c) If the answer to subpart (a) is no, please explain how a 5 minute idling cap will be enforced. Is the applicant willing to accept this enforcement procedure as a COC? Will it be included as a contract condition and written on blueprints? If your answer is no to any of the questions in subpart (c), please explain your answer and provide all information that supports it.

Response:

The 5-minute idle time will be requested of all workers and visitors at the construction site. The Applicant will not accept a COC on this item. Please refer to the response to CURE Data Request #279a.

(d) The EMFAC2000 model only provides emission factors for on-road vehicles. The emission factors used for all off-road construction equipment in Tables G-3 does not include idling emissions. These can be substantial if multiple 5 minute periods are accumulated by a large number of pieces of equipment during the workday. Thus, please provide an estimate of idle emissions for construction equipment shown on the bottom half of Table G-3, starting with concrete pump and ending with welders.

Response:

The emission factors are multiplied by a usage factor which is based on data from the design engineer. The usage factors include any idling periods that may occur during the use of the equipment.

289. CURE Data Request 36 requested the emission factors used to estimate well flow run emissions in Table G-14 and any supporting data, including source tests and brine and steam composition data assumed in the emission calculations. The response provided a sample calculation for PM10 for a production well and an injection well, explaining that "[e]mission factors were not used to determine emissions." CURE Data Request 36 also requested "any supporting data, including source tests and brine and steam composition data assumed in the emission calculations." The sample calculations provided in response to CURE Data Requests 36-38 indicate that produced fluid total dissolved solids (TDS) and steam properties were used in the calculations. However, the assumptions used in the sample calculations are inconsistent with Figure 3.3-9. Thus, please provide the following additional information to clarify the emissions in Table G-14:

(a) The sample PM10 calculations indicate that the produced fluid composition data used in the sample calculation differs from that

presented in Table 3.3-1 (TDS = 231,606 mg/L vs. 235,000 mg/L in Table 3.3-1). The resulting injection well emissions, 51.2 lb/hr, are lower than the 56 lb/hr shown in Table G-14 and are inconsistent with the ratio of TDS. Thus, please provide the brine composition data used to calculate the emissions in Table G-14 and resolve the discrepancy in emissions between Table G-14 and the response to CURE Data Request 36.

Response:

Please refer to the response to CURE Data Request #36. The correct emission rate is 51.1 lb/hr. The brine composition used to calculate emission values, shown in Table G-14, is identical to that used in responding to Data Request #36. The 235,000 mg/l value includes non-condensible gases that do not contribute to PM10.

(b) The sample PM10 calculations assume a well flow rate of 1,200,000 lb/hr while Figure 3.3-9 indicates a well flow rate of 1,276,800 lb/hr. The vent tank emission calculations, in Table G-15, are based on a well flow rate of 1,280,000 lb/hr, consistent with Figure 3.3-9. Please resolve the discrepancy between the steam flow rate used in the sample PM10 calculations and the steam flow rate used elsewhere.

Response:

The 1.2 million lb/hr flow rate is based on the assumed well testing flowrate, whereas the rate shown in Figure 3.3-9 represents a projected average production flowrate during actual operation. As these are two different cases, there is no discrepancy.

(c) Please support the basis of the flash fractions for HP flash, SP flash, LP flash, and ATM flash, as reflected on Figure 3.3-9 with engineering calculations.

Response:

The calculations are very complex and involve internal recycles and a number of flowstreams, so the calculations cannot be presented in a concise manner. However, the flash values are close to those observed at the existing Salton Sea power plants.

(d) The sample PM10 calculations assume that 1% of the steam flow is brine. Presumably, the cooling tower blowdown contains the residual brine associated with the steam. Table 3.3-2 indicates that the TDS of the cooling tower blowdown is 1,168 mg/l, or 1.2%. Please resolve the discrepancy between these two figures and explain the basis for the 1% brine carryover value that was used in the TDS sample

calculations. Support your answer with engineering calculations and/or test data.

Response:

The sample calculations assume 0.1% carryover in the well test units. The steam quality going to the turbine is much better quality. Therefore, the TDS in the cooling tower blowdown is not comparable. Cooling tower blowdown and the welltest fluids are separate processes and are not connected in any way.

(e) Please provide comparable sample calculations for the noncondensible gases to those provided in response to CURE Data Requests 37 and 38.

Response:

Nonconensible gases were not included in the PM10 calculations, as they are not associated with PM10 emissions.

290. The vent tank emissions in Table G-15 are based on 50 hours of 100% brine flow. What is the basis of the 50 hours? Please support your answer with at least 5 years of actual operating data from existing facilities.

Response:

The Applicant estimates that 6 warm starts of 2 hours each will take place every year, and used 50 hours for the evaluation in order to represent a conservative analysis. Please note that number of starts and duration may vary, and that the sum is expected to remain below 50 hours. Operating data from existing facilities is not necessary to support these conservative assumptions.

291. The emission inventory does not include any emissions from wells during well drilling. The response to CURE Data Request 43 claims that these emissions are negligible. However, we observed significant steam venting on January 8 to 10, 2003, during the drilling of an injection well for the Leathers facility.

(a) Please explain the source of this steam and why you believe it would not contain brine carry-over solids and volatilized constituents from the drilling mud. Please support your discussion with engineering calculations and test data.

Response:

During drilling, drilling mud is circulated down the drill pipe and back to the surface through the annular space between the drill pipe and the casing or the open hole drilled through the reservoir rock. Drilling mud is

composed of canal water and various drilling additives that increase the fluid density. The fluid density is adjusted to provide optimal lifting of drill cuttings to the surface, prevent drilling mud from escaping into the formation and, most pertinent to this question, to prevent inflow of reservoir fluids to the well bore. A well cannot be drilled safely or cost-effectively if drilling mud escapes into the reservoir or reservoir fluids flow to the surface. The water vapor that is commonly observed during well drilling operations is generated by the heating of the drilling mud by the hot reservoir rock as the drilling mud circulates down the hole and back to the surface. Thus, the source of the "steam" is canal water.

(b) Please provide an MSDS for the drilling mud that will be used to drill Project wells.

Response:

MSDS for materials typically used in drilling mud can be found in Attachment CDR-291.

292. CURE Data Request 44c requested the composition of the cooling tower circulating water, including the contribution from chemicals added to control scale and biological growth. The response in CDR44 shows that 884 lb/hr of scale inhibitor is added.

(a) Please identify the inhibitor and provide an MSDS.

Response:

The scale inhibitor currently proposed for use is Nalco 9355 (MSDS attached). It should be noted, however, that similarly effective products are available from alternate vendors and, therefore, may be used for cost-effective plant operation.

(b) Table 3.3-9 shows that 141 lb/day of sulfonated carboxylated polymer, TRASAR, would be added to the circulating water. If this is the scale inhibitor that would be used, please resolve the discrepancy between the 884 lb/hr shown in CDR-44 and the 141 lb/day shown in Table 3.3-9.

Response:

TRASAR is a trade name for a technology that measures cooling water treatment dosage in real time. The ingredient, a sulfonated carboxylated polymer, is a flow rate tracer, not a scale inhibitor.

(c) Table 3.3-9 indicates that 94 lb/day of bio-detergent and 7,260 lb/day of 12% sodium hypochlorite would also be used for cooling tower

treatment. These chemicals are not shown in CDR-44. Please revise CDR-44 to include all chemicals that would be added to the circulating water and provide an MSDS for each.

Response:

The bio-detergent and chlorine MSDSs are provided in Attachment CDR-292.

293. The response to CURE Data Request 46a reports SO4 emissions from the cooling tower of 2.02 lb/hr. However, CDR-44 shows SO4 emissions per cooling tower cell of 0.1012 lb/hr. There are 10 cells. Thus, CDR-44 indicates that total cooling tower emissions would be 1.01 lb/hr. Please resolve discrepancy.

Response:

There are 20 cooling towers cells not 10.

294. The response to CURE Data Request 46b and 46c declined to analyze emissions and ambient air concentrations for PM2.5 and PM10 by stating that the standards are not final. Although the implementation of these standards was delayed due to litigation, the standards were recently upheld and implementation is underway. In June 2002, California revised existing PM10 standards and adopted a new standard for PM2.5. The State lowered the annual PM10 standard from 30 $\mu g/m^2$ to 20 $\mu g/m^3$ and adopted a new annual PM2.5 standard of 12 $\mu g/m^3$. (See California Air Resources Board (CARB), Resolution 02-24, p. 3-4, June 20, 2002; CARB Notice of Public Availability of Modified Text, Attachment A, p. A-6, August 15, 2002; CARB Second Notice of Public Availability of Modified Text, Attachment A, p. A-6, October 10, 2002.)[2] These new PM10 and PM2.5 standards are substantially lower than the federal equivalents and are now final.

Furthermore, the California Environmental Quality Act (CEQA) requires the lead agency to analyze potentially significant public health impacts from PM10 and PM2.5 emissions from the proposed project. Under CEQA, standards or thresholds that have been adopted to protect the environment are used to determine the significance of project impacts. Where an applicable standard exists, an environmental change which does not comply with the standard is considered significant. “Standard” is defined to include a quantitative requirement found in a statute, ordinance, resolution, rule, regulation, order, or other standard of general application. (14 Cal. Code Reg. § 15064(h). As noted above, the State’s new annual PM10 standard of 20 $\mu g/m^3$ and new annual PM2.5 standard of 12 $\mu g/m^3$ was adopted in State of California Air Resources Board 02-24 Resolution on June 20, 2002. Therefore, please expand the emission inventory and modeling analysis to include the following:

(a) Emissions and ambient air concentrations for PM2.5.

Response:

The regulatory package containing these new regulations is currently being finalized by CARB staff and will soon be submitted to the Office of Administrative Law (OAL) for review, where upon approval, the new annual standards will become part of the regulations sometime in 2003, unless challenged. Please refer to Attachment CDR 294 which contains written confirmation on the above from CARB staff.

(b) Revised PM10 air quality impact analysis based on the recently revised California annual PM10 AAQS.

Response:

See response to CURE Data Request #294a.

295. CURE Data Request 46d asked for a cumulative air quality analysis that includes existing geothermal facilities. The applicant responded that a cumulative analysis was reported in AFC Section 5.1.3. However, this analysis only calculated the cumulative increase of SS6 and one other new facility. CURE seeks to clarify that it seeks an analysis or description of the baseline. Because there is no recent on-site or nearby H2S ambient air quality data to use as a background and the existing geothermal facilities are the principal source of H2S, these existing facilities should be included, cumulatively, in a baseline analysis. Therefore, please prepare a H2S air quality analysis that includes all of the existing geothermal facilities.

Response:

Applicant has previously provided data used to establish background concentrations of H_2S. Please refer to the response to CURE Data Request 249. The analysis requested by CURE is not necessary and is not reasonably feasible to conduct.

Furthermore, the ensure that there is no additional impact from project emissions, emission offsets will be obtained at an offset ratio of 1.2. This will be done by retrofitting either the Leathers or Elmore facility with H_2S abatement technologies.

296. The response to CURE Data Request 47 indicates that background H2S "was established by information provided by Mr. Harry Dillon of the Imperial County Air Pollution Control District." Please provide a copy of all information that Mr. Dillon provided to the applicant.

Response:

The information was submitted with CURE Data Response 249.

297. We believe that when Unocal owned the existing geothermal facilities, ambient H2S concentrations were measured using a network of fenceline monitors.

(a) Is the applicant aware of any historic ambient H2S monitoring data?

Response:

No, the Applicant is not aware of any historical data at the "Unocal owned facilities" and even if there were historical data, the data would be meaningless since these facilities have installed H_2S controls after the ownership changed.

(b) If the answer to subpart (a) is yes, please provide a copy of all known ambient H2S data.

Response:

Not applicable, see the response to Data Request #297a above.

298. The response to CURE Data Request 50 indicates that the 10 ppb background NH3 concentration used in the visibility analyses is based on typical background values for grasslands. This value was uniformly applied between the Project site and Joshua Tree National Park, 177 km to the north. However, much of this and nearby areas to the south are occupied by land uses that would emit much larger amounts of NH3 than grasslands, including principally agricultural lands, dairies, geothermal facilities, and heavily traveled roadways (NH3 is emitted from the tailpipe of vehicles), among others. Therefore, please support this choice by providing the results of a literature survey on ambient NH3 concentrations representative of these land uses and/or the results of an ambient monitoring program to determine more representative background NH3 concentrations.

Response:

The Applicant followed the IWAQM (Interagency Workgroup on Air Quality Modeling) Phase 2 Summary Report guidance, the appropriate guidance as per the modeling protocol for this project. That guidance recommended the use of a 10 ppb background concentration whenever the plume would be transported through regions of high ammonia emissions. The use of a constant 10 ppb ammonia concentration throughout the entire modeling domain represents a conservative approach (the highest background value listed in IWAQM) when applying CALPUFF for the calculation of project impacts on haze and deposition. Therefore, using a different background ammonia

concentration is not warranted for regulatory modeling purposes in this case.

299. The response to CURE Data Requests 51 to 53 claims that the Project's NH3 contribution is included in the background NH3 concentration of 10 ppb by virtue of having picked the highest background NH3 concentration associated with several types of native vegetation. However, as noted above in CURE Data Request 298, local land uses would likely emit far more ammonia than native grasslands. Further, the annual average Project contribution, based on the applicant's modeling, ranges from 30 ppb to 37 ppb. Thus, it is unlikely that the Project's contribution to NH3 background has been properly included in the visibility analyses. Please specifically estimate the Project's contribution to background ammonia, based on the modeling performed for the public health analysis.

Response:

The use of a constant, non-varying background concentration of 10 ppb for ammonia to represent the project plus any other source(s) of ammonia that may contribute to haze and deposition is part of the IWAQM guidance referenced in the response to CURE Data Request #298. While there may be local "hot spots" for background ammonia, the fact that the highest recommended value in the Phase 2 Summary Report was used throughout the entire modeling domain reflects current guidance on applying CALPUFF in areas of large background sources of ammonia. Thus, the project's contribution to background has been taken into account according to IWAQM guidance.

Finally, CURE has selected a value of 37 ppb for ammonia to define the project's contribution to the background ammonia concentration. The value selected by CURE is the maximum impact value for the proposed project and it occurs within half a kilometer of the facility. The use of the highest modeled ammonia concentration for background, as CURE suggests for the entire modeling domain, would be an incorrect use of the procedures for assessing impacts to Class I areas. At 10 kilometers in the direction of Joshua Tree, the ammonia concentrations from the project decrease to 0.6 ppb, at 177 kilometers, which is the distance to Joshua Tree, the project's contribution would be insignificant. Therefore, use of 10 ppb for background ammonia accounts for the proposed project's contribution to total background.

300. In response to CURE Data Request 59b, the applicant claims that fugitive emissions from pumps, valves and flanges would be minimized through a

maintenance program. Please provide the following information on this program:

(a) Please describe the fugitive emission maintenance program that would be implemented. If a specific program has not yet been designed for this Project, please provide a copy of the maintenance program currently followed at existing facilities and identify any anticipated changes.

Response:

A program has not yet been developed for SSU6. Regular visual inspections are carried out at the existing facilities and any deficiencies such as leaking components are reported to a supervisor for appropriate corrective action.

(b) Is the applicant willing to accept a COC that requires the use of the maintenance program described in subpart (a) as a COC. If your answer is no, please justify your answer and identify a program that you would be willing to accept.

Response:

No COC is required since it is in the Applicant's own interest to maintain and operate facility in a safe and reliable manner.

(c) Please support your conclusion that fugitive emissions are insignificant by providing the results of fugitive emission monitoring at existing facilities that are subject to a maintenance plan.

Response:

Fugitive emissions from pumps, valves and flanges are insignificant due to their limited volume and/or limited duration.

301. CURE Data Request 221 requested an estimate of fluorine emissions, supporting calculations, and a fluorine material balance. The response reported that all of the emissions were "0.00." However, no supporting calculations were provided. Instead, the response refers to CEC Data Response 54, which does not contain any supporting calculations. Thus, please provide engineering calculations and a material balance that support the conclusion that fluorine emissions from all sources are zero.

Response:

Where a fluoride concentration of 0.000 is shown in Attachment PH-54C, this should be interpreted to mean that there is less than 0.0005 but greater than zero. Please refer to the very small fluoride concentrations (in ppm) shown in the liquid phases. The amount of fluoride in each

emission stream can be computed by multiplying the quantity of the stream by the fluoride concentration.

302. CURE Data Request 222 requested an engineering calculation and a boron material balance to support the boron emissions from the cooling tower in Table G-7. The response claims that the boric acid concentration in the drift is not directly proportional to the TDS and refers to CEC Data Response 54, which does not contain the requested information. Please provide the following additional information:

(a) Please explain why boric acid is not directly proportional to TDS in the cooling tower drift. Support your answer with engineering calculations and direct measurements.

Response:

The TDS in the cooling tower water is predominantly sulfate derived from oxidation of H2S in the oxidizer boxes. A very small fraction is derived from brine carryover into the steam.

(b) Please provide an engineering calculation that supports the boron emissions from the cooling towers in Table G-7.

Response:

As boric acid is essentially nonvolatile, the Applicant has assumed that virtually all of the boron remains in the brine and brine carryover. This is reflected in Attachment 54C.

(c) Please provide a boron material balance that shows all boron sources and sinks.

Response:

All of the boron is derived from the brine. All of the boron except for the emission listed in Table G-7 in Appendix G of the AFC is reinjected back to the geothermal reservoir.

303. The Geotechnical Report in Appendix J indicates that deep foundations will be required to reduce ground settlement, which will require pile driving. (See, for example, AFC, pages 3-26 to 3-29 and 5.11-6.) Table 3.4-2 does not identify pile drivers. Construction emissions in Appendix G do not include emissions from pile drivers. Thus, please provide the following additional information:

(a) Please revise Table 3.4-2 to include pile drivers.

Response:

As stated in response to CURE Data Request #142a, a pile driving schedule has not been developed at this stage of project development. However, pile driving is expected to occur during months 8 through 12 inclusive, commensurate with Civil/Sitework Crews identified in Table 3.4-1.

(b) Please identify and describe the type of pile drivers that will be used. Your response should include the following:

i. vendor literature

ii. horsepower rating

iii. noise controls

iv. emission factors

Response:

Responses to ii) and iv.) have been provided in response to CURE Data Request #'s 142b and 142c respectively. Information related to i) and iii) should be available from the manufacturers identified in the response to CURE Data Request #142b.

(c) Please revise the construction emissions in Table G-3 to include pile drivers.

Response:

Emissions were provided in CURE Data Request #142c.

Waste Management

304. The response to CURE Data Request 64 states that the composition of filter cake shown in Table 3.3-6 was estimated by calculating the mean concentration of analyses from existing plants and refers to attachment CDR-63 for the supporting data. However, CDR-63 is a MSDS and does not contain the supporting data. CDR-62 contains four annual filter cake analyses, one each for Elmore, Leathers, Region 1, and Region 2. Please provide the following additional information on your response:

(a) Should the response to CURE Data Request 64 have referred to CDR-62 instead of CDR-63?

Response:

No, reference to Attachment CDR-63 is correct.

(b) If the answer to subpart (a) is yes, the average of the four samples provided in CDR-62 is not consistent with Table 3.3-6. Thus, please provide a copy of all analyses that were relied on to develop the filter cake composition data in Table 3.3-6 and justify your choice of analyses.

Response:

Not Applicable.

(c) If the answer to subpart (a) is no, please provide a copy of all analyses that were relied on to develop the filter cake composition data in Table 3.3-6 and justify your choice of analyses.

Response:

Table 3.3-6 is based on attachment CDR-63 and no further analysis was relied on.

305. CURE Data Request 65 requested filter cake TCLP and solids analyses for the previous 1 year for each of the existing geothermal facilities in the Salton Sea area. The response claims that the data is provided in attachment CDR-62. However, this attachment only contains four annual analyses for four facilities. According to the response to CEC Data Request 92b, Table 5.10-12R1, 120 tons of filter cake would be generated and hauled away from the Project site every day. The AFC claims that 95% of this material is nonhazardous. A daily analysis would have to be performed to determine where to send the waste. Thus, even though the existing facilities are smaller than the Project, it appears that much more frequent analyses than the annual data provided in CDR-62 must exist for the existing facilities to determine whether to ship each truck load of filter cake to a hazardous or nonhazardous waste landfill.

(a) Please provide a complete set of STLC and TTLC analyses, comparable to those provided in attachment CDR-62, for the most recent year for each existing geothermal facility.

Response:

Desert Valley Company operating permits require a complete waste characterization annually, including STLC and TTLC analysis, from each generator that provides waste to the facility. The STLC and TTLC analyses, from Region 1, Region 2, Elmore and Leathers for 2002 are presented in Attachment CDR-305.

(b) If your answer to subpart (a) claims that all existing analyses were provided in attachment CDR-62, please explain why only annual analyses are performed and support your answer with a table that provides the following:

i. Summarizes the estimated quantity of filter cake that was generated at each existing facility for each of the immediately previous 5 years;

ii. Identifies its destination (hazardous or nonhazardous waste facility, and name of facility);

iii. Identifies the number and type of trucks used to transport the material; and

iv. Provides all evidence upon which you justify sending filter cake to a nonhazardous waste facility.

Response:

CURE Data Request #62 requested TCLP results for a representative sample of filter cake. Although TCLP analyses are not required for operation of the existing generating facilities or operation of the Desert Valley monofill, one was provided for each of the generating facilities. The Elmore and Leathers facilities use brine handling processes that are similar, but not identical, to that proposed for SSU6. Whereas, the Elmore and Leathers facilities do utilize a conventional CRC process, as proposed for SSU6, but dissimilar to the modified pH Mod processes used at Region 1 and Region 2. The Elmore and Leathers facilities do not benefit from the vacuum belt filtration process proposed for use at SSU6 and currently in use at Region 1. Thus, the estimated filter cake generation rates are based on Elmore and Leathers process technology, with improvements based on the use of vacuum belt filtration. Attachment CDR-305 summarizes annual tonnages of hazardous and non-hazardous filter cake generated at Elmore and Leathers for the years 1998-2002, including the final destination. The type of trucks that will be

used to haul filter cake from SSU6 and the quantity that each truck will be capable of hauling has been discussed previously.

(c) The AFC, pp. 1-4 and 3-2, indicate that there are nine geothermal power plants within a 2-miles radius of the proposed plant site. Please explain why filter cake data was only provided for four facilities.

Response:

Filter cake is generated from each of the four existing CRC processes located at Region 1, Region 2, Elmore and Leathers. At Region 1 and Region 2 steam is supplied to multiple generating units from a single brine processing facility.

(d) Is the filter cake that is produced at existing geothermal facilities comparable to that which will be produced by the Project? If your answer is no, please identify all differences and explain the basis for the differences, including all supporting calculations, data and other information you have to justify the answer.

Response:

See the response to Data Request #305b above.

(e) Please describe the procedures that will be used by the Project to generate, store, test, load into transport vehicles, and transport filter cake. Your response should answer the following:

i. Whether any filter cake will be stored on site and if so, how long, where, and in what type of containers;

ii. The equipment that will be used to transfer the filter cake from the filter press to storage or transport vehicles;

iii. The frequency of sampling, the location where samples will be collected (e.g., from each truck, or each container), the method that will be used to collect the samples; and

iv. The procedure(s) that will be used to decide whether to send the filter cake to the monofill or a hazardous waste landfill.

Response:

Procedures used to generate, store, load and transport filter cake have been discussed in detail previously. Anticipated testing requirements are discussed in 305a above.

i. Filter cake will held for testing on site, on the north side of the facility, in covered end-dump trailers, for up to 5 days.

ii. Filter cake will be transferred from the vacuum belt filter to end-dump trailers via conveyer.

iii. The frequency, method and location of sampling will be dictated by regulatory requirements.

iv. The procedures used to determine whether filter cake is non-hazardous are specified in the California Code of Regulations.

306. CURE Data Request 66 asked for 5 years of historic data summarizing the relative amount of filter cake that was disposed as hazardous and nonhazardous waste. The response refers to AFC, page 3-17, and the responses to CURE Data Requests 64 and 68. This is not responsive because none of these three sources contains any of the requested information. CURE therefore clarifies its request. Please provide 5 years of data that shows the amount of filter cake that was disposed of as hazardous and nonhazardous waste from each of the existing geothermal units. The response should include a table that identifies each of the 9 existing units, the split in waste classification for each of the past 5 years, or one entry for each year between 1998 and 2002, and all of the supporting data, including daily or more frequent analyses.

Response:

See the response to Data Request #'s 305a-d above.

307. CURE Data Request 68 requested "all engineering calculations, historic data, and chemical composition data and all assumptions that were relied on to determine that 95% of the filter cake is nonhazardous." The response contains none of this information, instead stating with no support that "[t]he split is based on a review of historic information regarding total filter cake produced on an annual basis, monofill disposal information and hazardous waste disposal manifests." Please provide a copy of all of the information relied on in this quoted passage from Response to CURE Data Request 68.

Response:

See the response to Data Request #305b above. Projected improvements in the percentage of non-hazardous filter cake are based on engineering estimates of the use of a vacuum belt filter in a conventional CRC process.

308. CURE Data Request 70 requested an analysis of the impacts of an accident involving a filter-cake truck, or, alternatively, all of the information required to prepare such an analysis. In the workshop on January 8, 2003, the applicant indicated that it had pursued the latter alternative, to provide the information required to prepare such an analysis. However, the response only refers to CEC Data Request Response 92, which only contains information on the

number of trucks. This is not sufficient to prepare an analysis of the impacts. Thus, please provide the following additional information:

(a) Destination and route of trucks;

Response:

The destination of the trucks would be either the Class III Monofil or the Class I landfill. The trucks would use the shortest routes to these facilities, which are the same routes proposed by the Applicant for the SSU6.

(b) Frequency of accidents involving waste trucks servicing existing geothermal facilities;

Response:

An accident occurred involving an empty truck that was returning to an existing facility on or about October 8, 2002.

(c) Frequency of accidents involving hazardous waste trucks in general;

Response:

See the response to Data Request #308b.

(d) A list of historic accidents involving filter cake trucks and all related information, e.g., reports prepared by agencies or owners of the facilities; and

Response:

See the response to Data Request #308b.

(e) A description and evaluation of historic accidents identified in subpart (d).

Response:

See the response to Data Request #308b.

309. The response to Data Request 71a indicates that the monofill identified in the AFC (e.g., Fig. 3.1-3) only accepts nonhazardous waste. The AFC claims that the filter cake is hazardous 5% of the time. Thus, please identify the landfills that have been historically used and will be used in the future to dispose of hazardous filter cake.

Response:

Please see response to CURE Data Request #67b.

The Clean Harbors Westmorland, CA and Clean Harbors Buttonwillow, CA (formerly Safety Clean and Laidlaw) are expected to receive hazardous filter

cake from SSU6. The same facilities have been used for existing geothermal plants.

310. The Project will generate about 2,500 tons of scale per year. CURE Data Request 73b sought support for the 2,500 ton/yr estimate and chemical composition data. The response stated that the quantity of scale was calculated from the amount of piping in the facility and other equipment surfaces through which brine flows and scale adheres to. Thus, please provide the following additional information:

(a) The engineering calculation referenced in the response that was used to arrive at 2,500 ton/yr.

Response:

The calculation resulting in 2,500 ton / year is a conservative engineering estimate provided by the Applicant.

(b) At least 1 year of historic data from existing facilities that supports the chemical composition data provided in attachment CDR-73.

Response:

The Applicant believes that the requested data is not relevant and the data provided in previous responses represents the best estimate for the expected scale generation from the proposed project.

311. The response to CURE Data Request 73c indicates that scale will be removed by hydroblasting on a concrete pad with concrete walls. Please provide the following additional information about this process:

(a) Engineering drawings of the hydroblasting area that shows it in cross section and plan view.

Response:

The hydroblasting station's design has not been started. However, the hydroblasting station will consist of a roofed structure supported by 3 solid walls. The 4th wall will be mobile and allow access into the station. During hydroblasting, the 4th wall will be closed to avoid emissions during operation.

(b) A description of the controls that will be used to prevent the escape of contaminated vapors into the environment.

Response:

Please see the response to CURE Data Request #311a.

(c) A description of the controls that will be used to protect workers.

Response:

The following controls will be used:

- Lock Out / Tag Out
- Confined Space Entry
- Hearing Conservation
- Hazard Communication,
- Respiratory protection,
- Business Plan / IIPP / SWPPP,
- Safe Work Permits
- Hazardous Material Training,
- Fire Safety
- Personnel protective equipment training.

(d) How frequently will scale be removed?

Response:

The Applicant expects that the station could be used on a daily basis, but will mainly be periodically during outages.

(e) Hydroblasting will require that pipelines and other equipment be disassembled and reassembled, generating construction noise, air emissions, and biological impacts. The AFC does not appear to have considered these periodic, maintenance impacts. Thus, please prepare an analysis of the noise, air quality, soil, and biological impacts of scale removal.

Response:

The impact analysis requested by the intervenor is not required because the noise generated from the hydroblasting station is included in the broader assumption made for operation of the plant. Air quality is not impacted because of the closed area and wet process associated with this operation, and soil and biological impacts are nonexistent due to the concrete slope of the pad into the brine pond.

(f) Pipelines and equipment would have to be disassembled to remove scale. This could result in the spill of contaminated brines and solids onto the ground. Please describe the procedures that would be used to minimize spills during maintenance activities.

Response:

Pipelines are drained to the fullest possible extent in order to reduce spills during disassembly. Soils are covered with plastic and pans.

(g) Is the applicant willing to accept a COC that requires the implementation of subparts (a), (b), (c) and (f)? If your answer is no, please explain why not.

Response:

No COC is required since it is in the Applicant's own interest to maintain and operate safe and reliable equipment.

312. The Phase I Environmental Site Assessment ("ESA") concluded that there would be possible impacts from historic application of organochlorine pesticides and chlorinated herbicides. Lands that were farmed before these chemicals were banned, as is the case here, frequently contain elevated concentrations of these pesticides that are high enough to pose a significant health risk to exposed construction workers. Thus, please perform a Phase II ESA that measures organochlorine pesticides and chlorinated herbicides in all soils that would be disturbed by Project construction. The Phase II ESA should use EPA Method 8270, should collect surface samples from the top 2 inches of soil, should not composite samples, and should include at least 30 separate samples.

Response:

Please see the response to CURE Data Request #174.

313. The AFC indicates that workers would be trained to identify contaminated soil and on proper procedures for handling such soils. (AFC, p. 5.13-2.) CURE Data Request 175a asked specifically for procedures that would be used by workers to identify pesticidecontaminated soils. The response cites two sections of the California Code of Regulations ("CCR") that would be followed. However, these sections only train workers to identify contaminants that can be observed or smelled. Similarly, the response to CURE Data Request 175b only addressed stained or odiferous soils. Pesticide-contaminated soils cannot be detected using the procedures outlined in the AFC or the CCR.

(a) Please explain how workers will be trained to identify pesticide-contaminated soils that cannot be observed or smelled and the procedures that will be implemented to prevent worker exposure to these soils.

Response:

The Applicant, through its construction contractor, will implement a site specific safety training program that will comply with all applicable federal, state, and local regulations. The program would include those measures needed to protect workers from know hazards on the project site. This

program will be developed during the final design stage of the project, which is not expected to occur until after the Commission issues the license.

(b) Is the applicant willing to accept a COC that implements its response to CURE Data Requests 175a and 175b? If your answer is no, please provide all supporting information you have to justify your answer.

Response:

The Applicant is willing to accept any Condition of Certification contained in the Commission's final decision on this issue.

314. CURE Data request 176g asked whether the mud pits associated with existing wells located on the 160-acre parcel are still present. The response discusses Regional Water Quality Control Board ("RWQCB") procedures, but does not provide a yes or no answer.

(a) Are the mud pits associated with the existing geothermal wells located on the 160-acre parcel still present? Please provide a yes or no answer.

Response:

As indicated during the January 9th workshop, the mud pits are present on the 160-acre parcel, south of the proposed 80-acre plant site.

(b) If your response to subpart (a) is yes, please locate the mud pits and the geothermal wells on Figure 3.1-2 and provide specific coordinates, e.g., latitude and longitude

Response:

The Applicant noticed one sump remaining at the SE corner of the 160-acre parcel. The coordinates are 33 Degrees 09 Minutes 45 Seconds North, 115 Degrees 37 Minutes 29 Seconds West.

Water Resources

315. CURE Data Request 75 asked for site-specific values for potential evaporation (p), average hourly daytime traffic (d), time between watering applications (t), and application intensity (i). The response refers to CURE Data Response 4, which does not contain potential evaporation (p) or average hourly daytime traffic (d). Thus, please provide the potential evaporation (p) for the site and the average hourly daytime traffic (d) during construction.

Response:

This information was provided in a Supplemental Response to CURE Data Request #75. However, for completeness, the potential evaporation (p) for the area is provided in a document referenced by CURE, Cowherd and Meluski, 1988. Potential traffic for the construction site was provided in Tables G-3.6 and G-3.8 of the AFC. An average hourly daytime traffic (d) for the construction period is estimated at 51. Daily truck traffic averages 28.7 trips during the construction period. Daily worker traffic averages 585.5 trips during the construction period. Therefore, for a daytime period of 12 hours, an hourly traffic value would be 51 (615/12).

316. The AFC indicates that freshwater water demand is based on the assumed salinity of the geothermal brine. The Project would ordinarily use about 293 acre feet per year ("afy") of IID canal water, based on an assumed brine salinity of 23.5%. However, "in the very unlikely event that the salinity reaches the maximum of 25.0%, the corresponding water demand could reach 987 afy."

(AFC, p. 5.4-8.) The response to CURE Data Request 77 stated that the upper limit of 25% includes recognition of the gradual increase in brine TDS. CURE Data Request 78 asked for all data that supported the TDS assumptions used to estimate freshwater demand. The response summarized the data but did not provide it.

(a) Please provide a copy of all data, calculations, and references you relied on in responding to CURE Data Requests 77 and 78 regarding your answer that the upper limit of 25% includes recognition of the gradual increase in brine TDS.

Response:

CURE has misinterpreted the response to Data Request #78, which clearly states the lack of any TDS increase in Regions 1, 2, and the Elmore plants will offset the SSU6 development. The history and any lack of data showing any increase of TDS in the offsetting well fields was taken into account in determining the expected TDS levels for SSU6. (Refer to the response to CURE Data Request # 77).

(b) Your response to CURE Data Request 80 indicates that TDS data from 24 wells in three regions was used to develop an expected average brine salinity of 23.5% and upper limit of 25% for the SSU6 wells. Is this the same data that you relied on in your

response to CURE Data Request 78? If your answer is no, please provide any additional data that you relied on in Response to CURE Data Request 80.

Response:

See the response to Data Request #316a.

317. CURE Data Request 84 asked for all information, including IID irrigation water delivery data and annual cropping patterns, that supports an annual average consumptive water demand of 5 acft/ac for crops historically grown on lands that would be taken out of production by the Project. The response provided a January 28, 2002 memorandum from the IID in attachment CDR-84. Please respond to the following questions on this memorandum:

(a) The 5 ac-ft/ac consumptive water demand is based only on data for the period 1987 to 1995. Please extend the analysis through the end of 2002.

Response:

The Applicant relied on the data provided by IID and no additional irrigation data is available to the Applicant.

(b) The memorandum does not provide annual cropping patterns, as requested in CURE Data Request 84. Please provide annual cropping patterns for the years 1996 through 2002.

Response:

Please refer to Attachment CDR-317.

(c) The January 28, 2002 memo indicates that "we have not used any year of zero water use in the baseline calculations." This would appear to result in overestimating baseline consumptive water use and thus underestimating net increase in water demand due to the Project. Please provide the complete data set, including all zero water use fields and/or years, from 1987 though 2002.

Response:

Please see the response to CURE Data Request # 317a.

(d) The January 28, 2002 memo indicates that the data used to develop 5 ac-ft/ac "are preliminary estimates only and are subject to revision as the rules governing the On-Farm Program are finalized."

i. Have these values been modified since the January 28, 2002 memo? If your answer is yes, please provide all revisions.

ii. Has the On-Farm Program been finalized? If your answer is yes, please describe the Program and indicate whether it would affect the estimated water demand.

Response:

Please refer to the response to Data Request #317a.

(e) Please provide copies of all correspondence and notes of telephone conversations regarding historical and existing water use between the applicant, its consultants, and the IID.

Response:

Subject to the General Objections and qualifications set forth at the outset of these responses, Applicant has previously provided all responsive documents which are relevant to these proceedings or necessary to make a decision on the application for certification.

318. The response to CURE Data Request 86 reconciled the Agriculture and Soils section of the AFC, which indicates only 97 acres would be taken out of agricultural production (AFC p. 5.3-12), with the Water Resources section, which assumes 173 acres would be taken out of production (AFC, p. 5.4-8), by stating that "the Water Resources Section of the AFC indicating 173 acres is correct."

(a) Please confirm that the reference to 97 acres in the Agriculture and Soils section is incorrect with a yes or no answer.

Response:

No.

(b) If the answer to subpart (a) is yes, please provide a revised analysis of impacts to agriculture and soils.

Response:

Not applicable.

(c) If the answer to subpart (a) is no, please provide all justification you have for your answer.

Response:

The 97-acres refers to contiguous acreage used as an input into the LESA model.

319. CURE Data Request 85 asked for support for the estimate of 173 acres of fallowed land. The response refers to Table 5.3-3 of the AFC, which only supports 97.2 acres.

(a) Please reconcile the discrepancy between Table 5.3-3 and the water demand calculations in Section 5.4.2.1.2 (AFC, p. 5.4-8), which are based on 173 acres.

Response:

There is no discrepancy. The 97.2 acres reference in Table 5.3-3 is only to Prime agricultural land.

(b) The water delivery data in attachment CDR-84 is based on only 144 acres, rather than the 173 acres used in the demand calculations. The consumptive use estimate of 5 ac-ft/ac should have been based on the same area that would be fallowed. Thus, please provide all water delivery data for the years 1987 to 2002 for the entire area that would be fallowed.

Response:

Attachment CDR-84 represents what was provided by IID.

320. CURE Data Request 87 asked the applicant to identify a backup water supply if Sections 4.1 and 4.3 of the Water Supply Agreement resulting in curtailment of the Project's primary supply were implemented. The response suggests that these sections could never be triggered. Please respond to the following questions on this issue:

(a) Please explain why these sections are included in the Agreement if they would never be triggered.

Response:

The terms of the Water Supply Agreement represent the rights and responsibilities of the parties thereto as agreed to by them. The Applicant is not seeking certification for an alternative supply of water. The Applicant believes that the terms of the Water Supply Agreement provide adequate water even in the event of partial curtailment by IID, if a partial curtailment were to occur, the Applicant would be required to identify any new water supplies, and provide an analysis of the environmental impacts of the proposed supplies to the Energy Commission for review and approval.

(b) If IID receives an order or directive from a governmental authority reducing the volume of water allocable to IID from the Colorado River, such as the Secretary of Interior's recent order imposing a 330,400 acre-foot reduction in IID's water supply, is it possible that IID may reduce the project's water supply pursuant to Section 4.3? Please answer yes or no.

Response:

Yes, it is possible, but only in the event the project's water supply needs severely exceeded the Applicant's expectations and IID's Colorado River allocation were severely limited, a highly speculative scenario.

(c) If your answer to subpart (b) is no, please provide all justification for your answer.

Response:

Not applicable.

(d) Section 4.1 of the Agreement appears to allow curtailments if deliveries exceed 1.5 cfs per day at gates 459 or 460 or 3.0 cfs per day from both gates combined. Response to CURE Data Request 87 indicates that the applicant expects a

maximum use rate of 1 to 2 cfs per day. The response and discussion in the workshop on January 8, 2003 suggest that only the 3.0 cfs per day cap applies.

i. Please provide correspondence with IID or other documents that support the applicant's interpretation of this section of the Agreement.

Response:

The Applicant possesses none.

ii. Is it possible that the applicant will receive all of its water through each of the following: gate 459? gate 460? gate 459 plus gas 460?

Response:

In what proportions the Applicant will receive its water has not been determined yet.

(e) Section 4.3 of the Agreement appears to allow curtailments if IID's Colorado River supply is reduced, which has recently occurred. The response to CURE Data Request 87 claims that this section will not result in a curtailment due to the ratio limitation in Section 4.3. Please clarify the ratio limitation, including all assumptions and information supporting your answer, by providing the following, assuming a 20% curtailment in Colorado River supply:

i. Ratio of reduction in the Maximum Use Amount to the total reduction of water allocable to IID from the Colorado River.

Response:

X / 620,000

ii. Ratio of Maximum Use Amount to the current total amount of water allocable to IID from the Colorado River.

Response:

1,000 / 3,100,000

iii. Please explain why the ratio in subpart (i) could never exceed the ratio in subpart

Response:

Contractually, X / 620,000 cannot exceed 1000 / 3,100,000.

(f) If brine salinity reaches 25% and the corresponding water demand reaches 987 afy, as described in Response to CURE Data Request 77, please confirm that an 11% reduction in IID's supply would result in an inadequate water supply for the project.

Response:

Please see the response to CURE Data Request #320b.

321. CURE Data Request 93 asked for historic releases from the brine ponds. The response indicates that no releases have occurred from other similar brine ponds at existing units 1-5 in the last 5 years.

(a) Are there any existing similar brine ponds?

Response:

No.

(b) If your answer to subpart (a) is no, please detail the differences between the existing brine ponds and the proposed brine ponds.

Response:

The new brine ponds will be elevated and there will be two ponds rather than one. The new brine ponds will meet the latest Title 27 criteria which may not have been in place when other brine ponds were designed.

(c) Please provide all information you have on historic releases over the past 5 years from all existing brine ponds. For each release, please provide the date of the release, the cause of the release, the size of the release, the composition of released fluids, the environmental consequences of the release, actions taken to cleanup the release, and change(s) made in pond design and operation to prevent similar future releases.

Response:

The following is a list of historic releases over the past 5 years.

9-15-99 Vulcan brine pond overflowed after a 230 kV transmission line tripped at 0140 hours. (6220 gallons released)

5-24-01 Unit 3 Brine backed up into the plant conveyance system resulting in a brine release to soil. Shut down well to plant to control brine in the plant. (6700 gallons released)

2-3-01 Vulcan - The pond was receiving geothermal brine from the M-9 production well when brine started to flow from the secondary clarifier to the pond and resulted in the pond over flowing. Additional injection pumps were started to stop the over flow. Brine on the soil was vacuumed up and the affected soil excavated. (41,200 gallons released)

6-21-00 Unit 3 - Release occurred when an expansion spool failed on the injection system. Valves were closed to isolate the leak. Brine accumulated in an on-site storm water basin. Contaminated soil was removed or rinsed to clean up salt residue. (55,000 gallons released)

322. CURE Data Request 95 asked for a compilation of pipeline releases over the past 10 years, including the date of the release, the amount of fluid released, the cause of the release, the environmental consequences of the release, the steps taken to cleanup the release, and any changes in design that were implemented to prevent similar future releases. The response in attachment CDR-95 provided the date, amount of fluid released, and location of the release, but none of the other requested data.

a. The list of releases in attachment CDR-95 covers the period 1995 to 2002, a 6 year period. Did any releases occur between 1990 and 1995? If your answer is yes, please provide all of the information asked for in CURE Data Request 95 for each release.

Response:

Please see Attachment CDR-322, which includes releases prior to the 10-year period originally requested.

b. The list of releases in attachment CDR-95 is incomplete. For example, releases of hazardous materials must be reported to the Governor's Office of Emergency Service (OES). A recent search of the hazardous materials spill database identified a release of 13,000 to 15,000 gallons on December 8, 2002. Please explain why this release was excluded from CDR-95, revise CDR-95 to include it, and update CDR-95 through the present, to include, among others, the release that occurred January 7-8, 2003 and any other releases that were not reported to OES.

Response:

Please see Attachment CDR-322, which includes releases occurring after the original data request was issued. Not all brine spills trigger the hazardous materials reporting requirements.

c. Does the applicant have any information on the cause of the releases identified in CDR-95 and subparts (a) and (b)? If your answer is yes, please provide a copy of all information.

i. Has a release ever been caused by a collision involving farm equipment? If your answer is yes, how many such events have occurred in the last 10 years?

Response:

No.

d. Does the applicant have any information on the environmental consequences of the releases identified in CDR-95 and subparts (a) and (b)? If your answer is yes, please provide a copy of all information you have on the environmental consequences of the releases.

Response:

Information on the results of releases is provided to the RWQCB and the OES in accordance with the applicable regulatory requirements.

e. Does the applicant have any information on the steps taken to cleanup the releases identified in CDR-95 and subparts (a) and (b)? If your answer is yes, please provide a copy of all information.

Response:

Yes, please refer to Data Request #323a.

f. Does the applicant have any information on design changes that were implemented to prevent similar future releases? If your answer is yes, please provide a copy of all responsive information.

Response:

Brine pipeline technology has been upgraded over time to include, for example, polymer concrete linings that were added to the inner walls of the carbon piping. Also, ultrasonic monitoring through a Nondestructive Examination (NDE) program has been implemented.

g. Based on our observation, it appears that the residue from the January 7-8 release was collected by hazardous waste trucks and disposed in the brine pond at the Elmore facility

i. Please state whether this observation is correct with a yes or no answer.

Response:

Yes, the trucks observed were vacuum trucks certified to haul hazardous waste. However the material collected on January 7-8th was not hazardous waste.

ii. If the answer to subpart (i) is no, please answer the following:

1. Describe the owners and operators of the hazardous waste trucks that were discharging into the Elmore brine ponds on January 8-10, 2003.

Response:

See the Response to Data Request #322giii.

2. Explain why the hazardous waste trucks were discharging into such pond on that date.

Response:

See the Response to Data Request #322giii.

3. Describe the specific residue (e.g., brine contaminated soil, brine fluids) that was put in the brine pond.

Response:

See the Response to Data Request #322giii.

iii. If the answer to subpart (i) is yes, please identify the specific residue (e.g., brine-contaminated soil, brine fluids) that was disposed?

Response:

Geothermal brine (non-hazardous substance).

iv. If the answer to subpart (i) is yes, were the residues characterized prior to disposal in the brine pond? If your answer is no, please explain why not. If your answer is yes, please provide a copy of all resulting analytical data.

Response:

The characterization of produced fluids appears in Table 3.3-1 of the AFC.

v. Will spill residues be disposed in the brine ponds of the Project? If your answer is yes, under what conditions?

Response:

Yes, under the same operating conditions as all facilities.

h. Please indicate how the volume of each spill in CDR-95 was determined? If this information is not available, please describe, in general, how spill volume would be estimated.

Response:

The volume of each spill was determined by the size of the area and soil moisture content.

i. Please provide a copy of all reports prepared in response to the releases in CDR-95, including, but not limited to, all reports made to the Governor's Office of Emergency Response.

Response:

Reports to the RWQCB and the OES are public documents that can be obtained by CURE directly.

j. The response to CEC Data Request 10 states that the amount of brine released to the ground would typically be 200 to 400 gallons and the response to CEC Data Request 24 states that the maximum release would be 1,050 gallons. The 45 releases in CDR-95 average 1,315 gallons and include seven releases larger than 1,050 gallons, ranging up to 16,000 gallons. Please resolve the discrepancy between CEC Data Response 10 and CURE Data Response 95.

Response:

Given the inherent design features of the pipeline and the implementation of the Nondestructive Examination (NDE) program, as discussed in the response to CURE Data Request #95, the Applicant reiterates what it stated in CURE Data Request #95 regarding a typical release. The Applicant's response to CEC Data Request #24 reflects a reasonable worst case scenario given the inherent design features of the pipeline and the Nondestructive Examination (NDE) program, which was implemented in 2001.

323. CURE Data Request 97c asked for a copy of the Containment, Control, and Cleanup procedures that would be used to mitigate pipeline releases. The response indicates that emergency response/contingency plans will be in place prior to the start of construction.

(a) Please describe the procedures that are currently used to contain, control, and cleanup pipeline releases. Provide a copy of any written procedures.

Response:

Pipeline release result in the removal of soils and gravel that have been in contact with geothermal brine. The cleanup is verified by soils sampling after the material is removed. The contaminated material is disposed in a non-hazardous landfill.

(b) Does the applicant anticipate any changes in the procedures described in subpart (a) at Salton Sea Unit 6? If your answer is yes, please describe all changes and explain their basis.

Response:

Please refer to the response to CURE Data Request #97c.

324. The Project is within the 100-year flood zone and is surrounded on three sides by 100-year flood zones. (Response to Data Adequacy Comments, p. WATER-13, FIRM map.) The entire site will be enclosed by an 8-foot high perimeter berm. The northern and western portions of the dike already exist, but apparently not the balance of the dike. (AFC, Appx. J, p. 3.) The AFC concluded that the 8-foot dike would eliminate potentially significant flooding impacts of the Project and thus provided no analysis of flooding impacts. (AFC, p. 5.4-9.) However, surrounding the Project site with an 8-foot high berm would remove 80 plus acres from the floodplain, increasing the base flood elevation outside of the berm and thus aggravating flooding impacts elsewhere. Response to CURE Data Request 100 claims that "removal of 80 acres will have an insignificant effect on the flood plain volume, as 80 acres is a very small portion of the entire 102,887 acre area." However, local flooding impacts, in the immediate vicinity of the Project, outside of the berm, would likely be significant. Thus, please estimate the local increase in flood elevation in the immediate vicinity of the Project. Please recommend mitigation for the impact, e.g., provide an equivalent volume of flood plain volume elsewhere. Please provide supporting calculations and all other information that supports your conclusion.

Response:

CURE assumption that " local flooding impacts, in the immediate vicinity of the Project, outside of the berm, would likely be significant" is unfounded and incorrect, as removal of the 80-acre section of the flood area would reduce the flood area, in this case by 0.08%, and therefore provide insignificant impact to the area.

325. CURE Data Request 102 asked for chemical composition data for several streams that are routed to the brine ponds. The applicant provided part of the requested information, but omitted others. Thus, please provide chemical composition data for the following:

(a) Liquids from thickener

Response:

The thickener liquid is a mixture of canal water, oxidizer box water, scrubber drain water, and brine from the clarifier underflows (mixed with acid). Canal water chemistry is provided in table 3.3-5 and brine chemistry is provided in table 3.3-2. The Applicant provided a reasonable level of detail in regard to brine pond affluent and further evaluation is not warranted.

(b) Bermed area

Response:

Chemical composition from the bermed area can include, but is not limited to, any combination of brine (Table 3.3-2), clarifier effluent (Table 3.3-2) and canal water (Table 3.3-5).

(c) In the January 8, 2003 workshop, the applicant admitted that it had failed to provide chemical composition data for the condensate steam tanks.

i. Thus, please provide chemical composition data for the condensate steam tanks.

ii. Are the condensate steam tanks the same as the emergency relief tanks?

Response:

The Applicant assumes that CURE is referring to the steam vent tanks. Chemical composition's of steam vent tanks was provided in CURE Data Request #268 for all three pressures (HP, SP and LP). A small amount of condensation caused by heat loss in the piping and equipment could be expected to occur, discharging from the LP vent tank bottom. As a result, Attachment CDR-325 shows the chemistry of the LP Vent Tank Condensate, assuming a nominal condensation rate of 5000 lbs / hr.

326. CURE Data Request 103 asked for an estimate of the frequency of discharge to brine ponds, the length of time wastes would remain in the ponds, and the annual average amount of each of the following streams discharged to the brine ponds: reverse osmosis reject; liquids from the thickener, bermed areas around plant equipment, and emergency relief tanks; and startup and drilling brine, based on operating experience at the existing

Units 1-5. The response claims existing operating experience is not relevant because the design of the redundant brine ponds for Unit 6 is different than at the existing facilities. However, the design of the brine ponds affects accidental releases *from* the ponds, not discharges to the ponds. The design of the geothermal facility itself would affect discharges into the ponds. Presumably, the design of the geothermal facilities is sufficiently similar that operating experience at the existing brine ponds is representative of the proposed brine ponds. Certainly, operating experience at existing ponds is more representative and useful than no information at all. Finally, there should be a design estimate for the Project for all of the requested information.

(a) Please provide the information requested in CURE Data Request 103. If you believe discharges to the existing brine ponds are not relevant, please document the differences in the facilities that you believe preclude the use of existing data on discharges to the brine ponds and provide all information that supports your answer.

Response:

Please refer to response to CEC Data Request #'s 82 and 83 for a discussion of the conditions that would result in discharge into the brine ponds as well as the frequency of occurrence.

(b) If you responded to subpart (a) by documenting the differences, please provide the design basis for each requested parameter for the Project.

Response:

Not Applicable.

327. CURE Data Request 104 asked for a sample calculation that shows how the brine pond composition data in Table 3.3-2 was estimated and to support your answer with volumes and chemical composition data. The response does not contain a sample calculation, volumes, or chemical composition data, stating only that brine pond composition is derived from brine composition assuming 26% flash. This is not responsive. Thus, please provide the following information:

(a) Please provide calculations that support the brine pond composition data in Table 3.3-2. The calculations should be prepared for several constituents that span the range of assumptions (e.g., TDS, H2S, As, NH4) and should identify all assumptions, including volumes and brine composition data that were used in the calculations.

Response:

The values shown were derived simply by dividing the brine chemistry by 0.74 (i.e., dividing by the quantity 1-0.26, consistent with a 26% flash calculation). Note that the Table 3.3-2 footnote indicates "All numbers are approximate." Applying the aforementioned factor to the dissolved solids in the brine produces quantities very close to what is presented in the brine pond column of Table 3.3-2.

(b) If the brine pond composition was calculated assuming 26% flash of brine, as claimed in the response to CURE Data Request 104, the brine pond composition does not include any of the other streams that would be routed to the ponds. Thus, please revise the brine pond composition in Table 3.3-2 to include all streams that would be routed to the ponds.

Response:

Flows to the brine pond will not occur simultaneously (e.g., clarifier overflow, production test unit, emergency relief). Of these, the worst case, interpreted to mean that case having the highest dissolved solid concentrations (which would be either emergency relief or production test unit brine), is presented in Table 3.3-2 of the AFC.

328. The Water Quality Control Plan for the Colorado River Basin encourages practices that conserve water. (Water Quality Control Plan, Colorado River Basin – Region 7, p. 1-4, 4-1.) The surface pond proposed to contain freshwater supply would appear to be inconsistent with water conservation. Response to CURE Data Request 113 states that an open pond was selected because it is a better solution based on flood management, maintenance, reliability, and cost. Please provide the following additional information on this issue:

(a) Please provide a copy of the analysis and all supporting information that concludes that an open pond provides flood management, maintenance, reliability, and cost benefits.

Response:

Please see the responses to CURE Data Request #'s 328b, c, and d.

(b) Please identify the flood management benefits provided by the open pond.

Response:

Please refer to page WATER-19 of the AFC Supplement for a discussion of the flood management benefits.

(c) Please identify the maintenance benefits provided by an open pond.

Response:

Distribution from IID vail 4 into the service water pond will require minimum pumping or no pumping at all, subject to final design. An enclosed, elevated, water tank would require pumping of the fluid into the storage tank. The Applicant estimates that the reduction of pumping requirement associated with the proposed solution increases reliability of the system and provides maintenance benefits.

(d) Please explain why an open pond is more reliable than a tank.

Response:

Please see the responses to CURE Data Request # 328c above.

(e) Please provide a cost analysis for a tank and the open pond, if not otherwise provided in response to subpart (a).

Response:

Please refer to Attachment CDR-328.

329. Solids would accumulate in the brine ponds and be removed periodically. CURE Data Request 121d and 121e asked for a description of the procedures that would be used to remove and dispose of brine pond solids. The response refers to Section 3.3.4.4.2 of the AFC, which does not describe the procedures. Please describe the procedures that would be used to remove and dispose of brine pond solids. Your description should include at least the following:

(a) How frequently will solids be removed?

Response:

Solids will be removed on an as-needed basis. Please refer to CEC Data Request # 83 for discussion regarding discharge frequency into the brine ponds and in accordance with applicable regulatory requirements.

(b) Will the solids be temporarily stored? If your answer is yes, identify the type of container, location of containers, and length of storage.

Response:

The pond solids are removed from the pond and placed directly into approved hazardous waste disposal bins and shipped directly to the disposal facility.

(c) What procedures will you use to prevent spills of brine pond solids during removal and placement in storage?

Response:

The pond banks and associated loading area are covered with plastic to contain any spillage. The area is inspected, cleaned and the plastic is sent with the last load of material daily.

(d) Identify the equipment that would be used to remove the solids, including type of fuel and horsepower of engine.

Response:

A crane-like piece of equipment called Trac Hoe (excavator) is used to remove and place solids into bins or end dumps. The Trac Hoe uses Red Diesel fuel and is powered by a 249.6 horsepower engine.

(e) Will the applicant contract the services or do the work in-house?

Response:

The Applicant owns the Trac Hoe (excavator) that removes the solids, the operator for the Trac hoe is contracted along with the hazardous waste tranporters and associated equipment.

330. CURE Data Response 157 provided chemical composition data for the RO inlet, outlet, and reject stream in attachment CDR-157. This attachment indicates that no Selenium (Se) would be present in the RO feed, RO permeate, or RO reject. However, Colorado River water contains about 2 ppb of Se,[3] which would be concentrated in the reject to concentrations that may be high enough to pose a hazard to wildlife. Thus, please revise CDR-157 to include Se concentrations greater than zero, or explain why the Project's IID supply would contain no Se. Please support your answer with chemical analyses of the proposed water supply.

Response:

If selenium concentrations are about 2 ppb in canal water (IID source water quality analyses typically report concentrations as below detection at <5 ppb), the RO system will concentrate selenium 4 times to about 8 ppb in the RO reject. RO reject will be routed to the fresh water pond or the brine pond. In either case, addition of 0.5 gpm of RO reject to these large water bodies will not measurably increase selenium concentrations. Thus, RO reject will not pose a hazard to wildlife.

331. CURE Data Response 160 indicates that continued IID supply is anticipated at the end of the 21-year life of the Water Supply Agreement. Please provide a copy of the will-serve letter for the last 9 years of the 30 year Project lifetime. If you do not provide a copy of the will-serve letter, please confirm that you have no current committed arrangement for continued IID supply beyond 21 years.

Response:

There is no such will-serve letter.

332. The Project would include 10 production wells and 7 injection wells. How many of each type of well would have to operate simultaneously to produce 180 MW of electricity? Please provide all information you used to support your answer.

Response:

The periods and reasons when all wells will not be operating simultaneously are outlined in section 5.1.2.4.1 of the AFC.

333. Poster boards containing useful descriptive information on the Project and geothermal resource[4] have been displayed at the public workshops. We were informed during the November 19, 2002 site visit that a copy of these poster boards would be posted on the CEC website. They have not been posted to date. Thus, please provide a copy of these poster boards.

Response:

Additional copies of the posters that were on display for two days at the public workshops on January 8 and 9 are not currently available.

Biology

334. Based on comments made during the workshop on January 9, 2003, CURE understands that at least a portion of the agricultural field where proposed well pads OB1 and OB2 will be located will be removed from production. At present, this field is managed by the Sonny Bono National Wildlife Refuge ("Refuge"). The well pads and the pipelines will remove at least 42 acres on this field from production.[5] This field is one of only four refuge-managed fields specifically planted to provide forage to several resident and migratory bird species. Removal of portions of this agricultural field and the associated loss of foraging habitat for resident and migratory birds were not evaluated in either the AFC or the responses to data requests.

Further, biological impacts of removing a total of 173 acres of agricultural land from production were not analyzed in either the AFC or the responses to data requests. This agricultural land, managed by the refuge or planted for production, currently provides foraging opportunities for many migratory and resident bird species, many of which are listed as federal and/or state endangered or threatened species. The removal of this agricultural land may have an adverse impact on a large number of birds due to reduction of feeding grounds.

(a) Please provide an analysis of impacts regarding the removal of 173 acres of agricultural land from production – and specifically the removal of 42 acres from production from the agricultural field at proposed well pads OB1 and OB2 – on resident and migratory birds with particular focus on the fully protected Yuma clapper rail, California Species of Concern, and each endangered and threatened species under federal and/or state law. Please include a description of the current use of this foraging habitat by birds.

Response:

The proposed location of Production Well Pad OB1 and OB2 are in an agricultural field in the northeastern part of the northwest quarter of Section 33, with a grading footprint of approximately 300 feet by 700 feet. This location is adjacent to a freshwater marsh that supports Yuma clapper rail. This freshwater marsh was created by the Refuge and is considered a jurisdictional wetland by the Corps of Engineers. An access road that is approximately four feet higher than the adjacent agricultural field is at the south end of this marsh and is located between the marsh and the proposed location of the well pad.

Most of the existing land use within the area is active agriculture, with scattered disturbed areas, a fresh water marsh dominated by cattails (*Typha* sp.) in the area nearest the Refuge, chenopod scrub, and desert scrub.

The Clapper rail is common in localized freshwater wetlands in the Salton Basin and the lower Colorado River in summer (Garrett and Dunn 1981, Wilbur 1987). It is found at both ends of the Salton Sea and is known to be a breeding species in marshes on the lower Alamo and New Rivers. Its winter occurrence is uncertain, probably owing to its low detectability when not courtship-calling (Garrett and Dunn 1981). These secretive birds prefer extensive and undisturbed marshes for foraging and nesting (Garrett and Dunn 1989). The clapper rail is considered sensitive primarily because of habitat destruction due to stream channelization and elimination of marsh habitat.

The principal food source for clapper is reported to be crayfish. Small fish, clams, isopods, water beetles, dragonflies and dragonfly nymphs, other insects, and small seeds (Wilbur and Tomlinson 1976 *in* Anderson, 1983). Various references describe clapper rail habitat as having a wet substrate, covered with dense vegetation greater than 40 cm in height and broken by openings with ponds and channels with water less than 30 cm deep (Todd 1986 *in* Roberts, 1996). Most authors note that the rail is shy bird that generally stays close to cover. Zeiner et al (1990) characterizes the bird as "requires shallow water and mudflats for foraging, with adjacent higher vegetation for cover…" Arizona Department of Fish and Game (2001) states "As soon as ground surface of marsh dries out, clapper rails move elsewhere."

Home ranges for male birds were found to average 7.7 + / - 5.9 ha, and for females 9.9 + / - 9.6 ha. (Coachella Valley MHSCP). Rosenburg et al. (1991 *in* Arizona Department of Fish and Game 2001) indicated around 7.5 ha per pair, and Eddleman (1989 1991 *in* Arizona Department of Fish and Game 2001) 0.1-1.62 ha (0.24-4.00 ac) for paired birds and 0.73-3.59 ha (1.80-8.87 ac) for unpaired birds. Overall, the indication is that clapper rails look for nest site availability, prey diversity and abundance, and protection from avian predators, all met within a very small area of wet marsh.

None of the references reviewed (or the citations summarized by these works) indicated any use of open agricultural habitats for foraging (Arizona Department of Fish and Game 2001, Anderson, 1983, Roberts 1996, Zeiner 1990, Anderson 1995, Coachella Valley MHSCP). Albertson indicates that a reason for this would be that birds that stray from cover are probably more susceptible to terrestrial and avian predation (Albertson 1995).

Finally, with respect to the current use of this foraging habitat by birds, the AFC states:

" *The agricultural and developed areas surrounding the proposed power plant provide reduced or highly degraded values for wildlife, and therefore do not function as viable wildlife corridors for large mammals."*

From field observations it is apparent that migratory waterfowl, probing shorebirds, gulls, raptors and abundant perching birds and blackbirds use the agricultural field opportunistically as forage is available. This would include species such as the

mountain plover, California black rail, and burrowing owl. Because agricultural habitat is common and widespread throughout California, the species that dominate this habitat are generally common and widespread. Brown pelicans that feed on medium size fish in shallow water primarily along the shores of the Salton Sea and may "loaf" on the adjacent uplands, generally within a few feet of water. Brown pelicans are rarely if ever expected to use upland agricultural habitats, such as the fields that OB1 and OB2 are located, for foraging, nesting or cover.

335. The location of well pad OB1 adjacent to Union Pond, a freshwater marsh that is Yuma clapper rail habitat, and the location of OB3 on Obsidian Butte, adjacent to a potential brown pelican nesting site and wetlands, may result in significant disturbance impacts during construction, operation, inspection, and maintenance of the well pads and associated pipelines. Ongoing disturbances during operation of the project, e.g., presence of humans, noise from maintenance operations, lights from maintenance vehicles, and vibration due to well operation near the periphery of Union pond may force Yuma clapper rails deeper into their already very limited habitat (i.e. deeper into Union Pond) or cause the rails and pelicans to abandon their nests or nesting attempts. Albertson, for example, documented a clapper rail abandoning its territory in Laumeister, a 36-ha marsh in the San Francisco National Wildlife Refuge, shortly after a repair crew worked on a nearby transmission line.[6]

Disturbance alters activity budgets and increases energy expenditures. When potential threats are detected, birds shift their time and energy from other behaviors to increased vigilance behaviors. Increased vigilance directly translates into less foraging time and reduced fat reserves. Both breeding and non-breeding seasons are critical times for the Yuma clapper rail. Disturbance during the breeding season (March through October at Salton Sea[7]) translates to less time spent brooding eggs or nestlings and may result in increased embryo/nestling mortality due to thermal intolerance (reduced nest shading by adults) or predation. Disturbance that occurs after chicks have left their nests may still result in reduced reproductive success. Chicks emulate the adult's vigilance behaviors and spend less time feeding. Fat reserves are critical for birds during the post-fledge period, when they are feeding on their own without guidance or assistance from adults.

Disturbance during the non-breeding season that causes vigilance or movement by the birds again results in reduced feeding or resting time and a net increase in energy loss. Avoidance behaviors such as running or flushing result in even greater energy expenditure and more depleted fat reserves. The ultimate effect of depleted fat reserves is reduced survival or reproduction, regardless of age, species of bird, and/or timing of disturbance.[8] Thus, Yuma clapper rail may be adversely impacted due to the location of well pad OB1 adjacent to its habitat.

a. Please provide an impact analysis of the location of proposed well pad OB1 adjacent to Yuma clapper rail habitat with respect to disturbance from human activity in the vicinity, noise from maintenance operations, lights from maintenance vehicles, and vibration caused by well operation near the periphery of Union pond. The response should address both breeding (March through October) and non-

breeding (November through February) seasons, both of which are recognized as critical times for the Yuma clapper rail. Non-breeding season impacts are exacerbated in small diked marshes, such as Union Pond, in which there is little to no high tide refugia or high marsh plain.

Response:

At its closest point, the well pad for OB1 is located approximately 200 feet from the edge of the marsh habitat at Union Pond. As noted above, studies of the clapper rail indicate it rarely ventures from cover, and there is no indication that this species forages in agricultural fields with sparse cover. Also, the marsh is separated from the agricultural field by an elevated road, which may make it less likely that clapper rails would approach the project area. Therefore, the Applicant believes the closest clapper rails will be approximately 200 feet from the proposed OB1 site.

With respect to potential impacts from noise, lights and vibration to the rails, the Applicant evaluates potential impacts separately for construction and operation. During operation the only noise emanating from the wells is a faint hiss from steam moving through the pipes. Lighting at the wells is kept to the minimum required for safety, and would not be visible to a bird standing 10 centimeters tall, particularly behind the dense vegetation preferred by this species. The wells produce no detectable vibration during operation and it is unlikely that clapper rails would detect any vibration from the project at a distance of 200 feet of more. Maintenance vehicles driving along the pipelines would cause some noise and nearby vibration in the course of observing the pipeline for potential leaks. Trucks could drive within 50 feet of the irrigation canal on the west side of the proposed pipeline. Maintaining vehicles in good working order (mufflers) and driving slowly would probably be sufficient to minimize impacts to clapper rails in this area, and as noted elsewhere this species readily becomes accustomed to regular, low intensity disturbances. Rails would probably use the irrigation ditch for foraging, but are unlikely to nest there because if its narrow size (much less than the estimated home range of a clapper rail). Within the dense vegetative cover of the irrigation ditch, it appears clapper rails would be well protected from disturbance due to general maintenance. To the extent maintenance activities can be scheduled (planned replacement) they should be planned to occur outside the nesting season when rails are less sensitive to disturbance. To the extent maintenance activities are in response to an acute problem (such as a spill), the disturbance is probably less damaging than the potential impacts of the spill.

During construction, there is potential for temporary noise from trucks, well drilling equipment, and construction equipment. At 200 feet from the sensitive receptor, and with the intervening vegetation and elevated road, this noise may not be detectable by clapper rails in Union Pond or the irrigation ditch west of OB1 and OB2. If construction were to occur during the non-nesting season, when clapper rails are not calling to locate mates or defending territory, it is unlikely there would be any effect.

Section 5.5.2.4 of the AFC states "Calculations show that the 60 dBA L_{eq} noise contour is approximately 900 feet from the pipeline. Yuma clapper rails within 900 feet of the pipeline between the plant site and Production Well Pads OB1, OB2, and OB3 would be exposed to sound levels that exceed 60 dBA L_{eq}. Because no construction would occur on the production pipelines associated with OB1, OB2, and OB3 during the breeding season (March through July) without the approval of CDFG and USFWS, no significant impact would occur. Additionally, burrowing owl, gull-billed tern, brown pelican, American white pelican, and California black rail would also not be significantly impacted because pipe construction would occur outside the breeding season. "

As noted above, the Applicant reviewed the available literature on clapper rails and their sensitivity to disturbance and found no references to studies of vibration. That violent vibration could be a cause for disturbance seems plausible, but there appear to be no validated criteria to use as benchmarks. The Applicant believes that if vibration is undetectable to a person standing near the site, or if it is a temporary impact outside the sensitive nesting season, then adverse impacts are unlikely to be significant.

CURE refers to Albertson 1995 as evidence of a clapper rail abandoning its territory after a repair crew worked on a nearby transmission line. The Applicant consulted the reference and contacted J. Albertson to understand further details of this occurrence. The reference describes the event as follows:

"*Bird #475's movement may have been prompted by disturbance by a Pacific Gas & Electric crew working on the transmission towers.*"

On further investigation, Ms. Albertson indicated that the repair crew arrived with several trucks and a generator, and worked for several days near the middle of the established home range. The crew was washing insulators and replacing equipment for several days (Ms. Albertson, personal comment, February 17, 2003). The bird in question was not nesting, but was probably defending a territory in preparation for nesting. The Applicant believes this is an extreme case of disturbance, and that construction of the SSU6 project and peripherals at a minimum distance of 200 feet from potential habitat and clapper rail territories is not similar enough to this example to suggest a similar response. In fact, both Ms. Albertson and staff at the SF Baylands indicate a tendency for clapper rails to become accustomed to disturbance (see Baylands website at http://wildlifewatcher.com/sw/baylands.phtml).

"*These clapper rails are quite accustomed to humans and tolerate your being very close. Remember that they are endangered species and must not be harassed or chased.* "

CURE offers additional evidence that disturbance altars activity budgets and increases energy expenditures, noting that disturbance results in "reduced nest shading by adults." None of these factors appeared in the refereed literature about clapper rails,

and in fact the only reference provided by CURE was correspondence from the USFWS. The Applicant notes that this evidence for potential effects resulting from disturbance is conjectural, and when referring to species that nest in densely shaded marsh, probably inapplicable to the present situation.

CURE requests an analysis specifically addressing impacts during the non-breeding season. In data described above, (Anderson 1983), it is uncertain whether clapper rails are present in the project area during winter months. Authors have noted that clapper rails defend territories only during the nesting season and otherwise are mobile and undefensive. The Applicant believes the USFWS tacitly acknowledges the seasonal nature of potential clapper rail disturbance, in that typical mitigation measures imposed for other projects include seasonal avoidance of the nesting period. From a review of the referenced literature, there were no discussions of particular sensitivity during the non-breeding season.

The USFWS clapper rail recovery plan indicates that the main limits on clapper rail are the availability of marsh-like habitat and food; and notes that the principle food (in the Lower Colorado) is crayfish. The recovery plan does not address noise or vibration as causes for jeopardizing the continued survival of this species (Anderson, 1983).

Based on the reported habitat requirements of the clapper rail, the Applicant believes that there is low potential for disturbance to rails in Union Pond from installation and operation of well pad OB1.

b. Please provide an impact analysis of the location of proposed well pad OB3 adjacent to a potential brown pelican nesting site with respect to disturbance from human activity in the vicinity, noise from maintenance operations, lights from maintenance vehicles, and vibration caused by well operation.

Response:

The Applicant contacted USFWS refuge biologist Charles Pelizza to investigate the location of past nesting efforts on Obsidian Butte. According to Shuford (Personal comment February 19, 2003), the last time pelicans attempted to nest at Obsidian Butte was around 1999. When they attempt to nest it is generally on one of the islands offshore of the west tip of Obsidian Butte. According to a letter from USFWS (dated February 5, 2003 from Pete Sorensen to Mark Durham at ACOE) pelicans last attempted to nest on the islands west of Obsidian Butte in 1997. The islands are approximately 2000 feet from the proposed well site. Pelicans typically nest on islands in part to avoid terrestrial predators. It is our opinion that visual and moderate noise impacts at a distance of 2000 feet would not have a significant adverse effect on these nesting attempts.

336. The response to CURE Data Request 187 regarding an analysis of project construction and operational impacts on Yuma clapper rail species inadequately analyzed potential impacts from noise. The AFC states that “[n]oise impacts would be considered significant if

the power plant project-related operations activities increased noise by 5 dbA above the lowest measured L90 at *any* noise-sensitive receptor." [Emphasis added]. Clearly, the Yuma clapper rail is a sensitive receptor and relevant background noise levels and increases due to project operation ought to be assessed. Estimated Project operational noise contours at 45 decibels extend into the Yuma clapper rail habitat (AFC, Figure 5.11-3). However, the noise measurements provided in the AFC are not adequate to establish background noise levels at the Yuma clapper rail habitat and, consequently, to determine significant impacts on Yuma clapper rail.

First, the closest noise measurements to the Yuma clapper rail habitat were performed at proposed well pads OB1 and OB2 at 5 feet off the ground surface (AFC p. 5.11-4). No specific noise measurements were performed at ground-level, close to the Yuma clapper rail habitat where the most sensitive noise receptor would be located. The present noise level at ground-level is likely lower at the Yuma clapper rail habitat because a small berm between Union Pond and the proposed well pad location currently reduces noise.

Second, measurements at well pads OB1 and OB2 were taken on just one day and for 10 minutes only, a meaningless time period to adequately determine existing average noise levels at a site and in particular to determine a lowest measured L90. The 10-minute L90 at OB1 was determined between 9 and 11 am on a weekday in June of 2001 at 51.1 dBA and at OB2 at 44.7 dBA. Lower L90-values could be present during different times of the day or different days of the week. The same incorrect measure of the baseline applies to the measurements at the proposed plant site, where only two 1 hour measurements were conducted on one day, also in June 2001. Noise levels may vary considerably from weekdays to weekend days as a result of increased visitor traffic on weekends to the Refuge and due to private, domestic, agricultural, and military airplane traffic. Further, noise levels may vary significantly during the harvesting and planting seasons due the presence or absence of operating agricultural equipment, including crop dusters, tractors and harvesters. Noise levels during the night are likely lower than during the day, when many of these activities take place. Since noise impacts are considered significant if the project-related operations activities increase noise by 5 dBA above the lowest measured L90 at any noise-sensitive receptor, the lowest L90 must be determined. To determine the lowest L90-value, noise measurements should be conducted during the night and during time periods of low activity.

(a) Please conduct, at a minimum, 25-hour noise measurements at the Yuma clapper rail habitat, at the proposed well pad OB1, and at the proposed plant site on both a weekend day and a weekday to determine the lowest L90.

Response:

CURE notes that the AFC states "noise impacts would be considered significant if the power plant project… increased noise by 5 dbA"… and continues to use this criterion to evaluate potential impacts to Yuma clapper rail. Although the statement is correct in the AFC, the context of the 5 dbA threshold is for human (not wildlife) receptors. The criterion appears in the noise section, and "sensitive receptors" are defined there. The CEC has adopted a position that noise increases of 5 dbA are potentially

significant because they are detectable and potentially a nuisance to human perception. That criterion is not appropriate to, and is not quoted in the biological section of the AFC. There are no parallel noise standard for biota. For this reason the discussion of 5 dBA with respect to wildlife is out of context. The request for 25-hour noise measurements, based on this contrived match of one set of criteria to another chapter is not supported by the information provided. Therefore, the Applicant will not be conducting the requested noise measurements.

(b) Based on the noise measurements obtained per the above data request, please provide an updated noise assessment for the construction and operational phase of the project, and provide all data supporting your assessment. Please provide estimated noise contours for the plant site as well for well pad OB1 and OB2 for both the operations and the construction phase of the project.

Response:

Please see response to CURE Data Request # 336a above.

337. Responses to CURE Data Requests 187 and 228 state that noise levels within the clapper rail habitat as a result of plant construction would range from 51 to 70 dBA and that Yuma clapper rail will be significantly impacted during breeding season. No specific information was given on how these numbers were derived. Because Yuma clapper rail is an endangered species under the federal Endangered Species Act ("ESA"), any impact that constitutes a take, which is defined as including harassment of birds, is not allowed. Harassment under Section 9 of the ESA includes any kind of behavioral changes, such as change in habitat use, change of foraging or sleep pattern, interference with vocal communication of birds, and certainly extends to forced dispersal of the birds caused by construction noise and vibration. Forced dispersal can increase predation risk and mortality.

Numerous mitigation measures exist for noise from construction equipment. Examples include the installation of exhaust mufflers on all equipment including impact tools, earthmoving equipment, and hand-held pneumatic tools, substitution of hydraulic or electric impact tools for combustion impact tools, substitution of sonic (or vibratory) pile drivers for impact pile drivers, and installation of enclosures around pile drivers and stationary equipment.

(a) Please provide all noise data and the calculations used for estimating construction noise levels of 51 dBA to 70 dBA at the Yuma clapper rail habitat.

Response:

Section 5.11.2.2.1 of the AFC addresses construction noise. Refer to Figure 5.11-2 of the AFC for the construction noise data. The sound level at Location 1 (Lp1) which is a distance (D1) from the noise source can be estimated if the sound level at Location 2 (Lp2) is known at a distance D2 from the source. Figure 5.11-2 presents sound levels (Lp2) at known distance of 50 feet (D2) for various pieces of construction equipment.

To determine the sound level at Lp1 which is a distance D1 from the noise source the following formula is used: Lp1=Lp2+20*LOG(D2/D1).

(b) Please provide a list of all mitigation measures that the applicant agrees should be conditions of certification to reduce the level of noise from plant construction including the anticipated noise reduction for each type of equipment.

Response:

The Applicant will implement all measures required by state and federal agencies.

338. The AFC proposes compensation land acquisition (AFC, BIO-24, p. 5.5-31) to mitigate project impacts to Yuma clapper rail and wetland areas and states that "the [a]pplicant is evaluating areas near the project site to mitigate project impacts to Yuma clapper rail and wetland areas." The Salton Sea shoreline is heavily utilized by agriculture and not much suitable habitat remains. The most suitable areas for mitigation had been determined along the southern shore of the Salton Sea (southeast to southwest). The west shore and the Whitewater River region had previously been determined unsuitable for mitigation.[9] It is critical that the habitat identified for mitigation purposes is free from threats that could contribute to population declines in the future.

(a) Please identify available suitable habitat for compensation land acquisition. Please provide a detailed description of the size and habitat qualities of the identified site(s) including the nature and magnitude of any threats that would be present on the site(s).

Response:

The Applicant will work with the CEC, USFWS, and CDFG to identify suitable habitat for compensation land acquisition.

339. The response to CURE Data Request 190 regarding cumulative impacts to Yuma clapper rail was that the applicant believes that "the analysis of cumulative impacts to the Yuma clapper rail [in the AFC] is complete and accurate." However, only noise and the removal of habitat were addressed. A number of potentially adverse impacts related to project construction and operation were not addressed and ought to be considered in an impact analysis. Such potential impacts include vibration from construction equipment during the construction phase and from operation of the plant, bright lights which illuminate the plant at night during construction and operation, removal of the buffer zone and foraging area between the project facilities and the Union Pond, and brine spills into the wetland, agriculture and/or adjacent areas. Therefore, please provide a full impact assessment for the Yuma clapper rail and each federal and/or state endangered or threatened species and species of concern, including vibration, light from the plant site and during construction, brine spills, and removal of the buffer zone and foraging area between the project facilities and the Union Pond, and provide all data supporting your assessment.

Response:

The Applicant has prepared a Biological Assessment for compliance with the Federal Endangered Species Act. A cumulative impacts assessment is a fundamental requirement of the Biological Assessment. CEOE will work with the USFWS to evaluate the cumulative impacts to threatened and endangered species. The project would not be approved by USFWS until they are satisfied that an adequate assessment of cumulative impacts has been completed.

With respect to state sensitive species and species of concern (as listed in Table 5.5-1c of the AFC), they consist generally of waterfowl and shorebirds, raptors, and perching birds. Most of the waterfowl and shorebirds depend on the aquatic features and forage in the agricultural fields. Perching birds largely forage opportunistically in the agricultural fields (that were not historically present). Most of the raptors appear as winter migrants, foraging on insects, small birds and mammals in the agricultural fields. Burrowing owls, in particular forage on insects and small mammals in the agricultural fields, and many of these are probably resident birds. For those species that depend on aquatic features, the project would have no affect on the availability or extent of water available. For those species that forage in agricultural fields, the project would contribute a small but cumulative effect to the regional loss of available foraging habitat. However, within the available area of agricultural habitat (approximately 500,000 acres), the conversion of the project area would be less than 0.01%, which is considered cumulatively insignificant.

340. The AFC (Appendix K, p. 16-2) states that "[i]f practicable, the steam blow process will be scheduled to coincide with the nonbreeding season of the Yuma clapper rail." This does not rule out the chance that a steam blow may occur during the Yuma clapper rail breeding season (March through October), forcing rails to abandon their nests, which would constitute a significant impact to breeding birds that could directly affect the survival of the species.

Further, the typical noise level of a steam blow has been estimated at approximately 102 dBA (response to CEC Data Request 17, Table BIO 17C). Supposedly, the proposed use of a silencer would provide attenuation of the typical 102 dbA to approximately 58 dBA. The typical noise level during a steam blow is not, however, the relevant measure, rather it is the highest noise level generated during a steam blow.

a. Please provide the range of sound pressure levels generated by steam blows.

Response:

Steam blow noise levels were provided in the AFC and in response to previous data requests. Steam blow noise levels were provided in the AFC and in response to previous data requests (Response to CURE BIO 17 and Section 5.11.2.2.1 of the AFC).

b. Please state whether the applicant would be willing to accept a condition that steam blows can only occur during the nonbreeding season (November through February) and would be controlled with a silencer.

Response:

No.

341. Regarding potentially significant adverse impacts to birds from brine ponds, response to CURE Data Request 216(a)(1) states that "given a choice of waters of various quality, it is likely that birds and small mammals would choose to drink less saline water" and further in response to CURE Data Request 216(d) that "[t]here is no risk, because the brine will cause taste aversion and involuntary rejection."

In several instances, brine ponds associated with mining and other operations with high salinities (exceeding those of the proposed Project brine pond) attracted large numbers of migratory birds.[10] Many dead birds were observed in the ponds and bird mortality was directly related to the water stored in the brine ponds – the birds died from salt toxicosis. Birds did not necessarily die because they voluntarily drank the brine, but because when they landed, sludge and brine coated their feathers. They subsequently preened their feathers in an attempt to clean themselves, ingested some of the sludge and brine, and, as a consequence, died from salt toxicosis. Often, carcasses are removed by small predators, so the operator would not necessarily detect the dead birds. In other cases, dead birds have been found to sink quickly with carcasses accumulating at the bottom of the pond. These same observations have been made in oil field waste pits,[11] which are not a visually attractive place for birds to land either.

Because numerous federal and state listed endangered and threatened species are observed in the area, this issue should be of concern. Brown pelican, a federally listed endangered species, have in the past been observed by Refuge staff sitting at the banks of brine ponds associated with other geothermal facilities in the area.[12] Blue heron have been observed standing on the banks of the Leathers Plant utility pond, which is located immediately adjacent to the brine pond. At the same time, an American Coot was observed swimming in the utility pond.[13] The location of the utility pond adjacent to the brine pond and the observations of birds suggest that birds will not be deterred by the location of the brine pond amidst large industrial structures as had been previously suggested in response to CURE Data Request 216(a).

Considering the fact that bird casualties due to salt toxicosis have been observed at other similar brine ponds and that birds have been observed next to CalEnergy brine ponds in the past, please perform monitoring six months for at least 1 month during the peak migration season of the existing brine ponds at existing geothermal facilities in the area for use by birds. If birds are observed at or in the brine ponds, please perform a detailed risk assessment for birds and evaluate alternatives to uncovered brine ponds to deter birds from landing on the ponds, and provide all data supporting your assessment.

Response:

The Applicant stated at the biological workshop on January 9, 2003 that to its knowledge there had been no avian mortality associated with the brine ponds operated by the existing geothermal plants. The Applicant also stated in response to

CURE Data Request #216 that it was unlikely that wildlife would choose to land in the brine, given the relative abundance of other waters.

CURE provided as evidence two cases of birds entering ponds and suffering injury. These were for Searles Lake, located east of Ridgecrest, California in a dry lakebed, and oil field waste pits, located in Wyoming, Colorado, Kansas and Montana. The Applicant has reviewed each of these examples and feels they are not representative of the proposal at SSU6.

Searles Lake is a very large dry lakebed (approximately 10 miles wide by 20 miles long) within which are dozens of salt evaporators and salt ponds. Open water is approximately 1,000 acres and there are few alternative water sources in the vicinity that are not salt ponds. CDFG estimates that 500 birds per year may die of salt toxicosis in Searles Lake. (0.5 bird / acre). The species that are most common in Searles Lake are loons, grebes and waterfowl. By contrast the proposed brine ponds for the SSU6 project are about 1.5 acre (each), adjacent to a large industrial facility, and within a mile of the Salton Sea and numerous irrigation ditches.

The oil field waste pits differ in having oily water on the surface, which coats bird feathers with surfactant. From pictures posted on the referenced website, it appears these ponds are in a rural setting, at some distance from industrial facilities.

Neither of these cases is particularly similar to conditions proposed at SSU6. The brine bonds proposed are alternately dry, shallow, and very small relative to the Salton Sea and other similar bodies of water, and contain no vegetation and little or no invertebrates to attract birds. Unlike either the Searles Lake or oil waste ponds, staff at existing geothermal plants in the area report that they have not observed or collected dead birds around existing brine ponds.

Finally, the Applicant's consultants spoke with Mr. Tom Andersen of the Sonny Bono Wildlife Refuge. Mr. Andersen confirmed that P. Bless had asked him if he had observed any use of the ponds, and he replied that he saw a pelican near one once. CURE notes in its comments an American Coot swimming on a utility pond. A utility pond is not a brine pond. At present there is no evidence that birds use the existing brine ponds. Because the existing evidence does not indicate any hazard to birds from the proposed brine ponds, there is no basis to support monitoring at this time.

342. CURE Data Request 216 asked for references, surveys, and other information that support the claims that brine ponds do not pose a significant ecological risk to wildlife. The Response stated that "[w]hile insects are potentially more salt tolerant than vertebrates, they also have salt tolerances that are probably exceeded by the brine ponds."

These "probable" insect salt tolerances are not supported by the literature. Brine flies and salt marsh mosquitoes have been found to withstand much higher salinities than those predicted for the brine ponds. The brine ponds at the proposed facility will have total

dissolved solids ("TDS") concentrations in excess of 215,000 ppm; salt tolerant insect larvae have been found to withstand TDS concentrations up to about 350,000 ppm.[14]

Given the evidence from scientific studies that some insect larvae are capable of surviving in waters with higher salinity than the water in the proposed brine ponds, please perform a detailed assessment of the impact of contaminants accumulation in the food chain and an analysis of potential impacts on birds and bats due to dietary uptake of insects, and provide all data supporting your assessment.

Response:

CURE states that because some insect larvae can survive in elevated brine concentrations, a detailed effects assessment of contaminants accumulation in the food chain is appropriate. The Applicant notes that it would be unusual to find references, surveys and other information supporting a negative finding (e.g. "brine ponds do not pose a significant ecological risk."). On the contrary, the Applicant notes that their staff have not observed dead or dying birds in the ponds around the existing geothermal plants, and in the cases where ecological toxicity has been documented (such as Searles Lake above), there appear to be other environmental factors (such as a scarcity of alternative water) that are not characteristic of the SSU6 site. Without evidence that the brine ponds pose a risk to wildlife, the Applicant does not believe it is necessary to attempt to prove a negative case.

343. In response to CURE Data Request 219, the applicant "believes that there will be no dietary uptake of contaminants from the brine ponds by bats, as insects would be unlikely to survive and reproduce in the brine." As discussed above, insects may very well survive in the ponds and could thus provide a source of contaminated food through bioaccumulation to bats.

Given the evidence from scientific studies that some insect larvae are capable of surviving in waters with higher salinity than the water in the proposed brine pond, and as requested previously in CURE Data Request 219, please provide an assessment of the dietary uptake of contaminants by bats via bioaccumulation in insects, and provide all data supporting your assessment.

Response:

Dead bats have not been observed in or around the ponds, and there appears to be no evidence of salt toxicosis in bats in similar settings. CURE's conjecture that contaminants may be taken up by insects and consumed by bats does not appear to have supporting evidence. Therefore, unless there is some information so show that this pathway is plausible from the proposed brine ponds and potentially significant, the Applicant does not propose to prepare additional risk assessment information at this time.

344. Response to CURE Data Request 196 states that "the Applicant has already proposed to implement measures to avoid significant impacts to the pupfish." However, no specific

measures are proposed in the AFC that would mitigate potential project impacts to the desert pupfish.

Please point out the measures in the AFC that specifically address significant adverse impacts to desert pupfish during construction and from potential operational impacts, including from brine spills from pipeline leaks.

Response:

As indicated in the Biological Assessment for the project, no desert pupfish were observed in waterways near the project site in 1998, 2000, or 2002. The Applicant has proposed to route all pipelines over waterways so as not to disturb them during construction, and to implement spill control measures (such as double-walled pipe) to minimize the potential for spills into pupfish habitat. For these reasons, the Applicant believes that adequate mitigation is already proposed to avoid adverse impacts to desert pupfish.

345. The response to CURE Data Request 198 states that "rarely are burrowing owls observed as road-kill." This statement is contrary to observation by Refuge employees,[15] who frequently observe burrowing owls as road-kill along McKendry Road and other roads in the immediate vicinity of the proposed plant site.

(a) Please provide an analysis of potential impacts to burrowing owl and identify mitigation measures to prevent road-kill of burrowing owls during project construction and operation.

Response:

CURE contends that burrowing owls are frequently observed as road-kill along McKendry Road. The Applicant is concerned about the burrowing owl and its continued survival. The Applicant notes that burrowing owls were not detected during field surveys along McKendry Road between the plant and OB3, although they may occur there from time to time. The Applicant suggests that mitigation measures that have been implemented in similar power plant projects would minimize the potential for injury to burrowing owls from the SSU6 project. Such measures include Worker Environmental Awareness Training, a speed limit for construction vehicles of 15 mph, a proposal to relocate nests that are in the construction areas prior to construction, and a requirement for reporting wildlife mortality. The Applicant believes that implementation of mitigation measures will reduce potential adverse impacts to less than significant.

346. Burrowing owls are noted for their ability to co-exist with man and frequently use man-made structures. For example, during preconstruction surveys, a burrowing owl was observed using a plastic duct along the proposed transmission line route (AFC, Photo 22, p. 5.5-63). During construction of the plant, various hollow construction materials such as pipes and ducts would be stored on site for varying time periods, allowing burrowing owls to use these objects unless they are enclosed, capped, or elevated off the ground

so they are not accessible. This could result in inadvertent killing of individual birds when the materials are moved.

(a) Is the applicant willing to accept a COC that requires measures to make hollow construction materials such as ducts and pipes inaccessible for use by burrowing owls, (e.g., caps, elevating off ground, enclosure)? If no, please explain why not.

Response:

CURE is concerned that owls may occupy pipes and ducts that are left open. The Applicant believes that mitigation measures implemented in similar projects are sufficient to reduce the potential for injury to owls. Mitigation measures used for similar projects include a requirement to cap or inspect open pipes and ducts prior to installing equipment. The Applicant is willing to implement this measure to minimize potential adverse impacts to burrowing owl.

347. The AFC provides estimates of bird abundance in the greater project area based on so-called avian flyover analyses (AFC, Appendix K, p. 3-8 ff.). These surveys were performed to determine how many birds are potentially at risk from new facilities and transmission lines. The AFC does not provide a detailed description of the methodology, e.g., date or time of day, distance, observation angle, etc. Many migratory birds use the Salton Sea as a stopover or wintering ground. Thus, the number of birds observed will vary considerably depending on the time of year the survey is conducted. Further, many migratory birds fly at night and will not be counted by daytime flyover analyses. Surveys designed to assist in predicting the risk to birds should therefore include seasonal as well as night-time components.

(a) Please provide a detailed description of the flyover survey methodology including the survey protocol, survey dates and time of day, observation distance or angle, etc.

Response:

CURE requests a detailed description of the flyover surveys. The following information is provided in the July 11, 2002 Biological Assessment:

"In 1994 Ogden developed the survey protocol for the avian flyovers with the assistance of the USFWS, and with the approval of the California Energy Commission staff. Starting at sunrise, approximately five predetermined stations within the project area were visited each survey day. Flyover surveys *at each station lasted 30 minutes, during which the species, direction, and approximate height of all shorebirds and waterfowl flying over a specific area were recorded. When a determination of species was not possible, birds were grouped into categories (e.g., terns, gulls, ducks, etc.). Flight elevation was estimated and grouped into three elevation categories: low (<75 feet), medium (75-150 feet), and high (>150 feet). These elevation categories are based on existing and proposed electrical transmission lines, and are determined to reflect potential hazards to waterfowl and shorebirds. Existing electrical*

transmission lines in the study area are 40 to 60 feet above the ground, and new electrical transmission lines proposed for the project are expected to be 100 to 125 feet above the ground.

Data collection was restricted to waterfowl and shorebirds that were observed moving from resting areas to inland foraging areas or from foraging areas to resting areas, potentially placing them at risk from new *facilities and transmission lines placed in the study area. Birds observed foraging along the shore, making short flights between the sea and immediately adjacent foraging habitat, traveling along the shoreline, or circling over the sea were recorded but not included in the data analysis as flyovers.*

Following a flyover survey at a given station, URS biologists assessed the abundance of waterfowl and shorebirds and any sensitive species in the study area. A predetermined survey route that included all proposed well pads, the power plant site, and the transmission line, each with a 1,000-foot buffer zone, was traveled by vehicle, with periodic stops to scan and count for birds. Only birds that were present at the beginning of the count were recorded. Habitat-type and agricultural or other human activities were recorded, as well as the presence or absence of water in foraging areas. Weather conditions and time spent surveying at each station were also recorded. Field observations were made with binoculars and spotting scopes when necessary. Results of this analysis are for the elevations that are relevant to the SSU6 Project (75-150 feet) and are displayed in Figure 9. All survey data is available in Appendix A."

Bird diverters may be installed in strategic locations along the transmission line routes to make the lines more visible to birds. This measure is expected to reduce the number of bird casualties associated with the new transmission lines.

(b) Please provide an assessment of the potential risk from new facilities and powerlines to birds that fly at night and all data supporting your assessment.

Response:

There are few studies of bird collisions with power lines at night. Generally night-time migrations occur at higher altitudes and therefore do not contact typical power lines except in elevated areas and mountain passes. Where birds migrate through a mountain pass, they may fly close to the ground and therefore encounter windmills, power lines or similar obstacles. The Applicant will continue to investigate whether there are any reliable data on this.

348. Brown pelicans, a federally listed endangered species, as well as many other bird species, have frequently been found dead along power lines. In the past, up to three dead birds per week have been found along one power line, located near the Union Pond. Refuge staff also reported frequent finds of dead birds under other power lines, e.g., along Sinclair Road.[16] Of particular concern is the L-Line interconnection within less than 1000 feet of the shoreline (Figure 5.5-1A). A small marsh area at the shoreline where birds are loafing is located where the transmission line comes closest to the shore. Refuge staff has expressed concern about avian collisions in this area,[17] especially for pelicans, which require a long distance to take flight. The AFC proposes that "bird flight

diverters will be installed … [i]n [seven] locations where the number of birds flying perpendicular to the proposed line exceeded 30 individuals." No other mitigation measures were proposed.

(a) Response to CURE Data Request 211(e), regarding the proposed mitigation measure to "under-build" transmission lines, claimed that "IID transmission facilities (161 kV) do not allow for under-built distribution or communication circuits." Please explain why IID transmission facilities do not allow for under-built construction of power lines.

Response:

The 161 kilovolt transmission circuits are spanned for distances on average of 600 feet or greater depending on the structure. Under built distribution or communication facilities are generally short span, 250 feet or less. In general this would require inter-setting poles to maintain span tensioning, ground clearance and drop off points for distribution or communication facilities.

(b) In the past, the IID proposed to install orange markers between pole spans and stated that "if these measures do not stop 100 percent of the bird mortality, the District will install the distribution line underground."[18] Please evaluate the alternative of placing the L-line interconnection underground. Please support your answer with both an engineering and cost analysis for both the proposed and alternative configurations.

Response:

Where IID has had confirmed incidents of bird mortality due to contact with conductors, it has taken action to place diverters and or increased phase to phase circuit separation that have proven successful in mitigating bird mortality.

349. The electrocution of raptors and other large perching birds is a well studied hazard of overhead transmission lines. Electrocution hazards can be greatly reduced through modifications to existing design standards. The location of the proposed transmission lines associated with the Project in an area of high use by a large number of federal and state endangered, threatened and rare bird species requires the evaluation of electrocution hazards due to power lines and the proposal of feasible mitigation measures.

Electrocution hazards for perching birds are related to phase-to-pole top clearance and the material of the pole construction, e.g., wood versus steel, concrete, or fiberglass poles. Several mitigation measures exist to reduce the number of casualties related to electrocutions associated with powerlines. These measures include installation of plastic pole-top caps, installation of fiberglass pole-top pins to increase the phase-to-pole top clearance, replacement of steel crossarms on steel poles with wood or fiberglass crossarms to reduce conductance, installation of perch guards, and insulation of phase-to-ground clearance on steel poles with thermoplastic polymer wrapping, or providing a better place to land.[19]

Further, studies show that wind direction relative to powerline crossarm orientation affects the probability of electrocution of raptors which perch on top of the poles: "Crossarms mounted perpendicular to the wind allow raptors to easily soar away from the structure and attached wires. Raptors taking off from crossarms mounted parallel to prevailing winds can more easily be blown into energized conductors. Wind orientation presumably places inexperienced fledgling birds at greatest risk." (Harness 2000[20]). Prevailing winds at the plant site blow from west and west southwest (AFC, Figure 5.1-2). The proposed L-line interconnection runs parallel to and in parts within 1,000 feet of the Salton Sea shoreline, thus positioning the crossarms parallel to the prevailing wind direction.

(a) If the Applicant suggests that undergrounding is not feasible, please provide an assessment of raptor casualties from electrocution as a result of the proposed transmission line poles and provide all data supporting your assessment.

Response:

The Applicant has reviewed the information provided by USFWS on bird collisions with power lines. In all cases where collisions were detected, bird flight diverters were effective at eliminating further casualties. Also, IID agrees to build according to "raptor-proof" guidelines issued by APLIC, to reduce the potential for mortality.

(b) If the Applicant suggests that undergrounding is not feasible, please detail all mitigation measures the applicant is willing to accept as conditions of certification to prevent raptor casualties related to the proposed powerlines.

Response:

The Applicant proposes that all electrical transmission lines will be built to current "raptor-proof" standards and that selected locations where bird hazards were identified would have bird flight diverters installed.

(c) Please provide an analysis of an alternative routing of the L-line interconnection to reduce the likelihood of impacts on birds.

Response:

The Applicant and IID believe that the proposed route provides adequate protection to local wildlife.

350. The applicant proposes to defer development of mitigation plans for various impacts to some time in the future. The AFC (Appendix K, p. 16-2) states that a "construction noise assessment will be conducted during final design to determine practicable mitigation measures to minimize noise impact to occupied clapper rail habitat." Further, response to CURE Data Request 211(d) regarding avian collision and/or electrocution associated with transmission power lines states that a "monitoring plan *may* be developed." (Emphasis added.)

This approach is problematic for several reasons. The deferral of developing a mitigation plan until the project is approved removes the California Energy Commission from its decision-making role. Further, impacts should be considered at a point in the planning process where real flexibility remains. The development of a mitigation plan cannot be deferred until the final design of the plant.

(a) Please provide a mitigation plan for impacts due to construction noise on Yuma clapper rail.

Response:

The Applicant will prepare a Biological Resources Mitigation Implementation and Monitoring Plan (BRMIMP) once the project is licensed, and after the project's final design is completed. The BRMIMP will include the construction noise mitigation measures requested, and the plan will be submitted to the California Energy Commission's Compliance Project Manager, California Department of Fish and Game, and the United States Fish and Wildlife Service for review, comments, and approval. If these reviewing agencies determine that the monitoring or mitigation measures identified in the BRMIMP are not adequate to protect biological resources, then they can request additional measures be included in the BRMIMP prior to approval. The timing of the BRMIMP development and submittal therefore provides the applicable agencies with the necessary flexibility identified by CURE to protect important biological resources.

(b) Please provide a monitoring plan for avian collision and/or electrocution due to transmission lines.

Response:

See the response to Data Request #350a.

351. Obsidian Butte serves as a quarry for the Imperial Irrigation District. Brown pelicans have in the past attempted to nest on the islands off of Obsidian Butte.[21] Proposed well pad OB3 is located close to the quarry. Construction as well as operation of the well pad will increase the level of disturbance at the pelican nesting site, e.g., through increase of noise. The AFC does not contain a description of the quarrying activities.

(a) Please provide baseline information about current IID quarrying activities at Obsidian Butte including volume of rock quarried, frequency of use, noise levels, etc.

Response:

The proposed location of Production Well Pad OB3 and associated 300-foot by 700-foot grading footprint is on the south side of Obsidian Butte in the eastern half of Section 32 (Figure 3). The IID actively mines this area for rocks used as riprap to line the roads adjacent to the Salton Sea. The well pad will be located on a level portion of Obsidian Butte in an area previously disturbed by the IID. Desert sink scrub

consisting of iodine bush (*Allenrolfea occidentalis*) and desert holly (*Atriplex hymenelytra*) surrounds the study area outside the limits of grading of the proposed well pad site.

Construction of a pipeline between Production Well Pad OB3 and the power plant site would affect wetlands over which the Corps has jurisdiction pursuant to Section 404 of the Clean Water Act. Placing Production Well Pad OB3 on Obsidian Butte requires widening the access road to Obsidian Butte in order to accommodate the transportation of drill rigs to the well pad, and construction of a pipeline connecting wells on OB3 to the plant.

The existing roadway between the west end of McKendry Road and Obsidian Butte is used to provide service to a gravel pit located on Obsidian Butte. The road width is approximately 10 feet, and varies along its length. In order to provide a route for the drilling rigs that would be required to construct the two production wells located on Obsidian Butte, the road would be widened by approximately 15 feet, providing a 25-foot wide road surface. The widening would occur along the south side of the existing road with standard civil construction equipment, including dump trucks, bulldozers, compacting machines and grading machines.

Installation of the pipeline would require installation of approximately 20 pipe supports along a 600-foot distance (one support every 30 feet) on the south side of the widened road. The pipe supports are anticipated to be 12 feet wide and constructed of steel. Each support would be elevated above grade, supported by two piles, each approximately 14 inches in diameter. One of each pair of piles would be driven along the road slope and the other driven directly in the water. Construction of the pipeline would require cranes, a pile driving machine, fork-lifts, welding machines and small trucks.

The pipeline corridor for Production Well OB3 on Obsidian Butte would cross a brackish marsh that is occupied by Yuma clapper rails. No desert pupfish were detected in this portion of the marsh during several recent surveys (Table 4). Minor impacts to the marsh and these species are expected to result from the installation of a series of piers that will support the pipeline crossing of the marsh. Some of the other agricultural drainage channels that will be crossed by the pipelines associated with the injection wells are vegetated with cattails and common reed and have the potential to support clapper rail. However, no clapper rails were detected in any of these channels during surveys.

(b) Please assess the potential impact of well pad OB3 construction and operation on brown pelican nesting, and provide all data supporting your assessment.

Response:

Please see the response to CURE Data Request #335b.

352. Brine pipelines are under pressure and a spill could conceivably spurt from the pipeline into the wetland. A recent spill of geothermal brine occurred on the night of January 7th to 8th from the pipeline to one of the injection wells located at the edge of the Refuge between Garst and Hatfield Roads between the Leathers and Elmore plants. The dimension of the area affected by the spill was estimated at the time at 5 feet by 100 feet.[22] During the "data response and issues workshop" on January 9, 2003, the applicant indicated that the double-lined section of the pipeline is designed with small overlap into the areas adjacent to the wetland. Depending on the length of this overlap and the pipeline pressure, it is conceivable that a break of the single-walled pipeline close to the wetland could result in brine fluid spouting from the leak into the wetland.

(a) Please provide to-scale drawings of the pipeline segment that runs from well pad OB3 to the plant site. The drawing should precisely locate the wetland area.

Response:

Please see Attachment CDR-352.

(b) Please provide an estimate of wellhead pressure and pipeline pressure decrease with distance from the production well and with distance from the facility for injection well pipelines.

Response:

The pipelines typically operate at a pressure between 350-400 psig, with a maximum pressure of 550 psig.

(c) Please estimate the area affected by a spill from a typical and worst-case pipeline break. Please support your estimate with engineering calculations and references to all assumptions. Please provide all data, assumptions and calculations that you use to support your answer.

Response:

Please see response to CEC Data Request #24, which does reflect a reasonable worst case scenario given the inherent design features and safety mechanisms of the pipeline.

353. Response to CEC Data Request 24 describes the technologies and procedures that will be in place at OB3 and along the OB3 pipeline to reduce spill volume. This response states that the 25-second response time of the proposed pressure control valves along the pipeline would limit the discharge to 1,050 gallons before full containment is achieved. The response also states that the total entrapment capacity of the outer pipe is 9,680 gallons. Please provide the following additional information on spill control procedures:

(a) Please present an engineering calculation that supports the estimated 1,050 gallon maximum spill for OB3. Identify all assumptions and include all information that supports your answer.

i. Does this spill volume only apply to the segment of OB3 that crosses the wetlands or does it apply along the entire length of OB3?

Response:

The discharge from the pressure control valve is estimated by assuming a well flowrate of 1500 klbs/hr, and that the valve requires 25 seconds to close. Assuming the valve closure rate is linear in time, a total of 5.25 klbs of fluid would discharge from the valve in 25 seconds, or 533 gallons. The remaining discharge comes from fluid stored in the pipe between the valve and rupture point. The spill volume will vary depending on the point of rupture, but the discharge from the well itself prior to complete valve closure will remain the same.

ii. Does this spill volume apply to other pipelines? If your answer is yes, which ones?

Response:

Yes. The spill volume applies to all pipelines with the same installed pressure control valves and pipeline diameters.

iii. Please resolve the discrepancy between the estimated maximum of 1,050 gallon spill and the actual spill sizes documented in CDR-95.

Response:

The conditions that resulted in the values presented in CDR-95 are unknown and not relevant to the proposed solution. Several criteria might have been significantly different (valve response time, pipe length) that could explain the discrepancy. The Applicant believes that the comparison is not relevant.

iv. Will the Project be designed to prevent large spills, such as those documented in CDR-95? If your answer is no, please explain why not. If your answer is yes, please describe all design features that will be included in the Project to prevent releases larger than 1,050 gallons.

Response:

Please refer to Response to Data Request #24 for a discussion of the proposed technology that results in a release below 1,050 gallons.

(b) Please present an engineering calculation that supports the estimated 9,680 gallon total entrapment capacity of the outer pipe. Identify all assumptions and include all information that supports your answer.

Response:

The volume calculation is based on an outer section (36" diameter) minus an inner section (30" diameter) over a length of 600 ft.

(c) Please provide a piping and instrument diagram ("P&ID") of the OB3 pipeline that shows all of the valves, flanges, tees, turns, headers, double-walled pipelines, containment chambers, and any other design features that may affect the spill volume anywhere along the pipeline. If other pipelines differ significantly from OB3, please also provide a P&ID diagram for a typical section(s) of pipeline elsewhere in the facility.

Response:

P&ID's are subject to final design and are not available at this stage to support the answer. Please refer to Response to Data Request #24 for a verbal description of the operation of the valves.

(d) Response to CEC Data Request 24 states that Rexa actuator-controlled pressure control valves would be used to limit the size of a spill. Please provide vendor data sheets that describe these valves and support their 25 second response time.

i. Will these valves be used only in the portion of the OB3 pipeline that crosses the marsh?

ii. If the answer to subpart (i) is no, please identify all other locations that will use 25-second pressure control valves.

iii. If the answer to subpart (i) is no, will these valves be uniformly spaced along pipelines? If your answer is yes, what is the typical distance between 25-second shutoff valves? What is the maximum distance between 25-second shutoff valves?

Response:

The 25 second response time of these REXA actuator-controlled pressure control valves is based on actual observed performance data at the Salton Sea field. These valves are a standard design component for current Salton Sea production wells. For the SSU6 project, this same pressure control valve technology is intended to be standardized at all of the new production wellheads. The actual distance between these valves is the same as the actual SSU6 wellhead spacing.

354. The OB1 and OB2 pipelines are very close to sensitive habitat within the Sonny Bono National Wildlife Refuge. In the workshop on January 8, 2003, the applicant claimed that spills from these pipelines would not affect the Refuge or the Salton Sea. Please support this claim by providing the following information:

(a) Please identify all barriers, if any, between the pipelines and sensitive habitat including the Refuge, the Salton Sea and agriculture that would prevent spills from reaching such sensitive habitat.

Response:

As in our current project and all geothermal projects pipeline spills are more effectively contained at the source.

(b) The pipelines are pressurized. Please provide the average and maximum pressures expected in all pipelines, the rate of decrease of pressure as a function of distance from the wellhead, and an estimate the area that would be affected by a release from three typical-sized leaks and a worst case scenario along each pipeline segment.

Response:

The pipelines typically operate at a pressure between 350-400 psig, with a maximum pressure of 550 psig.

(c) Please evaluate alternate OB1 and OB2 well locations and pipeline routes, to avoid proximity to sensitive habitat.

Response:

Because, per the Applicant's analysis as set forth in the AFC, there are no significant impacts from the location of these facilities, no alternatives are analyzed.

(d) Would the applicant be willing to relocate wells and pipelines related to OB1 and OB2 to avoid significant impacts of brine spills to sensitive habitat? If your answer is no, please support your answer.

Response:

It is the Applicant's belief that the environmental impacts associated with the entire project are either less than significant or will be mitigated to level of less than significant through the application of the proposed mitigation. Therefore, the need to relocate well pads OB1 and OB2 is unnecessary.

355. Federal and state endangered desert pupfish have historically been found in agricultural drainage ditches and laterals around the project site. A brine spill above or close to these locations could potentially wipe out populations of desert pupfish.

(a) Please provide an explanation of why the proposed pipeline is only double-walled where it crosses the wetland but not in other sections.

Response:

Pipeline leaks are very local in nature. Any leaks in a pipeline that crosses a wetland would drain into the wetlands due to gravity. If the pipe is not directly over the wetlands, any leak will not immediately drain into the wetlands and other mitigation is more effective.

(b) Please calculate and describe the worst-case brine spill. Support your statement with engineering calculations including flow rate, pipeline diameter, length between shut-off valves, response time of valves, shut-off time of valves, etc.

Response:

Please see response to CURE Data Request #352c.

356. Response to CEC Data Request 17 provided noise levels for a variety of construction-related activities and equipment (Tables BIO 17A through 17C). However, noise levels were not provided for all equipment listed in the AFC (AFC, Table 3.4-1). Further, the tables provided typical sound pressure levels only, not ranges. These typical values were selected from a 1971 EPA study and an unidentified study by Barnes et al. 1976. The relevance of using studies that are almost 30 years old is questionable as the design and size of construction equipment has since changed considerably. For example, Table 3.4-2 shows the use of 45, 60, 140, and 230 ton cranes for construction; Tables BIO 17A through 17C only provide noise levels for 11 to 20 ton-cranes.

(a) Please provide a copy of the Barnes et al. 1976 study.

Response:

This reference is in the public domain and can be acquired by CURE.

(b) Please provide ranges of sound pressure levels for all construction equipment.

Response:

Noise levels from construction activities have been presented in several formats as previously requested (in ranges and as typical). The noise levels presented cover the complete range of anticipated equipment levels - that is, any equipment that has not been specifically identified will most certainly have a noise level that falls within the range of data previously submitted. These values represent the extent of data available for construction activities.

(c) Please provide ranges and typical sound pressure levels for all equipment listed in AFC Table 3.4-1 not currently included in response to CEC Data Request 17.

Response:

See the response to Data Request #356b.

(d) Is the applicant willing to accept a COC that requires the use of construction equipment that meets the noise levels assumed in the construction noise impact analysis? If your answer is no, please explain why not.

Response:

As stated above, the noise levels predicted from construction are based on the best available data. The Applicant believes that the predicted noise levels are consistent with the noise levels occurring in the area due to agricultural activities and will not constitute a significant increase in noise levels warranting the acceptance of additional mitigation measures.

357. The Project infrastructure, including wells and transmission lines, would facilitate predator access to Union Pond, the Salton Sea shoreline, rookeries in the vicinity of Obsidian Buttes, and other sensitive areas by providing elevated perches that could be used for hunting. Please evaluate the impact of increased predation from elevated perches on all threatened and endangered species, and provide all data supporting your assessment and recommend mitigation to reduce the impact.

Response:

The Applicant disagrees with the premise that the project infrastructure will significantly affect predator access to Union Pond. We note that Union pond and the Salton Sea shoreline. Each of these areas is currently surrounded by dirt roads, and is easily accessible to vehicles and animals. The addition of the pipes and well pads would provide no enhanced access. With respect to transmission lines, the commentor will note that transmission lines are routed south and east from the power plant, approaching neither Union Pond or Obsidian Butte. The Applicant would note that the region is already abundantly crossed by transmission lines and power poles, and the additional perching opportunities, if any are an immeasurably small addition to the existing perching sites. There is no evidence that supports the premise provided by the commenter.

References:

Anderson, B.W., and R.D. Ohmart. 1985. Habitat use by clapper rails in the lower Colorado River Valley. Condor 87: 116- 126

Anderson, S.H. 1983. Yuma Clapper Rail Recovery Plan. US Fish and Wildlife Service. Coachella Valley Multiple Habitat Species Conservation Plan. Yuma Clapper Rail\MSHCP - Yuma clapper rail.htm

Arizona Game and Fish Department. 2001. *Rallus longirostris yumanensis.* Unpublished abstract compiled and edited by the Heritage Data Management System, Arizona Game and Fish Department, Phoenix, AZ. 8 pp.

Hazardous Materials

358. The AFC does not provide a complete analysis for facility-upset conditions upstream of the hydrogen sulfide (H2S) control equipment. Uncontrolled steam (containing high concentrations of gases such as H2S and ammonia (NH3) releases are not uncommon at geothermal power facilities, whether from emergency relief venting or equipment failure.

Response to CEC Data Request 51 contained an analysis of one potential upset condition. This particular release scenario does not represent a potential worst-case release as it relies on active mitigation (pressure detection and a bypass valve) to minimize the duration of the release to less than one minute. As shown in Figure 1, there is a relatively high probability that the active safety system would fail on demand.

The Environmental Protection Agency (EPA) under the Risk Management Program (RMP) allows only passive mitigation measures (e.g., dikes, physical vapor barriers, etc.) to be considered, while active mitigation measures (i.e., those systems that rely on automatic detection and control) are assumed to fail. As shown in Figure 1, the automatic bypass system would have approximately a 17 percent chance of failing on demand, just based on the failure rates for the main system components. The actual failure probability could be higher as more components are considered in the fault tree analysis.

(a) Please provide a complete set of Piping and Instrumentation Diagrams (P&IDs), Process Flow Diagrams (PFDs) and Material Balances for all portions of the facility between the production and injection wells, including but not limited to all piping associated with the following areas identified in AFC Figure 3.1-3:

- Production Wells and Pipelines
- Brine/Steam Handling
- Power Generation
- Heat Rejection System

Response:

The P&ID diagrams requested by CURE will be available when the final design phase of the project is completed, which is scheduled to be completed sometime after the CEC licensing.

(b) Please prepare a Hazard and Operability (HAZOP) study for the proposed facility to identify potential release scenarios and facility failure modes. The HAZOP study can be based on preliminary facility design or on as-built drawings for a similar facility.

Response:

The Applicant will prepare all required HAZOP studies on such a schedule as to comply with the applicable regulations and Conditions of Certification (contained in the Commissions Final Decision for the project).

(c) Please provide an analysis of accidental release scenarios for planned and unplanned geothermal steam venting, as well as an estimate of equipment failure rates for each component that could fail and release geothermal steam prior to or during H2S removal. The analysis should consider the hazards associated with H2S and NH3. Please provide all justification for your analysis, including all data and release rates. Planned and unplanned steam venting rates should be based on industry observed rates and the operational performance of similar units. For equipment failure rates, industry specific component failure rates should be used where available. Otherwise, component failure rates from such sources as the American Institute of Chemical Engineers (AIChE) and Center for Chemical Process Safety (CCPS) could be used, adjusted upward to account for the corrosive environment at this facility. It is suggested that scenario failure probabilities be estimated using Fault Tree Analysis (FTA) or some other similar technique.

Response:

Please refer to the response to Data Request #358b.

Attachment CDR - 276

Attachment CDR - 291

Attachment CDR - 292

Attachment CDR - 294

Attachment CDR - 305

Attachment CDR - 317

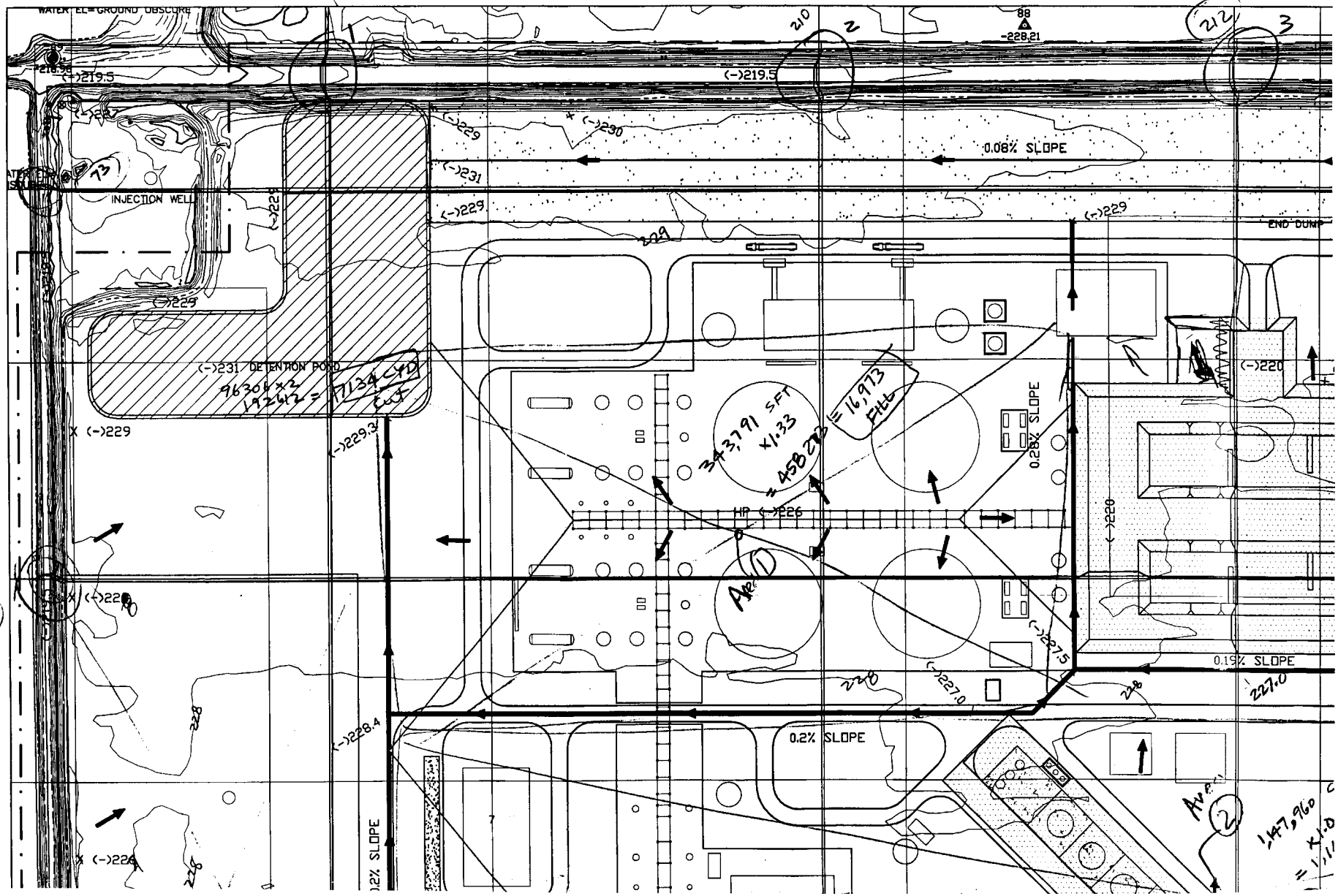
Attachment CDR - 322

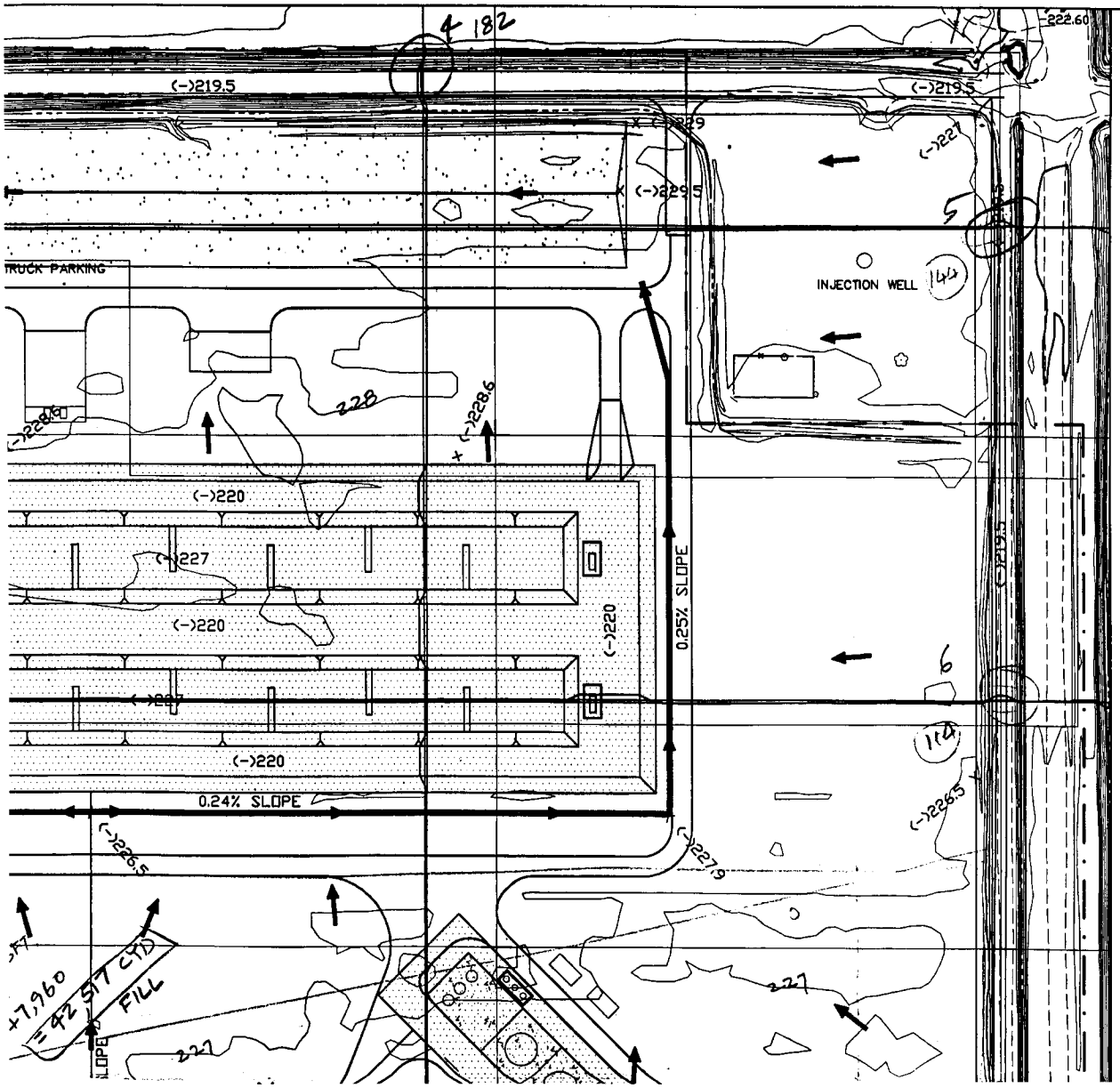
Attachment CDR - 325

Attachment CDR - 328

Attachment CDR - 352

Attachment
CDR-276


WATER EL=GROUND OBSCURE
(-)219.5
(-)219.5
(-)229
(-)230
0.08% SLOPE
(-)231
(-)229
INJECTION WELL
(-)229
(-)229
END DUMP
(-)229
(-)231 DETENTION POND
(-)229
(-)229.3
(-)220
0.28% SLOPE
HP (-)226
(-)220
(-)227.5
0.19% SLOPE
(-)227.0
0.2% SLOPE
(-)228.4
0.2% SLOPE
(-)226
(-)226
-228.21
343,791 SFT
x1.33
= 458,272
= 16.973 Ac
Area D
Area 2
147,960
x1.0
= 1,11



NORTH

1 – 160
2 – 210
3 – 212
4 – 182

= 191 × 2545 = 486,095

EAST

5 – 144
6 – 104
7 – 198

= 148.67 × 1428 = 212,296

SOUTH

8 – 234
9 – 251
10 – 182
11 – 223

= 222.5 × 2545 = 566,263

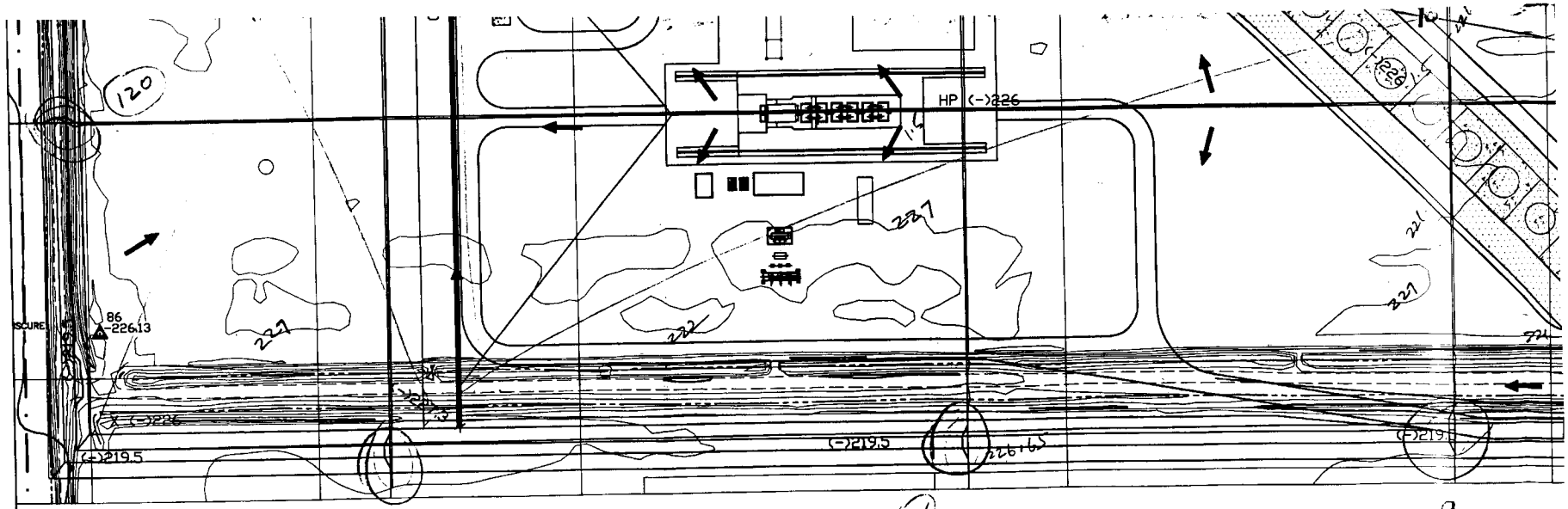
WEST

12 – 120
13 – 115
14 – 73

102.67 × 1428 = 146,608

= 1,411,262 CFT

= 52,269 CYD



PLOT PLAN

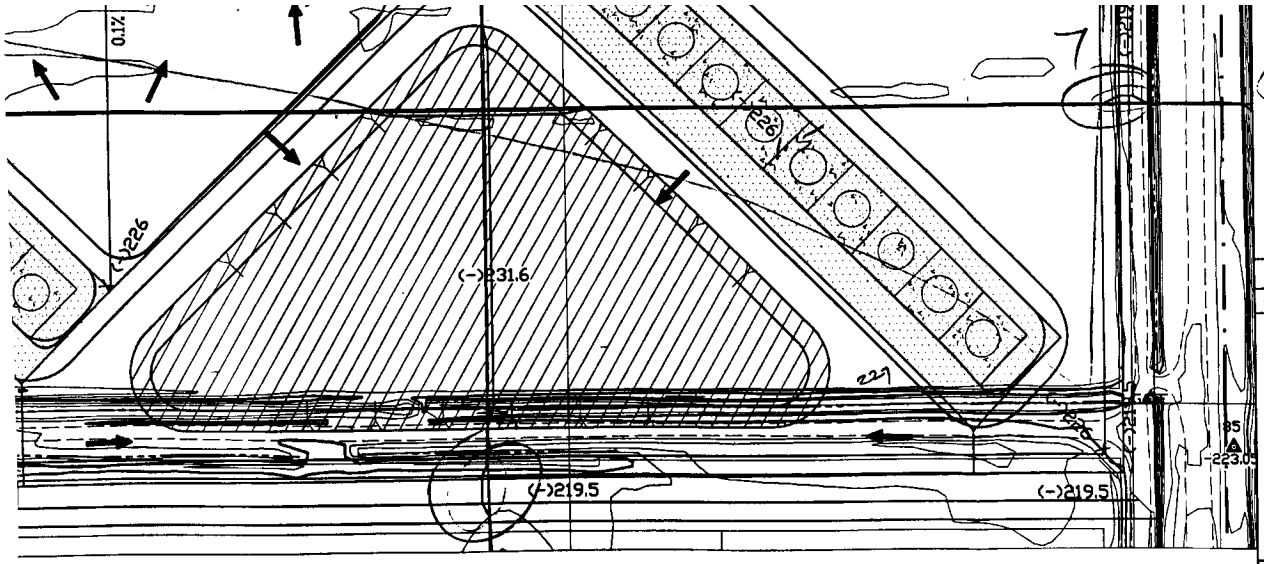
TOTAL AREA (DIKE TO DIKE)	3,808,862
TOTAL AREA OF ROADS (BLACKTOP)	298,422
TRUCK PARKING AREA (BLACKTOP)	251,410
PLANT CONCRETE AREA	404,602
COOLING TOWER AREA	73,920
DETENTION POND AREA	70,358
WATER POND AREA	136,354
BRINE POND AREA	92,640

1904431

1904431 SFT = 70,534 CYD (cut) 6" TOP SOIL

420

130



229 8

REV.	DESCRIPTION	PREP	CHK	DATE
A	ISSUED FOR APPROVAL	JOY	DPB	2/12/02

Bibb and associates
A KIEWIT COMPANY

EPC
CONTRACTOR

CAL ENERGY
OPERATING CORPORATION
A MIDAMERICAN ENERGY HOLDINGS COMPANY AFFILIATE
7030 GENTRY ROAD
CALIPATRIA, CALIFORNIA 92233

SALTON SEA UNIT 6

PLOT PLAN ON TOPO MAP
145 ACRES
ROUGH GRADING PLAN

1:0
.5
32.5

7134 +
5116
12250

+32.5 / 2 × 1700 = 138125
Cut = 5116 CYD

N

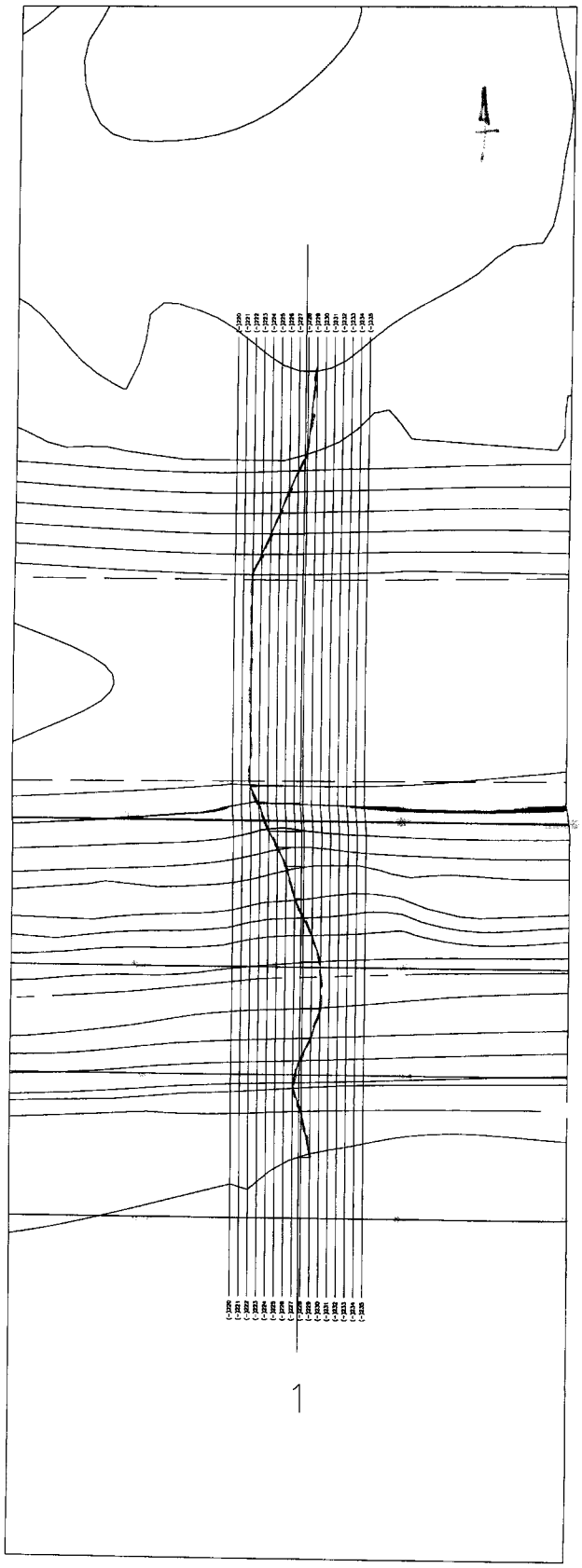
GRAPHIC SCALE
150 100 50 0 50 100 150 250 500
1"=100'

	by	date
DESIGNED	CAH	1/28/02
DRAWN	JOY	1/28/02
CHECKED	DPB	1/28/02
APPROVED	---	1/28/02

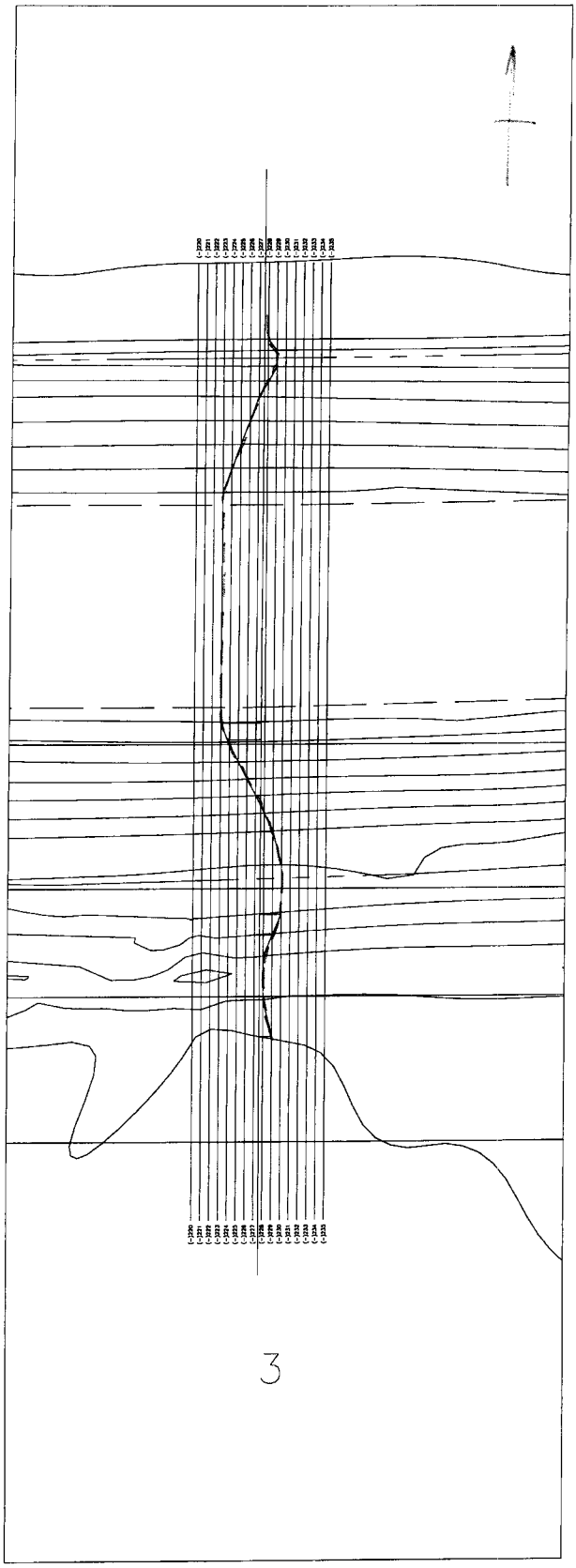
SHEET
— of —

DRAWING NUMBER
21-043-SD-SK4A

SAVE FOR Cut & Fill C


1

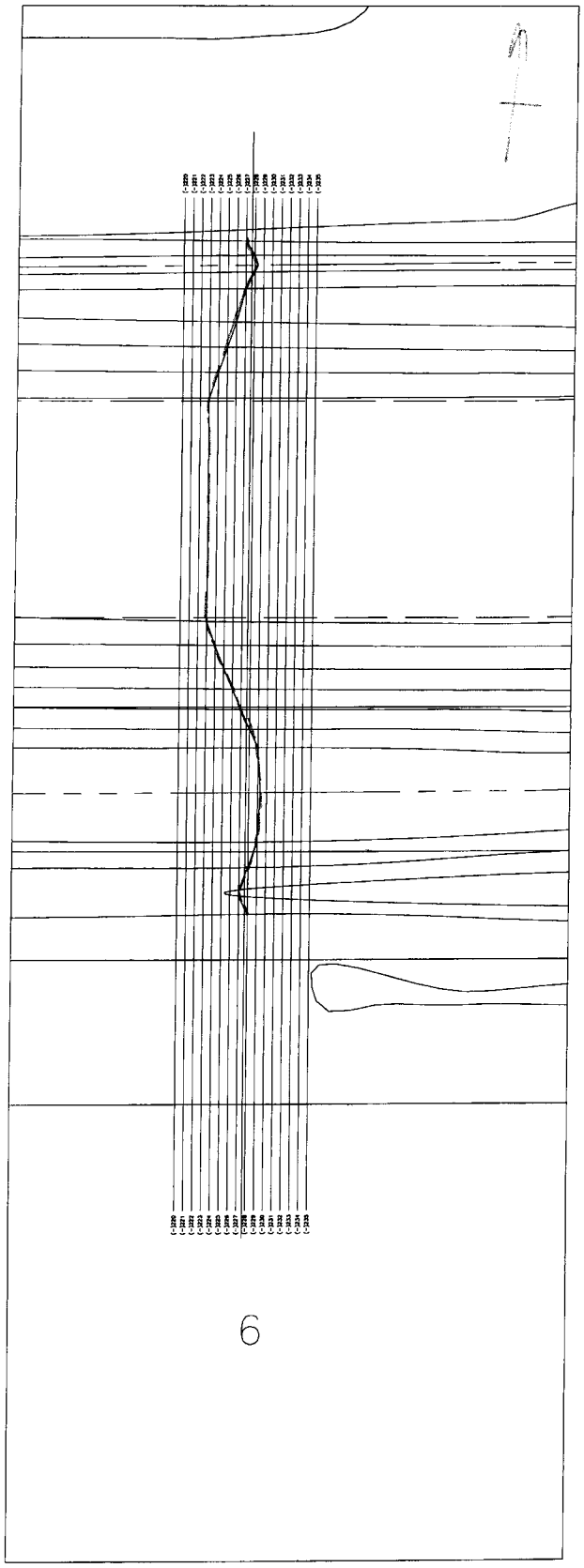
4
2



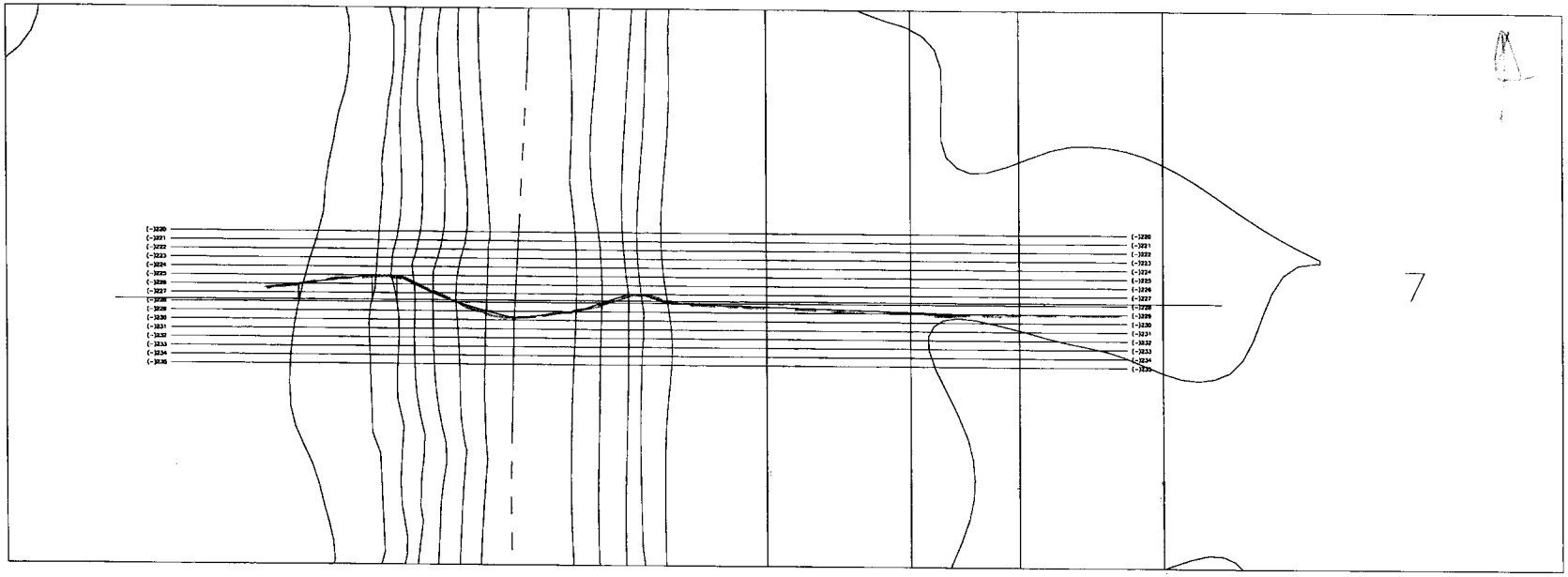
3

4

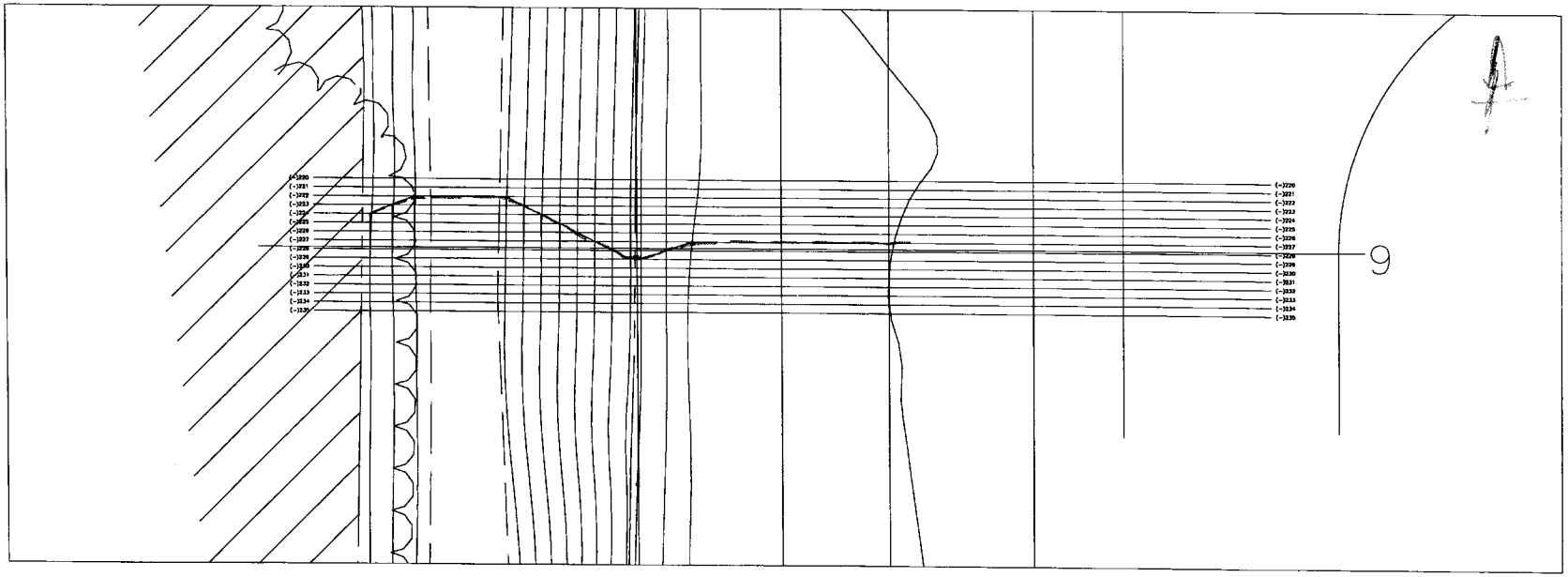
5

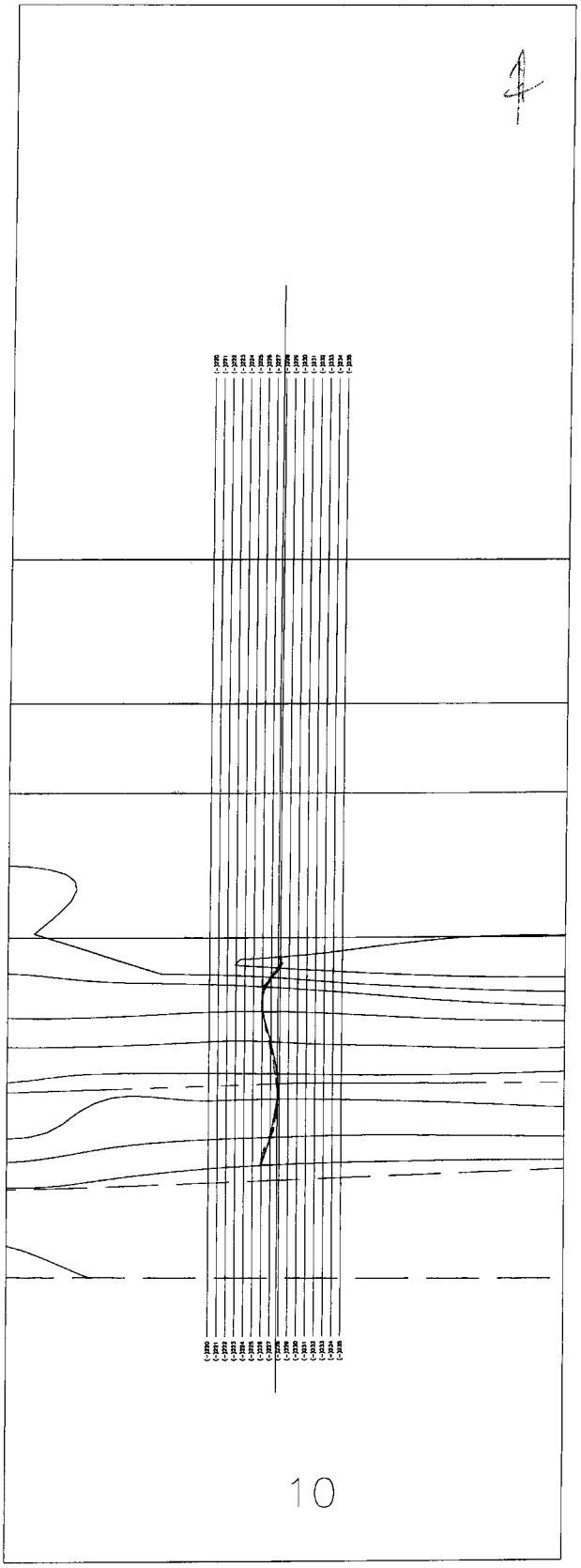


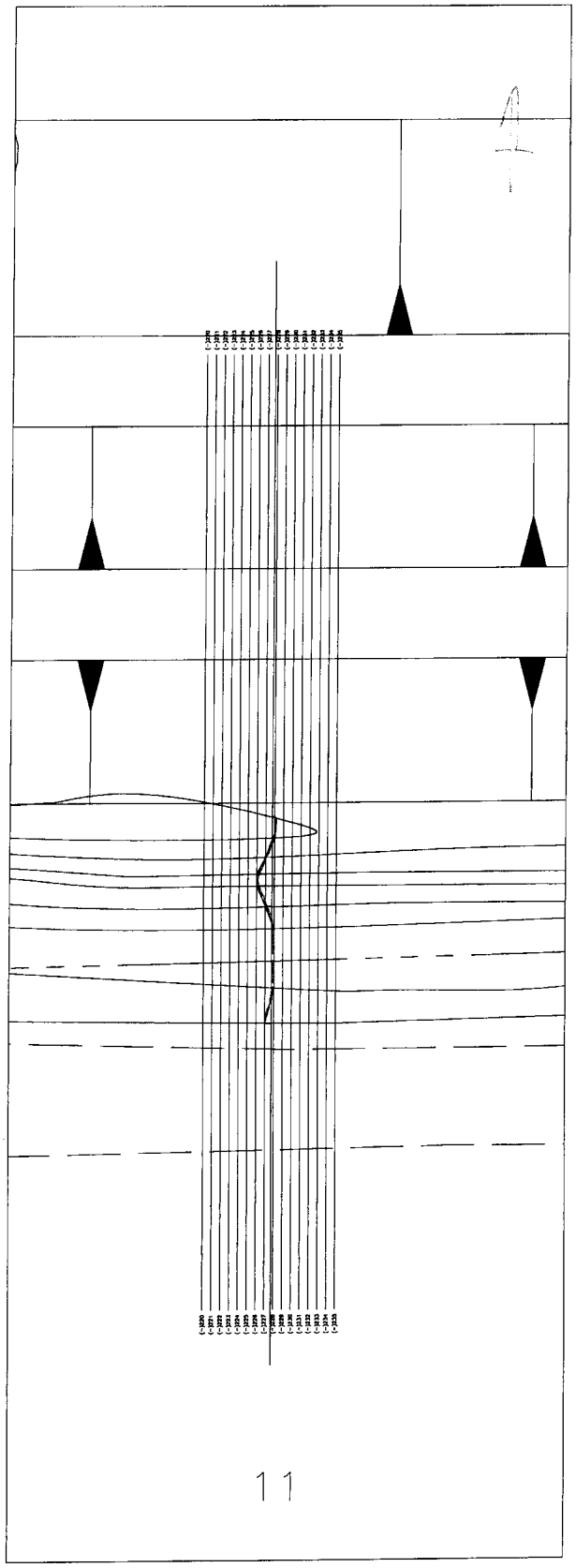
6

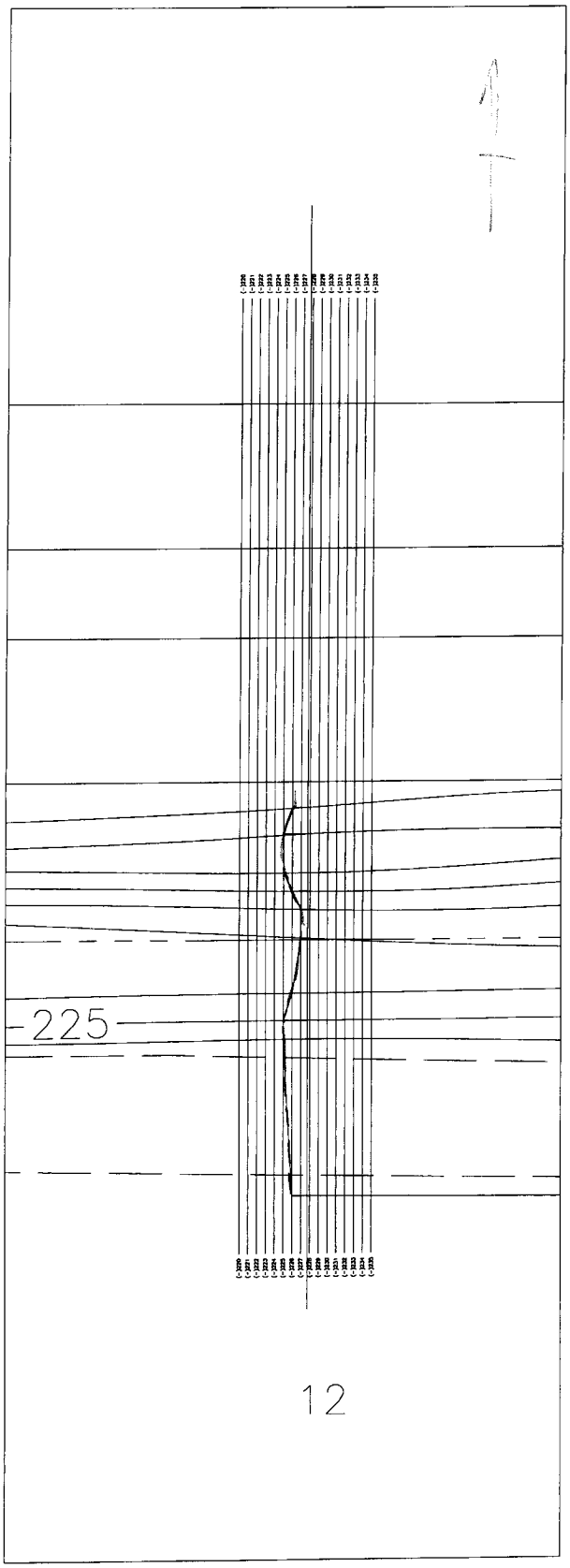

(-)3220
(-)3221
(-)3222
(-)3223
(-)3224
(-)3225
(-)3226
(-)3227
(-)3228
(-)3229
(-)3230
(-)3231
(-)3232
(-)3233
(-)3234
(-)3235
(-)3220
(-)3221
(-)3222
(-)3223
(-)3224
(-)3225
(-)3226
(-)3227
(-)3228
(-)3229
(-)3230
(-)3231
(-)3232
(-)3233
(-)3234
(-)3235
7

00

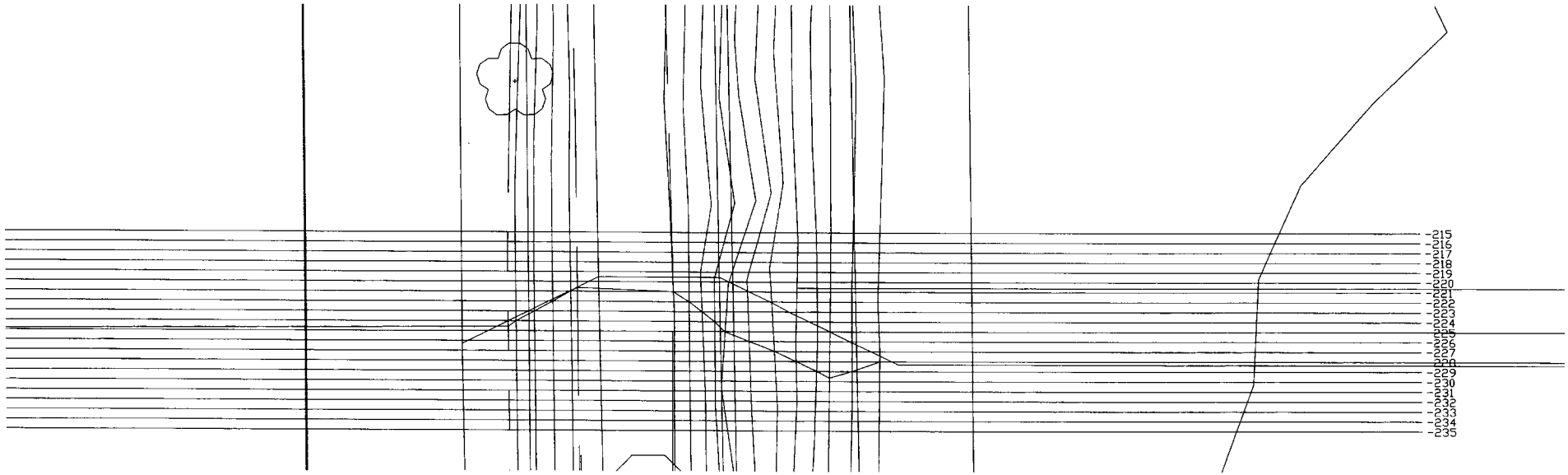

(-3220
(-3221
(-3222
(-3223
(-3224
(-3225
(-3226
(-3227
(-3228
(-3229
(-3230
(-3231
(-3232
(-3233
(-3234
(-3235
9



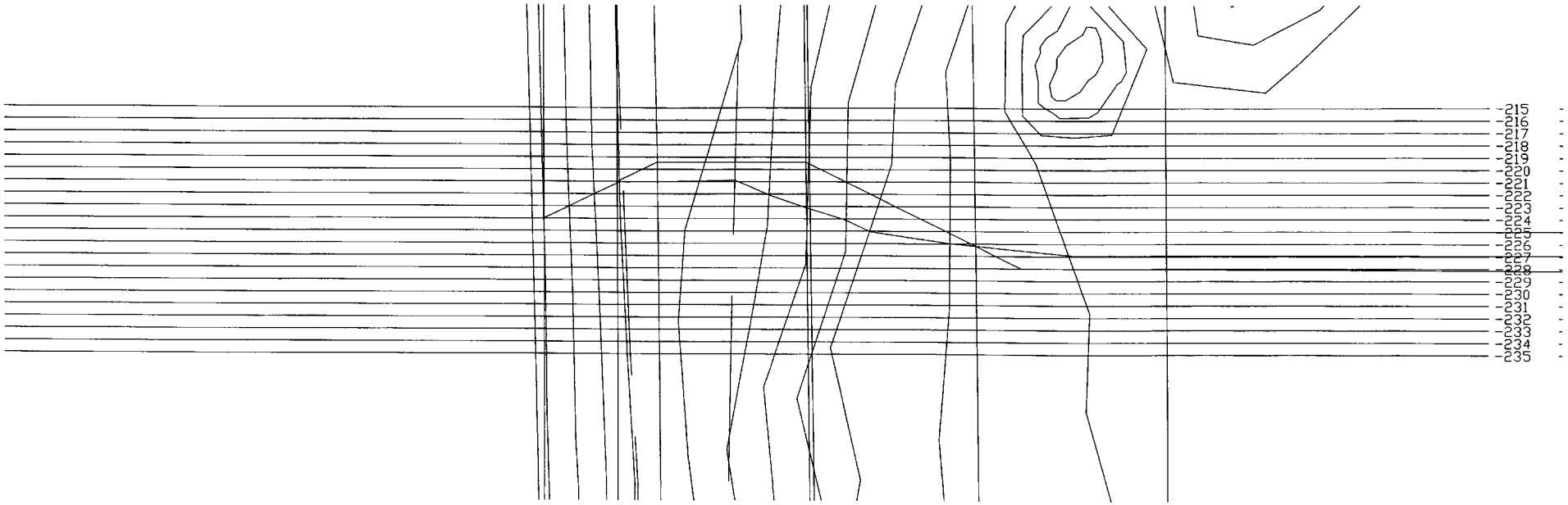




12


215
216
217
218
219
220
221
222
223
224
225
226
227
228
229
230
231
232
233
234
235

13


-215
-216
-217
-218
-219
-220
-221
-222
-223
-224
-225
-226
-227
-228
-229
-230
-231
-232
-233
-234
-235

Attachment
CDR-291

4800

GEO
P.O. Box 1478
Bakersfield, CA 93302
Tel (661) 325-5919
Drilling Fluids, Inc.

MSDS BOOK

Revised 4/15/01

1431 Union Avenue • Bakersfield, CA 93305 • Telephone (661) 325-5919
1-800-GETSGEO • FAX (661) 325-5648 • E-Mail {geodf@lightspeed.net}

GEO

Drilling Fluids, Inc.

TABLE OF CONTENTS

1. Barite
2. Bicarbonate of Soda (Bicarb) (Sodium Bicarbonate) (Na_2HCO_3)
3. Benex (Polysec-KD)
4. Calcium Carbonate ($CaCO_3$)
5. Calcium Chloride ($CaCl_2$)
6. Caustic Soda (Sodium Hydroxide) (NaOH)
7. Celite
8. Citric Acid
9. CFR
10. Cotton Seed Hulls
11. DESCO CF
12. Defoamer 7
13. DMS
14. DMA (Cypan)
15. Drilling Detergent (MD)
16. Drillpac (LV & HV) (Drispac {Super Lo & Regular})
17. GEO Gel
18. HEC
19. Kwik Seal (Prima Seal)
20. LD-8
21. Lime
22. LP-701 (Liquid Polymer)
23. LVT 200
24. Magma Fiber
25. Mica
26. NIS
27. Omnipol II
28. Phosphoric Acid (25% & 40%)
29. Poly Bloc
30. Poly Bloc Extender
31. Potash (KCl) (Potassium Chloride)
32. Salt
33. SAPP

1431 Union Avenue • Bakersfield, CA 93305 • Telephone (661) 325-5919
1-800-GETSGEO • FAX (661) 325-5648 • E-Mail {geodf@lightspeed.net}

GEO

Drilling Fluids, Inc.

34. Sawdust
35. SDIC
36. Seamud
37. Soda Ash (Na_2CO_3)
38. Walnut Hulls
39. XCD & Xanvis

April 16, 2001

F E D E R A L W H O L E S A L E D R I L L I N G M U D

BARITE

(Division of M-I Drilling Fluids Co.) 5950 North Course Drive, Houston, TX 77072

TRANSPORTATION & MATERIAL SAFETY DATA SHEET

DE NAME : BARITE

EMERGENCY TELEPHONE NUMBERS
(713) 561-1600
(713) 561-1300
DAY OR NIGHT

HAZARD RATING : HEALTH 0
FLAMMABILITY 0
REACTIVITY 0
SPECIAL HAZARD

PREAMBLE

ederal Wholesale Drilling Mud is pleased to furnish this data at your request independent of any sale of the product. While y y effort has been made to accurately describe this product and associated manifestations, some of the data are obtained r the open literature, independent laboratory studies, or other sources beyond our direct supervision. We cannot make n assertion as to the reliability or completeness; therefore, the User may rely thereon only at User's risk. We have ade no effort to censor nor to conceal deleterious aspects of this product. Since we cannot anticipate or control h many different conditions under which this information and our products may be used, we make no guarantee that the th and safety precautions we have suggested will be adequate for all individuals and/or situations. Likewise, we make uarantee or warranty of any kind that the use or disposal of this product is in compliance with all federal, state r local laws. It is the obligation of each User of this product to determine and comply with the requirements of all pplicable statutes. Federal Wholesale Drilling Mud will furnish, upon request, any additional information to assist the ; however, no warranty, either expressed or implied, nor liability of any nature with respect to the product o the data herein is made or incurred hereunder.

I. PRODUCT IDENTIFICATION

MON NAME : Barite (barium sulfate)
UFACTURER : M-I Drilling Fluids Company
ACKAGE QUANTITY : 45.4 kg (100 lb), bulk
JSE : Drilling fluid additive
IGHT DESCRIPTION : Oil well drilling fluid additive
TAINER SPECIFICATIONS : Multiwall paper bag meets DOT requirements (49 CFR 178)

CHEMICAL FORMULA : BaSO4
CAS NUMBER : 7727-43-7
UNIT OF ISSUE : Kilogram (pound)
APPLICATION : Weighting material

II. HAZARDOUS INGREDIENTS

ERIAL OR COMPONENT	%	(A) OSHA PEL / (B) ACGIH TLV / (C) OTHER LIMITS RECOMMENDED
ica, crystalline quartz, respirable dust [14808-60-7]	4-6	(A) 0.1 mg/m3 (1) (B) 0.1 mg/m3 (2) (C) NIOSH TWA: 0.05 mg/m3 (3)
Barium sulfate, total dust [7727-43-7]	91-93	(A) 10 mg/m3 (1) (B) 10 mg/m3 (2)
ica, respirable dust [12001-26-2]	0-2	(A) 20 mppcf (1) (B) 3 mg/m3 (2) (C) NIOSH TWA: 3 mg/m3 (3)

III. PHYSICAL DATA

BOILING POINT (760 mm Hg) : N.A.
pH (1% Soln.) : N.D.
ECIFIC GRAVITY (H2O=1) : N.D.
POR DENSITY (air=1) : N.A.
PHYSICAL APPEARANCE : Powder
BULK DENSITY : 1714-2163 kg/m3 107-135 lb/ft3

MELTING POINT : 1580 C 2876 F
VAPOR PRESSURE @ 20 deg C : N.A.
SOLUBILITY IN WATER @ 20 deg C : Insoluble
EVAPORATION RATE (BUTYL ACETATE=1): N.A.
FLASH POINT (method used) : N.A.
ODOR & COLOR : Odorless, tan to gray

IV. REACTIVITY DATA

PRODUCT IS STABLE? : Yes
ODUCT DECOMPOSES? : No
ODUCT POLYMERIZES? : No

INCOMPATIBILITY AIR _ HEAT _ ACID _ BASE _ WATER _ OXIDIZER _
OTHER None.
(Specify)

.D.-Not Determined N.A.-Not Applicable <-Less Than >-Greater Than C-Ceiling Limit
te: For additional information and interpretive assistance, see last page.

V. FIRE AND EXPLOSION HAZARD INFORMATION

FLAMMABLE LIMITS BY AIR, % BY VOL. L.E.L.: N.D. U.E.L.: N.D. AUTO IGNITION TEMPERATURE: N.D. **BARITE**

PRODUCTS EVOLVED WHEN SUBJECTED TO HEAT BY COMBUSTION	This material is not combustible. When heated to decomposition, it emits toxic fumes of sulfur oxides (SOx).
EXTINGUISHING MEDIA	Compatible with agents used to extinguish nearby fires.
UNUSUAL FIRE FIGHTING PROCEDURES	None are required.
UNUSUAL FIRE AND EXPLOSION HAZARDS	At decomposition temperatures (>1600 C), material becomes incompatible with phosphorus and combination with aluminum can produce an explosion.(4)

VI. HEALTH HAZARD INFORMATION

PRIMARY ROUTES OF EXPOSURE: EYE CONTACT: X SKIN CONTACT: X SKIN ABSORPTION: INHALATION: X INGESTION:

TARGET ORGAN: Respiratory system and liver

CARCINOGENICITY: NTP: No IARC: No OSHA: No

ACUTE EFFECTS OF EXPOSURE	Inhalation may result in distress in breathing, coughing, and irritation of the upper respiratory system. Skin and eye contact may cause mechanical irritation.(4)
CHRONIC EFFECTS OF EXPOSURE	Barium sulfate is an experimental tumorigen. Crystalline silica is known to cause fibrosis, silicosis, and liver effects.(4) Limited evidence (IARC) shows that the inhalation of crystalline silica does cause cancer in humans.(5)
CARCINOGENICITY	Intrapleural-rat: TDLo 100 mg/kg:ETA.(4) Crystalline silica is an IARC Group 2A probable carcinogen. Respirable crystalline cristobalite, quartz and tridymite are NTP anticipated carcinogens (NTP 6th Annual Report 1991).(1)

VII. EMERGENCY AND FIRST AID PROCEDURES

EYES	Hold eyelids apart and flush eyes with water for at least 15 minutes. Seek medical attention if irritation persists.
SKIN	Wash thoroughly with soap and water. Remove contaminated clothing.
INGESTION	Drink water to dilute. Never give anything by mouth to an unconscious person. Seek medical attention as needed.
INHALATION	Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen.
OTHER INSTRUCTIONS	Sensitive individuals should avoid further contact. Persons seeking medical attention should carry a copy of this msds with them.

VIII. OCCUPATIONAL CONTROL MEASURES

RESPIRATORY	Wear a NIOSH/MSHA-approved high-efficiency particulate respirator when the airborne concentration is above the PEL.
VENTILATION	Supply natural or mechanical ventilation adequate to keep exposures below the recommended OSHA PELs
SKIN	Wear gloves and long protective clothing. Wash thoroughly after handling. Wash clothes and clean shoes before reuse.
EYES	Wear chemical safety goggles or glasses with sideguards. Insure proper fit for best protection.
OTHER PROTECTIVE EQUIPMENT	Ordinary measures of personal hygiene should be observed. Avoid contact with skin and clothing. Avoid breathing dust.

IX. SPECIAL PRECAUTIONS

PRECAUTIONARY LABELING	WARNING! Contains crystalline silica inhalation of which may cause cancer. May cause mechanical eye, skin, and upper respiratory irritation.
PRECAUTIONS FOR TRANSPORTATION HANDLING AND STORAGE	Keep dusts to a minimum. Keep container closed. Use with adequate ventilation. See the msds for proper protective equipment.

N.D.-Not Determined N.A.-Not Applicable <-Less Than >-Greater Than

* : For additional information and interpretive assistance, see last page.

X. SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IF MATERIAL RELEASED OR SPILLED: Wear proper protective equipment (MSDS Section VIII). Contain the spill. Minimize dust. Re-sack or place in a suitable container. Keep out of sewers and waterways.

STE DISPOSAL HOD: Consult your local authorities for the proper procedures for disposing of barite, a naturally-occurring material that is approximately 90% barium sulfate, which is insoluble in water.

XI. U.S. GOVERNMENT & OTHER REGULATORY AGENCY CONTROLS

SARA TITLE III ACUTE: X CHRONIC: X FIRE: REACTIVITY: SUDDEN RELEASE OF PRESSURE:

Barite is considered to be a SARA Section 313 Toxic Chemical, due to the fact that it contains barium as part of its infrastructure.

XII. TRANSPORTATION INFORMATION

A. DEPARTMENT OF TRANSPORTATION (DOT)

ASSIFIED AS A HAZARDOUS MATERIAL ACCORDING TO DOT (49 CFR 172): No

OPER SHIPPING NAME : Drilling fluid additive, n.o.s. (barium sulfate)
HAZARD CLASS : Not restricted
IDENTIFICATION NO. : N.A.
BEL(S) REQUIRED : None

CEPTIONS & PACKAGING REQUIREMENTS (SEE SECTION) : N.A.
MAXIMUM QUANTITY PASSENGER AIRCRAFT : N.A.
IN ONE PACKAGE CARGO AIRCRAFT : N.A.

B. AIR TRANSPORT REGULATIONS (IATA/ICAO)

PROPER SHIPPING NAME : Drilling fluid additive, n.o.s. (barium sulfate) UN NO.: N.A.
ZARD CLASS : Not restricted FLASH POINT : N.A. deg F N.A. deg C
MAXIMUM QUANTITY PASSENGER AIRCRAFT : N.A. PACKAGING (SEE SECTION) : N.A.
IN ONE PACKAGE CARGO AIRCRAFT : N.A. PACKAGING (SEE SECTION) : N.A.

C. INTERNATIONAL MARITIME ORGANIZATION REGULATIONS (IMO)

SUBSTANCE NAME : Drilling fluid additive, n.o.s. (barium sulfate) UN NO.: N.A.
ZARD CLASS : Not restricted CLASS NO. : N.A. PAGE NO. : N.A.
BEL(S) : None FLASH POINT : N.A. deg F N.A. deg C
DESCRIPTION : Oil well drilling fluid additive (barium sulfate)

XIII. ADDITIONAL INFORMATION

ferences:

(1) Chemical Guide to the OSHA Hazard Communication Standard, Ed. by Clansky, K.B., 7th Edition; Roytech: Burlingame, CA, (1992).
(2) 1991-1992 Threshold Limit Values and Biological Exposure Indices; American Conference of Governmental Industrial Hygienists: Cincinnati, (1991).
(3) NIOSH Pocket Guide to Chemical Hazards; National Institute for Occupational Safety and Health: Cincinnati, (1991).
(4) Sax, N. I. and Lewis, R.J.,Sr. : Dangerous Properties of Industrial Materials, 7th Edition, Vols. I-III; VNR: New York, (1989).
(5) IARC Monographs on the Evaluation of the Carcinogenic Risk of Chemicals to Humans, Silica and Some Silicates, Vol. 42; World Health Organization: Lyon, France, (1987).

FOR ADDITIONAL INFORMATION CONTACT:
ager, Environmental Affairs (713) 561-1507

Prepared by : James H. Rushing
Date Prepared : Revised: February 1993

N.D.-Not Determined N.A.-Not Applicable <-Less Than >-Greater Than
Note: For additional information and interpretive assistance, see last page.

CHURCH & DWIGHT CO., INC.
469 NORTH HARRISON STREET PRINCETON NJ 08543-5297
PHONE (609) 683-5900 CABLE ADDRESS CHURCHWIGHT
TWX 710 460 9266

MATERIAL SAFETY DATA SHEET

S NUMBER: MSDS-960 ISSUE DATE: 10/20/94

PRODUCT IDENTIFICATION

Product Name

SODIUM BICARBONATE
BAKING SODA

Emergency Phone:
1-609-683-5900 (U.S.A.)

Medical Emergency Phone:
1-800-228-5635
Ext. 007 (U.S.A.)

COMPOSITION/INFORMATION ON INGREDIENTS

Chemical Ingredient (% by Weight)		CAS Number
Sodium Bicarbonate	100%	144-55-8

(X) Not hazardous under OSHA Standard 29 CFR 1910.1200.
(X) Not a WHMIS controlled substance.

HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW

White crystalline powder
No odor
Not a fire hazard
No significant health or environmental effects associated with this material.

HMIS Rating	
Health	0
Fire	0
Reactivity	0

Potential Health Effects

EYE: Not an eye irritant.

SKIN CONTACT: Not a skin irritant.

INGESTION: Material is non-toxic. Small amounts (1-2 tablespoonfuls) swallowed during normal handling operations are not likely to cause injury as long as the stomach is not overly full; swallowing larger amounts may cause injury (see Note in Section IV).

INHALATION: None known.

SUBCHRONIC EFFECTS/CARCINOGENICITY: Based on published studies on its effects in animals and humans, sodium bicarbonate is not teratogenic or genotoxic. Only known subchronic effect is that of a marked systemic alkalosis. The material is not listed as a carcinogen or potential carcinogen by IARC, NTP, OSHA, or ACGIH.

MATERIAL SAFETY DATA SHEET

FIRST AID MEASURES

EYES: Check for and remove contacts. Flood eyes with clean flowing water, low pressure and luke warm (not hot) if possible, occasionally lifting eyelids.

INGESTION: If large amounts of this material are swallowed, do not induce vomiting. Administer water if person is conscious. Never give anything by mouth to an unconscious person.

NOTE TO PHYSICIAN: Large doses may produce systemic alkalosis and expansion in extracellular fluid volume with edema.

FIRE FIGHTING MEASURES

FLAMMABLE PROPERTIES
FLASHPOINT: Not combustible
METHOD USED: Not applicable

FLAMMABLE LIMITS
LFL: Not applicable
UFL: Not applicable

EXTINGUISHING MEDIA: Non-combustible material. Use extinguishing media appropriate for surrounding fire.

FIRE-FIGHTING INSTRUCTIONS: Carbon Dioxide may be generated making necessary the use of a self-contained breathing apparatus (SCBA) and full protective equipment (Bunker Gear). Carbon dioxide is an asphyxiant at levels over 5% w/w. Sodium oxide, another thermal decomposition product existing at temperatures above 1564°F is a respiratory, eye, and skin irritant. Avoid inhalation, eye and skin contact with sodium oxide dusts.

UNUSUAL FIRE AND EXPLOSION HAZARDS: None known.

ACCIDENTAL RELEASE MEASURES

Scoop up into dry, clean containers. Wash away uncontaminated residue with water.

HANDLING AND STORAGE

Store in cool, dry areas and away from incompatible substances (see Section 10).

Sodium Bicarbonate reacts with acids to yield carbon dioxide gas which can accumulate in confined spaces. Do not enter confined spaces until they have been well ventilated and carbon dioxide and oxygen levels have been determined to be safe.

EXPOSURE CONTROLS/PERSONAL PROTECTION

RESPIRATORY PROTECTION: Dust mask required if total dust level exceeds 10 mg/m^3.

PROTECTIVE GLOVES: General purpose for handling dry product. Impervious gloves when working with solutions.

EYE PROTECTION: Safety glasses when handling bulk material or when dusts are generated.

OTHER PROTECTIVE CLOTHING OR EQUIPMENT: Full cover clothing. Apron where splashing may occur when working with solutions.

PROTECTIVE WORK/HYGIENIC PRACTICES: No special requirements beyond those provided above

CHURCH & DWIGHT CO., INC.

469 NORTH HARRISON STREET
PHONE (609) 683-5900

PRINCETON, NJ 08543-5297
CABLE ADDRESS CHURDWIGHT
TWX 710 480 9256

MATERIAL SAFETY DATA SHEET

PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE: White crystalline powder.
ODOR: None.
PHYSICAL STATE: Solid
pH AS IS: Not Applicable
pH (1% SOLN. w/v): 8.2
VAPOR PRESSURE: Not applicable.
VAPOR DENSITY: Not applicable.
BOILING POINT: Not applicable.
FREEZING/MELTING POINT: Not applicable.
SOLUBILITY IN WATER: 8.6 g/100 ml @ 68°F.
SPECIFIC GRAVITY (Water = 1): 2.2
APPARENT DENSITY (g/cc): Approximately 1.
% VOLATILE: Not applicable.
VOLATILE ORGANIC COMPOUNDS: Not applicable.
MOLECULAR WEIGHT: 84.02

STABILITY AND REACTIVITY

CHEMICAL STABILITY: Stable.

CONDITIONS TO AVOID: Temperatures above 228°F.

INCOMPATIBILITY WITH OTHER MATERIALS: Reacts with acids to yield carbon dioxide. Also may yield free caustic in presence of lime dust (CaO) and moisture (i.e., water, perspiration).

HAZARDOUS DECOMPOSITION PRODUCTS: Heating above 228°F may cause dangerous levels of carbon dioxide gas to be present in confined spaces. Yields sodium oxide if exposed to temperatures above 1564°F. Avoid inhalation, eye and skin contact with sodium oxide.

HAZARDOUS POLYMERIZATION: Not applicable.

TOXICOLOGICAL INFORMATION

EYE EFFECTS: The material was minimally irritating to unwashed eyes and practically non-irritating to washed eyes (rabbits).

SKIN EFFECTS: Not a skin irritant or dermally toxic. Not a contact sensitizer.

ACUTE ORAL EFFECTS: Acute Oral-rat LD_{50} 7.3 g/kg.

ACUTE INHALATION: LC_{50} (rat) > 4.74 mg/l.

AQUATIC TOXICITY:

Daphnids:	EC_{50} = 4100 mg/l.
Bluegill:	LC_{50} = 7100 mg/l.
Rainbow Trout:	LC_{50} = 7700 mg/l.

MATERIAL SAFETY DATA SHEET

DISPOSAL CONSIDERATIONS

Bury in a secured landfill in accordance with all local, state and federal environmental regulations. Empty containers may be incinerated or discarded as general trash.

TRANSPORTATION INFORMATION

D.O.T. SHIPPING NAME: Not regulated
TECHNICAL SHIPPING NAME: Sodium Bicarbonate
D.O.T. HAZARD CLASS: None
U.N./N.A. NUMBER: None
HAZARDOUS SUBSTANCE/RQ: None
D.O.T. LABEL: None
D.O.T. PLACARD: None

REGULATORY INFORMATION

CERCLA REPORTABLE QUANTITY: None

OSHA: Not hazardous under 29 CFR 1910.1200

RCRA: Not a hazardous material by listing or characteristic

SARA TITLE III:
- Section 302, Extremely Hazardous Substances: None
- Section 311/312, Hazardous Categories: Non-hazardous
- Section 313, Toxic Chemicals: None

MISCELLANEOUS INFORMATION

Material is reported in the EPA TSCA Inventory List.

Material is not listed as carcinogen or potential carcinogen by:
- NTP Annual Report
- IARC Group I or II
- OSHA 29CFR Part 1910, Subpart 2
- ACGIH Appendix A

NATIONAL STOCKING NUMBER: 6810002646618, Contract No. DLA 40086C1831
NSF STANDARD 60: Corrosion and Scale Control in Potable Water. Max use 100 mg/l.
EUROPEAN INVENTORY (EINECS): 205-633-8
JAPANESE INVENTORY (HITI): 1-164
AUSTRALIAN INVENTORY (AICS): Carbonic acid, monosodium salt.

M EDES DATE: 01/31/94

This Product Safety Data Sheet is offered solely for your information, consideration and investigation. Church & Dwight Co., Inc. provides no warranties, either expressed or implied, and assumes no responsibility for the accuracy or completeness of data contained herein. Church & Dwight Co., Inc. urges persons receiving this information to make their own determination as to the information suitability for their particular application.

BENEX (Polysec-KD)

AMERICAN COLLOID COMPANY

One North Arlington • 1500 West Shure Drive
Arlington Heights, Illinois 60004-7803 • USA
(708) 392-4600 • Telex ITT 4330321
Fax (708) 506-6199

MATERIAL SAFETY DATA SHEET - May be used to comply with OSHA's Hazard Communication Standard, 29 CFR 1910.1200. Standard must be consulted for specific requirements. 67601
67601

PRODUCT NAME: POLYSEC-KD

Section I MANUFACTURER'S INFORMATION

Manufacturer's Name & Address:

American Colloid Company
1500 West Shure Drive
One North Arlington
Arlington Heights, Illinois 60004

Emergency Telephone Number: 708-392-4600
Telephone Number for Information: 708-392-4600
Date Prepared: August 23, 1994

Section II HAZARDOUS INGREDIENTS/IDENTITY INFORMATION

Hazardous Components (Specific Chemical Identity: Common Name(s))		OSHA PEL	ACGIH TLV	Other Limits Recommended	% (optional)
Nuissance Dust	- Total Dust	$15mg/m^3$	$10mg/m^3$	-	-
	- Respirable	$5mg/m_3$	$5mg/m_3$	-	-

PRODUCT IDENTIFICATION

Chemical Name: Sodium Polyacrylate, Molecular Weight - Approx. 200,000
CAS No.: 9003-04-7
NFPA/HMIS: Health - 0, Fire - 0, Reactivity - 0, Specific Hazard - None
Dot Class: Not Regulated

Section III PHYSICAL/CHEMICAL CHARACTERISTICS

Boiling Point	- Decomposes	Specific Gravity (H_2O = 1)	- 0.9
Vapor Pressure (mm Hg.)	- Not Applicable	Melting Point	- Not Applicable
Vapor Density (AIR = 1)	- Not Applicable	Evaporation Rate (Butyl Acetate = 1)	- Not Applicable
Solubility in Water	- Negligible		
Appearance and Odor	- White to pink color, granules, slight odor		

Section IV FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used) - Not Available
Flammable Limits - Not Available LEL- - UEL- -
Extinguishing Media - Any available medium, although non-flammable as supplied.
Special Fire Fighting Procedures - None
Unusual Fire and Explosion Hazards - Becomes slippery when wet.

AMERICAN COLLOID COMPANY

One North Arlington • 1500 West Shure Drive
Arlington Heights, Illinois 60004-7803 • USA
(708) 392-4600 • Telex ITT 4330321
Fax (708) 506-6199

67601
67601

PRODUCT NAME: POLYSEC-KD

Section V — REACTIVITY DATA

Stability — Unstable - ; Stable - X — Conditions to Avoid - None Known

Incompatibility (Materials to Avoid) - Strong oxidizers.
Hazardous Decomposition or By-products - Thermal decomposition: CO, CO_2, hydrocarbons

Hazardous Polymerization — May Occur - ; Will Not Occur - X — Conditions to Avoid - None Known

Section VI — HEALTH HAZARD DATA

Route(s) of Entry: Inhalation? Yes Skin? Yes Ingestion? No

Health Hazards (Acute and Chronic) - Nuisance dust. Contact with eyes, skin or clothing may cause irritation.

Carcinogenicity: NTP? No IARC Monographs? No OSHA Regulated? No

Signs and Symptoms of Exposure - Slight irritant effects.

Medical Conditions Generally Aggravated by Exposure - None Known

Emergency and First Aid Procedures - Eyes: Flush with water, consult physician.
Skin: Wash with soap and water.
Inhalation: Remove to fresh air, consult physician.

Section VII — PRECAUTIONS FOR SAFE HANDLING AND USE

Steps to be Taken in Case Material is Released or Spilled - Vacuum if possible to avoid generating airborne dust. Avoid adding water, the product will become slippery when wet.

Waste Disposal Method - Dispose of in accordance with federal, state and local regulations.

Precautions to Be Taken in Handling and Storing - Store in a cool, dry place. Avoid breathing powder. Avoid skin and eye contact.

Other Precautions - Slippery when wet.

AMERICAN COLLOID COMPANY

One North Arlington • 1500 West Shure Drive
Arlington Heights, Illinois 60004-7803 • USA
(708) 392-4600 • Telex ITT 4330321
Fax (708) 506-6199

67601
67601

PRODUCT NAME: POLYSEC-KD

Section VIII CONTROL MEASURES

Respiratory Protection (Specify Type) - Use NIOSH/MSHA approved or equivalent.

Ventilation - Local Exhaust - As appropriate
- Mechanical (General) - As appropriate

Protective Gloves - Impervious/rubber

Other Protective Clothing or Equipment - None

Work/Hygienic Practices - Use good housekeeping practices.

Special - None

Other - None

Eye Protection - Safety goggles

The information herein has been compiled from sources believed to be reliable and is accurate to the best of our knowledge. However, American Colloid Company cannot give any guarantees regarding information from other sources, and expressly does not make any warranties, nor assumes any liability, for its use.

MATERIAL SAFETY DATA SHEET

CalMat Co

9300 FLAIR DRIVE / P. O. BOX 5210 / EL MONTE, CALIFORNIA 91734-1210 / 213/258-2777

MANUFACTURERS NAME
CalMat Co.

DATE
10-27-86

MSDS NUMBER
0011

PREPARER
Grady

ADDRESS
695 South Rancho Road
Colton, CA. 92324

EMERGENCY TELEPHONE NUMBER
(800) 282-4924

SECTION I

CHEMICAL FAMILY
Calcium Compounds

TRADE NAME & SYNONYMS
Limestone, Limestone flour, Limestone Meal, Glass Sand, Calcium Carbonate.

CHEMICAL NAME & SYNONYMS & FORMULAS
$CaCO_3$ (CAS # 1317-65-3)

TLV's
$10 mg/m^3$

SECTION II - HAZARDOUS INGREDIENTS

Limestone is not listed by NTP, IARC, or OSHA as containing carginogens.

SECTION III - PHYSICAL DATA

BOILING POINT
N/A as limestone is a solid.

SPECIFIC GRAVITY
2.71

VAPOR PRESSURE
N/A as limestone is a solid.

PERCENT VOLATILE BY VOLUME
0%

VAPOR DENSITY
N/A as limestone is a solid.

EVAPORATION RATE
N/A as limestone is a solid.

SOLUBILITY IN WATER
Slight

APPEARANCE AND ODOR
White to gray powder; earthy odor.

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT
N/A

FLAMMABLE OR EXPLOSIVE LIMITS
N/A

EXTINGUISHING MEDIA
N/A

SPECIAL FIREFIGHTING PROCEDURES
N/A

UNUSUAL FIRE & EXPLOSION HAZARDS
None

SECTION V - HEALTH HAZARD DATA

THRESHOLD LIMIT VALUE (TLV)
Total Dust - $10mg/m^3$

EMERGENCY & FIRST AID PROCEDURES
Irrigate eyes with water for at least 15 min. Consult physician.
Wash exposed skin areas with soap and water.
If ingested consult physican immediately. Give water. Induce vomiting.

EFFECTS OF OVEREXPOSURE
Acute: Limestone dust can irritate the eyes and upper respiratory system.

Chronic: Limestone dust can cause aggravation respiratory disorders.

SECTION VI - REACTIVITY DATA

STABILITY

Product is stable

INCOMPATIBILITY
Fluorine

HAZARDOUS DECOMPOSITION PRODUCTS
When burned forms CaO which is caustic and irritating to eyes, skin, and respiratory system.
HAZARDOUS POLYMERIZATION
Will not occur.

SECTION VII - SPILL PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS SPILLED
Use dry cleanup methods that do not disperse the dust into the air.

WASTE DISPOSAL
Material can be returned to container for later use, or it can be disposed of as an industrial waste.

SECTION VIII - SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION
Use NIOSH/MSHA approved respirators. Based on airborne concentrations.

VENTILATION
Local exhaust can be used to control airborne dust levels.

EYE PROTECTION
The use of tight fitting goggles is recommended.

SKIN PROTECTION
Use gloves, boots, and clothing to protect the skin from prolonged contact with dust. After working with limestone workers should shower with soap and water.

SECTION IX - SPECIAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING
Keep material dry.

OTHER PRECAUTIONS
None

SECTION X - ABBREVIATIONS

ACGIH
American Conference of Governmental Industrial Hygienists

CAS
Chemical Abstract Service

CFR
Code of Federal Regulations

ft^3
Cubic Foot

IARC
International Agency for Research on Cancer

m^3
Cubic Meter

mg.
Milligram

MSHA
Mine Safety and Health Administration

N/A
Not Applicable

NIOSH
National Institute for Occupational Safety & Health

NTP
National Toxicology Program

OSHA
Occupational Safety and Health Administration

TLV's
Threshold Limit Values

NOTICE: The information presented herein is based on data considered to be accurate as of the date of preparation of this Material Safety Data Sheet. However, no warranty or representation, express or implied, is made as to the accuracy or completeness of the foregoing data and safety information. In addition, no responsibility can be assumed by vendor for any damage or injury resulting from abnormal use, from any failure to adhere to recommended practices, or from any hazards inherent in the nature of the product.

WARNING
AVERTISSEMENT

Calcium Carbonate
CAS 1317-65-3

This product contains small amounts of silica (0.1 to 1.5%) which may cause cancer or serious lung problems.

AVOID BREATHING PRODUCT DUST

WEAR A RESPIRATOR IN DUSTY AREAS

FIRST AID: MOVE TO FRESH AIR

See MSDS for additional safety information.

Carbonate de Calcium
CA 1317-65-3

Ce produit contient des niveaux peu élevés de Silice (0.1 à 1.5%) qui pourrait être cancérigène et représente un danger pour les voies respiratoires.

NE PAS INHALER LA POUSSIÈRE

PORTER UN MASQUE ANTI POUSSIÈRES DANS LES LIEUX POUSSIÉREUX

PREMIERS SOINS: AMENER LA VICTIME À L'AIR FRAIS

Voir la fiche signalétique pour plus de renseignements.

OMYA, Inc. 61 Main Street Proctor, VT 05765

CALCIUM CHLORIDE
MATERIAL SAFETY DATA SHEET

MANUFACTURER NAME :	INDUSTRIA DEL ALCALI, S.A. DE C.V.
ADDRESS :	LOMA LARGA # 2626 COL. OBISPADO MONTERREY, N.L. MEXICO
PHONE :	(528)329-2600
FAX :	(528)333-7151, (528)346-1814

I PRODUCT IDENTIFICATION

CHEMICAL NAME :	$CaCl_2$
SYNONYMS :	CALCIUM CHLORIDE, HYDROPHILITE

PRODUCT NAME : CALCIUM CHLORIDE

INGREDIENTS :

CALCIUM CHLORIDE	($CaCl_2$)	CAS # 010043-52-4	93 - 96 %
SODIUM CHLORIDE	(NaCl)	CAS # 007647-14-5	1.5 - 2.5
POTASIUM CHLORIDE	(KCl)	CAS # 007447-40-7	1.5 - 2.5
WATER	(H_2O)	CAS # 007732-18-5	BALANCE

II HAZARDOUS INGREDIENTS

NOT APPLICABLE

P.O. BOX 2459 Monterrey, N.L. Mexico C.P. 64000 Phone (528) 329 2600 Fax (528) 333 7151

ALCALI

FIRST AID – IN ALL CASES CONSULT MEDICAL PERSONNEL

EYES	: IMMEDIATELY FLUSH WITH RUNNING WATER FOR FIFTEEN MINUTES
SKIN	: IMMEDIATELY FLUSH SKIN WITH ABUNDANT WATER FOR AT LEAST FIFTEEN MINUTES AND REMOVE CONTAMINATED CLOTHES. WASH CLOTHES BEFORE REUSE. DESTROY CONTAMINATED SHOES.
INGESTION	: IMMEDIATELY DRINK TWO GLASSES OF WATER AND INDUCE VOMITING BY PLACING A FINGER DOWN THE THROAT.
INHALATION	: REMOVE TO FRESH AIR IF ILL EFFECTS OCCUR. CONSULT MEDICAL PERSONNEL

MEDICAL IMPORTANCE NOTES

EYES	: IF EVIDENCE OF CORNEAL INJURY IS FOUND, MAKE USE OF ANTIBIOTIC STEROID PREPARATION FREQUENTLY. CONSULT OPHTALMOLOGIST.
SKIN	: TREAT AS NORMAL CONTACT DERMATITIS. IN CASE OF BURN TREAT AS THERMAL BURN. NOT CONSIDERED ABSORBABLE IN TOXIC AMOUNTS.
RESPIRATORY	: MAY CAUSE IRRITATION.
ORAL	: LOW TOXICITY.

OTHER NOTES

NO SPECIFIC ANTIDOTE OR TREATMENT IS USED. TREATMENT BASED ON JUDGDMENT OF PHYSICIAN. ON THE PARTICULAR CASE CONSULT STANDARD LITERATURE.

P.O. BOX 2459 Monterrey, N.L. Mexico C.P. 64000 Phone (528) 329 2600 Fax (528) 333 7151

ALCALI

IX SPECIAL PRECAUTIONS OF COMMENTS

PRECAUTIONS	: EYE CONTACT SHOULD BE AVOIDED, ALSO PROLONGED SKIN CONTACT. VERY HIGH HEAT IS DEVELOPED WHEN DISOLVING CALCIUM CHLORIDE. ALWAYS USE WATER AT LESS THAN 27°C, TEMPERATURE. CALCIUM CHLORIDE PICKS UP MOISTURE AND FORMS A SOLUTION WHEN EXPOSED TO THE ATMOSPHERE.

MARCH 1993

P.O. BOX 2459 Monterrey, N.L. Mexico C.P. 64000 Phone (528) 379 2600 Fax (528) 333 7151

ALCALI

OxyChem®

Responsible Care® A Public Commitment

MATERIAL SAFETY DATA SHEET

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

MSDS NUMBER : M32415 ISSUE DATE : 01-01-98

PRODUCT NAME : CAUSTIC SODA LIQUID (ALL GRADES)

Manufacturer's Name and Address : Occidental Chemical Corporation, Occidental Tower
5005 LBJ Freeway, P.O. Box 809050
Dallas, TX 75380 (972) 404-3800

24 HOUR EMERGENCY TELEPHONE : 1-800-733-3665 OR 972-404-3228

TO REQUEST AN MSDS : 1-800-699-4970

CUSTOMER SERVICE : 1-800-752-5151

PRODUCT USE : Metal Finishing, Industrial Cleaners, Chemical Processing, Petroleum Industry

CHEMICAL NAME : Sodium Hydroxide

CHEMICAL FORMULA : NaOH

SYNONYMS/COMMON NAMES : Sodium Hydroxide; Solution

2. COMPOSITION/INFORMATION ON INGREDIENTS

CAS NUMBER / NAME	EXPOSURE LIMITS	PERCENTAGE	
7732-18-5 Water	PEL:Not Established	VOL	ND
	TLV:Not Established	WT	48.50-91

COMMON NAMES:

Listed On(List Legend Below):
00 19 22 23 50 51

- -

2. COMPOSITION/INFORMATION ON INGREDIENTS (Continued)

1310-73-2 Sodium hydroxide (Na(OH))

EXPOSURE LIMITS
PEL:2 mg/m3, Ceiling
TLV:2 mg/m3, Ceiling

PERCENTAGE	
VOL	ND
WT	9-51.50

COMMON NAMES:
CAUSTIC SODA

Listed On(List Legend Below):
00 13 18 21 22 50 51

- -

7647-14-5 Sodium chloride (NaCl)

EXPOSURE LIMITS
PEL:None established
TLV:None established

PERCENTAGE	
VOL	ND
WT	0-1.30

COMMON NAMES:
SALT

Listed On(List Legend Below):
00 22 23 50 51

- -

7775-09-9 Chloric acid, sodium salt

EXPOSURE LIMITS
PEL:Not Established
TLV:Not Established

PERCENTAGE	
VOL	ND
WT	0-0.30

COMMON NAMES:
SODIUM CHLORATE

Listed On(List Legend Below):
00 12 21 22 50 51

- -

LIST LEGEND

00 TSCA INVENTORY	12 PA HAZARDOUS SUBSTANCE
13 PA ENVIROMENTAL HAZ SUBSTANCE	18 NY HAZARDOUS SUBSTANCES
19 PA REQUIREMENT- 3% OR GREATER	21 NJ SPECIAL HEALTH HAZ SUB
22 CANADIAN DOMESTIC SUB LIST	23 NJ REQUIREMENT- 1% OR GREATER
50 PHILIPPINES INVENTORY (PICCS)	51 EINECS

3. HAZARDS IDENTIFICATION

********** EMERGENCY OVERVIEW **********

MAY CAUSE BURNS TO THE EYES, SKIN, AND MUCOUS MEMBRANES. MAY CAUSE PERMANENT EYE DAMAGE. INHALATION OF DUST, MIST, OR SPRAY CAN CAUSE SEVERE LUNG DAMAGE. CAN REACT VIOLENTLY WITH WATER, ACIDS AND OTHER SUBSTANCES.

Clear liquid with no distinct odor

3. HAZARDS IDENTIFICATION (Continued)

POTENTIAL HEALTH EFFECTS

ROUTES OF ENTRY:

Inhalation, Ingestion.

TARGET ORGANS:

Eyes, Skin, Respiratory Tract, Gastrointestinal Tract.

IRRITANCY:

Liquid, vapors or mist may be irritating to eyes, skin and respiratory tract.

SENSITIZING CAPABILITY:

None known.

REPRODUCTIVE EFFECTS:

None known.

CANCER INFORMATION:

None known.

SHORT-TERM EXPOSURE (ACUTE)

INHALATION:

Exposure to vapor, mist or liquid can produce burns of the respiratory tract.

Severe exposures could result in chemical pneumonia.

EYES:

Contact can cause severe damage including burns and blindness.

The severity of the effects depend on concentration and how soon after exposure the eyes are washed.

SKIN:

Corrosive.

Contact may cause burns and tissue destruction.

Note that irritation may follow an initial latency (delay between the time that the exposure occurs and when the sense of irritation starts). The latent period can vary as much as hours for a dilute solution (0.04%) to minutes with more concentrated solutions (25-50%).

Prolonged or repeated contact, even to dilute concentrations, can cause a high degree of tissue destruction.

INGESTION:

Corrosive.

3. HAZARDS IDENTIFICATION (Continued)

Severe burns and complete tissue perforation of mucous membranes of mouth, throat and stomach.

REPEATED EXPOSURE (CHRONIC)

No known chronic effects.

SYNERGISTIC MATERIALS:

None known.

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE:

None known.

4. FIRST AID MEASURES

EYES:

IMMEDIATELY FLUSH EYES WITH A DIRECTED STREAM OF WATER for at least 15 minutes, forcibly holding eyelids apart to ensure complete irrigation of all eye and lid tissue. Washing eyes within several seconds is essential to achieve maximum effectiveness. GET MEDICAL ATTENTION IMMEDIATELY.

SKIN:

Flush thoroughly with cool water under shower while removing contaminated clothing and shoes. Discard non-rubber shoes. Wash clothing before reuse. GET MEDICAL ATTENTION AS SOON AS POSSIBLE.

INHALATION:

Remove to fresh air. If breathing is difficult, have trained person administer oxygen. If respiration stops, have a trained person administer artificial respiration. GET MEDICAL ATTENTION IMMEDIATELY.

INGESTION:

NEVER GIVE ANYTHING BY MOUTH TO AN UNCONSCIOUS PERSON. If swallowed, DO NOT INDUCE VOMITING. Give large quantities of water. (If available, give several glasses of milk.) If vomiting occurs spontaneously, keep airway clear and give more water. GET MEDICAL ATTENTION IMMEDIATELY.

NOTES TO PHYSICIAN:

No specialized procedures. Treat for clinical symptoms.

5. FIRE FIGHTING MEASURES

Flash Point: Non-flammable

Method: Non-flammable

5. FIRE FIGHTING MEASURES (Continued)

Autoignition Temperature: Non-flammable

FLAMMABLE LIMITS IN AIR, BY % VOLUME

Upper: Non-flammable
Lower: Non-flammable

EXTINGUISHING MEDIA:

Non-flammable / Non-combustible.

Use water spray to keep fire-exposed containers cool.

FIRE FIGHTING PROCEDURES:

Use water to cool containers but avoid getting water into containers. Wear NIOSH/MSHA approved positive-pressure self-contained breathing apparatus and full protective clothing.

FIRE AND EXPLOSION HAZARD:

Direct contact with water can cause a violent exothermic reaction.

SENSITIVITY TO MECHANICAL IMPACT:

Not sensitive.

SENSITIVITY TO STATIC DISCHARGE:

Not sensitive.

6. ACCIDENTAL RELEASE MEASURES

PERSONAL PRECAUTIONS:

Evacuate unnecessary personnel.

Follow protective measures provided under Personal Protection in Section 8.

ENVIRONMENTAL PRECAUTIONS:

According to 40 CFR 302 Table 302.4 (CERCLA), environmental releases that exceed the RQ must be reported to the National Response Center by calling 800-424-8802 (202-426-2675) and the State Emergency Response Commission and the Local Emergency Planning Committee (40 CFR 355.40) as appropriate.

Contain liquids and prevent discharges to streams or sewers, control or stop the loss of volatile materials to the atmosphere. Large leaks may require environmental consideration and possible evacuation. Do not apply water to the leak. Spills or releases should be reported, if required, to the appropriate local, state and federal agencies.

Contain spill with dike to prevent entry into sewers or waterways.

CAUTION: This product may react strongly with acids and water.

6. ACCIDENTAL RELEASE MEASURES (Continued)

NEVER FLUSH TO SEWER.

METHODS FOR CLEANING UP:

Dry material can be shoveled up, liquid material can be removed with a vacuum truck. Neutralize remaining traces with any dilute inorganic acid (hydrochloric, sulfuric or acetic acid). Flush spill area with water followed by a liberal covering of sodium carbonate. All clean-up material should be removed for proper treatment or disposal. Spills on other than pavement (eg. dirt or sand) may be handled by removing the affected soil and placing in approved containers.

7. HANDLING AND STORAGE

HANDLING:

Avoid breathing mist.

Avoid breathing vapors.

Hazardous carbon monoxide gas can form upon contact with food and beverage products in enclosed spaces and can cause death. Follow appropriate tank entry procedures (ANSI Z117.1).

Containers, even those that have been emptied, will retain product residue and vapor and should be handled as if they were full.

Do not get in eyes, on skin or clothing.

Do not take internally

Keep away from acids, to avoid possible violent reaction.

Wash contaminated clothing before reuse.

Wash thoroughly after handling; exposure can cause burns which are not immediately painful or visible.

Wear personal protective equipment as described in Exposure Controls/Personal Protection (Section 8) of the MSDS.

If product is added too rapidly, or without stirring, and becomes concentrated at bottom of mixing vessel, excessive heat may be generated, resulting in DANGEROUS boiling and spattering, and a possible IMMEDIATE AND VIOLENT ERUPTION of highly caustic solution.

SPECIAL MIXING AND HANDLING INSTRUCTIONS:

Considerable heat is generated when product is mixed with water. Therefore, when making solutions always carefully follow these steps:

ALWAYS wear ALL protective clothing described above. NEVER add water to product. ALWAYS add product, with constant stirring, slowly to surface of lukewarm (80-100°F) water, to assure product is being completely dissolved as it is added.

7. HANDLING AND STORAGE (Continued)

Product can react EXPLOSIVELY with acids, aldehydes, and many other organic chemicals, add product VERY gradually, while stirring constantly. If product is added too rapidly, or without stirring, and becomes concentrated at bottom of mixing vessel, excessive heat may be generated, resulting in DANGEROUS boiling and spattering, and a possible IMMEDIATE AND VIOLENT ERUPTION of highly caustic solution.

ALWAYS empty and clean containers of all residues before adding product, to avoid possible EXPLOSIVE reaction between product and unknown residue.

Returnable containers should be shipped in accordance with supplier's recommendations. Return shipments should comply with all federal, state, and DOT regulations. All residue should be removed from containers prior to disposal.

Avoid contact with aluminum, tin, zinc, and alloys containing these metals. Avoid contact with leather, wool, acids, organic halogen compounds and organic nitro compounds.

STORAGE:

Keep container tightly closed and properly labeled.

Dike storage containers to contain 110% of tank volume.

Under normal conditions, this product can be stored satisfactorily in mild steel without an interior lining. Aluminum is not recommended for storage and handling.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

ENGINEERING CONTROLS:

No special ventilation required under normal use.

NOTE: Where carbon monoxide may be generated, special ventilation may be required.

Where engineering controls are not feasible use adequate local exhaust ventilation wherever mist, spray or vapor may be generated.

PERSONAL PROTECTION

RESPIRATORY:

Respiratory protection is not required under normal use.

Wear a NIOSH/MSHA approved respirator following manufacturer's recommendations, where airborne contaminants may occur.

EYE/FACE:

Wear chemical safety goggles plus full face shield to protect against splashing when appropriate (ANSI Z87.1).

8. EXPOSURE CONTROLS/PERSONAL PROTECTION (Continued)

SKIN:

Wear chemical resistant gloves such as rubber, neoprene or vinyl.

Wash contaminated clothing and dry before reuse.

Whenever there is a possibility of splash or contact wear a chemical resistant full body suit and boots.

OTHER:

Standard work clothing closed at the neck and wrists.

Discard shoes that cannot be decontaminated.

Emergency shower and eyewash facility should be in close proximity (ANSI Z358.1).

9. PHYSICAL AND CHEMICAL PROPERTIES

	Concentration, weight %				
Physical State: Liquid	10	20	30	40	50
Boiling Pt @ 760 mm Hg, °C	110	113	119	129	144
Freezing Pt °C	-10	-32	0	15	12
Vapor Press., mm Hg @ 60°C	135	110	76	46	13
Spec. Grav. @ 15.6°C	1.11	1.22	1.33	1.43	1.53
Density, lb/gal @ 15.6 C	9.27	10.20	11.11	11.97	12.76

Sol. in H20, % by Wt. . . . . .Completely Soluble. . . . . .

Vapor Density . . . . . .Not Applicable. . . . . .

Appearance and Odor Clear liquid with no distinct odor.

Odor Threshold (ppm) Not available

Evaporation Rate Not known

Coefficient Water/Oil Distribution Not available

pH 7.5% solution has pH 14.0

Appearance and Odor: Clear liquid with no distinct odor

Solubility in Water (% by wt.): Not available

VOC (g/l. by wt.): 0

10. STABILITY AND REACTIVITY

CHEMICAL STABILITY:

X	STABLE		UNSTABLE

REACTS WITH:

X	AIR		OXIDIZERS	X	METALS
X	WATER	X	ACIDS	X	OTHER
	HEAT		ALKALIS		NONE

HAZARDOUS POLYMERIZATION:

	OCCURS	X	WILL NOT OCCUR

COMMENTS:

Avoid direct contact with water.

Product is corrosive to tin, aluminum, zinc and alloys containing these metals and will react with these metals in powder form. Avoid contact with leather, wool, acids, organic halogen compounds, or organic nitro compounds. Hazardous carbon monoxide gas can form upon contact with reducing sugars, food and beverage products in enclosed spaces and can cause death. Follow appropriate tank entry procedures.

See Handling and Storage (Section 7).

HAZARDOUS DECOMPOSITION PRODUCTS:

None.

11. TOXICOLOGICAL INFORMATION

1310-73-2 Sodium hydroxide (Na(OH))

ACUTE DERMAL LD50 :	(rabbit)	1350 mg/kg
PRIMARY SKIN IRRITATION :	(rabbit)	severe
PRIMARY EYE IRRITATION :	(rabbit)	severe

7647-14-5 Sodium chloride (NaCl)

ACUTE ORAL LD50 :	(rat)	3000 mg/kg
PRIMARY SKIN IRRITATION :	(rabbit)	mild
PRIMARY EYE IRRITATION :	(rabbit)	moderate

7775-09-9 Chloric acid, sodium salt

ACUTE ORAL LD50 :	(rat)	1200 mg/kg
PRIMARY SKIN IRRITATION :	(rabbit)	mild
PRIMARY EYE IRRITATION :	(rabbit)	mild

12. ECOLOGICAL INFORMATION

1310-73-2 Sodium hydroxide (Na(OH))

AQUATIC ECOTOX DATA
Fish:

LC50 (24 hr.)	(Goldfish)	160	mg/L
LC50 (48 hr.)	(Bluegill sunfish)	99	mg/L
LC50 (96 hr.)	(Mosquito fish)	125	mg/L
LC100(24 hr.)	(Carp)	180	mg/L
NOEC (168 hr.)	(Goldfish, Bass)	50	mg/L

Invertebrates:

Lethal(48 hr.)	(Water flea)	100	mg/L
Lethal(48 hr.)	(Midge)	700	mg/L

Amphibians:
No data available

Plants:
No data available

TERRESTRIAL ECOTOX DATA
Wildlife:

LD50(interperitoneal)	(Mouse as surrogate)	40	mg/Kg
LDLo (Oral)	(Rabbit as surrogate)	500	mg/Kg

Plants:
No data available

ENVIRONMENTAL FATE DATA
Biotic:
BOD NaOH has no biological oxygen demand
Abiotic:
No data available

There is limited information available on the environmental fate and effects of sodium hydroxide (NaOH). Laboratory toxicity data indicate that NaOH is moderately toxic to aquatic and terrestrial organisms. The primary mode of action is due the corrosive nature of this chemical and its tendency to increase pH in poorly buffered environments. Aquatic organisms become increasingly stressed as pH exceeds 9, with many aquatic species being intolerant of pH levels in excess of 10. Increased pH due to the introduction of NaOH into aquatic environments may lead to the precipitation of essential micronutrients. Exposed terrestrial species would be subject to skin irritation and burns due to the corrosive nature of this material. Due caution should be exercised to prevent the accidental release of this material to aquatic or terrestrial environments.

7647-14-5 Sodium chloride (NaCl)

AQUATIC ECOTOX DATA
Fish:

LC50 (96 hr.)	(Fathead minnow)	7,650	mg/L
LC50 (96 hr.)	(Bluegill sunfish)	12,946	mg/L

12. ECOLOGICAL INFORMATION (Continued)

Invertebrates:

LC50 (48 hr.)	(Water flea)	3,310	mg/L
LC50 (48 hr.)	(Mosquito larva)	10,200	mg/L
EC50 (48 hr.)	(Pond snail)	3,388	mg/L
LC50 (7 day)	(Water flea)	1,770	mg/L*
	*mean value for five laboratory tests		
IC50Repro(7 day)	(Water flea)	1,340	mg/L*
	*mean value for five laboratory tests		

Amphibians:

Mortality(5 day)	(Frog)	46.66%@1,800	mg/L*
	(* concentration as Cl)		
Mortality(5 day)	(Frog)	46.66%@1,200	mg/L*
	(* concentration as Na)		

Plants:

EC50 (32 day)	(Water-milfoil)	5,962-8,183	mg/L

TERRESTRIAL ECOTOX DATA
Wildlife:

LD50 (oral)	(Rat as surrogate)	3,000	mg/Kg

Plants:
No data available

ENVIRONMENTAL FATE DATA

Sodium chloride (NaCl) is a naturally occurring inorganic salt in surface waters, groundwater and the earth's crust. Biological systems typically maintain a necessary osmotic balance of critical salts including sodium chloride. The tolerance of aquatic species to NaCl is variable depending upon whether the organism is freshwater or marine, or if the organism is capable of moving between freshwater and marine environments. In general NaCl has low to moderate toxicity to aquatic or terrestrial species. Continuous discharge of salt to freshwater environments can lead to increased salinity over time. Bulk releases could impact salt intolerant aquatic species and sessile terrestrial lifeforms. Due care should be taken to avoid the accidental release of this material to aquatic or terrestrial environments.

7775-09-9 Chloric acid, sodium salt

AQUATIC ECOTOX DATA
Fish:

LC50 (96 hr.)	(Fathead minnow)	4.46-4.56	mg/L
LC50 (96 hr.)	(Carp)	330	mg/L
LC50 (48 hr.)	(Brown trout)	7.3	mg/L

BCF No data available

Invertebrates:

LC50 (96 hr.)	(Aquatic sowbug)	210-280	mg/L
LC50 (96 hr.)	(Caddisfly larvae)	270	mg/L

BCF No data available

12. ECOLOGICAL INFORMATION (Continued)

Amphibians:
No data available

Plants:
Mortality(7 day)(Duckweed) 100 mg/L

TERRESTRIAL ECOTOX DATA
Wildlife:
LD50 (oral) (Rat as surrogate) 1,200 mg/Kg

Plants:
No data available

ENVIRONMENTAL FATE DATA
Biotic:
No data available
Abiotic:
reactive oxidizer of organic material

There is limited data on the environmental fate and effects of sodium chlorate (chloric acid, sodium salt). Laboratory test data indicate that sodium chlorate is moderately toxic to aquatic and terrestrial organisms. This material is highly soluble in water. It may persist up to 5 years in locations with low annual rainfall. Due caution should be exercised to avoid the accidental release of this material to aquatic and terrestrial environments.

13. DISPOSAL CONSIDERATIONS

Recovery and reuse, rather than disposal, should be the ultimate goal of handling efforts.

Dispose of all waste and contaminated equipment in accordance with all applicable federal, state and local health and environmental regulations.

Ensure that all responsible federal, state, and local agencies receive proper notification of spill and disposal methods.

Shipments of waste materials may be subject to manifesting requirements per applicable regulations. Appropriate disposal will depend on the nature of each waste material and should be done by a competent and properly permitted contractor.

The materials resulting from clean-up operations may be hazardous wastes and, therefore, subject to specific regulations. Package, store, transport, and dispose of all (clean-up) materials and any contaminated equipment in accordance with all applicable federal, state, and local regulations.

14. TRANSPORT INFORMATION

DOT PROPER SHIPPING NAME: Sodium Hydroxide, Solution

DOT HAZARD CLASS: 8

14. TRANSPORT INFORMATION (Continued)

DOT IDENTIFICATION NO: UN1824

DOT PACKING GROUP: II

DOT HAZARDOUS SUBSTANCE: RQ 1,000 Lbs. (Sodium Hydroxide)

DOT MARINE POLLUTANT(S): Not Applicable

ADDITIONAL DESCRIPTION REQUIREMENT: Not Applicable

15. REGULATORY INFORMATION

U.S. FEDERAL REGULATIONS:

OSHA Standard 29 CFR 1910.1200 requires that information be provided to employees regarding the hazards of chemicals by means of a hazard communication program including labeling, material safety data sheets, training and access to written records. We request that you, and it is your legal duty to, make all information in this Material Safety Data Sheet available to your employees.

To aid our customers in complying with regulatory requirements, SARA Title III Hazard Categories for this product are indicated below. If the word "YES" appears next to any category, this product may be reportable by you under the requirements of 40.CFR.370. Please consult those regulations for details.

TSCA:

All components of this product that are required to be on the TSCA inventory are listed on the inventory.

SARA/TITLE III HAZARD CATEGORIES:

Immediate(Acute) Health:	YES	Reactive Hazard	YES
Delayed(Chronic) Health:	NO	Sudden Release of Pressure	NO
Fire Hazard:	NO		

HMIS HAZARD RATINGS:

HEALTH HAZARD: 3 FIRE HAZARD: 0 REACTIVITY: 2 .

STATE REGULATIONS:

See Section 2. COMPOSITION/INFORMATION ON INGREDIENTS list legend for applicable state regulation.

INTERNATIONAL REGULATIONS:

Consult the regulations of the importing country.

CANADA:

WHMIS Hazard Class: D1B, E

16. OTHER INFORMATION

For additional non-emergency health, safety or environmental information telephone (972) 404-2405 or write to:

Occidental Chemical Corporation
Product Stewardship Department
5005 LBJ Freeway
P.O. Box 809050
Dallas, Texas 75380

MSDS LEGEND:

ACGIH = American Conference of Governmental Industrial Hygienists

CAS = Chemical Abstracts Service Registry Number

CEILING = Ceiling Limit (15 Minutes)

CEL = Corporate Exposure Limit

OSHA = Occupational Safety and Health Administration

PEL = Permissible Exposure Limit (OSHA)

STEL = Short Term Exposure Limit (15 Minutes)

TDG = Transportation of Dangerous Goods (Canada)

TLV = Threshold Limit Value (ACGIH)

TWA = Time Weighted Average (8 Hours)

WHMIS = Worker Hazardous Materials Information System (Canada)

* = See Section 3 Hazards Identification - Repeated Exposure(Chronic) Information

IMPORTANT: The information presented herein, while not guaranteed, was prepared by competent technical personnel and is true and accurate to the best of our knowledge. NO WARRANTY OF MERCHANTABILITY OR FITNESS FOR PURPOSE, OR OF ANY OTHER KIND, EXPRESS OR IMPLIED, IS MADE REGARDING PERFORMANCE, STABILITY OR OTHERWISE. This information is not intended to be all-inclusive as to the manner and conditions of use, handling and storage. Other factors may involve other or additional safety or performance considerations. While our technical personnel will be happy to respond to questions regarding safe handling and use procedures, safe handling and use remains the responsibility of the customer. No suggestions for use are intended as, and nothing herein shall be construed as a recommendation to infringe any existing patents or violate any federal, state or local laws, rules, regulations or ordinances.

This Material Safety Data Sheet (MSDS) covers the following materials:

- DIAPHRAGM 50%
- RAYON 25%
- SOLUTION 50%
- CAUSTIC SODA LIQUID (ALL GRADES)
- MEMBRANE 50%
- PURIFIED 50%
- WORSLEY BLEND
- RAYON 50%

16. OTHER INFORMATION (Continued)

- 50% CAUSTIC SODA-RAYON
- 38% CAUSTIC SODA-RAYON
- 10% CAUSTIC SODA-RAYON
- 18% CAUSTIC SODA-RAYON
- 25% CAUSTIC SODA-RAYON
- 30% CAUSTIC SODA-RAYON
- 30% CAUSTIC SODA-DIAPHRAGM
- 25% CAUSTIC SODA-DIAPHRAGM
- 20% CAUSTIC SODA-RAYON
- 20% CAUSTIC SODA-DIAPHRAGM
- 18% CAUSTIC SODA-DIAPHRAGM
- 50% CAUSTIC SODA-DIAPHRAGM
- 50% CAUSTIC SODA-MEMBRANE
- 50% CHEMICAL CAUSTIC SODA
- 35% CAUSTIC SODA-DIAPHRAGM
- 50% CAUSTIC SODA-PURIFIED
- 45% CAUSTIC SODA-DIAPHRAGM
- 10% CAUSTIC SODA-DIAPHRAGM
- 50% CAUSTIC SODA SOLUTION
- 28% CAUSTIC SODA-DIAPHRAGM
- MEM 50% LIQ CAUS (DRYBA) 50% CAUSTIC SODA-MEMBRANE
- 18% CAUSTIC SODA MEMBRANE
- 30% CAUSTIC SODA-MEMBRANE
- 25% CAUSTIC SODA-MEMBRANE WT
- CAUSTIC SODA-MEMBRANE CELL LIQUOR
- 20% CAUSTIC SODA-MEMBRANE
- 33% CAUSTIC SODA-DIAPHRAGM
- 10% CAUSTIC SODA-MEMBRANE
- 35% CAUSTIC SODA-MEMBRANE
- 50% CAUSTIC DODA DIAPHRAGM
- 15% CAUSTIC SODA-MEMBRANE
- 25% CAUSTIC SODA DIAPHRAGM
- 20% CAUSTIC SODA DIAPHRAGM
- 24% CAUSTIC SODA-DIAPHRAGM

Revised

17. WARNING LABEL INFORMATION

SIGNAL WORD:

DANGER

HAZARD WARNINGS:

MAY CAUSE BURNS TO THE EYES, SKIN, AND MUCOUS MEMBRANES.

MAY CAUSE PERMANENT EYE DAMAGE.

INHALATION OF DUST, MIST, OR SPRAY CAN CAUSE SEVERE LUNG DAMAGE.

CAN REACT VIOLENTLY WITH WATER, ACIDS AND OTHER SUBSTANCES.

PRECAUTIONS:

Avoid contact with eyes, skin and clothing.

Avoid breathing dust, vapors or mist.

Do not swallow.

17. WARNING LABEL INFORMATION (Continued)

Use with adequate ventilation and wear respiratory protection when exposure to dust, mist, or spray is possible.

Wear safety glasses with side shields or chemical splash goggles, protective clothing and chemical resistant gloves.

Wash thoroughly after handling; exposure can cause burns which are not immediately painful or visible.

Keep container tightly closed and properly labeled.

Product can react violently with water, acids and other substances. See Handling and Storage (Section 7) of the MSDS for instructions before using.

Avoid contact with aluminum, tin, zinc, and alloys containing these metals. Avoid contact with leather, wool, acids, organic halogen compounds and organic nitro compounds.

Hazardous carbon monoxide gas can form upon contact with food and beverage products in enclosed spaces and can cause death. Follow appropriate tank entry procedures (ANSI Z117.1).

FIRST AID

EYES:

IMMEDIATELY FLUSH EYES WITH A DIRECTED STREAM OF WATER for at least 15 minutes, forcibly holding eyelids apart to ensure complete irrigation of all eye and lid tissue. Washing eyes within several seconds is essential to achieve maximum effectiveness. GET MEDICAL ATTENTION IMMEDIATELY.

SKIN:

Flush thoroughly with cool water under shower while removing contaminated clothing and shoes. Discard non-rubber shoes. Wash clothing before reuse. GET MEDICAL ATTENTION AS SOON AS POSSIBLE.

INHALATION:

Remove to fresh air. If breathing is difficult, have trained person administer oxygen. If respiration stops, have a trained person administer artificial respiration. GET MEDICAL ATTENTION IMMEDIATELY.

INGESTION:

NEVER GIVE ANYTHING BY MOUTH TO AN UNCONSCIOUS PERSON. If swallowed, DO NOT INDUCE VOMITING. Give large quantities of water. (If available, give several glasses of milk.) If vomiting occurs spontaneously, keep airway clear and give more water. GET MEDICAL ATTENTION IMMEDIATELY.

IN CASE OF SPILL OR LEAK:

Leaks should be stopped.

CAUTION: This product may react strongly with acids and water.

Scoop or sweep up all spilled product and other contaminated material and place in marked disposal containers

17. WARNING LABEL INFORMATION (Continued)

Neutralize residue with dilute acid and flush spill area with water followed by a liberal covering of sodium carbonate.

Dispose of wash water and spill by-products according to federal, state and local regulations.

Spills of 1000 pounds or more must be reported to the National Response Center, 1-800-424-8802.

State and local regulations may have additional reporting requirements, check with the proper state and local authorities.

Wear neoprene or rubber gloves.

FIRE:

Material does not burn.

Use extinguishing medium as appropriate for surrounding fire.

HANDLING AND STORAGE:

Considerable heat is generated when product is mixed with water. Therefore, when making solutions always carefully follow these steps:

ALWAYS wear ALL protective clothing described above. NEVER add water to product. ALWAYS add product, with constant stirring, slowly to surface of lukewarm (80-100°F) water, to assure product is being completely dissolved as it is added.

Product can react EXPLOSIVELY with acids, aldehydes, and many other organic chemicals, add product VERY gradually, while stirring constantly. If product is added too rapidly, or without stirring, and becomes concentrated at bottom of mixing vessel, excessive heat may be generated, resulting in DANGEROUS boiling and spattering, and a possible IMMEDIATE AND VIOLENT ERUPTION of highly caustic solution.

ALWAYS empty and clean containers of all residues before adding product, to avoid possible EXPLOSIVE reaction between product and unknown residue.

Returnable containers should be shipped in accordance with supplier's recommendations. Return shipments should comply with all federal, state, and DOT regulations. All residue should be removed from containers prior to disposal.

Containers that have been emptied, will retain product residue and vapor and should be handled as if they were full.

DISPOSAL:

A spill or release of this material may trigger the emergency release reporting requirements under SARA, Title III (40 CFR, Part 355) and/or CERCLA (40 CFR, Part 300). State or local reporting requirements may differ from federal requirements. Consult counsel for further guidance on your responsibilities under these laws.

Material that cannot be reused or chemically reprocessed should be disposed of in a manner meeting government regulations.

17. WARNING LABEL INFORMATION (Continued)

Always package, store, transport and dispose of all waste and contaminated equipment in accordance with all applicable federal, state and local health and environmental regulations.

Appropriate disposal will depend on the nature of each waste material and should be done by a competent and properly permitted contractor.

INFORMATION REQUIRED BY FEDERAL, STATE OR LOCAL REGULATIONS:

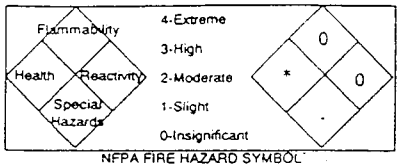
This Product Contains:

CAS#	NAME
7732-18-5	Water
1310-73-2	Sodium hydroxide (Na(OH))
7647-14-5	Sodium chloride (NaCl)
7775-09-9	Chloric acid, sodium salt

HMIS RATING: HEALTH 3 FLAMMABILITY 0 REACTIVITY 2

LABEL NUMBER: 0198M32415

For Industrial Use Only



NFPA FIRE HAZARD SYMBOL*
See NFPA 704 for detailed explanation.
* See Section 3 HAZARD IDENTIFICATION

Material Safety Data Sheet

No.: 2410 Rev. No.: 0
Date Revised: 1/1/99

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Trade Name(s): (CELITE® = C) AQUA-CEL®, C503, C503RV, C535, C545, C552, C560, C566, C578P, C580, X-6, X-7

Generic Name: FLUX CALCINED DIATOMACEOUS EARTH
Chemical Name: SILICA
Manufacturer: CELITE CORPORATION
Address: P.O. BOX 519
City: LOMPOC **State:** CA **Zip:** 93438

CAS: 68855-54-9
EINECS: 272-489-0
Formula: SiO_2
Telephone: (805) 735-7791
Emergency: CHEMTREC - USA: (800) 424-9300
International: (703) 527-3887 (collect)

2. COMPOSITION/INFORMATION ON INGREDIENTS

INGREDIENT NAME:	CAS NUMBER:	%	PEL AND TLV (except as noted)
FLUX CALCINED DIATOMACEOUS EARTH (DE)	68855-54-9	100	SEE BELOW
THIS PRODUCT MAY CONTAIN UP TO 54% CRYSTALLINE SILICA:			
CRISTOBALITE	14464-46-1	< 50	.05mg/M³ RESPIRABLE CRISTOBALITE, OSHA
QUARTZ	14808-60-7	< 4	.1mg/M³ RESPIRABLE QUARTZ, OSHA

3. HAZARD IDENTIFICATION

Summary: THIS PRODUCT CONTAINS CRYSTALLINE SILICA (CS), WHICH IS CONSIDERED A HAZARD BY INHALATION. IARC HAS CLASSIFIED INHALATION OF CS AS CARCINOGENIC FOR HUMANS (GROUP 1). CS IS LISTED BY NTP AS A SUBSTANCE WHICH MAY REASONABLY BE ANTICIPATED TO BE A CARCINOGEN. INHALATION OF CS IS ALSO A KNOWN CAUSE OF SILICOSIS, A NONCANCEROUS LUNG DISEASE.

Medical conditions which may be aggravated: PRE-EXISTING UPPER RESPIRATORY AND LUNG DISEASE SUCH AS, BUT NOT LIMITED TO BRONCHITIS, EMPHYSEMA AND ASTHMA.
Target Organ(s) : LUNGS, EYES

Acute Health Effects: TRANSITORY UPPER RESPIRATORY OR EYE IRRITATION.
Chronic Health Effects: INHALATION OF CRYSTALLINE SILICA HAS BEEN CLASSIFIED BY IARC AS CARCINOGENIC FOR HUMANS (GROUP 1). INHALATION OF CRYSTALLINE SILICA IS ALSO A KNOWN CAUSE OF SILICOSIS, A NONCANCEROUS LUNG DISEASE CAUSED BY EXCESSIVE EXPOSURE TO CRYSTALLINE SILICA.

Primary Entry Route(s) : INHALATION, DUST CONTACT WITH EYES.

Inhalation: IRRITATION AND SORENESS IN THROAT & NOSE. IN EXTREME EXPOSURES SOME CONGESTION MAY OCCUR.
Eyes: TEMPORARY IRRITATION OR INFLAMMATION.
Skin Contact: NA **Skin Absorption:** NA **Ingestion:** NOT HAZARDOUS WHEN INGESTED.

4. FIRST AID MEASURES

Inhalation: REMOVE TO FRESH AIR. DRINK WATER TO CLEAR THROAT AND BLOW NOSE TO EVACUATE DUST.
Eyes: FLUSH EYES WITH LARGE QUANTITIES OF WATER. IF IRRITATION PERSISTS CONSULT A PHYSICIAN.
Skin Contact: NA **Skin Absorption:** NA **Ingestion:** NA

5. FIRE FIGHTING MEASURES

Flash Point (Method) : NONFLAMMABLE **NFPA Flammable/Combustible Liquid Classification:** NA.
Flammable Limits: LEL: NA UEL: NA **Auto-Ignition Temperature:** NA
Extinguishing Media: NA **Unusual Fire or Explosion Hazards:** NONE **Special Fire-Fighting Procedures:** NONE

6. ACCIDENTAL RELEASE MEASURES

Procedures for Spill/Leak: VACUUM CLEAN DUST WITH EQUIPMENT FITTED WITH HEPA FILTER. USE A DUST SUPPRESSANT SUCH AS WATER IF SWEEPING IS NECESSARY-

"Copyright© 1990 "National Fire Protection Assoc., Quincy, MA 02269. This reprinted material is not the complete and official position of the NFPA on the referenced subject, which is represented

7. HANDLING AND STORAGE

MINIMIZE DUST GENERATION AND ACCUMULATION. AVOID BREATHING DUST, AVOID CONTACT WITH EYES. SEAL BROKEN BAGS IMMEDIATELY. CONTINUE TO FOLLOW ALL MSDS/LABEL WARNINGS WHEN HANDLING EMPTY CONTAINERS.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Goggles: GOGGLES OR SAFETY GLASSES WITH SIDESHIELDS ARE RECOMMENDED.
Gloves: NOT NORMALLY REQUIRED.
Respirator: <10X PEL, USE AN N95 QUARTER OR HALF MASK RESPIRATOR; <50X PEL, USE A FULL FACE RESPIRATOR EQUIPPED WITH N95 FILTERS; <200X PEL, USE A POWERED AIR PURIFYING RESPIRATOR (POSITIVE PRESSURE) WITH N95 FILTERS; >200X PEL, USE A FULL FACE, TYPE C SUPPLIED AIR RESPIRATOR (CONTINUOUS FLOW MODE).
Ventilation: USE SUFFICIENT NATURAL OR MECHANICAL VENTILATION TO KEEP DUST LEVEL BELOW PEL.

Other: Special Considerations for repair/maintenance of contaminated equipment: INSURE PROPER RESPIRATORY PROTECTION.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance and Odor: FINE WHITE POWDER, NO ODOR.

Boiling Point:	NA	**Evaporation Rate (= 1) :**	NA	**Specific Gravity (water = 1) :**	2.3
Vapor Pressure:	NA	**Melting Point:**	ND	**% Volatile by Volume:**	NIL
Water Solubility (%) :	NEGLIGIBLE	**Vapor Density (Air=1) :**	NA	**pH:**	9 - 10.5

10. STABILITY AND REACTIVITY

MATERIAL IS STABLE.
Chemical Incompatibilities: HYDROFLUORIC ACID.
HAZARDOUS POLYMERIZATION CANNOT OCCUR.
Conditions to Avoid: NONE IN DESIGNED USE.

11. TOXICOLOGICAL INFORMATION

Summary: THIS PRODUCT CONTAINS CRYSTALLINE SILICA (CS), WHICH IS CONSIDERED A HAZARD BY INHALATION. IARC HAS CLASSIFIED CS AS CARCINOGENIC FOR HUMANS (GROUP 1). CS IS LISTED BY NTP AS A SUBSTANCE WHICH MAY REASONABLY BE ANTICIPATED TO BE A CARCINOGEN. CS IS ALSO A KNOWN CAUSE OF SILICOSIS, A NONCANCEROUS LUNG DISEASE.

12. ECOLOGICAL INFORMATION

GENERALLY CONSIDERED CHEMICALLY INERT IN THE ENVIRONMENT. USED MATERIAL WHICH HAS BECOME CONTAMINATED MAY HAVE SIGNIFICANTLY DIFFERENT CHARACTERISTICS BASED ON THE CONTAMINANT AND SHOULD BE EVALUATED ACCORDINGLY.

13. DISPOSAL CONSIDERATIONS

WASTE IS NOT HAZARDOUS AS DEFINED BY RCRA (40 CFR 261). OTHER STATE AND LOCAL REGULATIONS MAY VARY, CONSULT LOCAL AGENCIES AS NEEDED. USED MATERIAL WHICH HAS BECOME CONTAMINATED MAY HAVE SIGNIFICANTLY DIFFERENT CHARACTERISTICS BASED ON THE CONTAMINANTS AND SHOULD BE EVALUATED ACCORDINGLY.

14. TRANSPORTATION INFORMATION

D.O.T. Proper Shipping Name: EARTH, DIATOMACEOUS, CRUDE OR GROUND **Hazard Classification:** NOT CLASSIFIED
Reportable Quantities: NOT APPLICABLE **UN (United Nations), NA(North America) Number:** NOT APPLICABLE

15. REGULATORY INFORMATION

OSHA Hazard Communications Standard, 29 CFR 1910.1200: MATERIAL IS CONSIDERED HAZARDOUS, SEE SECTION 3 OF THIS MSDS.
RCRA: THIS MATERIAL IS NOT DEFINED AS HAZARDOUS WASTE PER 40 CFR 261.
TSCA: THIS MATERIAL IS LISTED IN THE TSCA INVENTORY, AND IS NOT OTHERWISE REGULATED BY TSCA SEC. 4, 5, 6, 7 OR 12.
CERCLA: MATERIAL IS NOT REPORTABLE UNDER CERCLA, LOCAL REQUIREMENTS MAY VARY.
SARA: 311/312 HAZARD CATAGORIES -IMMEDIATE AND DELAYED HEALTH, 313 REPORTABLE INGREDIENTS - NONE.
California Proposition 65: THIS PRODUCT CONTAINS CHEMICALS KNOWN TO THE STATE OF CALIFORNIA TO CAUSE CANCER.

16. OTHER INFORMATION

Storage Segregation Hazard Classes: NA
Special Handling/Storage: REPAIR ALL BROKEN BAGS IMMEDIATELY.
Special Workplace Engineering Controls: ADEQUATE VENTILATION TO KEEP DUST LEVEL BELOW PEL.

Prepared/Revised by: CHRIS PAULEY **Title:** DIRECTOR, HEALTH & SAFETY SERVICES

As of the date of preparation of this document, the foregoing information is believed to be accurate and is provided in good faith to comply with applicable federal and state law(s). However, no warranty or representation with respect to such information is intended or given.

AMBER CHEMICAL, INC.
MATERIAL SAFETY DATA SHEET

CITRIC ACID SOLUTION 50%

HAZARD INDEX

HEALTH:	3
FLAMMABILITY:	0
REACTIVITY:	0
PERSONAL PROTECTION:	g

SECTION I - GENERAL INFORMATION

PRODUCT NAME..... CITRIC ACID SOLUTION 50%
CHEMICAL DESCRIPTION..... Citric acid solution

SUPPLIER..... AMBER CHEMICAL, INC.
ADDRESS..... 5201 BOYLAN STREET, BAKERSFIELD, CA. 93308
EMERGENCY TELEPHONE NUMBER..... (805) 325-2072

PREPARED BY..... AMBER CHEMICAL, INC. (805) 325-2072
DATE PREPARED..... January 1990 Supersedes: March 1988

SECTION II - HAZARDOUS COMPONENTS

HAZARDOUS COMPONENTS	CAS #	PERCENT	TLV (UNITS)	OSHA PEL
No hazardous ingredients				

SECTION III - FIRE AND EXPLOSION HAZARD DATA

FLASHPOINT AND METHOD OF DETERMINATION..... N.A. Aqueous solution
UPPER EXPLOSION LIMIT(% BY VOL). N.A.
LOWER EXPLOSION LIMIT(% BY VOL). N.A.
AUTO-IGNITION TEMPERATURE..... N.A.
EXTINGUISHING MEDIA..... Material does not burn.
Use appropriate media for surrounding fire

SPECIAL FIRE FIGHTING PROCEDURES None
EXPLOSION DATA..... Aqueous solutions of citric acid can, if in contact with reactive metals, form hydrogen which may form explosive mixtures.

HAZARDOUS COMBUSTION PRODUCTS... None

SECTION IV - HEALTH HAZARD DATA

PRIMARY ROUTES OF ENTRY..... SKIN CONTACT
EYE CONTACT

AMBER CHEMICAL, INC.
MATERIAL SAFETY DATA SHEET

CITRIC ACID SOLUTION 50%

HAZARD INDEX

HEALTH: 3
FLAMMABILITY: 0
REACTIVITY: 0
PERSONAL PROTECTION: g

SECTION VI - PHYSICAL DATA

APPEARANCE and ODOR..... Clear white to medium yellow liquid, essentially odorless to very slight sugar odor

SPECIFIC GRAVITY..... 1.22 - 1.26
VAPOR PRESSURE..... 16 mmHg @ 20 C
VAPOR DENSITY..... 0.62
EVAPORATION RATE..... 1
BOILING POINT..... 219 F
FREEZING POINT..... N.E.
SOLUBILITY IN H20..... Complete
pH..... 2

SECTION VII - REACTIVITY DATA

CHEMICAL STABILITY..... Stable
INCOMPATIBLE MATERIALS..... Caustics and reactive metals such as iron, zinc, aluminum.

HAZARDOUS POLYMERIZATION..... DOES NOT POLYMERIZE
HAZARDOUS DECOMPOSITION PRODUCTS None

SECTION VIII - SPECIAL/PERSONAL PROTECTION

VENTILATION..... The use of mechanical ventilation is recommended whenever this product is used in a confined space. Where engineering controls are not feasible, assure use is in an area where there is natural air movement.
RESPIRATORY PROTECTION..... Not Required
PROTECTIVE GLOVES..... Rubber or Neoprene
EYE PROTECTION..... Goggles
OTHER PROTECTIVE EQUIPMENT..... Eyewash bottles or other rinsing equipment should be easily accessible.

SECTION IX - HANDLING PRECAUTIONS

AMBER CHEMICAL, INC.
MATERIAL SAFETY DATA SHEET

CITRIC ACID SOLUTION 50%

HAZARD INDEX

HEALTH:	3
FLAMMABILITY:	0
REACTIVITY:	0
PERSONAL PROTECTION:	g

0 Materials that are normally stable and will not burn unless heated

REACTIVITY:

4 Danger: Explosive material at room temperature
3 Danger: May be explosive if shocked or heated under confinement or mixed with water
2 Warning: Unstable or may react violently with water
1 Caution: May react if heated or mixed with water but not violently
0 Stable: Not reactive when mixed with water

PERSONAL PROTECTION:

SEE AMBER CHEMICAL product label or Section VIII

The information contained herein is based on data considered accurate. However, no warranty is expressed or implied regarding the accuracy of these data or the results to be obtained from the use thereof. Vendor assumes no responsibility for injury to vendee or third persons proximately caused by the material if reasonable safety procedures are not adhered to as stipulated in the data sheet. Additionally, vendor assumes no responsibility for injury to vendee or third persons proximately caused by abnormal use of the material even if reasonable safety procedures are followed. Furthermore, vendee assumes the risk in his use of the material.

GEO Drilling Fluids, Inc.
P.O. Box 1478 | Bakersfield, CA 93302 | Telephone (805) 325-5919 | 1-800-GETSGEO

CFR

R

GEO Drilling Fluids, Inc.

Material Safety Data Sheet

Product: C F R

SECTION I - IDENTIFICATION

WARNING! THIS PRODUCT CONTAINS 0.15-0.18% NICKEL! NICKEL AND NICKEL SALTS HAVE BEEN CLASSIFIED AS CANCER HAZARDS BASED ON TESTS WITH EXPERIMENTAL ANIMALS! CANCER RISK DEPENDS ON DURATION AND LEVEL OF EXPOSURE! NICKEL SALTS MAY BE HARMFUL IF SWALLOWED, INHALED, OR ABSORBED THROUGH THE SKIN! MAY CAUSE SKIN AND EYE IRRITATION!

DO NOT GET IN EYES, ON SKIN, OR ON CLOTHES. DO NOT BREATHE VAPOR OR MIST. KEEP CONTAINER CLOSED. USE ONLY WITH ADEQUATE VENTILATION. WASH THOROUGHLY AFTER HANDLING.

PRODUCT: EMERY 979-U FATTY ACID

SYNONYMS:

CHEMICAL: FATTY ACIDS, C14-18 AND C16-18-UNSATURATED, DISTILLATION RESIDUES

CAS NO: 70321-73-2

SARA HAZARD: ACUTE, CHRONIC (SECTION 311/312)
TITLE III SECTION 313- CONTAINS 0.15-0.18% NICKEL (AS FATTY ACID SOAP)

SECTION II - INGREDIENTS AND HAZARD CLASSIFICATION

COMPOSITION	%	PEL/TLV	HAZARD
GLYCERIDE ESTERS (**)	50	NONE/NONE	NONE NOTED
CARBOXYLIC ACIDS (*)	40	NONE/NONE	NONE NOTED
UNSAPONIFIABLES	APPROX 6	NONE/NONE	NONE NOTED
NICKEL (AS FATTY ACID SOAP)	0.15-0.18	SEE SECT IV	CARCINOGENIC IN LAB ANIMALS

(*) C18:1, C16, C18:2, C18, C16:1, AND C18:3 FATTY ACIDS
(**) MIXED GLYCERIDES OF ABOVE FATTY ACIDS

SECTION III - HEALTH INFORMATION

INHALATION: UNKNOWN

INGESTION: LD50:>10 G/KG (ALBINO RATS)(STEARIC, OLEIC, LINOLEIC, AND PALMITIC ACIDS)
INGESTION OF NICKEL CATAYST MAY CAUSE AN ALLERGIC REACTION, NAUSEA, VOMITING OR DIARRHEA. HIGH DOSES OF SOLUBLE SALTS INDUCE GIDDINESS AND NAUSEA. LARGE DOSES OF NICKEL SALTS CAUSE ACUTE GASTROINTESTINAL TRACT IRRITATION, WITH VOMITING AND DIARRHEA (DOGS). CHRONIC DOSING OF INORGANIC NICKEL SALTS IS WELL TOLERATED BY RODENTS.

EYE CONTACT: STEARIC-PALMITIC MIXTURES PRODUCED ONLY MILD CONJUNCTIVAL ERYTHEMA IN TWO OF SIX RABBITS AT THE 24 AND 48-HOUR READINGS. NO OTHER SIGNS OF IRRITATION WERE OBSERVED. ALL SIGNS OF IRRITATION HAD SUBSIDED COMPLETELY AT THE 72-HOUR READING. OLEIC ACID PRODUCED MILD CONJUNCTIVITIS IN FIVE OF SIX RABBITS. NO OTHER IRRITATIVE SIGNS WERE OBSERVED AND ALL EXCEPT ONE RABBIT SHOWED NO IRRITATIVE SIGNS AT THE 72-HOUR READING. NICKEL SALTS MAY CAUSE EYE IRRITATION OR CONJUNCTIVITIS.

SKIN CONTACT: EXPOSURE TO STEARIC-PALMITIC ACID MIXTURES CAUSED NO SIGNS OF IRRITATION OR CORROSIVITY AT EITHER INTACT OR ABRADED SITES ON ALBINO RABBITS. EXPOSURE TO OLEIC ACID RESULTED IN VERY SLIGHT ERYTHEMA IN SIX INTACT AND SIX ABRADED SITES ON ALBINO RABBITS AT THE 24-HOUR READING ONLY. NO EDEMA WAS OBSERVED AT EITHER OBSERVATION.
PROLONGED OR REPEATED CONTACT OF NICKEL SALTS WITH THE SKIN MAY RESULT IN AN ALLERGIC REACTION (DERMATITIS) IN SENSITIVE INDIVIDUALS.
PRIMARY IRRITATION INDEX FOR STEARIC, PALMITIC AND OLEIC ACIDS WAS 0.0-0.5.
75 MG OF STEARIC ACID APPLIED INTERMITTENTLY TO HUMAN SKIN OVER A 3-DAY PERIOD RESULTED IN MILD IRRITATION. 500 MG OF STEARIC ACID APPLIED TO RABBIT SKIN OVER A 24-HOUR PERIOD RESULTED IN MODERATE IRRITATION. 15 MG OF OLEIC ACID INTERMITTENTLY APPLIED TO HUMAN SKIN OVER A 3-DAY PERIOD RESULTED IN MODERATE IRRITATION. 500 MG OF OLEIC ACID APPLIED TO RABBIT SKIN IN AN OPEN DRAIZE TEST RESULTED IN MILD IRRITATION.

SECTION IV - OCCUPATIONAL EXPOSURE LIMITS

PEL: TWA: 1 MG/M3 (NICKEL: METAL AND INSOLUBLE COMPOUNDS- AS NICKEL)
TWA: 0.1 MG/M3 (NICKEL: SOLUBLE COMPOUNDS- AS NICKEL)

TLV: TWA: 1 MG/M3 (NICKEL: METAL AND INSOLUBLE COMPOUNDS- AS NICKEL)
TWA: 0.1 MG/M3 (NICKEL: SOLUBLE COMPOUNDS- AS NICKEL)

SECTION V - EMERGENCY FIRST AID PROCEDURE

FOR OVEREXPOSURE BY SWALLOWING: IF VICTIM IS CONSCIOUS AND ABLE TO SWALLOW, QUICKLY HAVE VICTIM DRINK WATER OR MILK TO DILUTE. DO NOT GIVE SODIUM BICARBONATE, FRUIT JUICES OR VINEGAR. NEVER GIVE ANYTHING BY MOUTH IF VICTIM IS UNCONSCIOUS OR HAVING CONVULSIONS. INDUCE VOMITING ONLY IF ADVISED BY PHYSICIAN OR POISON CONTROL CENTER. **CALL PHYSICIAN OR POISON CONTROL CENTER IMMEDIATLY.**
FOR OVEREXPOSURE BY SKIN CONTACT: IMMEDIATELY FLUSH SKIN WITH PLENTY OF WATER WHILE REMOVING CONTAMINATED CLOTHING. WASH CONTAMINATED CLOTHING BEFORE REUSE.
FOR OVEREXPOSURE BY EYE CONTACT: IMMEDIATELY FLUSH EYES WITH PLENTY OF COOL WATER FOR AT LEAST 15 MINUTES. DO NOT LET VICTIM RUB EYES. **GET MEDICAL ATTENTION IMMEDIATELY.**
FOR OVEREXPOSURE BY INHALATION: IMMEDIATELY REMOVE VICTIM TO FRESH AIR. IF VICTIM HAS STOPPED BREATHING GIVE ARTIFICIAL RESPIRATION, PREFERABLY BY MOUTH-TO-MOUTH. **GET MEDICAL ATTENTION IMMEDIATELY.**

SECTION VI - PHYSICAL DATA

BOILING POINT: APPROX. 182 DEG C AT 1 MM HG PRESSURE
MELTING POINT: NOT DETERMINED
VAPOR PRESSURE: 1 MM HG PRESSURE AT 180 DEG C (APPROX.)
SPECIFIC GRAVITY: 0.89 AT 25/20 DEG C
SOLUBILITY IN WATER: NEGLIGIBLE
APPEARANCE AND COLOR:
BLACK VISCOUS LIQUID AT 25 DEG C

SECTION VII - FIRE AND EXPLOSION HAZARDS

FLASH POINT & METHOD USED: 365 DEG F (185 DEG C) C.O.C.
FLAMMABLE LIMITS IN AIR, % BY VOL. LOWER: NOT ESTABLISHED
FLAMMABLE LIMITS IN AIR, % BY VOL. UPPER: NOT ESTABLISHED
NFPA RATING: NO NFPA RATING
HMIS RATING: HEALTH (2*) FIRE (1) REACTIVITY (0)
SPECIAL FIRE FIGHTING PROCEDURES & PRECAUTIONS
(INDIVIDUALS SHOULD PERFORM ONLY THOSE FIRE FIGHTING PROCEDURES FOR WHICH THEY HAVE BEEN TRAINED). WATER OR FOAM MAY CAUSE FROTHING WHEN APPLIED TO FLAMMABLE LIQUIDS HAVING FLASH POINTS ABOVE 212 DEG F (100 DEG C). THE REMARK IS INCLUDED ONLY AS A PRECAUTION AND DOES NOT MEAN THAT WATER OR FOAM SHOULD NOT OR COULD NOT BE USED IN FIGHTING FIRES IN SUCH LIQUIDS. THE FROTHING MAY BE QUITE VIOLENT AND COULD ENDANGER THE LIFE OF THE FIREFIGHTER PARTICULARLY WHEN SOLID STREAMS ARE DIRECTED INTO THE HOT BURNING LIQUID. ON THE OTHER HAND, WATER SPRAY CAREFULLY APPLIED HAS FREQUENTLY BEEN USED WITH SUCCESS IN EXTINGUISHING SUCH FIRES BY CAUSING THE FROTHING TO OCCUR ONLY ON THE SURFACE AND THIS FOAMING ACTION BLANKETS AND EXTINGUISHES THE FIRE. (NFPA 325M-1984)
UNUSUAL FIRE & EXPLOSION HAZARDS
FIREFIGHTERS SHOULD WEAR SELF-CONTAINED BREATHING APPARATUS IN THE POSITIVE-PRESSURE MODE WITH A FULL FACEPIECE WHEN THERE IS A POSSIBILITY OF EXPOSURE TO SMOKE, FUMES OR HAZARDOUS DECOMPOSITION PRODUCTS.

SECTION VIII - REACTIVITY

STABILITY:
GENERALLY STABLE
HAZARDOUS POLYMERIZATION:
NONE LIKELY
CONDITIONS & MATERIALS TO AVOID:
AVOID CONTACT WITH STRONG OXIDIZING AGENTS AND STRONG ALKALIES.
HAZARDOUS DECOMPOSITION PRODUCTS:
DECOMPOSITION MAY PRODUCE CARBON MONOXIDE AND CARBON DIOXIDE.

SECTION IX - EMPLOYEE PROTECTION

CONTROL MEASURES:
HANDLE IN THE PRESENCE OF ADEQUATE VENTILATION.
RESPIRATORY PROTECTION:
WHERE EXPOSURE IS LIKELY TO EXCEED ACCEPTABLE CRITERIA (SEE SECTIONS II AND IV), USE NIOSH/OSHA APPROVED RESPIRATORY EQUIPMENT. RESPIRATORS SHOULD BE SELECTED BASED ON THE FORM AND CONCENTRATION OF CONTAMINANT IN AIR AND IN ACCORDANCE WITH OSHA (29 CFR 1910.134).
PROTECTIVE CLOTHING:
WEAR GLOVES AND PROTECTIVE CLOTHING WHICH ARE IMPERVIOUS TO THE PRODUCT FOR THE DURATION OF ANTICIPATED EXPOSURE IF THERE IS POTENTIAL FOR PROLONGED OR REPEATED SKIN CONTACT.
EYE PROTECTION:
WEAR SAFETY GLASSES MEETING THE SPECIFICATIONS OF ANSI STANDARD Z87.1 WHERE NO CONTACT WITH THE EYE IS ANTICIPATED. CHEMICAL SAFETY GOGGLES MEETING THE SPECIFICATIONS OF ANSI STANDARD Z87.1 SHOULD BE WORN WHENEVER THERE IS THE POSSIBILITY OF SPLASHING OR OTHER CONTACT WITH THE EYES.

SECTION X - ENVIRONMENTAL PROTECTION

ENVIRONMENTAL PRECAUTIONS:
AVOID UNCONTROLLED RELEASES OF THIS MATERIAL. WHERE SPILLS ARE POSSIBLE, A COMPREHENSIVE SPILL RESPONSE PLAN SHOULD BE DEVELOPED AND IMPLEMENTED.

SPILL OR LEAK PRECAUTIONS:
WEAR APPROPRIATE RESPIRATORY PROTECTION AND PROTECTIVE CLOTHING AS DESCRIBED IN SECTION IX. CONTAIN SPILLED MATERIAL. TRANSFER TO SECURE CONTAINERS. WHERE NECESSARY, COLLECT USING ABSORBENT MEDIA.
IN THE EVENT OF AN UNCONTROLLED RELEASE OF THIS MATERIAL, THE USER SHOULD DETERMINE IF THE RELEASE IS REPORTABLE UNDER APPLICABLE LAWS AND REGULATIONS.

WASTE DISPOSAL:
ALL RECOVERED MATERIAL SHOULD BE PACKAGED, LABELED, TRANSPORTED, AND DISPOSED OR RECLAIMED IN CONFORMANCE WITH APPLICABLE LAWS AND REGULATIONS AND IN CONFORMANCE WITH GOOD ENGINEERING PRACTICES. AVOID LANDFILLING OF LIQUIDS. RECLAIM WHERE POSSIBLE.

SECTION XI - REGULATORY CONTROLS

DEPARTMENT OF TRANSPORTATION:
DOT CLASSIFICATION: NOT REGULATED
DOT PROPER SHIPPING NAME:
OTHER DOT INFORMATION:

OTHER REGULATORY REQUIREMENTS:
LISTED IN TSCA INVENTORY

CERCLA HAZARDOUS MATERIALS:
NICKEL RQ: 100 LBS

SECTION XII - PRECAUTIONS: HANDLING, STORAGE AND USAGE

STORE IN A COOL, DRY, WELL-VENTILATED AREA. STORE AWAY FROM HEAT AND MOISTURE AND OUT OF SUNLIGHT. AREA SHOULD BE PROTECTED FROM CONTAMINATION BY CORROSIVE FUMES. SHOULD BE STORED AWAY FROM FIRE HAZARD AREAS. STORAGE AREA SHOULD NOT CONTAIN DRAIN TO WHICH TOXICANTS COULD BE FLUSHED. CONTAINERS SHOULD BE SEALED AS TIGHTLY AS POSSIBLE. INSPECT PERIODICALLY FOR DEFICIENCIES. A SPILL CONTROL PLAN SHOULD BE PROVIDED. ISOLATE FROM ACIDS AND ACID FUMES, CORROSIVES, FIRE HAZARDS, HEAT AND MOISTURE. CONTAINER HAZARDOUS WHEN EMPTIED. SINCE EMPTIED CONTAINERS RETAIN PRODUCT RESIDUES, ALL HAZARD PRECAUTIONS DESCRIBED ON THIS MSDS MUST BE OBSERVED.

KEEP IN CLOSED OR COVERED CONTAINERS AND DO NOT STORE NEAR HEAT OR OPEN FLAMES.

The information presented herein is believed to be factual as it has been derived from the works and opinions of persons believed to be qualified experts; however, nothing contained in this information is to be taken as a warranty or representation for which Henkel Corporation bears legal responsibility. The user should review any recommendations in the specific context of the intended use to determine whether they are appropriate.

Cotton Seed Hulls

amber chemical inc.

MATERIAL SAFETY DATA SHEET

(Approved by U.S. Department of Labor as "essentially similar" to Form LSB-003-4)

PRODUCT

SECTION I - IDENTIFICATION OF PRODUCT

NUFACTURER'S NAME: ber Chemical, Inc.

EMERGENCY TELEPHONE NO.: (805) 325-2072

RESS (Number, Street, City, State and ZIP Code): 1330 Turcon Ave. Bakersfield, CA 93308

RADE NAME: tton Seed Hulls

CHEMICAL NAME: Cotton Seed Hulls

MICAL FAMILY: NA

CHEMICAL FORMULA: NA

SECTION II - HAZARDOUS COMPONENTS OF MIXTURES

The precise composition of this product is proprietary information. A more detailed disclosure will be provided by Amber Chemica INC. personnel to qualified Medical or Industrial Hygiene personnel as privileged information upon request in case of need for specific treatment.

t Applicable

SECTION III - TYPICAL PHYSICAL DATA

ARANCE AND ODOR: tton Seed Hulls

SPECIFIC GRAVITY: 2.71

ILING POINT (°F): Applicable

PERCENT VOLATILE (BY VOLUME): Not Applicable

R PRESSURE: ot Applicable

EVAPORATION RATE (n - BUTYL ACETATE = 1): Not Applicable

OR DENSITY (AIR 1): Applicable

ILITY IN WATER: egligible

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

S POINT (Method): ot Applicable

FLAMMABLE LIMITS (PERCENT BY VOLUME): Lel 55 gm/m3; Uel Unknown

EXTINGUISHING MEDIA: Chemical, CO2 or water

FIRE FIGHTING PROCEDURES: one

UAL FIRE AND EXPLOSION HAZARDS: can cause an explosion improperly handled, stored and/or exposed to an ignition source, this material burn. Airborne dust in sufficient concentrations, when confined and exposed a sufficient ignition source, can explode.

RDOUS PRODUCTS OF COMBUSTION: e expected

ORMATION RELATES ONLY TO THE SPECIFIC MATERIAL TED AND MAY NOT BE VALID FOR SUCH MATERIAL COMBINATION WITH ANY OTHER MATERIALS OR IN ANY S. Such information is, to the best of Amber, INC.'s knowledge accurate and reliable as of the date indicated. HOWEVER, NO REPRESENTATION, WARRANTY OR GUARANTEE IS MADE AS TO ITS ACCURACY, RELIABILITY OR COMPLETENESS. IT IS THE USER'S RESPONSIBILITY TO SATISFY HIMSELF AS TO THE SUITABLENESS AND COMPLETENESS OF SUCH INFORMATION FOR HIS OWN PARTICULAR USE.

PRINTED IN U.S.

SECTION V - HEALTH HAZARD DATA

THRESHOLD LIMIT VALUE: Not Applicable

EFFECTS OF OVEREXPOSURE
- ACUTE: Not Applicable
- CHRONIC: None expected

EMERGENCY AND FIRST AID PROCEDURES: Not Applicable

SECTION VI - REACTIVITY DATA

STABILITY			CONDITIONS TO AVOID
	UNSTABLE		
	STABLE	X	None

INCOMPATIBILITY (MATERIALS TO AVOID FOR PURPOSES OF TRANSPORT, HANDLING & STORAGE ONLY)

None

HAZARDOUS DECOMPOSITION PRODUCTS

None

SECTION VII - SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED

None

Normal Clean-Up

WASTE DISPOSAL (INSURE CONFORMITY WITH LOCAL DISPOSAL REGULATIONS)

NONE

SECTION VIII - PERSONAL PROTECTION INFORMATION

RESPIRATORY PROTECTION: None - can use dust mask

VENTILATION		
	LOCAL EXHAUST	SPECIAL
	MECHANICAL (General)	OTHER

PROTECTIVE GLOVES

EYE PROTECTION: Goggles

OTHER PROTECTIVE EQUIPMENT

SECTION IX - HANDLING AND STORAGE PRECAUTIONS

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING

None

OTHER PRECAUTIONS

DATE OF ISSUE: 10/5/95

☐ NEW ☒ REVISED; SUPERSEDES

APPROVED BY

TITLE PRES

September 30, 1997

Material Safety Data Sheet

CHROME-FREE DESCO® DEFLOCCULANT

DRILLING SPECIALTIES COMPANY
Bartlesville, Oklahoma 74004

PHONE NUMBERS
Emergency: (918) 661-8118
Technical Services: (800) 221-1956
For Additional MSDSs: (918) 661-7354

A. Product Identification

Synonyms: Drilling Mud Deflocculant
Chemical Name: Mixture
Chemical Family: Mixture
Chemical Formula: Mixture
CAS Reg. No.: Mixture
Product No.: Not Established

Product and/or components entered on EPA's TSCA Inventory: YES

This product is in U.S. commerce, and is listed in the Toxic Substances Control Act (TSCA) Inventory of Chemicals; hence, it may be subject to applicable TSCA provisions and restrictions.

B. Components

Ingredients	CAS Number	% By Wt.	OSHA PEL	ACGIH TLV
Proprietary ingredients	Various	90	NE	NE
Ferrous sulfate	7720-78-7	10	NE	1 mg/m3*
Crystalline silica	Various	<1	<3.3 mg/m3	0.1 mg/m3

* For soluble iron salts.

The specific chemical identity of this material is being withheld as a trade secret. It will be provided in accordance with the provisions of 29 CFR Part 1910.1200(i). In the event of a medical emergency, it will be provided to a treating physician or nurse through utilization of the above Emergency Telephone Number.

NA - Not Applicable NE - Not Established

C. Personal Protection Information

Ventilation: Local exhaust and mechanical ventilation system is recommended if handled in a confined area. Use adequate ventilation to control below recommended exposure levels.

Respiratory Protection: Use NIOSH/MSHA approved air purifying respirator for protection against dusts having an exposure limit measured as a time weighted average not less than 0.05 milligrams per cubic meter.

Eye Protection: Use chemical goggles.

Skin Protection: Use gloves and protective garments.

NOTE: Personal protection information shown in Section C is based upon general information as to normal uses and conditions. Where special or unusual uses or conditions exist, it is suggested that the expert assistance of an industrial hygienist or other qualified professional be sought.

D. Handling and Storage Precautions

Do not get in eyes, on skin or on clothing. Do not breathe vapors, mist, fume or dust. Wash thoroughly after handling. Immediately remove and launder contaminated clothing before reuse. Wear protective equipment and/or garments described in Section C if exposure conditions warrant. Use only with adequate ventilation.

Store in well-ventilated area. Store in closed container.

E. Reactivity Data

Stability: Stable
Conditions to Avoid: Not Established
Incompatibility (Materials to Avoid): Oxidizing agents and alkalies

Hazardous Polymerization: Will Not Occur
Conditions to Avoid: Not Established
Hazardous Decomposition Products: Sulfur and carbon oxides formed when burned.

F. Health Hazard Data

Recommended Exposure Limits:

See Section B.

Acute Effects of Overexposure:

Eye: May cause severe irritation to the eyes.

Skin: May cause severe irritation, redness and itching.

Inhalation: May cause irritation to the mucous membranes of the nose, throat and upper respiratory tract.

Ingestion: May cause gastrointestinal tract irritation, shock, liver damage, rapid heart beat, and death.

Subchronic and Chronic Effects of Overexposure:

Chronic inhalation of dust containing crystalline silica may cause silicosis, a progressive pulmonary fibrosis which may be associated with significantly impaired pulmonary function, cardiopulmonary impairment and death. Symptoms may progress after dust exposure ceases. Silicosis typically results from silica dust exposure over many years.

Crystalline silica has been classified as probably carcinogenic for humans (2A) by the International Agency for Research on Cancer (IARC).

Long term exposure to iron dusts may cause a benign lung condition ("siderosis") in which there are lung changes identifiable by x-ray imaging, without significant impairment of lung function. Prolonged contact of the eye with iron particles may cause temporary irritation and a brown discoloration. Prolonged lodging of iron particles in the eye may cause eye damage, impaired vision or blindness.

Other Health Effects:

Preexisting medical conditions which may be aggravated by exposure include: dermatitis, asthma, conjunctivitis, stomach or digestive problems.

Health Hazard Categories:

	Animal	Human		Animal	Human
Known Carcinogen	_X_	___	Toxic	___	___
Suspect Carcinogen	___	_X_	Corrosive	___	___
Mutagen	___	___	Irritant	_X_	_X_
Teratogen	___	___	Target Organ Toxin	_X_	_X_
Allergic Sensitizer	___	___	Specify - Lung Toxin		
Highly Toxic	___	___			

First Aid and Emergency Procedures:

Eye: Immediately flush eyes with running water for at least fifteen minutes. If irritation or adverse symptoms develop, seek medical attention.

Skin: Immediately wash skin with soap and water for at least fifteen minutes. If irritation or adverse symptoms develop, seek medical attention.

Inhalation: Immediately remove from exposure. If breathing is difficult, give oxygen. If breathing ceases, administer artificial respiration followed by oxygen. Seek immediate medical attention.

Ingestion: Give two glasses of water and induce vomiting only if subject is conscious. Seek medical attention.

Note to Physician:
This product contains iron salts. If severity of poisoning requires chelation therapy, the following is recommended:
Gastric lavage using Deproxamine® 2 grams in 1 liter of water containing sodium bicarbonate, 20 mg/l. Leave 10 mg of Deprosamine in 50 ml of 5% sodium bicarbonate in the stomach.

G. *Physical Data*

Appearance:	Fine reddish-brown powder with small white specks
Odor:	Odorless
Boiling Point:	Not Applicable
Vapor Pressure:	Not Applicable
Vapor Density (Air = 1):	Not Applicable
Solubility in Water:	Appreciable
Specific Gravity (H20 = 1):	1.5-1.7
Percent Volatile by Volume:	Not Applicable
Evaporation Rate (Butyl Acetate=1):	Not Applicable
Viscosity:	Not Applicable

H. *Fire and Explosion Data*

Flash Point (Method Used):	Not Applicable
Flammable Limits (% by Volume in Air):	LEL - Not Applicable UEL - Not Applicable
Fire Extinguishing Media:	Water, foam, dry chemical or carbon dioxide (CO2)
Special Fire Fighting Procedures:	Evacuate area of all unnecessary personnel. Wear appropriate safety equipment for fire conditions including NIOSH/MSHA self-contained breathing apparatus (SCBA) and other protective equipment and/or garments described in Section C if exposure conditions warrant.
Fire and Explosion Hazards:	If in a finely divided and suspended state, treat as a on flammable dust. Carbon, sulfur and iron oxides may be released when burned.

I. Spill, Leak and Disposal Procedures

Precautions Required if Material is Released or Spilled:
Evacuate area of all unnecessary personnel. Wear protective equipment and/or garments described in Section C if exposure conditions warrant. Shut off source, if possible and contain spill. Protect from ignition. Keep out of water sources and sewers. Absorb in a dry, inert material (sand, clay, etc). Transfer to disposal drums using non-sparking equipment.

Waste Disposal (Insure Conformity with all Applicable Disposal Regulations):
Incinerate or place in permitted waste management facility.

J. DOT Transportation

Shipping Name:	Not Applicable
Hazard Class:	Not Applicable
ID Number:	Not Applicable
Packing Group:	Not Applicable
Marking:	Not Applicable
Label:	Not Applicable
Placard:	Not Applicable
Hazardous Substance/RQ:	Not Applicable
Shipping Description:	Not Applicable
Packaging References:	Not Applicable

K. RCRA Classification - Unadulterated Product as a Waste

Prior to disposal, consult your environmental contact to determine if TCLP (Toxicity Characteristic Leaching Procedure, EPA Test Method 1311) is required. Reference 40 CFR Part 261.

L. Protection Required for Work on Contaminated Equipment

Contact immediate supervisor for specific instructions before work is initiated. Wear protective equipment and/or garments described in Section C if exposure conditions warrant.

M. Hazard Classification

_X_ This product meets the following hazard definition(s) as defined by the Occupational Safety and Health Hazard Communication Standard (29 CFR Section 1910.1200):

___ Combustible Liquid	___ Flammable Aerosol	___ Oxidizer
___ Compressed Gas	___ Explosive	___ Pyrophoric
___ Flammable Gas	_X_ Health Hazard (Section F)	___ Unstable
___ Flammable Liquid	___ Organic Peroxide	___ Water Reactive
___ Flammable Solid		

___ Based on information presently available, this product does not meet any of the hazard definitions of 29 CFR Section 1910.1200.

N. Additional Comments

Environmental Toxicity: Environmental effects testing has been conducted using Chrome-Free Desco® Deflocculant in a generic mud. The tests were conducted according to the 1985 U.S. EPA draft methodology - Drilling Fluid Toxicity Tests. In the test program, mysid shrimp "Mysidopsis Bahia" were exposed to the suspended particulate phase. The 96-hour LC50 for the mysid shrimp was > 1,000,000 ppm.

SARA 313

As of the preparation date, this product did not contain a toxic chemical or chemicals subject to the reporting requirements of Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 and 40 CFR Part 372.

NFPA 704 Hazard Codes - - - - - - - - Signals

Health	: 2	Least - 0
Flammability	: 0	Slight - 1
Reactivity	: 0	Moderate - 2
Special Haz.	: -	High - 3
		Extreme - 4

Phillips Petroleum Company (references to Phillips Petroleum Company or Phillips includes its divisions, affiliates and subsidiaries) believes that the information contained herein (including data and statements) is accurate as of the date hereof. NO WARRANTY OF MERCHANTABILITY, FITNESS FOR ANY PARTICULAR PURPOSE OR ANY OTHER WARRANTY, EXPRESS OR IMPLIED, IS MADE AS CONCERNS THE INFORMATION HEREIN PROVIDED. The information provided herein relates only to the specific product designated and may not be valid where such product is used in combination with any other materials or in any process. Further, since the conditions and methods of use of the product and information referred to herein are beyond the control of Phillips, Phillips expressly disclaims any and all liability as to any results obtained or arising from any use of the product or such information. No statement made herein shall be construed as a permission or recommendation for the use of any product in a manner that might infringe existing patents.

M A T E R I A L S A F E T Y D A T A S H E E T

DEFOAMER 7

AMBER CHEMICAL INCORPORATED
5201 BOYLAN STREET
BAKERSFIELD, CA 93308
(661) 325-2072

SECTION 1 -- PRODUCT INFORMATION

PRODUCT NAME: ACI DEFOAMER 7
SYNONYMS: Nonionic Defoaming Agent

NFPA Rating	HMIS Rating
HEALTH: 1	HEALTH: 1
FLAMMABILITY: 1	FLAMMABILITY: 1
REACTIVITY: 0	REACTIVITY: 0

EMERGENCY TELEPHONE NUMBER: CHEMTREC 1-800-424-9300

EMERGENCY OVERVIEW

Light yellow viscous liquid with slight odor. May cause mild transient skin and eye irritation.

SECTION 2 -- COMPOSITION INFORMATION

INGREDIENT	CAS NO.	% WT/WT	PEL:	TLV:
Trade Secret Ingredients	Trade Secret	100	None Established	None Established

LISTED AS CARCINOGEN BY:

IARC: NO
OSHA: NO
NTP: NO
ACGIH: NO

PEL: OSHA Permissible Exposure Limit
STEL: Short Term Exposure Limit
HI: Hazardous Ingredient
TWA: Time Weighted Average, 8-hr
TLV: ACGIH Threshold Limit
C.LIM: Ceiling Limit

M:	Oil mist	WF:	Wax fume
D:	Total dust	RF:	Respirable fraction
:	Nuisance dust	ST:	Skin TWA

SECTION 3 -- HAZARDS IDENTIFICATION

ROUTES OF EXPOSURE

INHALATION: No hazard expected under ordinary conditions of use. Prolonged or repeated exposure to vapors generated at high temperatures may result in irritation of the respiratory tract and inhalation of harmful amounts.

SKIN CONTACT: May cause minimal irritation.

SKIN ABSORBTION: Practically non-toxic by this route.

EYE CONTACT: May cause irritation.

INGESTION: Considered practically non-toxic. May cause nausea, vomiting and diarrhea.

EFFECTS OF OVEREXPOSURE

ACUTE OVEREXPOSURE: Possible eye, skin and respiratory tract irritation.

CHRONIC OVEREXPOSURE: No Data

SECTION 4 -- FIRST AID MEASURES

EYES: Immediately flush with plenty of water for at least 15 minutes, holding eyelids apart to ensure flushing of the entire surface. Washing within one minute is essential to achieve maximum effectiveness. Seek medical attention.

SKIN: Wash thoroughly with soap and water, remove contaminated clothing and footwear. Wash clothing before reuse. Get medical attention if irritation should develop.

INHALATION: Remove to fresh air.

INGESTION: Do not induce vomiting. If vomiting should occur spontaneously, keep airway clear. Get medical attention. Never give anything by mouth to an unconscious person.

NOTES TO PHYSICIAN: None

SECTION 5 -- FIRE FIGHTING MEASURES

FLASHPOINT: >200 °F

AUTOIGNITION TEMPERATURE: Not Available

FLAMMABLE LIMITS IN AIR, % BY VOLUME:

LOWER FLAMMABILITY LIMIT: NAV

UPPER FLAMMABILITY LIMIT: NAV

XTINGUISHING MEDIA: Water Spray, Carbon Dioxide, Foam, Dry Chemical.
IRE OR EXPLOSION HAZARDS: None
E FIGHTING PROCEDURES:
Cool exposed containers with water spray. Use self-contained breathing apparatus in confined areas.

SECTION 6 -- ACCIDENTAL RELEASE MEASURES

top leaks. Use absorbent material to clean up spills.
lace in labeled waste container for disposal. Wear adequate personal protective clothing and equipment.

SECTION 7 -- HANDLING AND STORAGE

RECAUTIONARY STATEMENTS:
AUTION!
MAY CAUSE IRRITATION.
void contact with eyes, skin, and clothing.
void breathing mist or vapor.
Wear chemical splash goggles, gloves, and protective clothing when handling.
se with adequate ventilation and employ respiratory protection where mist or vapor may be generated.
Wash thoroughly after handling.
R INDUSTRIAL USE ONLY.

HANDLING/STORAGE REQUIREMENTS:
Always mix well before using. Product may congeal or tratify if cold; Warm to 122 deg. F (50 deg. C) and ix well before using.

SECTION 8 -- EXPOSURE CONTROLS/PERSONAL PROTECTION

ENTILATION REQUIREMENTS: Local exhaust ventilation recommended.
YE PROTECTION: Chemical splash goggles and/or face shield.
SKIN PROTECTION: Rubber or plastic gloves.
RESPIRATORY PROTECTION:
None required under normal conditions of use. NIOSH/MSHA approved respirator if necessary following manufacturer's recommendations.
THER REQUIRED EQUIPMENT:
Standard work clothing and work shoes. Safety shower and eye wash located in immediate area.

SECTION 9 -- PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE: Clear, light yellow slightly viscous liquid
OR: Slight
SPECIFIC GRAVITY (WATER=1): 0.986
BOILING POINT: NAV
FREEZING POINT: NAV
VAPOR PRESSURE: NAV
VISCOSITY: 260 SUS AT 100 °F

SOLUBILITY IN WATER: Poor unstable emulsions
pH: 6.8 (2%)
DENSITY @ 20C: 8.2 lb/gal
MELTING POINT: NAPL
EVAPORATION RATE: NAV
VAPOR DENSITY (AIR=1): NAV
VOLATILES BY WEIGHT: Not Available

SECTION 10 -- STABILITY AND REACTIVITY

STABLE: YES
CONDITIONS TO AVOID: None
INCOMPATIBLE MATERIALS: Strong oxidizing agents.
HAZARDOUS POLYMERIZATION: NO
DECOMPOSITION PRODUCTS: Carbon dioxide and carbon monoxide.

SECTION 11 -- TOXICOLOGICAL INFORMATION

Acute Oral LD50 (rat): 15 g/kg
Acute Dermal LD50 (rabbit): >20 g/kg

SECTION 12 -- ECOLOGICAL INFORMATION

BOD5: mg O2/mg: 0.0217
ppm: Not Available
Biodegradable, %: Not Available
BOD28: mg O2/mg: Not Available
ppm: Not Available
Biodegradable, %: Not Available
COD: mg O2/mg: 1.550
ppm: Not Available
Biodegradable, %: 1.4

Aquatic Toxicity:
Not Available

SECTION 13 -- DISPOSAL CONSIDERATIONS

Dispose of product in an approved chemical waste landfill or incinerate in accordance with applicable Federal, State, and local regulations. Avoid landfilling liquids. Since emptied container retains product residue, all labeled hazard precautions must be observed.

SECTION 14 -- TRANSPORTATION INFORMATION

DOT PROPER SHIPPING NAME: NOT APPLICABLE, NOT RESTRICTED

Harmonized Tariff Schedule Number: 3402.13.20 10

SECTION 15 -- REGULATORY INFORMATION

NOTICE: This product does not contain any ingredients subject to the reporting requirements of SARA Title III, Section 313 (40 CFR Part 372).

SARA Section 311/312: Not Applicable.

TSCA: Components found in TSCA Inventory.

New Jersey Trade Secret Registry Numbers: 679485-5053P

SECTION 16 -- OTHER INFORMATION

LAST REVISION DATE: 01-01-99

The information herein is given in good faith but no warranty, expressed or implied, is made.

Legend: NAPL Not Applicable
NAV Not Available

========== LAST PAGE OF THE DOCUMENT ==========

AMBER ACI
CHEMICAL
INCORPORATED

MATERIAL SAFETY DATA

MSDS No: 0269
Date: 09/12/95
Supersedes: 12/17/93

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME: AMBER DMA

SYNONYMS: None

CHEMICAL FAMILY: Sodium Polyacrylate/Polyacrylamide

MOLECULAR FORMULA: Mixture

MOLECULAR WGT: Mixture

AMBER CHEMICAL, INC., 5201 BOYLAN ST., BAKERSFIELD, CA 93308
(805) 325-2072
EMERGENCY PHONE: For emergency involving spill, leak, fire, exposure or accident call CHEMTREC: 1-800/424-9300. Outside the USA and Canada call 202/483-7616.

2. COMPOSITION/INFORMATION ON INGREDIENTS

OSHA REGULATED COMPONENTS

COMPONENT	CAS. NO.	%	TWA/CEILING	REFERENCE
Sodium hydroxide	001310-73-2	<2.2	2 mg/M3 (ceiling)	OSHA/ACGIH

3. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW

APPEARANCE AND ODOR: Off-white to cream colored granular powder; no odor.

STATEMENTS OF HAZARD:
IMPORTANT! SPILLS OF THIS PRODUCT ARE VERY SLIPPERY WHEN WET

POTENTIAL HEALTH EFFECTS

EFFECTS OF OVEREXPOSURE:
Acute oral (rat) and dermal (rabbit) LD50 values are both greater than 10 g/kg. The 4-hour inhalation (rat) LC50 is estimated to be greater than 3,000 ppm. No eye irritation was seen when tested in rabbits. Refer to Section 11 for toxicology information on the OSHA regulated components of this product.

4. FIRST AID MEASURES

In case of skin contact, wash affected areas of skin with soap and water.
In case of eye contact, immediately irrigate with plenty of water for 15 minutes.
Material is not expected to be harmful if inhaled. If inhaled, remove to fresh air.

5. FIRE FIGHTING MEASURES

FLAMMABLE PROPERTIES

FLASH POINT: Not applicable

FLAMMABLE LIMITS
(% BY VOL): Not applicable

AUTOIGNITION TEMP: Not available

DECOMPOSITION TEMP: Not available

EXTINGUISHING MEDIA AND FIRE FIGHTING INSTRUCTIONS

Use water, carbon dioxide or dry chemical to extinguish fires. Wear self-contained, positive pressure breathing apparatus.

. ACCIDENTAL RELEASE MEASURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED

Spills of this product are very slippery. Spilled material should be absorbed onto an inert material and scooped up. The area should be thoroughly flushed with water and scrubbed to remove residue. If slipperiness remains apply more dry-sweeping compound.

. HANDLING AND STORAGE

Spills should be scooped up or wiped up immediately, and the spill area flushed with water.
To avoid product degradation and equipment corrosion, do not use iron, copper or aluminum containers or equipment.

. EXPOSURE CONTROLS/PERSONAL PROTECTION

ENGINEERING CONTROLS AND PERSONAL PROTECTIVE EQUIPMENT (PPE)

Engineering controls are not usually necessary if good hygiene practices are followed. Before eating, drinking, or smoking, wash face and hands thoroughly with soap and water. Avoid unnecessary skin contact. Impervious gloves are recommended to prevent prolonged skin contact. For operations where eye or face contact can occur, eye protection is recommended.

9. PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE AND ODOR: Off-white to cream colored granular powder; no odor.

BOILING POINT: Not applicable

MELTING POINT: Not available

VAPOR PRESSURE: Not applicable

SPECIFIC GRAVITY: Not available

VAPOR DENSITY: Not applicable

% VOLATILE (BY WT): 5-10

pH: Not applicable

SATURATION IN AIR (% BY VOL): Not applicable

EVAPORATION RATE: Not applicable

SOLUBILITY IN WATER: Moderate

0. STABILITY AND REACTIVITY

STABILITY: Stable
CONDITIONS TO AVOID: None known

POLYMERIZATION: Will Not Occur
CONDITIONS TO AVOID: None known

INCOMPATIBLE MATERIALS: Strong oxidizing agents

HAZARDOUS DECOMPOSITION PRODUCTS: carbon monoxide; carbon dioxide; ammonia; and/or; oxides of nitrogen

11. TOXICOLOGICAL INFORMATION

Toxicological information for the product is found under Section 3. HAZARDS IDENTIFICATION. Toxicological information on the OSHA regulated components of this product is as follows:

Acute overexposure to sodium hydroxide mists or dusts causes severe respiratory irritation. A solution of sodium hydroxide can produce irreversible damage to eyes and skin.

12. ECOLOGICAL INFORMATION

LC50

BLUEGILL, 96 HOUR: 681 mg/L

TROUT 96 HOUR: 768 mg/L

OCTANOL/H_2O PARTITION COEF.: Not available

13. DISPOSAL CONSIDERATIONS

Disposal must be made in accordance with applicable governmental regulations.

14. TRANSPORT INFORMATION

This section provides basic shipping classification information. Refer to appropriate transportation regulations for specific requirements.

	D.O.T. SHIPPING INFORMATION	IMO SHIPPING INFORMATION
SHIPPING NAME:	NOT APPLICABLE/NOT REGULATED	NOT APPLICABLE/NOT REGULATED
HAZARD CLASS/ PACKING GROUP:	Not Applicable	Not Applicable
UN NUMBER:	Not Applicable	Not Applicable
IMDG PAGE:	Not Applicable	Not Applicable
D.O.T. HAZARDOUS SUBSTANCES:	(PRODUCT REPORTABLE QUANTITY) Not Applicable	Not Applicable
TRANSPORT LABEL REQUIRED:	None Required	None Required

	ICAO/IATA	TRANSPORT CANADA
SHIPPING NAME:	NOT APPLICABLE/NOT REGULATED	NOT APPLICABLE/NOT REGULATED
HAZARD CLASS:	Not Applicable	Not Applicable
SUBSIDIARY CLASS:	Not Applicable	Not Applicable
UN / ID NUMBER:	Not Applicable	Not Applicable
PACKING GROUP:	Not Applicable	Not Applicable
TRANSPORT LABEL REQUIRED:	None Required	None Required

PACKING INSTR:	PASSENGER Not Applicable CARGO Not Applicable	Not Applicable
MAX NET QTY:	PASSENGER Not Applicable CARGO Not Applicable	Not Applicable

ADDITIONAL TRANSPORT INFORMATION

TECHNICAL NAME (N.O.S.): Not Applicable

15. REGULATORY INFORMATION

INVENTORY INFORMATION

US TSCA: This product is manufactured in compliance with all provisions of the Toxic Substances Control Act, 15 U.S.C. 2601 et. seq.

CANADA DSL: Components of this product have been reported to Environment Canada in accordance with subsection 25 of the Canadian Environmental Protection Act and are included on the Domestic Substances List.

EEC EINECS: All components of this product are included in the European Inventory of Existing Chemical Substances (EINECS) or are polymers of which the components are in EINECS, in compliance with Council Directive 67/548/EEC and its amendments.

OTHER ENVIRONMENTAL INFORMATION The following components are defined as toxic chemicals subject to reporting requirements of Section 313 of Title III and of 40 CFR 372 or subject to other EPA regulations.

COMPONENT	CAS. NO.	%	TPQ(lbs)	RQ(lbs)	S313	RCRA	TSCA 12B
Sodium hydroxide	001310-73-2	<2.2	NONE	1000	NO	NONE	NO

PRODUCT CLASSIFICATION UNDER SECTION 311 OF SARA
Not Applicable under SARA TITLE III

16. OTHER INFORMATION

NFPA HAZARD RATING (National Fire Protection Association)

Fire 1
Health 0 0 Reactivity
—
Special

FIRE: Materials that must be preheated before ignition can occur.
HEALTH: Materials which on exposure under fire conditions would offer no hazard beyond that of ordinary combustible material.
REACTIVITY: Materials which in themselves are normally stable, even under fire exposure conditions, and which are not reactive with water.

REASON FOR ISSUE:

Revised Section 3

Marvin A. Friedman, Ph.D., Director of Toxicology and Product Stewardship

information is given without any warranty or representation. We do not assume any legal responsibility for same, nor do we permission, inducement, or recommendation to practice any patented invention without a license. It is offered solely for your nsideration, investigation and verification. Before using any product, read its label.

AMBER
CHEMICAL

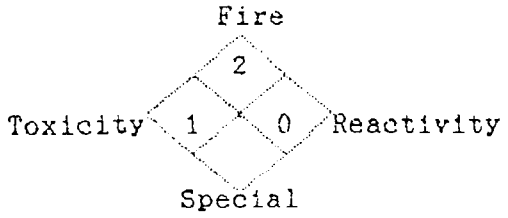
MATERIAL SAFETY DATA SHEET

DMS

Product Code: 158 6646SF

CAS NO: mixture

NFPA HAZARD RATINGS
4 - Extreme
3 - High
2 - Moderate
1 - Slight
0 - Insignificant



HMIS HAZARD INDEX		HMIS RATINGS
Hazardous Materials Identification System	4 - Severe	Health.....1
	3 - Serious	Flammability.....2
	2 - Moderate	Reactivity.....0
	1 - Slight	Personal protection.....G*
	0 - Minimal	*See last page for Code Table.

DIVISION AND LOCATION---SECTION I

Location: 5201 Boylan Street
BAKERSFIELD, CA 93308
Emergency Telephone Number: (805) 325-2072

CHEMICAL AND PHYSICAL PROPERTIES---SECTION II

Chemical Name:
proprietary mixture of surfactants
Formula: no data available
Hazardous Decomposition Products:
as with any organic material, combustion will produce carbon dioxide (CO_2) and probably carbon monoxide (CO).
oxides of sulfur
Incompatibility (Keep away from):
strong oxidizers such as hydrogen peroxide, bromine, and chromic acid.

Toxic and Hazardous Ingredients:	%	CAS #
2-propanol	5.0	67-63-0

HAZ. INGRED NOTE: This product may contain trace amounts of residual ethylene oxide.
See SECTION IX for further details.

Form: liquid
Odor: mild
Appearance: clear liquid
Color: light yellow
Specific Gravity (water=1): 1.089
Boiling Point: no data available
Melting Point: no data available

(Continued on next page)

AMBER
CHEMICAL MATERIAL SAFETY DATA SHEET

Product Code: 158 6646SF

(Section II continued)

Solubility in Water (by weight %): soluble at 25xC
Volatile (by weight %): 4-6
Evaporation Rate: not applicable
Vapor Pressure (mm Hg at 20xC): 33
Vapor Density (air=1): no data available
pH(10%): 7.1
Stability: Product is stable under normal conditions
Viscosity SUS at 100xF: greater than 100

FIRE AND EXPLOSION DATA---SECTION III

Special Fire Fighting Procedures:
Firefighters must be equipped to prevent breathing of vapors or products of combustion. Wear an approved self-contained breathing apparatus and protective clothing.

Unusual Fire and Explosion Hazards:
none

Flashpoint: (Method Used) Pensky-Martens closed-cup 133xF
Flammable limits %: not applicable
Extinguishing agents:
Drychemical or Waterspray or Waterfog or CO_2 or Foam or Sand/Earth

HEALTH HAZARD DATA---SECTION IV

Permissible concentrations (air):
isopropyl alcohol: 400 ppm, 980 mg/m³ (TWA); 500 ppm, 1225 mg/m³ (STEL) (OSHA/ACGIH)

Chronic effects of overexposure:
isopropyl alcohol: irritation of eyes, nose, throat; headache, nausea, and dizziness.

Acute toxicological properties:
Mild irritation of eye and nose occurs at very high concentrations. The liquid can defat the skin, producing a dermatitis characterized by drying and fissuring.

Emergency First Aid Procedures:

Eyes:	Immediately flush with large quantities of water for at least 15 minutes and call a physician.
Skin Contact:	Flush with large amounts of water for 15 minutes.
Inhalation:	Remove to fresh air and if victim is not breathing, give artificial respiration. Call a physician immediately.
If Swallowed:	Contact a physician immediately.

(Continued on next page)

AMBER
CHEMICAL

MATERIAL SAFETY DATA SHEET

SPECIAL PROTECTION INFORMATION---SECTION V

Ventilation Type Required (Local,mechanical,special):
mechanical

Respiratory Protection (Specify type):
Use NIOSH/OSHA approved respirator with organic vapor cartridge if vapor concentration exceeds permissible exposure limit

Protective Gloves:
rubber or plastic, solvent resistant

Eye Protection:
chemical safety goggles

Other Protective Equipment:
neoprene protective type apron.

HANDLING OF SPILLS OR LEAKS---SECTION VI

Procedures for Clean-Up:
Absorb with an inert material such as sand, soil or vermiculite; sweep up and dispose of in accordance with federal, state and local regulations.

Waste Disposal:
Dispose of in accordance with all applicable federal, state and local regulations.

SPECIAL PRECAUTIONS---SECTION VII

Precautions to be taken in handling and storage:
Store between 40xF and 120xF.

TRANSPORTATION DATA---SECTION VIII

D.O.T.: Regulated
U.S. D.O.T. Proper Shipping Name: Combustible liquid, n.o.s. (Isopropanol)
U.S. D.O.T. Hazard Class: Combustible liquid
I.D. Number: NA 1993
Label(s) Required: none
Reportable Quantity: not applicable
Freight Classification: Cleaning compound
Special Transportation Notes:
Unregulated by DOT when shipped in containers of less than 118.9 gallons.

(Continued on next page)

AMBER
CHEMICAL

MATERIAL SAFETY DATA SHEET

DMS

Product Code: 158 6646SF

ENVIRONMENTAL/SAFETY REGULATIONS---SECTION IX

Section 313 (Title III Superfund Amendment and Reauthorization Act):

This product does not contain any chemical subject to the reporting requirements of Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 and 40 CFR Part 372.

COMMENTS

Avoid contact and/or mixing with strong bases. Contact with strong base will liberate free amine.

COMMENTS Ethylene Oxide may accumulate in the head space of drum and bulk containers. However, the concentration of ethylene oxide in the head space should not cause the OSHA 0.5 ppm action level for ethylene oxide exposure to be exceeded. Ethylene Oxide is listed as a potential carcinogen by OSHA, NTP and IARC. If the product is handled as recommended in this MSDS, the trace amounts of ethylene oxide are not expected to result in acute or chronic hazards.

Prepared by: Bob Brister
Title: President
Original Date:
Revision Date: 01-15-96
Supersedes:
Date Sent:

We believe the statements, technical information and recommendations contained herein are reliable, but they are given without warranty or guarantee of any kind, express or implied, and we assume no responsibility for any loss, damage, or expense, direct or consequential, arising out of their use.

AMBER
CHEMICAL

MATERIAL SAFETY DATA SHEET

DMS

Product Code: 158 6646SF

****
* LETTER DESIGNATIONS OF PERSONAL PROTECTIVE EQUIPMENT *
* Safety Glasses.....A *
* Safety Glasses, Gloves.....B *
* Safety Glasses, Gloves, Synthetic Apron.....C *
* Face Shield, Gloves, Synthetic Apron.....D *
* Safety Glasses, Gloves, Dust Respirator.....E *
* Safety Glasses, Gloves, Synthetic Apron, Dust Respirator.....F *
* Safety Glasses, Gloves, Vapor Respirator.....G *
* Splash Goggles, Gloves, Synthetic Apron, Vapor Respirator.....H *
* Safety Glasses, Gloves, Combination Dust and Vapor Respirator.....I *
* Splash Goggles, Gloves, Synthetic Apron, Combination Dust and ..... *
* Vapor Respirator.....J *
* Airline Hood or Mask, Gloves, Full Protective Suit, Boots.....K *
* Situations Requiring Specialized Handling.....X *
****

DD

U.S. DEPARTMENT OF LABOR
Occupational Safety and Health Administration DD

MATERIAL SAFETY DATA SHEET

Required under USDL Safety and Health Regulations for Ship Repairing, Shipbuilding, and Shipbreaking (29 CFR 1915, 1916, 1917)

SECTION I

MANUFACTURER'S NAME: GEO Drilling Fluids, Inc.	EMERGENCY TELEPHONE NO.: (805) 325-5919
ADDRESS (Number, Street, City, State, and ZIP Code): 1431 Union Avenue, Bakersfield, California 93305	
CHEMICAL NAME AND SYNONYMS: GEO Detergent	TRADE NAME AND SYNONYMS: GEO Detergent (Drilling Detergent)
CHEMICAL FAMILY: Nonionic Surfactant	FORMULA: Proprietary

SECTION II - HAZARDOUS INGREDIENTS

PAINTS, PRESERVATIVES, & SOLVENTS	%	TLV (Units)	ALLOYS AND METALLIC COATINGS	%	TLV (Units)
PIGMENTS			BASE METAL		
CATALYST			ALLOYS		
VEHICLE			METALLIC COATINGS		
SOLVENTS			FILLER METAL PLUS COATING OR CORE FLUX		
ADDITIVES			OTHERS		
OTHERS					

HAZARDOUS MIXTURES OF OTHER LIQUIDS, SOLIDS, OR GASES	%	TLV (Units)
CAS# - None		
Dot Regulations: Not regulated		

SECTION III - PHYSICAL DATA

BOILING POINT (°F.)	N/A	SPECIFIC GRAVITY (H_2O=1)	1.05
VAPOR PRESSURE (mm Hg.)	N/A	PERCENT, VOLATILE BY VOLUME (%)	N/A
VAPOR DENSITY (AIR=1)	Not volatile	EVAPORATION RATE (_____ =1)	N/A
SOLUBILITY IN WATER	Complete		
APPEARANCE AND ODOR	Light tan liquid		

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (Method used): >500°F	FLAMMABLE LIMITS: N/A	Lel	Uel
EXTINGUISHING MEDIA: N/A			
SPECIAL FIRE FIGHTING PROCEDURES: None			
UNUSUAL FIRE AND EXPLOSION HAZARDS: None			

(Continued on reverse side)

Form OSHA-20
Rev. May 72

DD DD

SECTION V - HEALTH HAZARD DATA

THRESHOLD LIMIT VALUE: Not Volatile

EFFECTS OF OVEREXPOSURE: Eye contact may cause irritation

EMERGENCY AND FIRST AID PROCEDURES: Flush with water

SECTION VI - REACTIVITY DATA

STABILITY			CONDITIONS TO AVOID
	UNSTABLE		
	STABLE	XX	

INCOMPATABILITY *(Materials to avoid)*: None

HAZARDOUS DECOMPOSITION PRODUCTS: None

HAZARDOUS POLYMERIZATION			CONDITIONS TO AVOID
	MAY OCCUR		N/A
	WILL NOT OCCUR	XX	

SECTION VII - SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED

Flush spill area with water

WASTE DISPOSAL METHOD: Flush to sewer with water

SECTION VIII - SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION *(Specify type)*: None required

VENTILATION			
	LOCAL EXHAUST	Normal	SPECIAL N/A
	MECHANICAL *(General)*		OTHER N/A

PROTECTIVE GLOVES

EYE PROTECTION: Normal safety goggles

OTHER PROTECTIVE EQUIPMENT: Use normal safety rules

SECTION IX - SPECIAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING: No special precautions. Use normal safety rules.

OTHER PRECAUTIONS: None

Material Safety Data Sheet

DRILLPAC® LV/HV POLYMER

DRILLING SPECIALTIES COMPANY
Bartlesville, Oklahoma 74004

PHONE NUMBERS
Emergency: (918) 661-8118
Technical Services: 1-800 221-1956
For Additional MSDSs: (918) 661-7354

A. Product Identification

Synonyms: Water Loss Control Agent, Viscosifier
Chemical Name: Proprietary
Chemical Family: Cellulosic polymer
Chemical Formula: Proprietary
CAS Reg. No.: Proprietary
Product No.: Not Established

Product and/or Components Entered on EPA's TSCA Inventory: YES

This product is in U.S. commerce, and is listed in the Toxic Substances Control Act (TSCA) Inventory of Chemicals; hence, it may be subject to applicable TSCA provisions and restrictions.

B. Components

Ingredients	CAS Number	% By Wt.	OSHA PEL	ACGIH TLV

This product does not meet the definition of a hazardous chemical given in 29 CFR Part 1910.1200 (OSHA). Information on this form is furnished as a customer service.

See Section F, Recommended Exposure Limits.

NA - Not Applicable NE - Not Established

C. Personal Protection Information

Ventilation: Use adequate ventilation to control concentration below recommended exposure limits.

Respiratory Protection: Not generally required unless needed to prevent respiratory irritation. For concentrations exceeding the recommended exposure limit, use NIOSH/MSHA approved air purifying respirator.

Eye Protection: Use safety glasses with side shields.

Skin Protection: Avoid unnecessary skin contamination with material.

NOTE: Personal protection information shown in Section C is based upon general information as to normal uses and conditions. Where special or unusual uses or conditions exist, it is suggested that the expert assistance of an industrial hygienist or other qualified professional be sought.

D. Handling and Storage Precautions

Avoid contact with eyes, skin or clothing. Avoid breathing vapors, mist, fume or dust. Wear equipment and/or garments described in Section C if exposure conditions warrant. Launder contaminated clothing before reuse. Wash thoroughly after handling. Use with adequate ventilation.

Store in a well-ventilated area. Store in a closed container.

E. Reactivity Data

Stability: Stable
Conditions to Avoid: Not Established
Incompatibility (Materials to Avoid): Not Established

Hazardous Polymerization: Will Not Occur
Conditions to Avoid: Not Established
Hazardous Decomposition Products: Not Established

F. Health Hazard Data

Recommended Exposure Limits:

Control as Particulate Not Otherwise Classified (PNOC) or Regulated:

	OSHA PEL	ACGIH TLV*
Respirable Fraction	5 mg/m3	3 mg/m3
Total Dust	15 mg/m3	10 mg/m3

* The value is for inhalable (total) particulate matter containing no asbestos and <1% crystalline silica.

Acute Effects of Overexposure:

Eye: Dust may produce mechanical irritation.

Skin: May produce slight irritation with prolonged contact with moistened product.

Inhalation: Non-irritating to mucous membranes, however, breathing high concentrations of the dust may cause mechanical irritation of the nose, throat, and upper respiratory tract.

Ingestion: Passes through relatively inert. May cause some gastrointestinal upset. Oral LD50 > 25 g/Kg (rats).

Subchronic and Chronic Effects of Overexposure:

No adverse effects have been noted in chronic feeding studies using laboratory animals and humans. Sarcomas were exhibited at injection sites of animals receiving repeated massive subcutaneous injections of aqueous solutions of the material. The effects may have been the result of local trauma.

Other Health Effects:

Long term exposure to high dust concentrations may cause non-debilitating lung changes.

Health Hazard Categories:

	Animal	Human		Animal	Human
Known Carcinogen	___	___	Toxic	___	___
Suspect Carcinogen	___	___	Corrosive	___	___
Mutagen	___	___	Irritant	___	___
Teratogen	___	___	Target Organ Toxin	___	___
Allergic Sensitizer	___	___	Specify - No known applicable information.		
Highly Toxic	___	___			

First Aid and Emergency Procedures:

Eye: Flush eyes with running water. If irritation or adverse symptoms develop, seek medical attention.

Skin: Wash skin with soap and water. If irritation or adverse symptoms develop, seek medical attention.

Inhalation: Remove from exposure. If illness or adverse symptoms develop, seek medical attention.

Ingestion: If illness or adverse symptoms develop, seek medical attention.

G. Physical Data

Appearance:	Light colored powder
Odor:	Odorless
Boiling Point:	Not Applicable
Vapor Pressure:	Not Applicable
Vapor Density (Air = 1):	Not Applicable
Solubility in Water:	Complete
Specific Gravity (H2O = 1):	1.6
Percent Volatile by Volume:	Negligible
Evaporation Rate (Butyl Acetate = 1):	Not Applicable
Viscosity:	Not Applicable

H. Fire and Explosion Data

Flash Point (Method Used):	Not Applicable
Flammable Limits (% by Volume in Air):	LEL - Not Established UEL - Not Established
Fire Extinguishing Media:	Dry chemical, foam or carbon dioxide (CO2), water spray or fog
Special Fire Fighting Procedures:	Evacuate area of all unnecessary personnel. Use NIOSH/MSHA approved self-contained breathing apparatus (SCBA) and other protective equipment described in Section C if conditions warrant. Water fog or spray may be used to cool exposed containers and equipment.
Fire and Explosion Hazards:	Carbon oxides and various hydrocarbons formed when burned. If in a finely divided and suspended state, treat as a flammable dust.

I. Spill, Leak and Disposal Procedures

Precautions Required if Material is Released or Spilled:
Evacuate area of all unnecessary personnel. Wear protective equipment and/or garments described in Section C if exposure conditions warrant. Shut off source, if possible and contain spill. Protect from ignition. Keep out of water sources and sewers. Absorb in a dry, inert material (sand, clay, etc). Transfer to disposal drums using non-sparking equipment.

Waste Disposal (Insure Conformity with all Applicable Disposal Regulations):
Incinerate or place in permitted waste management facility.

J. DOT Transportation

Shipping Name:	Not Applicable
Hazard Class:	Not Applicable
ID Number:	Not Applicable
Packing Group:	Not Applicable
Marking:	Not Applicable
Label:	Not Applicable
Placard:	Not Applicable
Hazardous Substance/RQ:	Not Applicable
Shipping Description:	Not Applicable
Packaging References:	Not Applicable

K. RCRA Classification - Unadulterated Product as a V

Prior to disposal, consult your environmental contact to determine if TCLP (Toxicity Characteristic Leaching Procedure, EPA Test Method 1311) is required. Reference 40 CFR Part 261.

L. Protection Required for Work on Contaminated Equipment

Contact immediate supervisor for specific instruction before work is initiated. Wear protective equipment and/or garments described in Section C if exposure conditions warrant.

M. Hazard Classification

___ This product meets the following hazard definition(s) as defined by the Occupational Safety and Health Hazard Communication Standard (29 CFR Section 1910.1200):

___ Combustible Liquid	___ Flammable Aerosol	___ Oxidizer
___ Compressed Gas	___ Explosive	___ Pyrophoric
___ Flammable Gas	___ Health Hazard (Section F)	___ Unstable
___ Flammable Liquid	___ Organic Peroxide	___ Water Reactive
___ Flammable Solid		

_X_ Based on information presently available, this product does not meet any of the hazard definitions of 29 CFR Section 1910.1200.

N. Additional Comments

SARA 313

As of the preparation date, this product did not contain a chemical or chemicals subject to the reporting requirements of Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 and 40 CFR Part 372.

NFPA 704 Hazard Codes - - - - - - - - Signals

Health	: 0	Least - 0
Flammability	: 0	Slight - 1
Reactivity	: 0	Moderate - 2
Special Haz.	: -	High - 3
		Extreme - 4

ENVIRONMENTAL TOXICITY

The 96-hour LC50 for Drillpac® HV for freshwater trout was >51,000 ppm; for saltwater stickleback it was >75,000 ppm. The 96-hour LC50 for Drillpac® LV for freshwater trout was >22,000 ppm; for saltwater stickleback it was >100,000 ppm.

Environmental effects testing has been conducted using Drillpac® Polymer (both HV and LV) in generic mud. The tests were conducted following the Environmental Protection Agency's (EPA), Region II drilling mud bioassay procedures.

The LC50 for rats is >25g/kg for Drillpac® HV and Drillpac® LV.

The results of these tests classify Drillpac® HV and Drillpac® LV as non-toxic drilling mud additives.

Phillips Petroleum Company (references to Phillips Petroleum Company or Phillips includes it's divisions, affilitates and subsidiaries) believes that the information contained herein (including data and statements) is accurate as of the date hereof. NO WARRANTY OF MERCHANTABILITY, FITNESS FOR ANY PARTICULAR PURPOSE OR ANY OTHER WARRANTY, EXPRESS OR IMPLIED, IS MADE AS CONCERNS THE INFORMATION HEREIN PROVIDED. The information provided herein relates only to the specific product designated and may not be valid where such product is used in combination with any other materials or in any process. Further, since the conditions and methods of use of the product and information referred to herein are beyond the control of Phillips, Phillips expressly disclaims any and all liability as to any results obtained or arising from any use of the product or such information. No statement made herein shall be construed as a permission or recommendation for the use of any product in a manner that might infringe existing patents.

Gel

AMERICAN COLLOID COMPANY

One North Arlington • 1500 West Shure Drive
Arlington Heights, Illinois 60004-7803 • USA
(708) 392-4600 • Telex ITT 4330321
Fax (708) 506-6199

MATERIAL SAFETY DATA SHEET - May be used to comply with OSHA's Hazard Communication Standard, 29 CFR 1910.1200. Standard must be consulted for specific requirements.

203
101

PRODUCT NAME: PREMIUM GEL

Section I MANUFACTURER'S INFORMATION

Manufacturer's Name & Address:

American Colloid Company
1500 West Shure Drive
One North Arlington
Arlington Heights, Illinois 60004

Telephone Number for Information: 847-392-4600
Date Prepared: January 24, 1996

Section II HAZARDOUS INGREDIENTS/IDENTITY INFORMATION

Hazardous Components (Specific Chemical Identity: Common Name(s))	OSHA PEL	ACGIH TLV	Other Limits Recommended	% (optional)
Crystalline Quartz CAS# 14808-60-7 (naturally occurring contaminant)	-	-	*	2-6%
Respirable Crystalline Quartz			NIOSH	
present (TWA)	0.1mg/m^3	0.1mg/m^3 TWA	50ug/m^3 TWA	<2%
proposed (TWA)		50ug/m^3 TWA	-	-
Nuisance Dust				
- Respirable	5mg/m^3	5mg/m^3	-	-
- Total Dust	15mg/m^3	10mg/m^3	-	-

* **WARNING:**
This clay product contains a small amount of crystalline silica which may cause delayed respiratory disease if inhaled over a prolonged period of time. Avoid breathing dust. Use NIOSH/MSHA approved respirator where TLV for crystalline silica may be exceeded. IARC Monographs on the evaluation of the Carcinogenic Risk of Chemicals to Humans (volume 42, 1987) concludes that there is "limited evidence" of the carcinogenicity of crystalline silica to humans. IARC classification 2A.

PRODUCT IDENTIFICATION

Chemical Name: Bentonite Clay (100%)
Chemical Family: Natural Mineral, Montmorillonite
CAS No.: 1302-78-9 Bentonite is on the TSCA inventory.
FORMULA: Naturally occurring hydrated aluminosilicate of sodium, calcium, magnesium, and iron
NFPA/HMIS: Health - 1, Fire - 0, Reactivity - 0, Specific Hazard - See Section VI
Dot Class: Not Regulated

AMERICAN COLLOID COMPANY

One North Arlington • 1500 West Shure Drive
Arlington Heights, Illinois 60004-7803 • USA
(708) 392-4600 • Telex ITT 4330321
Fax (708) 506-6199

203
101

PRODUCT NAME: PREMIUM GEL

Section III PHYSICAL/CHEMICAL CHARACTERISTICS

Boiling Point	- Not Applicable	Specific Gravity (H_2O = 1)	- 2.5
Vapor Pressure (mm Hg.)	- Not Applicable	Melting Point	- Not Applicable
Vapor Density (AIR = 1)	- Not Applicable	Evaporation Rate (Butyl Acetate = 1)	- Not Applicable
Solubility in Water	- Negligible		
Appearance and Odor	- Pale grey to buff powder or granules, odorless		

Section IV FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used) - Not Applicable
Flammable Limits - Not Applicable LEL- - UEL- -
Extinguishing Media - Not Applicable
Special Fire Fighting Procedures - Inorganic Mineral/Non-Flammable
Unusual Fire and Explosion Hazards - Not Applicable

Section V REACTIVITY DATA

Stability Unstable - Conditions to Avoid - None Known
Stable - X

Incompatibility (Materials to Avoid) - None Known
Hazardous Decomposition or By-products - None Known

Hazardous Polymerization May Occur - Conditions to Avoid - None Known
Will Not Occur - X

Section VI HEALTH HAZARD DATA

Route(s) of Entry: Inhalation? Yes Skin? No Ingestion? No
Health Hazards (Acute and Chronic) - May cause delayed respiratory disease if dust inhaled over a prolonged period of time.

Carcinogenicity: NTP? Yes IARC Monographs? Yes OSHA Regulated? No

IARC Monographs on the evaluation of the Carcinogenic Risk of Chemicals to Humans (volume 42, 1987) concludes that there is "limited evidence" of the carcinogenicity of crystalline silica to humans. IARC classification 2A.

Signs and Symptoms of Exposure - Excessive inhalation of dust may result in shortness of breath and reduced pulmonary function.

Medical Conditions Generally Aggravated by Exposure - Individuals with pulmonary and/or respiratory disease including but not limited to asthma and bronchitis should be precluded from exposure to dust.

Emergency and First Aid Procedures - Eyes - Flush with water.
- Gross inhalation of dust - Remove to fresh air; give oxygen or artificial respiration if necessary; get medical attention.

AMERICAN COLLOID COMPANY

One North Arlington • 1500 West Shure Drive
Arlington Heights, Illinois 60004-7803 • USA
(708) 392-4600 • Telex ITT 4330321
Fax (708) 506-6199

203
101

PRODUCT NAME: PREMIUM GEL

Section VII PRECAUTIONS FOR SAFE HANDLING AND USE

Steps to be Taken in Case Material is Released or Spilled - Vacuum if possible to avoid generating airborne dust. Avoid breathing dust. Wear an approved respirator. Avoid adding water, the product will become slippery when wet.

Waste Disposal Method - Follow federal, state and local regulations for solid waste.

Precautions to Be Taken in Handling and Storing - Avoid breathing dust, use NIOSH/MSHA approved respirator where TLV limits for Crystalline Silica may be exceeded.

Other Precautions - Slippery when wet.

Section VIII CONTROL MEASURES

Respiratory Protection (Specify Type) - OSHA standard 1910.134 or ANSI Z88.2-1980 specification.

Ventilation - Local Exhaust - As appropriate
- Mechanical (General) - As appropriate

Protective Gloves - Not Required

Other Protective Clothing or Equipment - None

Work/Hygienic Practices - Use good housekeeping practices.

Special - None
Other - None
Eye Protection - Recommended

The information herein has been compiled from sources believed to be reliable and is accurate to the best of our knowledge. However, American Colloid Company cannot give any guarantees regarding information from other sources, and expressly does not make any warranties, nor assumes any liability, for its use.

UNION CARBIDE CORPORATION
MATERIAL SAFETY DATA SHEET

EFFECTIVE DATE 12/27/96

Union Carbide urges each customer or recipient of this MSDS to study it carefully to become aware of and understand the hazards associated with the product. The reader should consider consulting reference works or individuals who are experts in ventilation, toxicology, and fire prevention, as necessary or appropriate to use and understand the data contained in this MSDS.

To promote safe handling, each customer or recipient should: (1) notify its employees, agents, contractors and others whom it knows or believes will use this material or the information in this MSDS and any other information regarding hazards or safety; (2) furnish this same information to each of its customers for the product; and (3) request its customers to notify their employees, customers, and other users of the product of this information.

I. IDENTIFICATION

PRODUCT NAME:	CELLOSIZE Polymer HEC-10, -20, -25
CHEMICAL NAME:	Hydroxyethyl Cellulose
CHEMICAL FAMILY:	Cellulose Ether
FORMULA:	$((C_6H_9O_5)(C_2H_4O)_xH)_n$
MOLECULAR WEIGHT:	60,000 to >1,000,000
SYNONYMS:	None
CAS # AND NAME:	See Section III, "Ingredients"

II. PHYSICAL DATA (Determined on Typical Material)

MELTING POINT:	Decomposes >200 C (>392 F)
DENSITY BULK:	0.4 - 0.8 g/cm3

Copyright 1996 Union Carbide.
CELLOSIZE is a registered trademark of Union Carbide.

EMERGENCY PHONE NUMBERS: 1-800-UCC-HELP (NUMBER AVAILABLE AT ALL TIMES) OR (304) 744-3487

UNION CARBIDE CORPORATION
39 Old Ridgebury Road, Danbury, CT 06817-0001

PRODUCT NAME: CELLOSIZE Polymer HEC-10, -20, -25 **HEC**

APPEARANCE: White

ODOR: Mild

PHYSICAL STATE: Powder

PERCENT VOLATILES (by weight): < = 5

III. INGREDIENTS

%	MATERIAL	CAS#	EXPOSURE LIMIT
85.7 min	Hydroxyethyl Cellulose	9004-62-0	See Section V
7.5 max	Sodium Acetate	127-09-3	None established
5.0 max	Water	7732-18-5	None established
1.5 max	Unreacted (or partially reacted) Cellulose	9004-34-6	See Section V
0.3 max	Glyoxal	107-22-2	None established

IV. FIRE AND EXPLOSION HAZARD DATA

SPECIAL FIRE FIGHTING PROCEDURES: Do not direct a solid stream of water or foam into burning molten material; this may cause spattering and spread the fire.
Use self-contained breathing apparatus and protective clothing.

AUTOIGNITION TEMPERATURE: 752 F ASTM

EXTINGUISHING MEDIA: Apply alcohol-type or all-purpose-type foam by manufacturer's recommended techniques for large fires. Use carbon dioxide or dry chemical media for small fires.

UNUSUAL FIRE AND EXPLOSION HAZARDS: Avoid dispersion of dust in the air to reduce potential for dust ignition/rapid burning. Dust is easily ignited; avoid ignition sources. All metal parts and equipment should be properly bonded and grounded. In the presence of flammable gases, liquids, or vapors, handle in inert nitrogen-blanketed equipment.

Static ignition hazard can result from handling and use. Electrically bond and ground all containers and equipment before transfer or use of material. Use proper bonding and grounding during product transfer as described in National Fire Protection Association Document NFPA 77.

For CELLOSIZE HEC products in Flexible Intermediate Bulk Containers or plastic

PRODUCT NAME: CELLOSIZE Polymer HEC-10, -20, -25

containers with a capacity greater than 500 pounds, a static ignition hazard can result from handling and use. Non-conductive containers cannot be grounded. Electrically ground the worker. Electrically bond and ground all equipment and piping before transfer or use of material as described in NFPA 77. For transfers between Flexible Intermediate Bulk Containers and another non-conductive container, special precautions may be necessary to dissipate static electricity.

V. HEALTH HAZARD DATA

EXPOSURE LIMIT(S): Cellulose: 15 mg/m3 TWA (total dust), OSHA
5 mg/m3 TWA (respirable dust), OSHA
10 mg/m3 TWA, ACGIH

EFFECTS OF SINGLE OVEREXPOSURE:

SWALLOWING: No evidence of harmful effects from available information.

SKIN ABSORPTION: No evidence of harmful effects from available information.

INHALATION: Dust may cause irritation of the respiratory tract, experienced as nasal discomfort and discharge.

SKIN CONTACT: No evidence of harmful effects from available information.

EYE CONTACT: Dust may cause discomfort in the eye and slight excess redness of the conjunctiva.

EFFECTS OF REPEATED OVEREXPOSURE:
This product may contribute to nuisance dusts and possibly to respirable dusts. Avoid breathing dusts.

MEDICAL CONDITIONS AGGRAVATED BY OVEREXPOSURE:
Inhalation of material may aggravate asthma and inflammatory or fibrotic pulmonary disease.

SIGNIFICANT LABORATORY DATA WITH POSSIBLE RELEVANCE TO HUMAN HEALTH HAZARD EVALUATION:
Pharmacokinetic and material balance studies have shown that only minor amounts of hydroxyethyl cellulose penetrate the skin under single sustained occluded conditions of cutaneous contact.

OTHER EFFECTS OF OVEREXPOSURE:
None currently known.

EMERGENCY AND FIRST AID PROCEDURES:

SWALLOWING: If a large quantity (several ounces) has been swallowed, and if patient is fully conscious, give two glasses of water. Induce vomiting. Obtain medical attention.

PRODUCT NAME: CELLOSIZE Polymer HEC-10, -20, -25

SKIN: Wash skin with soap and water.

INHALATION: Remove to fresh air.

EYES: Immediately flush eyes with water and continue washing for several minutes. Remove contact lenses, if worn. Obtain medical attention if discomfort persists.

NOTES TO PHYSICIAN: Toxicology studies have shown this or similar material to be of very low acute toxicity. There is no specific antidote. Treatment of overexposure should be directed at the control of symptoms and the clinical condition of the patient.

VI. REACTIVITY DATA

STABILITY: Stable

CONDITIONS TO AVOID: None known.

INCOMPATIBILITY (materials to avoid):
None.

HAZARDOUS COMBUSTION OR DECOMPOSITION PRODUCTS:
Combustion may produce the following products:
Carbon monoxide and/or carbon dioxide.
Carbon monoxide is highly toxic if inhaled; carbon dioxide in sufficient concentrations can act as an asphyxiant.

HAZARDOUS POLYMERIZATION: Will Not Occur

CONDITIONS TO AVOID: None known.

VII. SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IF MATERIAL IS RELEASED OR SPILLED:
FOR SPILL: Cover with absorbent, sweep up, collect and dispose immediately.
Will absorb moisture and become slippery.
Observe government regulations.

WASTE DISPOSAL METHOD:
Landfill where permitted under appropriate Federal, State, and local regulations.

VIII. SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION (specify type):
Use dust respirator if dusting conditions exist.

VENTILATION: Special, local ventilation is recommended in areas where containers are opened

PRODUCT NAME: CELLOSIZE Polymer HEC-10, -20, -25

and their contents are discharged or in any other areas where dusting conditions may develop.

PROTECTIVE GLOVES: PVC-coated

EYE PROTECTION: Monogoggles

OTHER PROTECTIVE EQUIPMENT:
Eye Bath, Safety Shower

IX. SPECIAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORAGE:

CAUTION!
STATIC IGNITION HAZARD CAN RESULT FROM HANDLING AND USE.
DUST DISPERSED IN AIR MAY BE IGNITED AND BURN RAPIDLY.
PLASTIC CONTAINER, IF PRESENT, MAY CAUSE STATIC IGNITION HAZARD.

Electrically bond and ground all containers and equipment before transfer or use of material.
Maintain proper grounding at all times.
Do not handle or empty container in presence of flammable vapors.
Avoid heat, sparks and flame under dust conditions.
Keep container closed.
Use with adequate ventilation.
Wash thoroughly after handling.

FOR INDUSTRY USE ONLY

OTHER PRECAUTIONS:

SPILLS: May be slippery when wet.

DUST EXPLOSION HAZARD: See Section IV, "Unusual Fire and Explosion Hazards," regarding dust explosion hazard.

FIBC: For Flexible Intermediate Bulk Containers or plastic containers that may hold more than 500 pounds - before transferring material, ground workers and conductive equipment to dissipate static electricity.
ADDITIONAL INFORMATION: Additional product safety information on this product may be obtained by calling your Union Carbide Corporation Sales or Customer Service contact.
Ask for the brochure:
Cellosize HEC in Flexible Intermediate Bulk Container(report)
Cellosize HEC Storage and Handling(report)

X. REGULATORY INFORMATION

STATUS ON SUBSTANCE LISTS:
The concentrations shown are maximum or ceiling levels (weight %) to be used for calculations for regulations.
Trade Secrets are indicated by "TS".

FEDERAL EPA

PRODUCT NAME: CELLOSIZE Polymer HEC-10, -20, -25

Comprehensive Environmental Response Compensation, and Liability Act of 1980 (CERCLA) requires notification of the National Response Center of release of quantities of Hazardous Substances equal to or greater then the reportable quantities (RQs) in 40 CFR 302.4.

Components present in this product at a level which could require reporting under the statute are:

*** NONE ***

Superfund Amendments and Reauthorization Act of 1986 (SARA) Title III requires emergency planning based on Threshold Planning Quantities (TPQs) and release reporting based on Reportable Quantities (RQs) in 40 CFR 355 (used for SARA 302, 304, 311 and 312).

Components present in this product at a level which could require reporting under the statute are:

*** NONE ***

Superfund Amendments and Reauthorization Act of 1986 (SARA) Title III requires submission of annual reports of release of toxic chemicals that appear in 40 CFR 372 (for SARA 313). This information must be included in all MSDSs that are copied and distributed for this material.

Components present in this product at a level which could require reporting under the statute are:

*** NONE ***

Toxic Substances Control Act (TSCA) STATUS:

The ingredients of this product are on the TSCA inventory.

STATE RIGHT-TO-KNOW

CALIFORNIA Proposition 65

This product contains no listed substances known to the State of California to cause cancer, birth defects or other reproductive harm, at levels which would require a warning under the statute.

MASSACHUSETTS Right-To-Know, Substance List (MSL) Hazardous Substances and Extraordinarily Hazardous Substances on the MSL must be identified when present in products.

Components present in this product at a level which could require reporting under the statute are:

HAZARDOUS SUBSTANCES (=> 1%)

CHEMICAL	CAS NUMBER	UPPER BOUND CONCENTRATION %
Unreacted (or partially reacted) Cellulose	9004-34-6	1.5

PENNSYLVANIA Right-to-Know, Hazardous Substance List Hazardous Substances and Special Hazardous Substances on the List must be identified when present in products.

Components present in this product at a level which could require reporting under the statute are:

HAZARDOUS SUBSTANCES (=> 1%)

CHEMICAL	CAS NUMBER	UPPER BOUND CONCENTRATION %
Unreacted (or partially reacted) Cellulose	9004-34-6	1.5

CALIFORNIA SCAQMD RULE 443.1 VOC'S:

Volatiles = substances with a vapor pressure of =>0.5 mmHg at 104 C (219.2 F).

This product contains:

2.99 g/liter VOC

3.15 g/liter of Material less Exempted Compounds

PRODUCT NAME: CELLOSIZE Polymer HEC-10, -20, -25

OTHER REGULATORY INFORMATION:

EPA Hazard Categories: NONE

NOTE ----
The opinions expressed herein are those of qualified experts within Union Carbide. We believe that the information contained herein is current as of the date of this Material Safety Data Sheet. Since the use of this information and the conditions of the use of the product are not under the control of Union Carbide, it is the user's obligation to determine conditions of safe use of the product.

REVISED SECTIONS:

Section II - Physical Data
Section IV - Fire And Explosion Hazard Data
Section VIII - Special Protection Information
Section IX - Special Precautions
Section X - Regulatory Information

PRODUCT: 19164
F NUMBER: B0337E

Kelco Oil Field Group

MATERIAL SAFETY DATA SHEET

Emergency Telephone: (713) 895-7575

KELCO OIL FIELD GROUP
3300 BINGLE ROAD
HOUSTON, TEXAS 77055
PHONE (713) 895-7575
FAX (713) 895-7586

SECTION I - PRODUCT IDENTIFICATION

Product Name: KWIK-SEAL
Product Use: Control lost circulation.
Chemical Family or Formula: Blend of vegetable and polymer fibers.
Description: Yellow to brown blend of granular, flake and fibrous materials.
Manufacturer: Kelco, a Unit of Monsanto Company, San Diego, CA

HMIS RATING:

Health	0
Flammability	1
Reactivity	0

SECTION II - INGREDIENTS

Toxic & Hazardous Ingredients: The ingredients of this product are on the TSCA Chemical Substance Inventory, the Canadian Domestic Substances List and are included in the European inventory of Existing Commercial Chemical Substances (EINECS). As of the date of this MSDS, KWIK-SEAL is not specifically regulated under CERCLA, CWA, DOT or TSCA. It is not "toxic" under SARA Title III. All hazardous ingredients are below de minimis concentrations.

Components: Blend of vegetable and polymer particles.

SECTION III - CHEMICAL AND PHYSICAL PROPERTIES

Physical State: Various sized particles
Specific Gravity (water=1): 0.9-1.2
Melting Point: NA
% Volatile by %WT: Not volatile.
Vapor Pressure (mm Hg): NA
pH: @ 1.0 %: NA
Viscosity SUS at 100 F: NDA

Odor: slight
Boiling Point: NA
Solubility in Water: Not soluble
Evap. Rate (n-BuAc=1): NA
Vapor Density (air=1): NA
Stable: Yes

SECTION IV - FIRE AND EXPLOSION DATA

For fires involving this material do not enter without proper protective equipment including self-contained breathing apparatus.
Flash Point: NDA
Extinguishing Agents: Drychemical, CO_2, Foam, Waterspray.

SECTION V - HEALTH HAZARD DATA

NATURE OF PRINCIPLE HAZARD: Not a health hazard as defined by OSHA. Permissible Concentrations (Air): NA
Effects of Overexposure: Slight eye and skin irritation. Non-toxic through ingestion and dermal absorption.

EMERGENCY FIRST AID PROCEDURES: Eyes: Flush with plenty of water. If irritation develops, call a physician. Skin Contact: Wash with soap and water. Not expected to present a significant hazard. Inhalation: Remove to fresh air. If swallowed: Symptomatic treatment. No harmful effects are expected.

NA = NOT APPLICABLE NDA = NO DATA AVAILABLE + = GREATER THAN - = LESS THAN

SECTION VI - PERSONAL PROTECTION INFORMATION

Ventilation Type Required: Local exhaust.
Respiratory Protection: In heavy product dust exposure a NIOSH approved mask is recommended.
Protective Gloves: Not normally required.
Eye Protection: Not normally required.
Other Protective Equipment: None.

SECTION VII - HANDLING OF SPILLS OR LEAKS

Procedures For Clean-Up: Sweep up spilled material and repackage.

Waste Disposal: Dispose of in accordance with local, state, and federal regulations.

SECTION VIII - REACTIVITY DATA

Stability: Product is stable.
Incompatibility: NA
Hazardous decomposition Products: Thermal decomposition products may include carbon dioxide and carbon monoxide.
Hazardous polymerization: Will not occur.
Conditions to avoid: None

SECTION IX - TOXICOLOGICAL INFORMATION

Aquatic Toxicity (96 hr LC50 API Test Procedure): Mysid shrimp > 1,000,000 ppm

SECTION X - SPECIAL PRECAUTIONS

Precautions to be taken in Handling and Storage: Normal precautions common to good manufacturing practice should be followed in handling and storage.

SECTION XI - REGULATORY INFORMATION

US DOT. Proper Shipping Name: Drilling Mud Compound
US DOT. Hazard Class: None
ID Number: NA Label(S) Required None
Freight Classification: Item #138640 NMF 100 G Class 50 Special Transportation Notes None
OSHA Hazard Communication Status: NA

Revision Date: 4/95

We believe the statements, technical information and recommendations contained herein are reliable, but they are given without warranty or guarantee of any kind, express or implied, and we assume no responsibility for any loss, damage, or expense, direct or consequential, arising out of their use. KWIK-SEAL is a trademarks of Kelco, a unit of Monsanto Company, and are Reg. in US Pat & TM Off

MATERIAL SAFETY DATA SHEET

7000 Hollister Rd., Suite 300
Houston, Texas 77040

LD-8

Emergency Telephone: (713) 439-8900
CHEMTREC: 1-800-424-9300

MANUFACTURER'S INFORMATION:

facturer: BAKER HUGHES INTEQ
oduct Name: LD-8
mical Name: DRILLING FLUID DEFOAMER
ical Description: DISPERSION OF FATTY ACID SOAP IN AN ALKOXYLATED ALCOHOL.

HMIS Hazard Rating and Key:

Health	0	Minimal	- 0
Flammability	1	Slight	- 1
Reactivity	0	Moderate	- 2
Personal Protection	E	Serious	- 3
		Severe	- 4

per Shipping Description: DRILLING FLUID COMPOUND, N.O.S.
ard Class: NOT REGULATED UN Number: NA Hazard Label: NA DOT Response Guide: NA
rtation Note: NA

- HAZARD IDENTIFICATION:

Hazardous Components:	ACGIH TLV:	OSHA PEL:	%:	CAS Number:	Product RQ
NCE PARTICULATES	10 MG/M3 T	15 MG/M3 T	ND	NA	NA

Hazards Associated with Product Use

	Yes		Yes		Yes		Yes
ustible Liquid		Flammable Material		Pyrophoric Material		Explosive Material	
table Material		Water Reactive Material		Oxidizer		Organic Peroxide	
ive Material		Compressed Gas		Irritant		Nuisance Particulate	X
azard		Eye Hazard		Toxic Agent		Highly Toxic Agent	
izer		Carcinogen		Reproductive Toxin		Blood Toxin	
ous System Toxin		Lung Toxin		Liver Toxin		Kidney Toxin	

Community Right-to-Know (SARA Title III Section 311-312)

Sudden Release Of Pressure: Reactivity: Immediate (Acute): X Delayed (Chronic):

- PHYSICAL DATA:

g Point(F):	>392	Vapor Pressure(mmHg): <1 (ESTIMATED)	PH: 5.5-6.5 (5%SOL)
ing Point(F):	ND	Vapor Density(Air=1): >1	Specific Gravity: 0.983
zing Point(F):	ND	Solubility In Water: APPRECIABLE	Percent Volatile By Volume(%): ND
reshold:	ND	Appearance And Odor: WHITE, BLAND ODOR	Evaporation Rate (ETHER = 1): <1.0
ll Is:	MIX-LIQUID	Coefficient of Water/Oil Distribution: PARTIALLY SOLUBLE IN OIL	

- FIRE & EXPLOSION HAZARD DATA:

int(F): >200 (TCC) Auto Ignition Temperature(F): ND
mable Limits - LFL: ND UFL: ND Explosion - LEL: ND UEL: ND
nguish Media - Water: X CO2: X Dry Chemical: X Foam: Fog: X

us Combustion Products:
L COMBUSTION, PRODUCT MAY FORM OXIDES OF CARBON, SMOKE AND TOXIC FUMES.
Fighting Procedures:
P SELF CONTAINED POSITIVE PRESSURE BREATHING APPARATUS AND FULL FIRE PROTECTIVE CLOTHING FOR ENCLOSED AREAS DURING A FIRE.
F APPLY WATER FOG TO THE FIRE SURFACE TO PRODUCE AN EXTINGUISHING FROTH, COOL CONTAINERS AND AVOID SPREADING THE FIRE.
Fire and Explosion Hazards:
LLED MATERIAL MAY BE SLIPPERY. DIRECT EXTINGUISHING STREAMS MAY SPREAD BURNING MATERIAL.

CTIVITY DATA:

cally Stable: Yes: X No: If no, Under Which Conditions? AVOID HEAT, SPARKS AND FLAMES.

ibility (Materials to Avoid): AVOID STRONG OXIDIZING AGENTS.

ous Decomposition or Byproducts: PRODUCT WILL NOT READILY DECOMPOSE.

Polymerization - May Occur: Will Not Occur: X Conditions to Avoid: NA

Determined NA - Not Applicable T - Total Dust R - Respirable Fraction C - Ceiling Limit

IS A REGISTERED TRADEMARK OF BAKER HUGHES INTEQ.

LD-8

HEALTH HAZARD INFORMATION:

mery Exposure Route - Skin Contact: X Skin Absorption: Eye Contact: X Inhalation: X Ingestion:

ct Carcinogenicity - NTP: NO IARC: NO

Effects of Overexposure:
RODUCT MAY CAUSE MILD IRRITATION TO SKIN AND EYES. INGESTION MAY CAUSE NAUSEA. INHALATION MAY CAUSE COUGH, SHORTNESS OF BREATH OR
HEST TIGHTNESS. PRODUCT MAY DEFAT SKIN AND WITH OVEREXPOSURE LEAD TO DERMATITIS.

ic Effects of Overexposure:
RODUCT MAY AGGRAVATE AN EXISTING ALLERGIC RESPIRATORY OR SKIN CONDITION.

EMERGENCY AND FIRST AID INSTRUCTIONS:

: HOLD EYELIDS APART AND FLUSH WITH WATER FOR AT LEAST 15 MINUTES. CONTACT A PHYSICIAN IF IRRITATION PERSISTS.

WASH THOROUGHLY WITH SOAP AND WATER. REMOVE CONTAMINATED CLOTHING AND WASH BEFORE REUSE.

stion: GIVE FLUIDS TO RINSE MOUTH AND THROAT AND TO DILUTE. DO NO INDUCE VOMITING. CONTACT A PHYSICIAN FOR SUPPORTIVE CARE.

tion: REMOVE TO FRESH AIR. IF NOT BREATHING, GIVE ARTIFICIAL RESPIRATION. IF BREATHING IS DIFFICULT, GIVE OXYGEN.

- ENVIRONMENTAL PROTECTION PROCEDURES:

Response:
PROTECTIVE EQUIPMENT. CONTAIN THE SPILL. ABSORB WITH INERT ABSORBENT MATERIAL AND SHOVEL INTO SUITABLE CONTAINERS FOR
SPOSAL. KEEP OUT OF WATERWAYS AND SEWERS. SPILLED MATERIAL MAY BE SLIPPERY.
Disposal Method:
WASTE, PRODUCT IS NOT HAZARDOUS ACCORDING TO RCRA CRITERIA OR LISTING AS SUPPLIED. DISPOSE OF IN ACCORDANCE WITH LOCAL,
FEDERAL REGULATIONS.
ing:
UTION! PRODUCT MAY IRRITATE EYES, SKIN AND UPPER RESPIRATORY SYSTEM. DO NOT GET IN EYES, ON SKIN OR ON CLOTHING. AVOID BREATHING
S OR VAPORS. WEAR PROPER PROTECTIVE CLOTHING STATED IN THE MSDS.
:
IN A DRY AREA AWAY FROM HEAT, SPARKS AND FLAMES. KEEP CONTAINERS CLOSED WHEN NOT IN USE. USE WITH ADEQUATE VENTILATION. DO
REUSE CONTAINERS.

OCCUPATIONAL CONTROL MEASURES:

ratory Protection:	WEAR AN APPROVED PARTICULATE RESPIRATOR WHEN EXPOSURES MAY EXCEED RECOMMENDED LIMITS.
tion:	USE MECHANICAL OR LOCAL EXHAUST VENTILATION WHEN RECOMMENDED EXPOSURE LIMITS MAY BE EXCEEDED.
ing:	WEAR LONG PROTECTIVE CLOTHING WITH AN APRON OR COVERALLS FOR ADDED PROTECTION. LAUNDER BEFORE REUSE.
:	WEAR CHEMICAL SAFETY GOGGLES OR GLASSES WITH SIDESHIELDS. INSURE PROPER FIT FOR BEST PROTECTION.
s:	USE NEOPRENE OR BUTYL-RUBBER GLOVES TO PREVENT SKIN CONTACT. Footwear: WEAR NORMAL SAFETY BOOTS.
essures:	INSURE GOOD PERSONAL HYGIENE. CLEAN EQUIPMENT OF RESIDUES BEFORE REUSE. WASH AFTER HANDLING AND BEFORE MEALS OR BREAKS. USE APPROPRIATE MILD CLEANSERS TO WASH OFF.

ADDITIONAL INFORMATION:

DISCLAIMER

tatements, information, and data provided in this material safety data sheet are believed reliable and accurate by Baker Hughes
and its responsible personnel; however, no other guarantee, representation, warranty or responsibility is expressed or implied
ser, regardless of reliance on all or any part thereof. This includes warranties of merchantability or of fitness for a
ar purpose, and Baker Hughes INTEQ assumes no responsibility whatever for advice or recommendations made. Nothing contai
should be interpreted as permission, inducement, or condonement to violate any law pursuant to this product's use, conve
sal.

By: Jim Rushing Date Prepared: 03/24/94 Supersedes Issue Date: 05/01/91

Not Determined NA - Not Applicable > - Greater Than < - Less Than C - Ceiling Limit

Material Safety Data Sheet
May be used to comply with
OSHA's Hazard Communication Standard
29 CFR 1910.1200. Standard must be
consulted for specific requirements.

U.S. Department of Labor
Occupational Safety and Health Administration
(Non-Mandatory Form)
Form Approved
OMB No. 1218-0072

IDENTITY
Hydrated Lime (Type N) (Ca(OH)2)

Note: Blank spaces are not permitted. If any item is not applicable, or no information is available, the space must be marked to indicate that.

Section I

Manufacturer's Name Chemical Lime Company (West)	Emergency Telephone Number Chemtrec 800-424-9300
Address (Number, Street, City, State, and ZIP Code) 7272 E. Indian School Rd. #350	Telephone Number for Information 602-941-1291
Scottsdale, AZ 85251-3951	Date Prepared 9-Nov-93
	Signature of Preparer (optional)

Section II - Hazardous Ingredients/Identity Information

Hazardous Components (Specific Chemical Identity; Common Name(s))			OSHA PEL	ACGIH TLV	Other Limits Recommend	% (optional)
Calcium hydroxide	1305-62-0	Hydrated lime	5 mg/m3	5 mg/m2	7340 mg	>90%
Magnesium hydroxide	1309-42-8	Brucite	N.A.	N.A.	N.A.	<5%
Calcium carbonate	1317-65-3	Limestone	15 mg/m3	10 mg/m3	6450 mg	<5%
Magnesium oxide	1309-48-4	Periclase	15 mg/m3	10 mg/m3		<5%
Silica	14808-60-7	Quartz	0.1 mg/m3	0.1 mg/m3		<1%
					LD50	
					oral/rat	

Section III - Physical/Chemical Characteristics

Boiling Point	2850 oC	Specific Gravity (H2O = 1)	2.2 g/oc
Vapor Pressure (mm Hg)	N.A.	Melting Point	decomposition 580 oC
Vapor Density (AIR = 1)	N.A.	Evaporation rate (Butyl Acetate = 1)	N.A.

Solubility in Water
Slightly soluble in water pH = 12.4 @ 25oC

Appearance and Odor
White or gray powder, odorless

Section IV - Fire and Explosion Hazard Data

Flash Point (Method Used) Not applicable	Flammable Limits Not applicable	LEL N.A.	UEL N.A.

Extinguishing Media
Use extinguishing agent suitable for surrounding fire

Special Firefighting Procedures
Avoid skin contact or inhalation of dust

Unusual Fire and Explosion Hazards
None

Section V - Reactivity Data

Stability	Unstable		Conditions to Avoid Material is stable
	Stable	X	

Incompatibility (Materials to Avoid)
Acids: React violently and produces heat Maleic Anhydride: May react explosively

Nitro Organic Compounds: May react to form explosive salts Phosphorous: May form flammable products when heated

Hazardous Decomposition or Byproducts: None

Hazardous Polymerization	May Occur		Conditions to Avoid
	Will Not Occur	X	

Section VI - Health Hazard Data

Route(s) of Entry:	Inhalation?	Skin?	Ingestion?
	Yes	Yes	Yes

Health Hazards (Acute and Chronic)
Mild to moderate corrosive: Avoid skin and eye contact as irritation will occur.

Inhalation will cause coughing, sneezing, or inflammation of the respiratory system.

Carcinogenicity:	NTP?	IARC Monographs?	OSHA Regulated?
		SiO2	

Free crystalline silica is classified by IARC as "probably carcinogenic to humans"

Signs and Symptoms of Exposure
Skin or eye irritation; coughing or breathing problems.

Medical Conditions
Generally Aggravated by Exposure Respiratory problems, asthma

Dermatitis or skin or eye sensitivity.

Emergency and First Aid Procedure
Flush contaminated area with excess water. If eye contact , rinse eye with warm water

for 30 minutes, and seek medical attention immediately.

Section VII - Precautions for Safe Handling and Use

Steps to be Taken in Case Material is Released or Spilled
Protect skin from contact and avoid inhalation of dust. If material is dry pick up and

keep away from acids or organic materials. Place in metal drums. If wet collect

and place in metal drums.

Waste Disposal Method
Carefully add water and flush to sewer. Consult local, state, or federal regulations.

Precautions to be Taken in Handling and Storage
Store in tightly closed containers. Keep dry and away from acids or other incompatible

substances.

Other Precautions

Section VIII - Control Measures

Respiratory Protection (Specify Type)
NIOSH approved dust filter respirator in dusty conditions.

Ventilation	Local Exhaust	Special
	Vent to dust collector	
	Mechanical (General) Vent to meet TLV requirements	Other

Protective Gloves
Clean dry rubber gloves

Other Protective Clothing or Equipment
Full clothing to cover arms and legs, safety glasses or face shield.

Work/Hygenic Practices
Eye wash and shower station should be readily available.

References: Sax, N.I. & R.J. Lewis Sr. (1989) "Dangerous Properties of Industrial Materials", New York: Van Nostrand Reinhold Co. Ltd.

MATERIAL SAFETY DATA

MSDS NO. 4511-06
DATE: 12/20/99

PRODUCT IDENTIFICATION

TRADE NAME:	LP-701
SYNONYMS:	Anionic polyacrylamide in water-in-oil emulsion
CHEMICAL FAMILY:	Anionic polymer
MOLECULAR FORMULA:	Mixture
MOLECULAR WGT.:	Mixture

WARNING

WARNING! CAUSES SKIN IRRITATION
MAY CAUSE EYE IRRITATION

OSHA REGULATED COMPONENTS

COMPONENT	CAS. NO.	%	TWA/CEILING	REFERENCE
Petroleum distillate	008002-05-9	26-27	400 ppm	OSHA

NFPA HAZARD RATING

Fire 1
Health 2 0 Reactivity
Special

FIRE: Material that must be preheated before ignition can occur.
HEALTH: Materials which on intense or continued exposure could cause temporary incapacitation or possible residual injury unless prompt medical treatment is given.
REACTIVITY: Materials which in themselves are normally stable, even under fire exposure conditions, and which are not reactive with water.

HEALTH HAZARD INFORMATION

EFFECTS OF OVEREXPOSURE: The acute oral (rat) and acute dermal (rabbit) LD50 values are both >10 ml/kg. Minimal eye irritation was produced in rabbit testing. When this product was tested in rabbits for skin irritation under occlusive conditions, as would be produced if the product was spilled into boots, irreversible skin damage was produced. When the product was tested under nonocclusive conditions with 24 hours of skin contact, as would occur when the product was spilled on clothing, some eschar formation was observed but the overall skin irritation score was lower (2.2 moderately irritating)
Acute overexposure to petroleum distillate vapors may cause eye dizziness, headache, nausea, and irritation of the respiratory tract.
Acute overexposure to petroleum distillate vapors may cause eye and throat irritation. On direct skin contact, petroleum distillate may produce a severe skin irritation. Prolonged repeated exposure to petroleum distillate vapor may cause central nervous system damage as well as heart and blood disorders. The oral LD50 in the rat for various distillates ranges from 4.5 to greater than 25 ml/kg, and the inhalation LC50 in rats is about 15000 ppm.
Aspiration of petroleum distillate may cause chemical pneumonitis. Overexposure to vapor may cause dizziness, drowsiness, headache, and nausea.

FIRST AID:	In case of skin contact, remove contaminated clothing without delay. Flush skin thoroughly with water. Do not reuse clothing without laundering. In case of eye contact, immediately irrigate with plenty of water for 15 minutes.
EXPOSURE CONTROL METHODS	Where this material is not used in a closed system, good enclosure and local exhaust ventilation should be provided to control exposure. Food, beverages, and tobacco products should not be carried, stored, or consumed where this material is in use. Before eating, drinking, or smoking, wash face and hands with soap and water. Avoid skin contact. Protective clothing such as impervious gloves, apron, workpants, long sleeve work shirt, or disposable coveralls are recommended to prevent skin contact. For operations where eye or face contact can occur, wear eye protection such as chemical splash proof goggles or face shield. Eyewash equipment and safety shower should be provided in areas of potential exposure. Where exposures are below the Permissible Exposure Limit (PEL), no respiratory protection is required. Where exposures exceed the PEL, use respirator approved by NIOSH for the material and level of exposure. See "GUIDE TO INDUSTRIAL RESPIRATORY PROTECTION" (NIOSH).

FIRE AND EXPLOSION HAZARD INFORMATION	FLASH POINT: METHOD:	>200 F (>93.3 C) Closed Cup
	FLAMMABLE LIMITS (% BY VOL):	Not Available
	AUTOIGNITION TEMP:	Not Available
	DECOMPOSITION TEMP:	Not Available
	FIRE FIGHTING:	Use water spray, carbon dioxide or dry chemical to extinguish fires. Use water to keep containers cool. Wear self-contained, positive pressure breathing apparatus and full fire-fighting protective clothing. See Exposure Control Methods for special protective clothing.
REACTIVITY DATA	STABILITY: CONDITIONS TO AVOID:	Stable None known
	POLYMERIZATION: CONDITIONS TO AVOID:	Will Not Occur None known
	INCOMPATIBLE MATERIALS:	Strong oxidizing agents. This material reacts slowly with iron, copper and aluminum, resulting in corrosion and product degradation
	HAZARDOUS DECOMPOSITION PRODUCTS:	Thermal decomposition or combustion may produce carbon monoxide, carbon dioxide, ammonia and/or oxides of nitrogen.
PHYSICAL PROPERTIES	APPEARANCE AND ODOR:	White, viscous, opaque liquid; slight hydrocarbon odor
	BOILING POINT:	Water phase ~100 C; oil phase ~175 C
	MELTING POINT:	~0 F(~-18 C)
	VAPOR PRESSURE:	Similar to water below ~100 C
	SPECIFIC GRAVITY:	~1.0
	VAPOR DENSITY:	Not Available
	% VOLATILE (BY VOL):	~65
	OCTANOL/H_2O PARTITION COEF.:	Not Available
	pH:	6-8 upon dilution with water
	SATURATION IN AIR (BY VOL):	Not Available
	EVAPORATION RATE:	Not Available
	SOLUBILITY IN WATER:	Limited by Viscosity

SPILL OR LEAK PROCEDURES	STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED:	Where exposure level is not known, wear NIOSH approved, positive pressure, self-contained respirator. Where exposure level is known, wear NIOSH approved respirator suitable for level of exposure. In addition to the protective clothing/equipment in Exposure Control Methods, wear impervious boots. Spills of this product are very slippery. Spilled material should be absorbed onto an inert material and scooped up. The area should be thoroughly flushed with water and scrubbed to remove residue. If slipperiness remains apply more dry sweeping compound.
WASTE DISPOSAL	Disposal must be made in accordance with applicable governmental regulations.	
SPECIAL PRECAUTIONS	HANDLING AND STORAGE/OTHER:	Prevent material from coming in contact with common metals. To avoid product degradation and equipment corrosion, do not use iron, copper or aluminum containers or equipment. OSHA regulations (29 CFR 106.a.14), required that the flashpoint of materials of this type be determined by the Pensky-Martens Closed Tester method. The test for this product indicates it has a flashpoint greater than 200 F (93.3 C). Another method indicates a potential for flash at approximately 154 F (67.8 C); therefore, caution should be exercised in storage and handling.

D.O.T. SHIPPING INFORMATION	PROPER SHIPPING NAME:	NOT APPLICABLE/NOT REGULATED
	HAZARD CLASS:	NOT APPLICABLE
	UN/NA:	NOT APPLICABLE
	D.O.T. HAZARDOUS SUBSTANCES:	(Reportable Quantity of Product) NOT APPLICABLE
	D.O.T. LABEL REQUIRED:	NOT APPLICABLE
TSCA INFORMATION	This product is manufactured in compliance with all provisions of the Toxic Substances Control Act, 15 U.S.C.	
ENVIRONMENTAL INFORMATION	The following components are defined as toxic chemicals subject to reporting requirements of Section 313 of Title III and of 40 CFR 372 or subject to other EPA regulations.	

COMPONENT	CAS. NO.	%	SARA TITLE III TPQ (lbs.)	RQ (lbs.)	S313	RCRA	TSCA 12B
This product does not contain any components regulated under these sections of the EPA							

PRODUCT CLASSIFICATION UNDER SECTION 311 OF SARA

ACUTE (Y)	CHRONIC (N)	FIRE (N)	REACTIVE (N)	PRESSURE (N)

This information is given without any warranty or representation. We do not assume any legal responsibility for same, nor do we give permission, inducement, or recommendation to practice any patented invention without a license. It is offered solely for your consideration, investigation and verification. Before using any product read its label.

MATERIAL SAFETY DATA SHEET

LVT 200

PENNZOIL

penreco
A DIVISION OF PENNZOIL PRODUCTS COMPANY

I PRODUCT IDENTIFICATION

Manufacturer's Name	PENRECO	CAS Number: 64742-47-8 MSDS Code: 013495	
Address	P.O. BOX 4274 HOUSTON, TX 77210	NFPA Hazard Identification Degree of Hazard	Hazard Ratings
		Health: 0 Fire: 1 Reactivity: 0	0 - Least 1 - Slight 2 - Moderate 3 - High 4 - Extreme
Emergency Telephone No.	(800) 546-6040		
Trade Name	PENRECO® LVT® 200		
Synonyms			

II INGREDIENTS

COMPONENT NAME CAS NUMBER	HAZARDOUS IN BLEND	PERCENTAGE MIN	MAX	COMPONENT EXPOSURE LIMIT	UNITS
HYDROTREATED LIGHT DISTILLATE 64742-47-8	NO		100	OSHA PEL ACGIH TLV	NO LIMIT NO LIMIT

BY: ENVIRONMENTAL, SAFETY & HEALTH
(800) 546-6227

EFFECTIVE DATE: NOVEMBER 20, 1998
SUPERSEDES DATE: NOVEMBER 20, 1998

DISCLAIMER OF WARRANTY:

THE INFORMATION CONTAINED HEREIN IS BASED UPON DATA AVAILABLE TO US, AND REFLECTS OUR BEST PROFESSIONAL JUDGEMENT. HOWEVER, NO WARRANTY OF MERCHANTABILITY, FITNESS FOR ANY USE, OR ANY OTHER WARRANTY IS EXPRESSED OR IMPLIED REGARDING THE ACCURACY OF SUCH DATA, THE RESULTS TO BE OBTAINED FROM THE USE THEREOF, OR THAT ANY SUCH USE DOES NOT INFRINGE ANY PATENT. SINCE THE INFORMATION CONTAINED HEREIN MAY BE APPLIED UNDER CONDITIONS OF USE BEYOND OUR CONTROL AND WITH WHICH WE MAY BE UNFAMILIAR, WE DO NOT ASSUME ANY RESPONSIBILITY FOR THE RESULTS OF SUCH APPLICATION. THIS INFORMATION IS FURNISHED UPON THE CONDITION THAT THE PERSON RECEIVING IT SHALL MAKE HIS OWN DETERMINATION OF THE SUITABILITY OF THE MATERIAL FOR HIS PARTICULAR PURPOSE.

III HEALTH EFFECT INFORMATION

EYE CONTACT	AVOID EYE CONTACT. THIS PRODUCT MAY BE SLIGHTLY IRRITATING TO THE EYES UPON DIRECT CONTACT. BASED ON TESTING OF SIMILAR PRODUCTS AND/OR COMPONENTS. EXPOSURE TO HIGH CONCENTRATIONS OF VAPORS MAY BE IRRITATING TO THE EYES.
SKIN CONTACT	AVOID SKIN CONTACT. THIS PRODUCT MAY CAUSE SLIGHT SKIN IRRITATION UPON DIRECT CONTACT. BASED ON TESTING OF SIMILAR PRODUCTS AND/OR COMPONENTS. PROLONGED OR REPEATED CONTACT MAY RESULT IN CONTACT DERMATITIS WHICH IS CHARACTERIZED BY DRYNESS, CHAPPING, AND REDDENING. THIS CONDITION MAY MAKE THE SKIN MORE SUSCEPTIBLE TO OTHER IRRITANTS, SENSITIZERS, AND DISEASE. PRE-EXISTING SKIN CONDITIONS MAY MAKE THE SKIN MORE SUSCEPTIBLE AND FACILITATE UPTAKE BY THIS ROUTE. MAY BE ABSORBED THROUGH SKIN. SEE HEALTH DATA SECTION BELOW.
INHALATION	AVOID PROLONGED INHALATION OF VAPORS. THIS PRODUCT MAY BE CONSIDERED A LOW HEALTH HAZARD UNLESS INHALED IN VERY HIGH CONCENTRATIONS. ACUTE AND CHRONIC EXPOSURE TO VAPORS MAY BE IRRITATING TO THE RESPIRATORY TRACT. SEVERE INTOXICATION MAY LEAD TO DROWSINESS, DULLNESS, NUMBNESS, AND HEADACHE FOLLOWED BY DIZZINESS, WEAKNESS, AND NAUSEA. EXPOSURE TO EVEN HIGHER CONCENTRATIONS MAY LEAD TO LOSS OF CONSCIOUSNESS AND CONVULSIONS FOLLOWED BY DEATH. AT EXTREMELY HIGH CONCENTRATIONS WHERE OXYGEN DISPLACEMENT IS A FACTOR, ASPHYXIATION MAY OCCUR. SEE HEALTH DATA SECTION BELOW. SEE SECTION IX, MISCELLANEOUS, FOR ADDITIONAL INFORMATION.
INGESTION	DO NOT INGEST. INGESTION OF SMALL QUANTITIES IS USUALLY NONFATAL UNLESS ASPIRATION OCCURS. ASPIRATION MAY LEAD TO CHEMICAL PNEUMONITIS WHICH IS CHARACTERIZED BY PULMONARY EDEMA AND HEMORRHAGE AND MAY BE FATAL. SIGNS OF LUNG INVOLVEMENT INCLUDE INCREASED RESPIRATORY RATE, INCREASED HEART RATE, AND A BLUISH DISCOLORATION OF THE SKIN. COUGHING, CHOKING, AND GAGGING ARE OFTEN NOTED AT THE TIME OF ASPIRATION. GASTROINTESTINAL DISCOMFORT MAY DEVELOP, FOLLOWED BY VOMITTING WITH A FURTHER RISK OF ASPIRATION. SEVERE ORAL INTOXICATION WILL LEAD TO INTENSE BURNING OF THE THROAT AND MAY RESULT IN DROWSINESS, DULLNESS, NUMBNESS, AND HEADACHE FOLLOWED BY DIZZINESS, WEAKNESS, AND NAUSEA. LOSS OF CONSCIOUSNESS AND CONVULSIONS FOLLOWED BY DEATH MAY RESULT. SEE HEALTH DATA SECTION BELOW.
HEALTH DATA	THIS PRODUCT CONTAINS PETROLEUM NAPHTHAS AND/OR SOLVENTS WHICH ARE A COMPLEX BLEND OF LIGHT PETROLEUM DISTILLATES. SOME OF THE COMPONENTS OF THESE BLENDS ARE CONSIDERED UNIQUELY TOXIC AT HIGH CONCENTRATIONS, SUCH AS BENZENE (BONE MARROW DISORDERS INCLUDING LEUKEMIA AND ANEMIA), AND N-HEXANE (PERIPHERAL NEUROPATHY). AT THE LOW CONCENTRATIONS AT WHICH THEY ARE PRESENT IN THIS BLEND HOWEVER, AND AT THE LOW EXPOSURE LEVELS AT WHICH THEY ARE ENCOUNTERED AS VAPORS, THESE COMPONENTS DO NOT PRESENT A SIGNIFICANT RISK. LIGHT HYDROCARBONS SUCH AS STODDARD SOLVENT, VM & P NAPHTHA AND C10-C11 ISOPARAFFIN PRODUCED KIDNEY TUMORS IN MALE RATS ONLY BUT NOT IN FEMALE RATS OR MICE. THE U.S. ENVIRONMENTAL PROTECTION AGENCY (EPA) HAS CONCLUDED THAT THESE KIDNEY TUMORS ARE NOT RELEVANT TO HUMANS. VARIOUS NAPHTHAS TESTED WERE NOT CARCINOGENIC IN MOUSE SKIN PAINTING BIO-ASSAYS. THE INTERNATIONAL AGENCY FOR RESEARCH ON CANCER (IARC) HAS CONCLUDED THAT PETROLEUM SOLVENTS ARE GROUP 3 SUBSTANCES, "NOT CLASSIFIABLE AS TO THEIR CARCINOGENICITY TO HUMANS." THIS PRODUCT IS NOT CARCINOGENIC ACCORDING TO THE OSHA HAZARD COMMUNICATION STANDARD.

IV EMERGENCY & FIRST AID PROCEDURES

LVT 200

EYE CONTACT	IMMEDIATELY FLUSH EYES WITH LARGE AMOUNTS OF WATER AND CONTINUE FLUSHING UNTIL IRRITATION SUBSIDES. IF IRRITATION PERSISTS, SEEK MEDICAL ATTENTION.
SKIN CONTACT	REMOVE CONTAMINATED CLOTHING. WASH CONTAMINATED AREA THOROUGHLY WITH SOAP AND WATER. USE A HAND OR SKIN LOTION TO PREVENT DRYNESS. IF REDNESS OR IRRITATION OCCURS, SEEK MEDICAL ATTENTION.
INHALATION	IF VICTIM EXHIBITS SIGNS OF VAPOR INTOXICATION REMOVE TO FRESH AIR. IF BREATHING HAS STOPPED OR IS IRREGULAR, ADMINISTER ARTIFICIAL RESPIRATION AND SUPPLY OXYGEN IF IT IS AVAILABLE. IF VICTIM IS UNCONSCIOUS, REMOVE TO FRESH AIR AND SEEK IMMEDIATE MEDICAL ATTENTION.
INGESTION	DO NOT INDUCE VOMITING DUE TO ASPIRATION HAZARD. IF VOMITING OCCURS LOWER HEAD BELOW KNEES TO AVOID ASPIRATION. SEEK IMMEDIATE MEDICAL ATTENTION.

V PERSONAL HEALTH PROTECTION INFORMATION

LVT 200

EYE PROTECTION	EYE PROTECTION IS NOT REQUIRED UNDER CONDITIONS OF NORMAL USE. IF MATERIAL IS HANDLED SUCH THAT IT COULD BE SPLASHED INTO EYES, WEAR PLASTIC FACE SHIELD OR SPLASH-PROOF SAFETY GOGGLES.
SKIN PROTECTION	NO SKIN PROTECTION IS REQUIRED FOR SINGLE, SHORT DURATION EXPOSURES. FOR PROLONGED OR REPEATED EXPOSURES, USE IMPERVIOUS SYNTHETIC RUBBER CLOTHING (BOOTS, GLOVES, APRONS, ETC.) OVER PARTS OF THE BODY SUBJECT TO EXPOSURE. LAUNDER SOILED CLOTHES. PROPERLY DISPOSE OF CONTAMINATED LEATHER ARTICLES INCLUDING SHOES, WHICH CANNOT BE DECONTAMINATED.
RESPIRATORY PROTECTION	IF CONCENTRATIONS ARE LESS THAN 10 TIMES THE LIMITS IN SECTION II OR IX, USE AN ORGANIC VAPOR RESPIRATOR. IF CONCENTRATIONS ARE GREATER THAN 10 TIMES THE LIMITS IN SECTION II OR IX, USE A SUPPLIED AIR RESPIRATOR OR A SELF-CONTAINED BREATHING APPARATUS. ALL RESPIRATORS MUST BE NIOSH CERTIFIED. DO NOT USE COMPRESSED OXYGEN IN HYDROCARBON ATMOSPHERES.
VENTILATION	ADEQUATE VENTILATION IN ACCORDANCE WITH GOOD ENGINEERING PRACTICE MUST BE PROVIDED TO MAINTAIN CONCENTRATIONS BELOW THE SPECIFIED EXPOSURE OR FLAMMABLE LIMITS. SEE ALSO FIRE PROTECTION INFORMATION IN SECTION VI.
OTHER	CONSUMPTION OF FOOD AND BEVERAGE SHOULD BE AVOIDED IN WORK AREAS WHERE HYDROCARBONS ARE PRESENT. ALWAYS WASH HANDS AND FACE WITH SOAP AND WATER BEFORE EATING, DRINKING, OR SMOKING.

VI FIRE PROTECTION INFORMATION

LVT 200

FLASH POINT	> 200 F	TEST METHOD	ASTM D93 - PMCC
AUTOIGNITION TEMPERATURE	NO DATA	TEST METHOD	NO DATA
FLAMMABLE LIMITS IN AIR % BY VOL	LOWER 1.0	UPPER 6.0	

EXTINGUISHING MEDIA	USE DRY CHEMICAL, FOAM, OR CARBON DIOXIDE.
SPECIAL FIRE FIGHTING PROCEDURES	WATER MAY BE INEFFECTIVE BUT CAN BE USED TO COOL CONTAINERS EXPOSED TO HEAT OR FLAME.
UNUSUAL FIRE AND EXPLOSIVE CONDITIONS	DENSE SMOKE MAY BE GENERATED WHILE BURNING. CARBON MONOXIDE, CARBON DIOXIDE, AND OTHER OXIDES MAY BE GENERATED AS PRODUCTS OF COMBUSTION.

VII REACTIVITY DATA

STABILITY (THERMAL, LIGHT, ETC.)	STABLE	CONDITIONS TO AVOID	NONE
HAZARDOUS POLYMERIZATION	WILL NOT OCCUR	CONDITIONS TO AVOID	NONE

INCOMPATIBILITY MATERIALS TO AVOID	MAY REACT WITH STRONG OXIDIZING AGENTS.
HAZARDOUS DECOMPOSITION PRODUCTS	NONE

VIII ENVIRONMENTAL PRECAUTIONS

LVT 200

STEPS TO BE TAKEN IF MATERIAL IS RELEASED OR SPILLED	CONSULT HEALTH EFFECT INFORMATION IN SECTION III, PERSONAL HEALTH PROTECTION INFORMATION IN SECTION V, FIRE PROTECTION INFORMATION IN SECTION VI, AND REACTIVITY DATA IN SECTION VII. NOTIFY APPROPRIATE AUTHORITIES OF SPILL. CONTAIN SPILL IMMEDIATELY. DO NOT ALLOW SPILL TO ENTER SEWERS OR WATERCOURSES. REMOVE ALL SOURCES OF IGNITION. PROVIDE ADEQUATE VENTILATION DURING CLEAN-UP. ABSORB WITH SOLVENT ABSORBENT MATERIAL. LARGE SPILLS MAY BE PICKED UP USING VACUUM PUMPS, SHOVELS, BUCKETS, OR OTHER MEANS AND PLACED IN DRUMS OR OTHER SUITABLE CONTAINERS.
WASTE DISPOSAL METHOD	ALL DISPOSALS MUST COMPLY WITH FEDERAL, STATE, AND LOCAL REGULATIONS. THE MATERIAL, IF SPILLED OR DISCARDED, MAY BE A REGULATED WASTE. REFER TO STATE AND LOCAL REGULATIONS. CAUTION! IF REGULATED SOLVENTS ARE USED TO CLEAN UP SPILLED MATERIAL, THE RESULTING WASTE MIXTURE MAY BE REGULATED. DEPARTMENT OF TRANSPORTATION (DOT) REGULATIONS MAY APPLY FOR TRANSPORTING THIS MATERIAL WHEN SPILLED. WASTE MATERIAL MAY BE LANDFILLED OR INCINERATED AT AN APPROVED FACILITY. MATERIALS SHOULD BE RECYCLED IF POSSIBLE.

IX MISCELLANEOUS

HANDLING AND STORAGE REQUIREMENTS	DO NOT TRANSFER TO UNMARKED CONTAINERS. STORE IN A COOL, WELL VENTILATED AREA IN CLOSED CONTAINERS AWAY FROM HEAT, SPARKS, OPEN FLAME OR OXIDIZING MATERIALS. FIRE EXTINGUISHERS SHOULD BE KEPT READILY AVAILABLE. SEE NFPA 30 AND OSHA 1910.106--FLAMMABLE AND COMBUSTIBLE LIQUIDS.
ADDITIONAL INFORMATION	NIOSH RECOMMENDED LIMITS FOR PETROLEUM DISTILLATES ARE 350 MG/M3 (10-HR TWA) AND 1800MG/M3 (STEL). THIS PRODUCT IS NOT KNOWN TO CONTAIN ANY SARA TITLE III, SECTION 313 REPORTABLE CHEMICALS AT OR GREATER THAN 1.0% (0.1% FOR CARCINOGENS). THE INGREDIENT OF THIS PRODUCT IS LISTED ON THE TOXIC SUBSTANCES CONTROL ACT (TSCA) INVENTORY. DOT: NOT REGULATED

X PHYSICAL PROPERTIES

BOILING POINT	430 - 550 F	PERCENT VOLATILE	NO DATA
MELTING POINT	NO DATA	VAPOR DENSITY (AIR=1)	6.2
APPEARANCE	CLEAR, COLORLESS LIQUID	EVAPORATION RATE (EE=1)	NO DATA
ODOR	NEGLIBLE ODOR	SPECIFIC GRAVITY	0.82 - 0.83
VAPOR PRESSURE	< 0.1 MM HG @ 68 F	MOLECULAR WEIGHT	NO DATA
SOLUBILITY	INSOLUBLE IN WATER		

P.O. Box 31853
Lafayette, La. 70593

L.C.S. Inc.

Exclusive Distributors of

MAGMA FIBER®

Magma Fiber

Telephone
(318)984-3150

MATERIAL SAFETY DATA SHEET

SECTION 1 : PRODUCT IDENTIFICATION

PRODUCT NAME MAGMA FIBER
GENERIC NAME mineral fiber
DISTRIBUTOR LOST CIRCULATION SPECIALISTS, INC.
P.O. BOX 53
CASPER, WY 82602

EMERGENCY PHONE NO.
DAY 307-237-3315
318-984-3150
NIGHT 307-237-3315

PRIMARY COMPONENTS Vitreous fiber made from blast furnace slag and/or basalt (mixture).

SECTION 2 : INGREDIENTS (Not specification values)

MATERIALS	PEL	TLV	CAS#
MINERAL FIBER	15 mg/M_3 (TOTAL)	10 mg/M_3 (TOTAL)	NONE
	5 mg/M_3 (RESPIRABLE)	5 mg/M_3 (RESPIRABLE)	ASSIGNED

SECTION 3 : PHYSICAL DATA

MELTING POINT (F) : 2400
VAPOUR PRESSURE (MMH@20C) : N/A
SPECIFIC GRAVITY : 2.6
PHYSICAL STATE : SOLID
COLOR AND ODOR : GRAY/TAN FIBER, LOW ODOR

VAP DENSITY (AIR=1) : N/A
SOLUBILITY IN WATER : NOT
% VOLATILE BY VOL : NONE

SECTION 4 : FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (C) : NON-COMBUSTIBLE (ASTME84)
FLAMMABLE LIMITS : N/A
EXTINGUISHING MEDIA : NON-COMBUSTIBLE
FIRE AND EXPLOSION HAZARD : NONE

P.O. Box 31853
Lafayette, La. 70593

L.C.S. Inc.

Exclusive Distributors of

MAGMA FIBER®

Magma Fiber
Telephone
(318)984-3150

SECTION 5 : REACTIVITY DATA

STABILITY	: STABLE
CONDITIONS TO AVOID	: NONE
INCOMPATABILITY	: ACIDS (gives off H_2S under certain conditions)
DECOMPOSITION	: NONE
POLYMERIZATION	: WILL NOT OCCUR

SECTION 6 : HEALTH HAZARD DATA

ORAL INGESTION	: N/A
EYE CONTACT	: MINERAL FIBER MAY CAUSE TRANSITORY (TEMPORARY) MECHANICAL IRRITATION TO EYES.
SKIN CONTACT	: SKIN CONTACT MAY CAUSE TRANSITORY SKIN IRRITATION AND POSSIBLE IRRITATION TO EYES AND UPPER RESPIRATORY TRACT.
SKIN ABSORPTION	: N/A
INHALATION	: MAY CAUSE TRANSITORY IRRITATION TO UPPER RESPIRATORY TRACT WHEN HANDLING THIS PRODUCT. WEAR A NIOSH APPROVED DUST MASK OR RESPIRATOR. AVOID CREATING EXCESSIVE DUST.

IARC CLASS 2B. NTP - NOT CLASSIFIED ACGIH - NOT CLASSIFIED

OVER EXPOSURE EFFECT : MINERAL FIBER MAY CAUSE TRANSITORY MECHANICAL IRRITATION TO EYES, SKIN OR UPPER RESPIRATORY TRACT.

FIRST AID PROCEDURE :

EYES	: FLUSH WITH WATER AND SEE A PHYSICIAN IF IRRITATION CONTINUES
SKIN	: WASH FIBER FROM SKIN WITH SOAP AND WATER.
INGESTION	: CALL A PHYSICIAN

P.O. Box 31853
Lafayette, La. 70593

L.C.S. Inc.

Exclusive Distributors of

MAGMA FIBER®

Magma Fiber

Telephone
(318)984-3150

SECTION 7 : SPECIAL PROTECTION

VENTILATION : LOCAL EXHAUST OR MECHANICAL VENTILATION TO KEEP BELOW TLV.

RESPIRATORY : NIOSH APPROVED 3M 8710 OR EQUIVALENT DUST RESPIRATOR IS RECOMMENDED.

CLOTHING : GLOVES IF DUST IS IRRITATING, TIGHT FITTING GOGGLES IN DUSTY ENVIROMENT. WEAR LONG SLEEVED. LOOSE FITTING CLOTHING CLOSED AT NECK AND WRISTS TO MINIMIZE SKIN EXPOSURE. WASH CLOTHES SEPARATELY FROM UNDERWEAR.

EYE PROTECTION : TO AVOID EYE IRRITATION WEAR SAFETY GLASSES OR GOGGLES.

SECTION 8 : SPILL OR LEAK PROCEDURES

STEP TO BE TAKEN : NORMAL CLEAN-UP PROCEDURES. AVOID CREATING EXCESSIVE DUST.

DISPOSAL METHOD : TO LANDFILL IN ACCORDANCE WITH LOCAL, PROVINCIAL AND FEDERAL REGULATIONS

SECTION 9 : SPECIAL PRECAUTIONS OR OTHER COMMENTS

HANDLING & STORAGE :

OTHER PRECAUTIONS :

TDG SHIPPING NAME : NON-HAZARDOUS

DATE 7/15/91

N/A - NOT APPLICABLE

U - UNKNOWN

FOR FURTHER TECHNICAL INFORMATION CONTACT:

LOST CIRCULATION SPECIALISTS, INC.
P.O. BOX 53
CASPER, WY 82602
(307) 237-3315

Mica

Material Safety Data Sheet

Required under USDL Safety and Health Regulations for Shipyard Employment (29 CFR 1915)

U.S. Department of Labor

Occupational Safety and Health Administration

719 01

OMB No. 1218-0074
Expiration Date 05/31/86

ISSUE 11/85 CC: hh LC: F

CAS NO. 12001-26-2

Section I

Manufacturer's Name: American Colloid Company

Emergency Telephone Number: 312-966-5720

Address (Number, Street, City, State, and ZIP Code): 5100 Suffield Court, Skokie, Illinois 60077

Chemical Name and Synonyms: Mica

Trade Name and Synonyms: Mica

Chemical Family: Mica

Formula: $KAl_2(AL\ Si_3O_{10})(OH_2)$

Section II - Hazardous Ingredients

Paints, Preservatives, and Solvents	%	TLV (Units)	Alloys and Metallic Coatings	%	TLV (Units)
Pigments	0	N/A	Base Metal	0	N/A
Catalyst	0	N/A	Alloys	0	N/A
Vehicle	0	N/A	Metallic Coatings	0	N/A
Solvents	0	N/A	Filler Metal Plus Coating or Core Flux	0	N/A
Additives	0	N/A	Others: Respirable Mica	*	See Sec. V.
Others	0	N/A			

Hazardous Mixtures of Other Liquids, Solids or Gases

	%	TLV (Units)

Section III - Physical Data

Boiling Point (°F)	N/A	Specific Gravity (H_2O=1)	2.6/3.2
Vapor Pressure (mm Hg.)	N/A	Percent Volatile by Volume (%)	N/A
Vapor Density (AIR=1)	N/A	Evaporation Rate (_____=1)	N/A

Solubility in Water: 0% - Negligible

Appearance and Odor: Soft translucent solid, odorless

Section IV - Fire and Explosion Hazard Data

Flash Point (Method Used)	N/A	Flammable Limits	Lel	Uel
		N/A		

Extinguishing Media: N/A

Special Fire Fighting Procedures: N/A

Unusual Fire and Explosion Hazards: N/A

Form OSHA-20

Section V - Health Hazard Data

Threshold Limit Value

20 MPPCF/3 mg/m^3

Effects of Overexposure

May be harmful if inhaled over prolonged period and may cause delayed lung injury.

Emergency First Aid Procedures

N/A

Section VI - Reactivity Data

Stability	Unstable		Conditions to Avoid N/A
	Stable	X	

Incompatability (Materials to Avoid)

N/A

Hazardous Decomposition Products

N/A

Hazardous Polymerization	May Occur		Conditions to Avoid N/A
	Will Not Occur	X	

Section VII - Spill or Leak Procedures

Steps to be Taken in Case Material is Released or Spilled

Vacuum if possible to avoid generating airborne dust. Avoid breathing dust. Wear approved respirator.

Waste Disposal Method

Sanitary Landfill

Section VIII - Special Protection Information

Respiratory Protection (Specify Type)

NIOSH/MSHA approved respirator

Ventilation	Local Exhaust Required	Special N/A
	Mechanical (General) N/A	Other N/A

Protective Gloves

N/A

Eye Protection

Optional use of Goggles

Other Protective Equipment

N/A

Section IX - Special Precautions

Precautions to be Taken in Handling and Storing Avoid breathing dust.
Use NIOSH/MSHA approved respirator where TLV limits for Mica may be exceeded.

Other Precautions

NONE

NIS

AMBER CHEMICAL INCORPORATED

MATERIAL SAFETY DATA

MSDS NUMBER : **67-8610**

REVISION DATE : 01/19/96

5201 Boylan Street
Bakersfield, CA 93308

EMERGENCY TELEPHONE NUMBER: (805) 325-2072

SECTION ONE - PRODUCT DESCRIPTION

PRODUCT NAME: N. I. S.

CHEMICAL DESCRIPTION: Phosphate Ester

SYNONYMS: Surfactant

DOT HAZARD CLASS: None

DOT SHIPPING NAME::

SECTION TWO - HAZARDOUS INGREDIENT

CHEMICAL	CAS NUMBER	% PRESENT	TLV OR PEL
Isopropyl Alcohol	67-63-0	3-5%	TWA=400ppm, PEL=500ppm

SECTION THREE - PHYSICAL DATA

BOILING POINT - Not Determined

SPECIFIC GRAVITY (H_2O=1) - 1.036

SOLUBILITY IN WATER (% BY VOLUME) - Soluble

FREEZING POINT - Not Determined

EVAPORATION RATE (BUTYL ACETATE = 1) - Not Determined

VAPOR PRESSURE @ 20°C - Not Det.

% VOLATILES BY VOLUME - 85% ± 5

VAPOR DENSITY - Not Determined

APPEARANCE AND ODOR - Pale liquidwith isopropyl alcohol odor

SECTION FOUR - FIRE AND EXPLOSION HAZARD

FLASH POINT [TEST METHOD(S)] - 200+ (Tag Closed Cup)

FLAMMABLE LIMITS IN AIR, % BY VOLUME -- Not Established

EXTINGUISHING MEDIA - Water Fog, Dry Powder or Carbon Dioxide

UNUSUAL FIRE AND EXPLOSION HAZARDS - Heating may cause pressure build up - and possible rupture of the container.

SPECIAL FIRE FIGHTING PROCEDURES - Remove unprotected personnel from hazard area. Wear protective clothing. Emergency personnel should be equipped with a NIOSH approved SCBA with full face piece. Cool exposed containers with water.

While Amber Chem. believes that the data contained herein are factual and the opinions expressed are those of qualified experts regarding the results of the tests conducted, the data are not to be taken as a warranty or representation for which Amber Chem. assumes legal responsibility. They are offered solely for your consideration, investigation and verification. Any use of these data and information must be determined by the user in accordance with applicable Federal, State and local laws and regulations.

SECTION FIVE - HEALTH AND FIRST AID DATA

ACUTE EFFECTS OF OVEREXPOSURE:

SWALLOWING - Ingestion may cause irritation to the membrances of the mouth, throat and gastrointestinal tract. Nausea, vomiting, cramps and diarrhea may occur.

SKIN ABSORPTION - None currently known.

INHALATION - Inhalation of vapors may cause headache, nausea and other similar symptoms for the exposure to methyl alcohol. Inhalation of mists or sprays may result in non-specific irritation to the upper respiratory tract.

SKIN CONTACT - Contact with skin could produce severe local irritation.

EYE CONTACT - Vapors may be irritating to the eyes. Mists, sprays and liquid forms may cause moderate to severe irritation to the eyes.

CHRONIC EFFECTS OF OVEREXPOSURE - No chronic effects, either systemic or local are known.

OTHER HEALTH HAZARDS - None currently known.

EMERGENCY AND FIRST AID PROCEDURES:

SWALLOWING - Give large amounts of warm water to induce vomiting or by putting finger down the patient's throat. Vomiting should be encourage until vomitus is clear. Milk, eggs, or olive oil may be given after vomiting, for their soothing effect. Obtain medical attention.

SKIN - Remove contaminated clothing and flush skin with water. Wash with soap and water until material is has been removed. Obtain medical attention if irritation persists.

INHALATION - Remove to fresh air. If symptoms of respiratory discomfort persist, obtain medical attention.

EYES - Immediately flush eyes with large amounts of water for 15 minutes. Hold eye lids apart to ensure complete flushing. Do not attempt to neutralize with chemical agents. Obtain medical attention.

TLV OR PEL AND SOURCE - None currently established.

HAZARDOUS MATERIALS IDENTIFICATION SYSTEM:

HEALTH: (1)

FLAMMABILITY: (1)

REACTIVITY: (0)

PERSONAL PROTECTION EQUIPMENT: (C) Goggles, gloves, synthetic apron.

HAZARD INDEX *
4 SEVERE HAZARD
3 SERIOUS HAZARD
2 MODERATE HAZARD
1 SLIGHT HAZARD
0 MINIMAL HAZARD

*USED AND ASSIGNED BY AMBER CHEMICAL TO IDENTIFY HAZARDS OF THE MATERIAL. SEE ATTACHED "MATERIAL SAFETY DATA SHEET TERMINOLOGY," PAGE B, FOR SPECIFIC INFORMATION ON EACH INDEX.

**SEE ATTACHED "MATERIAL SAFETY DATA SHEET TERMINOLOGY," PAGE B

SECTION SIX - REACTIVITY DATA

STABILITY: Stable

CONDITIONS TO AVOID IF UNSTABLE: High temperatures.

INCOMPATIBILITY WITH OTHER MATERIALS: N. I. S. reacts rapidly and exothermically (but not violently) with alkalies to form stable salts.

HAZARDOUS DECOMPOSITION PRODUCTS: May produce hazardous fumes or hazardous decomposition products.

HAZARDOUS POLYMERIZATION: Will not occur.

CONDITIONS TO AVOID: None currently known.

SECTION SEVEN - SPILL AND DISPOSAL PROCEDURES

STEPS TO BE TAKEN IF MATERIAL IS RELEASED OR SPILLED: Eliminate all ignition sources. Wear suitable protective equipment. Small Spills: Absorb liquid with absorbent material. Large Spills: Stop spill at source. Dike area of the spill to prevent spreading. Pump liquids into waste containers. Remaining liquids can be absorbed.

WASTE DISPOSAL METHOD: Incinerate or landfill where permitted under appropriate federal, state and local regulations.

SECTION EIGHT - SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION: Self-contained breathing apparatus in high concentrations. Normally not required.

VENTILATION: General (mechanical) room ventilation is expected to be satisfactory.

PROTECTIVE GLOVES: Butyl or neoprene rubber.

EYE PROTECTION: Monogoggles.

OTHER PROTECTIVE EQUIPMENT: Synthetic apron, eye wash station.

SECTION NINE - SPECIAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING: Do not get in eyes, on skin, or on clothing. Wash thoroughly after handling. Soiled clothing should be removed and laundered before reuse. Store below 120°F.

MATERIAL SAFETY DATA SHEET

GEO DRILLING FLUIDS P.O. BOX 1478 BAKERSFIELD, CA 93302

CONTACT FOR FURTHER INFORMATION
MSDS COORDINATOR: 805- 325-5919

MSDS NO. 06150
CODE NO. 0144

IDENTIFICATION

PRODUCT NAME: OMNIPOL II

OSHA HAZARD: NONE
DOT CLASSIFICATION: NOT REGULATED

INGREDIENTS

SODIUM POLYACRYLATE	CAS# 9003-04-7	35%
WATER	CAS# 007732-18-5	65%

CONTAINS NO HAZARDOUS MATERIAL AS DEFINED BY OSHA HAZARD COMMUNICATION STANDARD CFR29-1910-1200.

PHYSICAL DATA

BOILING POINT: 212 F
SPECIFIC GRAVITY: 1.239
VAPOR DENSITY: <1.0 (WATER)
PERCENT VOLATILES: 65 (WATER)
APPEARANCE AND ODOR: CLEAR SOLUTION
HAZARD RATING (HMIS)
HEALTH = 1
FLAMMABILITY = 0
REACTIVITY = 0

FREEZING POINT: < 32 F
VAPOR PRESSURE: 17 mm Hg 20 C
EVAPORATION RATE: < 1.0
SOLUBILITY IN WATER: INFINITE
pH 9.0-9.5
HAZARD RATING SCALE
0 = MINIMAL
1 = SLIGHT
2 = MODERATE
3 = SERIOUS
4 = SEVERE

HEALTH HAZARDS/ROUTES OF ENTRY

EYE CONTACT: Product can cause slight irritation or redness upon direct contact.
SKIN CONTACT: May cause slight irritation to sensitive individual.
INHALATION: Unlikely source of hazard.
INGESTION: May cause abdominal pain and nausea.
COMMENTS: This product is essentially non-toxic. No chronic health effects are known at this time relative to repeated overexposure.

EMERGENCY AND FIRST AID PROCEDURE

EYE CONTACT: Flush eyes with clean water, seek prompt medical attention.
SKIN CONTACT: Wash affected areas thoroughly with mild soap and water. If irritation or redness develops and persists - seek medical attention.
INHALATION (BREATHING): Unlikely to cause adverse effects. If respiratory irritation develops, remove person to fresh air.
INGESTION (SWALLOWING): Give 2 or 3 glasses of water to dilute product. Induce vomiting and seek medical attention. Do not give anything by mouth to an unconscious person.

PRODUCT NAME: OMNIPOL II
PRODUCT CODE NO:

SPECIAL PROTECTION INFORMATION

VENTILIATION: Unnecessary in most cases. Open windows and doors to create drafts if desired.
RESPIRATORY PROTECTION: If space is misty use suitable mist mask.
PROTECTIVE GLOVES: Rubber gloves.
EYE PROTECTION: Safety glasses or better.
OTHER PROTECTIVE EQUIPMENT: N/A

REACTIVITY DATA:

STABILITY: Product is stable.
INCOMPATIBILITY (MATERIALS TO AVOID): None
HAZARDOUS DECOMPOSITION PRODUCTS: Carbon dioxide, carbon monoxide.
HAZARDOUS POLYMERIZATION: Will not occur.

ENVIRONMENTAL AND DISPOSAL INFORMATION:

ACTION TO TAKE FOR SPILLS/LEAKS: CAUTION - Material will form a very slippery surface on floors. Guard against falls. Contain spill with inert materials or dikes. Clean up and store for disposal. Polymer can be coagulated by mixing with 50% calcium chloride solution in water. A clear water and white sludge will be formed. Dispose of liquid into a chemical sewer and the sludge into an approved land disposal in accordance with local, state and federal regulations.

STORAGE AND SPECIAL PRECAUTIONS:

HANDLING AND STORAGE PRECAUTIONS: Freezing will not destabilize product.

FIRE AND EXPLOSION HAZARD DATA:

NFPA HAZARD CLASS	HEALTH HAZARD:	1	HAZARD RANKING
	FLAMMABILITY:	0	0 = LEAST
	REACTIVITY:	0	1 = SLIGHT
			2 = MODERATE
			3 = HIGH
			4 = EXTREME

LOWER EXPLOSIVE LIMIT (% VOL.): N/A
UPPER EXPLOSIVE LIMIT (% VOL.): N/A

FLASH POINT: Aqueous system, will not propagate flame.
EXTINGUISHING MEDIA: Aqueous system. Product will not burn until all water has evaporated. For dried solids use dry chemical, water fog, foam. CO or Halon.
FIRE & EXPLOSION HAZARDS: Some decomposition by-products may be toxic.
FIRE FIGHTING PROCEDURES: As a precaution, firefighters should wear self-contained breathing apparatus.

DOCUMENTARY INFORMATION:

PRODUCT NAME: OMNIPOL II
PRODUCT CODE NO:

DISCLAIMER OF EXPRESSED AND IMPLIED WARRANTIES:

The information in this document is believed to be correct as of the date issued. HOWEVER, NO WARRANTY OF MERCHANTABILITY, FITNESS FOR ANY PARTICULAR PURPOSE, OR ANY OTHER WARRANTY IS EXPRESSED OR IS TO BE IMPLIED REGARDING THE ACCURACY OR COMPLETENESS OF THIS INFORMATION THE RESULTS TO BE OBTAINED FROM THE USE OF THIS INFORMATION OR THE PRODUCT, THE SAFETY OF THIS PRODUCT, OR THE HAZARDS RELATED TO ITS USE. This information and product are furnished on the condition that the person receiving them shall make his own determination as to the suitability of the product for his particular purpose and on the condition that he assume the risk of his use therof.

Revised date: July 1997

Bob Brister

JAN-16-96 WED 14:04

72-62-7820-01

MATERIAL SAFETY
DATA SHEET

24-HOUR EMERGENCY TELEPHONE 1 (800) 274-5263

04286

PHOSPHORIC ACID 25% TECH

THIS MSDS COMPLIES WITH 29 CFR 1910.1200 (THE HAZARD COMMUNICATION STANDARD)

Product Name: PHOSPHORIC ACID 25% TECH
CAS NUMBER: 7664-38-2

Data Sheet No: 0004102-004
Prepared: 01/16/96

(805) 325-2072

Amber Chemical, Inc.
5201 Boylan Street
Bakersfield, CA 93308

ATTN: PLANT MGR./SAFETY DIR.

SECTION I-PRODUCT IDENTIFICATION

Chemical or Generic ID: INORGANIC ACID

DOT Hazard Classification: CORROSIVE MATERIAL (173.240)

SECTION II-COMPONENTS

IF PRESENT, IARC, NTP AND OSHA CARCINOGENS AND CHEMICALS SUBJECT TO THE REPORTING REQUIREMENTS OF SARA TITLE III SECTION 313 ARE IDENTIFIED IN THIS SECTION. SEE DEFINITION PAGE FOR CLARIFICATION

INGREDIENT	% (by WT)	PEL	TLV	Note
PHOSPHORIC ACID CAS #: 7664-38-2	25%	1 MG/M3	1 MG/M3	(1)

Notes:

(1) ACGIH - SHORT TERM EXPOSURE LIMIT (STEL) FOR PHOSPHORIC ACID IS 3 MG/CUM.

THIS CHEMICAL IS SUBJECT TO THE REPORTING REQUIREMENTS OF SECTION 313 OF SARA TITLE III.

SECTION III-PHYSICAL DATA

Boiling Point	for PRODUCT	@ 105° Deg C @ 760.00 mm Hg
Vapor Pressure	for PRODUCT	@ 60 mm Hg
Specific Vapor Density	UNAVAILABLE	
Specific Gravity		@ 1.150 (20.00 Deg C)
Percent Volatiles		100.00%
Evaporation Rate		SLOWER THAN ETHER

SECTION IV-FIRE AND EXPLOSION INFORMATION

FLASH POINT NOT APPLICABLE

EXPLOSIVE LIMIT NOT APPLICABLE

EXTINGUISHING MEDIA: WATER FOG

HAZARDOUS DECOMPOSITION PRODUCTS: MAY FORM TOXIC MATERIALS:, PHOSPHOROUS COMPOUNDS, ETC.

FIREFIGHTING PROCEDURES: WATER MAY BE USED TO EXTINGUISH FIRE BY COOLING, AND DILUTING LIQUID WITH WATER. WEAR SELF-CONTAINED BREATHING APPARATUS WITH A FULL FACEPIECE OPERATED IN THE POSITIVE PRESSURE DEMAND MODE AND FULL BODY PROTECTION WHEN FIGHTING FIRES.

SPECIAL FIRE & EXPLOSION HAZARDS: NEVER USE WELDING OR CUTTING TORCH ON OR NEAR DRUM (EVEN EMPTY) BECAUSE PRODUCT (EVEN JUST RESIDUE) CAN IGNITE EXPLOSIVELY.

ACID REACTS WITH MOST METALS TO RELEASE HYDROGEN GAS WHICH CAN FORM EXPLOSIVE MIXTURES WITH AIR.

NFPA CODES: HEALTH- 2 FLAMMABILITY- 0 REACTIVITY- 0

SECTION V-HEALTH HAZARD DATA

PERMISSIBLE EXPOSURE LEVEL 1 MG/M3

THRESHOLD LIMIT VALUE 1 MG/M3

EFFECTS OF ACUTE OVEREXPOSURE: FOR PRODUCT

EYE - CAUSES BURNS.
SKIN - CAUSES BURNS.
BREATHING - MIST CAN CAUSE DAMAGE TO NASAL AND RESPIRATORY PASSAGES.
SWALLOWING - RESULTS IN SEVERE DAMAGE TO MUCOUS MEMBRANES.

CONTINUED ON PAGE: 2

72-62-7820-01

AMBER CHEMICAL, INCORPORATED

MATERIAL SAFETY DATA SHEET

24-HOUR EMERGENCY TELEPHONE 1 (800) 274-5263

04286

PHOSPHORIC ACID 25% TECH

SECTION V-HEALTH HAZARD DATA (Continued)

RST AID:

IF ON SKIN: IMMEDIATELY FLUSH EXPOSED AREA WITH WATER FOR AT LEAST 15 MINUTES, GET MEDICAL ATTENTION. REMOVE CONTAMINATED CLOTHING. LAUNDER CONTAMINATED CLOTHING BEFORE RE-USE.

REMOVE CONTAMINATED SHOES PROMPTLY. DISCARD SHOES SATURATED WITH THIS PRODUCT.

IN EYES: IMMEDIATELY FLUSH WITH LARGE AMOUNTS OF WATER FOR AT LEAST 15 MINUTES, LIFTING UPPER AND LOWER LIDS OCCASIONALLY. GET IMMEDIATE MEDICAL ATTENTION.

IF PHYSICIAN IS NOT IMMEDIATELY AVAILABLE, CONTINUE FLUSHING WITH WATER.

DO NOT USE CHEMICAL ANTIDOTE.

IF SWALLOWED: DO NOT INDUCE VOMITING. VOMITING WILL CAUSE FURTHER DAMAGE TO THE THROAT. DILUTE BY GIVING WATER. GIVE MILK OF MAGNESIA. KEEP WARM, QUIET. GET MEDICAL ATTENTION IMMEDIATELY.

I BREATHED: IF AFFECTED, REMOVE INDIVIDUAL TO FRESH AIR. IF BREATHING IS DIFFICULT, ADMINISTER OXYGEN. IF BREATHING HAS STOPPED GIVE ARTIFICIAL RESPIRATION. KEEP PERSON WARM, QUIET AND GET MEDICAL ATTENTION.

RIMARY ROUTE(S) OF ENTRY:

INHALATION, SKIN CONTACT

SECTION VI-REACTIVITY DATA

AZARDOUS POLYMERIZATION: CANNOT OCCUR

TABILITY: STABLE

OMPATIBILITY: AVOID CONTACT WITH:, STRONG ALKALIES., ALKALI METALS

SECTION VII-SPILL OR LEAK PROCEDURES

TEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED:

L SPILL: COVER THE CONTAMINATED SURFACE WITH SODIUM BICARBONATE OR A SODA ASH/SLAKED LIME MIXTURE (50-50). MIX AND ADD WATER IF NECESSARY TO FORM A SLURRY. SCOOP UP SLURRY AND WASH SITE WITH SODA ASH SOLUTION

ARGE SPILL: PERSONS NOT WEARING PROTECTIVE EQUIPMENT SHOULD BE EXCLUDED FROM AREA OF SPILL UNTIL CLEAN-UP IS COMPLETED. STOP SPILL AT SOURCE. DIKE TO PREVENT SPREADING. PUMP TO SALVAGE TANK.

E DISPOSAL METHOD:

MALL SPILL: FLUSH DOWN DRAIN WITH LARGE AMOUNTS OF WATER IN ACCORDANCE WITH APPLICABLE REGULATIONS.

E SPILL: COLLECT AND ADD SLOWLY TO LARGE VOLUME OF AGITATED SOLUTION OF SODA ASH AND SLAKED LIME. ADD NEUTRALIZED SOLUTION TO EXCESS RUNNING WATER IN ACCORDANCE WITH APPLICABLE REGULATIONS.

SECTION VIII-PROTECTIVE EQUIPMENT TO BE USED

ESPIRATORY PROTECTION: IF WORKPLACE EXPOSURE LIMIT(S) OF PRODUCT OR ANY COMPONENT IS EXCEEDED (SEE SECTION II), A NIOSH/MSHA APPROVED AIR SUPPLIED RESPIRATOR IS ADVISED IN ABSENCE OF PROPER ENVIRONMENTAL CONTROL. OSHA REGULATIONS ALSO PERMIT OTHER NIOSH/MSHA RESPIRATORS (NEGATIVE PRESSURE TYPE) UNDER SPECIFIED CONDITIONS (SEE YOUR SAFETY EQUIPMENT SUPPLIER). ENGINEERING OR ADMINISTRATIVE CONTROLS SHOULD BE IMPLEMENTED TO REDUCE EXPOSURE.

ENTILATION: PROVIDE SUFFICIENT MECHANICAL (GENERAL AND/OR LOCAL EXHAUST) VENTILATION TO MAINTAIN EXPOSURE BELOW TLV(S).

OTECTIVE GLOVES: WEAR RESISTANT GLOVES SUCH AS:, NEOPRENE, NITRILE RUBBER, POLYVINYL CHLORIDE, POLYETHYLENE

E PROTECTION: CHEMICAL SPLASH GOGGLES AND FACE SHIELD (8" MIN.) IN COMPLIANCE WITH OSHA REGULATIONS ARE ADVISED; HOWEVER, OSHA REGULATIONS ALSO PERMIT OTHER TYPE SAFETY GLASSES. (CONSULT YOUR SAFETY EQUIPMENT SUPPLIER)

R PROTECTIVE EQUIPMENT: TO PREVENT SKIN CONTACT, WEAR IMPERVIOUS CLOTHING AND BOOTS.

SECTION IX-SPECIAL PRECAUTIONS OR OTHER COMMENTS

DITION TO WATER RELEASES HEAT WHICH CAN RESULT IN VIOLENT BOILING AND SPATTERING. ALWAYS ADD SLOWLY AND IN SMALL AMOUNTS. NEVER USE HOT WATER.

V ADD WATER TO ACIDS. ALWAYS ADD ACIDS TO WATER.

NTAINERS OF THIS MATERIAL MAY BE HAZARDOUS WHEN EMPTIED.SINCE EMPTIED CONTAINERS RETAIN PRODUCT RESIDUES (VAPOR, LIQUID, AND/OR SOLID), ALL HAZARD PRECAUTIONS GIVEN IN THE DATA SHEET MUST BE OBSERVED.

E INFORMATION ACCUMULATED HEREIN IS BELIEVED TO BE ACCURATE BUT IS NOT WARRANTED TO BE WHETHER ORIGINATING WITH THE COMPANY OR NOT. RECIPIENTS ARE ADVISED TO CONFIRM IN ADVANCE OF NEED THAT THE INFORMATION IS CURRENT, APPLICABLE, AND SUITABLE TO THEIR CIRCUMSTANCES.

72-62-7820-01

MATERIAL SAFETY DATA SHEET

AMBER CHEMICAL, INCORPORATED
5201 Boylan Street
Bakersfield, CA 93308 (805) 325-2072
24-HOUR EMERGENCY TELEPHONE : (800) 274-5262

JC1286

PHOSPHORIC ACID 40% TECH

THIS MSDS COMPLIES WITH 29 CFR 1910.1200 (THE HAZARD COMMUNICATION STANDARD)

****

Product Name: PHOSPHORIC ACID 40% TECH
CAS NUMBER: 7664-38-2

Data Sheet No: 0004102-004
Prepared: 01/19/96
Supersedes:

ATTN: PLANT MGR./SAFETY DIR.

SECTION I - PRODUCT IDENTIFICATION

General or Generic ID: INORGANIC ACID

DOT Hazard Classification: CORROSIVE MATERIAL (173.240)

SECTION II - COMPONENTS

IF PRESENT, IARC, NTP AND OSHA CARCINOGENS AND CHEMICALS SUBJECT TO THE REPORTING REQUIREMENTS OF SARA TITLE III SECTION 313 ARE IDENTIFIED IN THIS SECTION.
SEE DEFINITION PAGE FOR CLARIFICATION

INGREDIENT	% (by WT)	PEL	TLV	Note
PHOSPHORIC ACID CAS #: 7664-38-2	40	1 MG/M3	1 MG/M3	(1)

Notes:

(1) ACGIH - SHORT TERM EXPOSURE LIMIT (STEL) FOR PHOSPHORIC ACID IS 3 MG/CUM.

THIS CHEMICAL IS SUBJECT TO THE REPORTING REQUIREMENTS OF SECTION 313 OF SARA TITLE III.

SECTION III - PHYSICAL DATA

Boiling Point	for PRODUCT	@ 100° DEG C 760.00 mm Hg
Vapor Pressure	for PRODUCT	@ 78 mm Hg 50° Deg C
Specific Vapor Density	UNAVAILABLE	
Specific Gravity		@ 1.255 20.00 Deg C)
Percent Volatiles		100.00%
Evaporation Rate		SLOWER THAN ETHER

SECTION IV - FIRE AND EXPLOSION INFORMATION

FLASH POINT NOT APPLICABLE

EXPLOSIVE LIMIT NOT APPLICABLE

EXTINGUISHING MEDIA: WATER FOG

HAZARDOUS DECOMPOSITION PRODUCTS: MAY FORM TOXIC MATERIALS:, PHOSPHOROUS COMPOUNDS, ETC.

FIREFIGHTING PROCEDURES: WATER MAY BE USED TO EXTINGUISH FIRE BY COOLING, AND DILUTING LIQUID WITH WATER.
WEAR SELF-CONTAINED BREATHING APPARATUS WITH A FULL FACEPIECE OPERATED IN THE POSITIVE PRESSURE DEMAND MODE AND FULL BODY PROTECTION WHEN FIGHTING FIRES.

SPECIAL FIRE & EXPLOSION HAZARDS: NEVER USE WELDING OR CUTTING TORCH ON OR NEAR DRUM (EVEN EMPTY) BECAUSE PRODUCT (EVEN JUST RESIDUE) CAN IGNITE EXPLOSIVELY.

ACID REACTS WITH MOST METALS TO RELEASE HYDROGEN GAS WHICH CAN FORM EXPLOSIVE MIXTURES WITH AIR.

NFPA CODES: HEALTH- 2 FLAMMABILITY- 0 REACTIVITY- 0

SECTION V - HEALTH HAZARD DATA

PERMISSIBLE EXPOSURE LEVEL 1 MG/M3

THRESHOLD LIMIT VALUE 1 MG/M3

EFFECTS OF ACUTE OVEREXPOSURE: FOR PRODUCT

EYES - CAUSES BURNS.
SKIN - CAUSES BURNS.
BREATHING - MIST CAN CAUSE DAMAGE TO NASAL AND RESPIRATORY PASSAGES.
SWALLOWING - RESULTS IN SEVERE DAMAGE TO MUCOUS MEMBRANES.

CONTINUED ON PAGE: 2

SECTION V-HEALTH HAZARD DATA (Continued)

FIRST AID:

IF ON SKIN: IMMEDIATELY FLUSH EXPOSED AREA WITH WATER FOR AT LEAST 15 MINUTES, GET MEDICAL ATTENTION. REMOVE CONTAMINATED CLOTHING. LAUNDER CONTAMINATED CLOTHING BEFORE RE-USE.

REMOVE CONTAMINATED SHOES PROMPTLY. DISCARD SHOES SATURATED WITH THIS PRODUCT.

IF IN EYES: IMMEDIATELY FLUSH WITH LARGE AMOUNTS OF WATER FOR AT LEAST 15 MINUTES, LIFTING UPPER AND LOWER LIDS OCCASIONALLY. GET IMMEDIATE MEDICAL ATTENTION.

IF PHYSICIAN IS NOT IMMEDIATELY AVAILABLE, CONTINUE FLUSHING WITH WATER.

DO NOT USE CHEMICAL ANTIDOTE.

IF SWALLOWED: DO NOT INDUCE VOMITING. VOMITING WILL CAUSE FURTHER DAMAGE TO THE THROAT. DILUTE BY GIVING WATER. GIVE MILK OF MAGNESIA. KEEP WARM, QUIET. GET MEDICAL ATTENTION IMMEDIATELY.

IF BREATHED: IF AFFECTED, REMOVE INDIVIDUAL TO FRESH AIR. IF BREATHING IS DIFFICULT, ADMINISTER OXYGEN. IF BREATHING HAS STOPPED GIVE ARTIFICIAL RESPIRATION. KEEP PERSON WARM, QUIET AND GET MEDICAL ATTENTION.

PRIMARY ROUTE(S) OF ENTRY:

INHALATION, SKIN CONTACT

SECTION VI-REACTIVITY DATA

HAZARDOUS POLYMERIZATION: CANNOT OCCUR

STABILITY: STABLE

INCOMPATIBILITY: AVOID CONTACT WITH:, STRONG ALKALIES., ALKALI METALS

SECTION VII-SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED:

SMALL SPILL: COVER THE CONTAMINATED SURFACE WITH SODIUM BICARBONATE OR A SODA ASH/SLAKED LIME MIXTURE (50-50). MIX AND ADD WATER IF NECESSARY TO FORM A SLURRY. SCOOP UP SLURRY AND WASH SITE WITH SODA ASH SOLUTION

LARGE SPILL: PERSONS NOT WEARING PROTECTIVE EQUIPMENT SHOULD BE EXCLUDED FROM AREA OF SPILL UNTIL CLEAN-UP IS COMPLETED. STOP SPILL AT SOURCE. DIKE TO PREVENT SPREADING. PUMP TO SALVAGE TANK.

SITE DISPOSAL METHOD:

SMALL SPILL: FLUSH DOWN DRAIN WITH LARGE AMOUNTS OF WATER IN ACCORDANCE WITH APPLICABLE REGULATIONS.

LARGE SPILL: COLLECT AND ADD SLOWLY TO LARGE VOLUME OF AGITATED SOLUTION OF SODA ASH AND SLAKED LIME. ADD NEUTRALIZED SOLUTION TO EXCESS RUNNING WATER IN ACCORDANCE WITH APPLICABLE REGULATIONS.

SECTION VIII-PROTECTIVE EQUIPMENT TO BE USED

RESPIRATORY PROTECTION: IF WORKPLACE EXPOSURE LIMIT(S) OF PRODUCT OR ANY COMPONENT IS EXCEEDED (SEE SECTION II), A NIOSH/MSHA APPROVED AIR SUPPLIED RESPIRATOR IS ADVISED IN ABSENCE OF PROPER ENVIRONMENTAL CONTROL. OSHA REGULATIONS ALSO PERMIT OTHER NIOSH/MSHA RESPIRATORS (NEGATIVE PRESSURE TYPE) UNDER SPECIFIED CONDITIONS (SEE YOUR SAFETY EQUIPMENT SUPPLIER). ENGINEERING OR ADMINISTRATIVE CONTROLS SHOULD BE IMPLEMENTED TO REDUCE EXPOSURE.

VENTILATION: PROVIDE SUFFICIENT MECHANICAL (GENERAL AND/OR LOCAL EXHAUST) VENTILATION TO MAINTAIN EXPOSURE BELOW TLV(S).

PROTECTIVE GLOVES: WEAR RESISTANT GLOVES SUCH AS:, NEOPRENE, NITRILE RUBBER, POLYVINYL CHLORIDE, POLYETHYLENE

EYE PROTECTION: CHEMICAL SPLASH GOGGLES AND FACE SHIELD (8" MIN.) IN COMPLIANCE WITH OSHA REGULATIONS ARE ADVISED; HOWEVER, OSHA REGULATIONS ALSO PERMIT OTHER TYPE SAFETY GLASSES. (CONSULT YOUR SAFETY EQUIPMENT SUPPLIER)

OTHER PROTECTIVE EQUIPMENT: TO PREVENT SKIN CONTACT, WEAR IMPERVIOUS CLOTHING AND BOOTS.

SECTION IX-SPECIAL PRECAUTIONS OR OTHER COMMENTS

ADDITION TO WATER RELEASES HEAT WHICH CAN RESULT IN VIOLENT BOILING AND SPATTERING. ALWAYS ADD SLOWLY AND IN SMALL AMOUNTS. NEVER USE HOT WATER.

NEVER ADD WATER TO ACIDS. ALWAYS ADD ACIDS TO WATER.

CONTAINERS OF THIS MATERIAL MAY BE HAZARDOUS WHEN EMPTIED.SINCE EMPTIED CONTAINERS RETAIN PRODUCT RESIDUES (VAPOR, LIQUID, AND/OR SOLID), ALL HAZARD PRECAUTIONS GIVEN IN THE DATA SHEET MUST BE OBSERVED.

THE INFORMATION ACCUMULATED HEREIN IS BELIEVED TO BE ACCURATE BUT IS NOT WARRANTED TO BE WHETHER ORIGINATING WITH THE COMPANY OR NOT. RECIPIENTS ARE ADVISED TO CONFIRM IN ADVANCE OF NEED THAT THE INFORMATION IS CURRENT, APPLICABLE, AND SUITABLE TO THEIR CIRCUMSTANCES.

LAST PAGE--SEE ATTACHMENT PAGE FOR [illegible]

U. S. DEPARTMENT OF LABOR
OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION

MATERIAL SAFETY DATA SHEET

SECTION I

A FACTURER'S NAME GEO Drilling Fluids	EMERGENCY TELEPHONE NO. (805) 325-5919
dress, Number, Street, City, State and Zip Code) 1431 Union Avenue - Bakersfield, CA. 93305	1/16/96
HEMICAL NAME AND SYNONYMS Polymer/Boron Blend	POLY-BLOC
HEMICAL FAMILY Blend of Polymers & Borate	FORMULA N/A

SECTION II - HAZARDOUS INGREDIENTS

aints, Preservatives & Solvents	%	TLV (Units)	Alloys and Metallic Coatings	%	TLV (Units)
i ents			Base Metal		
atalyst			Alloys		
cle			Metallic Coatings		
vents					
dditives			Others		
t rs					

SECTION III - PHYSICAL DATA

oiling Point (°F.)	N/A	Specific Gravity (H^2O=1)	0.9-1.1
a r Pressure (mm Hg.)	N/A	Percent, Volatile by Volume (%)	N/A
olubility in Water	N/A		N/A

E arance and Odor Cream to pale yellow color, mild odor.

SECTION IV - FIRE AND EXPLORATION HAZARD DATA

l h Point (Method Used)	Flammable Limits	Lel	Uel
N/A			

x nguishing Media
Water spray, dry chemical, foam or CO_2

pecial Fires Fighting Procedures
None

n ual Fire and Exploration Hazards
May form explosive dust-air mixture.

SECTION V - HEALTH HAZARD DATA

T eshold Limit Value N/A

ects of Overexposure Eyes: May cause irritation. Skin: Wash with soap and water.

Inhalation: May cause irritation to nasal passages.

Emergency and First Aid Procedures Eyes: Flush with water for 15 mintues. Ingestion: If large amounts are swallowed, give two glasses of water to drink and seek medical attention.

SECTION VI - REACTIVITY DATA

S BILITY	Unstable		Conditions to Avoid
	Stable	XX	

I ompatibility (Materials to avoid) N/A

Hazardous Decomposition Products None

H ardous P ymerization	May Occur		Conditions to Avoid N/A
	Will not occur	XX	

SECTION VII - SPILL OR LEAK PROCEDURES

ps to be taken in case material is released or spilled
If small amounts are spilled, sweep and put in garbage. Use water with caution. Product becomes slippery when wet.

Waste Disposal Method

Material can be dumped in regular landfill sites. Follow state and local regulations.

SECTION VIII - SPECIAL PROTECTION INFORMATION

R piratory Protection (Specify type) Nuisance dust mask

Ventilation	Local Exhaust XX	Special N/A
	Mechanical (General)	Other N/A

Protective Gloves As required | Eye Protection Safety glasses

O er Protective Equipment N/A

SECTION IX - SPECIAL PRECAUTIONS

cautions to be taken in handling and storing

Store in sealed containers in a dry place away from heat.

O er Precautions Keep area clean. Surfaces subject to spills or dusting with this product become slippery when wet.

ATERIAL SAFETY DATA

DISODIUM PHOSPHATE

7558 -79 -4

U.S./CANADA VERSION EFFECTIVE: 07/20/93 PRINTED: 04/29/96

PRINTED FOR..... LOS ANGELES CHEMICAL
ATTN: MICHELLE BRACY
4545 ARDINE ST
SOUTHGATE CA 90280

1. CHEMICAL PRODUCT/COMPANY IDENTIFICATION

PRODUCT NAME.....: DISODIUM PHOSPHATE
SYNONYMS.....: DISODIUM ORTHOPHOSPHATE; DISODIUM HYDROGEN PHOSPHATE; SODIUM PHOSPHATE, DIBASIC; DSP; DISODIUM MONOPHOSPHATE

INFORMATION PROVIDED BY..: FMC CORPORATION
1735 MARKET STREET
PHILADELPHIA PA 19103

RECEIVED
MAY 6 1996

EMERGENCY PHONE NUMBERS
CHEMTREC.....: (800) 424-9300
MEDICAL.....: (303) 595-9048 CALL COLLECT
PLANT/OTHER.....: CHEMTREC: (800) 424-9300 TRANSPORTATION

2. COMPOSITION/INFORMATION ON INGREDIENTS

CAS # AND COMPONENTS.....: 7558-79-4
DISODIUM PHOSPHATE

3. HAZARD IDENTIFICATION

EMERGENCY OVERVIEW.....: PRODUCT IS NOT CONSIDERED HAZARDOUS BY KNOWN GOVERNMENTAL DEFINITIONS. HOWEVER, CONTINUOUS CONTACT MAY CAUSE SKIN IRRITATION.

HEALTH EFFECTS.....: MINIMALLY TO MODERATELY IRRITATING TO UNWASHED EYES AND MINIMALLY TO MILDLY IRRITATING TO WASHED EYES IN RABBITS. SKIN IRRITATION FROM CONTINUOUS CONTACT HAS BEEN REPORTED DURING MANUFACTURING WHEN PROTECTIVE MEASURES FOR CONTACT OR PERSONAL HYGIENE PROCEDURES ARE NOT FOLLOWED.
HUMAN INDUSTRIAL EXPERIENCE HAS SHOWN NO SIGNIFICANT INHALATION HAZARD OR SKIN IRRITATION WHEN EXPOSURES ARE PROPERLY CONTROLLED. EXPOSURE MONITORING INDICATES THAT THE AMOUNT OF RESPIRABLE DUST IN THE PRODUCT IS LOW.
THERE HAVE BEEN NO MEDICAL CONDITIONS REPORTED AS BEING AGGRAVATED BY EXPOSURE.

4. FIRST AID MEASURES

EYES.....: FLUSH EYES WITH LARGE AMOUNTS OF WATER. IF IRRITATION OCCURS AND PERSISTS, OBTAIN MEDICAL ATTENTION.

SKIN.....: WASH WITH PLENTY OF SOAP AND WATER. GET MEDICAL ATTENTION IS IRRITATION OCCURS AND PERSISTS.

(CONTINUED)

4. FIRST AID MEASURES

INHALATION	REMOVE TO FRESH AIR. IF BREATHING DIFFICULTY OR DISCOMFORT OCCURS AND PERSISTS, OBTAIN MEDICAL ATTENTION.
INGESTION	DRINK PLENTY OF WATER. NEVER GIVE ANYTHING BY MOUTH TO AN UNCONSCIOUS PERSON. IF ANY DISCOMFORT PERSISTS, OBTAIN MEDICAL ATTENTION.
NOTES TO PHYSICIAN	LARGE DOSES MAY CAUSE NAUSEA, VOMITING AND DIARRHEA. SYSTEMIC ORAL TOXICITY IS EXTREMELY RARE AND HAS CONSISTED OF ACIDOSIS AND HYPOCALCEMIC TETANY.

5. FIRE FIGHTING MEASURES

EXTINGUISHING MEDIA	PRODUCT IS NONCOMBUSTIBLE
SPECIAL FIREFIGHTING PROCEDURES	NOT APPLICABLE
DEGREE OF FIRE AND EXPLOSION HAZARD	NONE
HAZARDOUS DECOMPOSITION PRODUCTS	NONE

6. ACCIDENTAL RELEASE MEASURES

PROCEDURE FOR RELEASE OR SPILL	MATERIAL SHOULD BE SWEPT UP FOR SALVAGE OR DISPOSAL.

7. HANDLING AND STORAGE

HANDLING	ANIMAL STUDIES AND MANUFACTURING EXPERIENCE INDICATE THAT EXPOSURE TO THE PRODUCT MAY RESULT IN EYE AND SKIN IRRITATION UNDER NORMAL CONDITIONS OF USE. IN THE EVENT OF CONTACT, IMMEDIATELY FLUSH EYES WITH WATER; WASH OFF SKIN.
VENTILATION	CONTROL MEASURES SUCH AS LOCAL EXHAUST VENTILATION MAY BE REQUIRED WHERE EXCESSIVE AIRBORNE DUST LOADING MAY BE PRESENT.
STORAGE	THE PRODUCT SHOULD BE STORED IN A CLEAN DRY AREA TO MAINTAIN PRODUCT QUALITY AND TO PREVENT POSSIBLE CONTAMINATION BY OTHER CHEMICALS.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

CONTROL MEASURES	PREVENTION OF EYE AND SKIN CONTACT MAY BE REQUIRED UNDER NORMAL USE CONDITIONS. HOWEVER, SEVERE AGITATION OR DISPERSION INTO THE WORK ENVIRONMENT MAY REQUIRE ENCLOSURE OF THE PROCESS AND LOCAL EXHAUST VENTILATION AT THE SOURCE TO PREVENT RELEASE INTO AIR. IF WORK ENVIRONMENT

(CONTINUED) PAGE 02

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

CONTROLS ARE NOT IMPLEMENTED, THEN PERSONAL PROTECTION FOR INHALATION, SKIN AND EYE MAY BE REQUIRED.

RECOMMENDED PERSONAL PROTECTIVE EQUIPMENT	
RESPIRATORY.....	USE APPROVED DUST RESPIRATORY PROTECTION IF RELEASE OF THE PRODUCT INTO THE WORK AREA IS EXPECTED.
EYES.....	WEAR CHEMICAL GOGGLES, WHEN AIRBORNE DUST IS EXPECTED.
GLOVES.....	USE IMPERVIOUS GLOVES WHEN CONTINUOUS CONTACT IS EXPECTED.
SPECIAL CLOTHING... AND EQUIPMENT	USE LONG SLEEVE WORK SHIRT TO REDUCE EXPOSED SKIN AREA.
FOOTWEAR.....	NO SPECIAL REQUIREMENT

9. PHYSICAL AND CHEMICAL PROPERTIES

MELTING/FREEZING POINT...	-H20,180*C
BOILING POINT.....	NOT APPLICABLE
VAPOR PRESSURE.....	NON-VOLATILE
VAPOR DENSITY (AIR=1)....	NON-VOLATILE
ROOM TEMPERATURE..... APPEARANCE AND STATE	WHITE GRANULES OR POWDER
ODOR.....	NONE
SPECIFIC GRAVITY (H20=1).	BULK DENSITY 0.8 G/ML
SOLUBILITY IN H20 % BY WT	12 @ 25*C
% VOLATILES.....	NON-VOLATILE
EVAPORATION RATE..... (BUTYL ACETATE=1)	NON-VOLATILE
PH (AS IS).....	NOT APPLICABLE
PH (1% SOLUTION).....	9
ODOR THRESHOLD.....	NOT APPLICABLE
DENSITY (G/ML).....	CA 0.8
PARTITION COEFFICIENT.... N-OCTANOL/WATER	NOT AVAILABLE
FLASH POINT.....	NON COMBUSTIBLE
AUTOIGNITION TEMPERATURE.	NON COMBUSTIBLE
FLAMMABLE LIMITS UPPER..	NOT APPLICABLE
(AIR) LOWER..	NOT APPLICABLE
EXPLOSIVE PROPERTIES.....	NONE
OXIDIZING PROPERTIES.....	NONE
SOLUBILITY..... - FAT SOLUBILITY (SOLVENT - OIL)	NOT AVAILABLE

(CONTINUED) PAGE 03

10. STABILITY AND REACTIVITY

STABILITY	PRODUCT IS STABLE.
HAZARDOUS POLYMERIZATION	WILL NOT OCCUR
CONDITIONS TO AVOID	NOT APPLICABLE
MATERIALS TO AVOID	NOT APPLICABLE
MAJOR CONTAMINANTS THAT CONTRIBUTE TO INSTABILITY	NONE
INCOMPATIBILITY	NONE
HAZARDOUS DECOMPOSITION PRODUCTS	NONE
SENSITIVITY TO MECH IMPACT	NONE
SENSITIVITY TO STATIC DISCHARGE	NONE

11. TOXICOLOGICAL INFORMATION

EYE CONTACT	MINIMALLY IRRITATING TO UNWASHED EYES; PRACTICALLY NONIRRITATING TO WASHED EYES (RABBIT). SOURCE: FMC REPORT I86-0931 DATE: 1986
SKIN CONTACT	MILD IRRITANT SOURCE: RTECS DATE: 1981-82
SKIN ABSORPTION	NO PUBLISHED DATA
INHALATION	NO PUBLISHED DATA
INGESTION	NO SIGNIFICANT HAZARD EXPECTED SOURCE: FED. REG. 44 (244): 74845 DATE: 1979
ACUTE EFFECTS FROM OVEREXPOSURE	NO HUMAN DATA AVAILABLE. ANIMAL EYE IRRITATION STUDIES NOTE THIS MATEIAL IS A MINIMAL IRRITANT TO UNWASHED EYES AND NON-IRRITATANT TO WASHED EYES; IT IS A MILD SKIN IRRITANT.
CHRONIC EFFECTS FROM OVEREXPOSURE (EFFECTS CONSIDERED INCLUDE: SENSITIVITIES, CARCINOGENICITY, TERATOGENICITY, MUTAGENICITY, SYNERGISTIC PRODUCTS, AND ANY MEDICAL CONDITIONS GENERALLY RECOGNIZED AS BEING AGGRAVATED BY EXPOSURE.)	HUMAN INDUSTRIAL EXPERIENCE HAS SHOWN NO SIGNIFICANT INHALATION HAZARD OR SKIN IRRITATION WHEN GOOD PERSONAL HYGIENE PRACTICES ARE FOLLOWED.

(CONTINUED) PAGE 04

12. ECOLOGICAL INFORMATION

ENVIRONMENTAL FATE.....: INORGANIC PHOSPHATES IN CONTACT WITH THE SOIL, SUB-SURFACE OR SURFACE WATERS MAY BE TAKEN UP BY PLANTS AND UTILIZED AS ESSENTIAL NUTRIENTS. PHOSPHATES MAY ALSO FORM PRECIPITATES, USUALLY WITH CALCIUM OR MAGNESIUM. THE RESULTANT COMPOUNDS ARE INSOLUBLE IN WATER AND BECOME A PART OF THE SOIL OR SEDIMENT. THE TERM BIODEGRADABILITY, AS SUCH, IS NOT APPLICABLE TO INORGANIC COMPOUNDS.

ENVIRONMENTAL EFFECTS....: AQUATIC TOXICITY DATA
96 HR LC50 > 100 MG/L, NON-TOXIC (RAINBOW TROUT, INLAND SILVERSIDES AND MYSID SHRIMP) FMC STUDIES I89-1085, -1086 & -1087
48 HR EC50 > 100 MG/L, NON-TOXIC (DAPHNIA MAGNA) FMC STUDY I89-1088

13. DISPOSAL CONSIDERATIONS

WASTE DISPOSAL METHOD....: THIS PRODUCT DOES NOT PRESENT A DANGER OR HAZARD FOR DISPOSAL. EXCEPT FOR FOOD APPLICATIONS, SALVAGE AND RETURN TO CONTAINER, PROCESS OR RECYCLE FOR OTHER USES. MAY BE DISPOSED OF IN LANDFILLS ACCORDING TO APPLICABLE REGULATIONS.

14. TRANSPORT INFORMATION

DOT PROPER SHIPPING NAME.:	NONE; NOT REGULATED
IATA.....:	NONE; NOT REGULATED
IMDG.....:	NONE; NOT REGULATED
DOT CLASSIFICATION.....:	NOT REGULATED
DOT LABELS.....:	NOT REQUIRED
DOT MARKING.....:	NOT REQUIRED
DOT PLACARD.....:	NOT REQUIRED
UN NUMBER.....:	NONE
HAZARDOUS SUBSTANCE/RQ...:	NOT LISTED
49 STCC NUMBER.....:	NONE
PRECAUTIONS TO BE TAKEN.. IN TRANSPORTATION:	NONE
OTHER SHIPPING..... INFORMATION:	NONE

15. REGULATORY INFORMATION

OSHA
EXPOSURE LIMITS

SUBSTANCE(S).....:	DISODIUM PHOSPHATE
OSHA PEL-TWA.....:	NOT APPLICABLE
STEL.....:	NOT APPLICABLE
CEILING.....:	NOT APPLICABLE

(CONTINUED) PAGE 05

15. REGULATORY INFORMATION

SKIN DESIGNATION.	NOT APPLICABLE
ACGIH TLV-TWA.....	NOT APPLICABLE
STEL.....	NOT APPLICABLE
CEILING.....	NOT APPLICABLE
SKIN DESIGNATION.	NOT APPLICABLE
TARGET ORGAN EFFECTS.....	NOT APPLICABLE
CARCINOGENIC POTENTIAL...	DISODIUM PHOSPHATE
REGULATED BY OSHA.....	NO
LISTED ON NTP REPORT...	NO
IARC GROUP 1, 2A, 2B...	NO
U.S. EPA REQUIREMENTS	
RELEASE REPORTING	
CERCLA (40 CFR 302)	
LISTED SUBSTANCE(S)....	NOT LISTED
RQ.....	NOT APPLICABLE
CATEGORY.....	NOT APPLICABLE
RCRA WASTE NO....	NOT APPLICABLE
UNLISTED SUBSTANCE(S)..	NOT APPLICABLE
RQ.....	NOT APPLICABLE
CHARACTERISTIC...	NOT APPLICABLE
RCRA WASTE NO....	NOT APPLICABLE
SARA TITLE III SEC 313	
(40 CFR 372).....	NOT LISTED
LISTED TOXIC CHEMICAL..	NOT LISTED
INVENTORY REPORTING	
SARA TITLE III SEC 311/312	
(40 CFR 370)	
SUBSTANCE(S).....	NOT LISTED
HAZARD CATEGORY.....	NOT APPLICABLE
PLANNING THRESHOLD.....	NOT APPLICABLE
EMERGENCY PLANNING	
SARA TITLE III SEC 302-303	
(40 CFR 355)	
LISTED SUBSTANCE(S)....	NOT APPLICABLE
RQ.....	NOT APPLICABLE
PLANNING THRESHOLD.....	NOT APPLICABLE
U.S. TSCA STATUS.....	LISTED IN INVENTORY
CANADA	
INGREDIENT DISCLOSURE LIST	
SUBSTANCE(S).....	NOT LISTED
CONTROLLED PRODUCT.....	NO
HAZARD SYMBOLS.....	NOT APPLICABLE
CLASS & DIVISION.....	NOT APPLICABLE
PRODUCT IDENTIFICATION NO	NOT APPLICABLE
DOMESTIC SUBSTANCE LIST..	LISTED
CEPA PRIORITY LIST.....	NOT LISTED
CARCINOGENICITY	
ACGIH APPENDIX A.....	NO
A1 - CONFIRMED HUMAN...	NOT LISTED

(CONTINUED) PAGE 06

15. REGULATORY INFORMATION

A1 - SUSPECTED HUMAN...	NOT LISTED
IARC GROUP 1 OR 2.....	NOT LISTED
LABEL LANGUAGE (US/CANADA)	
HEALTH.....	NOT HAZARDOUS BY OSHA NOR CANADIAN WHMIS DEFINITION.
PHYSICAL.....	NOT APPLICABLE
HANDLING AND STORAGE...	STORE CLEAN DRY AREA. FOR FOOD APPLICATIONS STORE AWAY FROM POSSIBLE CONTAMINATION.
FIRST AID.....	IN CASE OF EYE OR SKIN CONTACT , FLUSH WITH PLENTY OF WATER. IF IRRITATION PERSISTS, OBTAIN MEDICAL ASSISTANCE.
STATE REGULATIONS.....	CONTAINS CHEMICALS FROM CALIFORNIA "PROP 65" LISTS OF CARCINOGENS AND REPRODUCTIVE TOXINS: PPM MAXIMUM ARSENIC 3, CADMIUM 2 AND LEAD 0.7.

16. OTHER INFORMATION

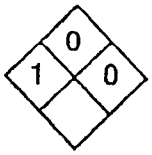
PRODUCT USES.....	BOILER WATER CONDITIONER, CATTLE FEED SUPPLEMENT PIGMENTS, DETERGENTS, TEXTILE WEIGHTING AND DYEING, BUFFER, EMULSIFIER, PRECIPITANT FOR CALCIUM. ALSO IN EVAPORATED MILK, PROCESS CHEESE, PRECOOKED MEATS, PHARMACEUTICALS, AND LAXATIVES. MAY BE USED TO TREAT DRINKING WATER UP TO 14.3 MG/L.
NFPA 704	
HEALTH.....	0
FLAMMABILITY.....	0
REACTIVITY.....	0
SPECIAL HAZARD.....	NONE
(DEGREE OF HAZARD 0 = NO HAZARD 4 = SEVERE HAZARD)	

THE CONTENTS AND FORMAT OF THIS MSDS ARE IN ACCORDANCE WITH OSHA HAZARD COMMUNICATION AND CANADA"S WORKPLACE HAZARDOUS MATERIAL INFORMATION SYSTEM (WHMIS)

MATERIAL SAFETY DATA SHEET - POTASH

PCS Sales

Suite 440, 5750 Old Orchard Road
Skokie, Illinois 60077
Phone (847)966-9933 FAX (847)966-1205
Transportation Emergencies (800)424-9300 (CHEMTREC)
Health Emergencies, Contact Your Local Poison Centre



NFPA CODE

1. PRODUCT INFORMATION

PRODUCT NAME	**POTASH**	CAS NUMBER	7447-40-7
CHEMICAL FAMILY	Inorganic Salt	FORMULA	KCl
CHEMICAL NAME	Potassium Chloride	MOLECULAR WEIGHT	74.6
DOT CLASS	Not Regulated by DOT	SYNONYMS	Muriate of potash
		MATERIAL USE	Fertilizer

2. TYPICAL COMPOSITION

INGREDIENTS	%	CAS
Potassium Chloride	95 - 99.8	7447-40-7
Sodium Chloride	0.1 - 4	7647-14-5

May contain up to 0.25% lubrication oil as a dedusting agent and/or 0.03% neutralized primary aliphatic amines as an anti-caking agent.
Note: The health and environmental effects of exposure to potash are very similar to that of sodium chloride (common table salt).

3. PHYSICAL DATA

PHYSICAL STATE	Solid	SPECIFIC GRAVITY (H_2O = 1)	2.0
MELTING POINT	1423°F	BULK DENSITY (loose)	65 - 75lbs/ft^3
SOLUBILITY IN WATER @ 68°F	26%	PERCENT VOLATILE (by weight)	0 - 0.3%
pH OF SOLUTION	8 - 9	ODOUR	none to slightly oily odour
ODOUR THRESHOLD	not available	VAPOUR DENSITY	not applicable
EVAPORATION RATE	not applicable	BOILING POINT	not applicable

COEFFICIENT OF WATER, OIL DISTRIBUTION - not applicable
APPEARANCE - white to red, fine to 4mm size granules

4. FIRE AND EXPLOSIVE HAZARD INFORMATION

FLAMMABLE	No	RATE OF BURNING	not applicable
FLASH POINT	not applicable	UPPER AND LOWER EXPLOSIVE LIMITS	not applicable
AUTO IGNITION TEMPERATURE	not applicable	SENSITIVITY TO STATIC DISCHARGE	none
SENSITIVITY TO CHEMICAL IMPACT	none	EXPLOSIVE POWER	none

MEANS OF EXTINCTION - As required for surrounding fire. Potash is a non-flammable, inorganic salt and will not support combustion. When subjected to extremely high temperatures it may release small amounts of chlorine gas.

Fire fighters and emergency personnel responding to a fire involving potash should wear full protective clothing and self-contained breathing apparatus.

5. HEALTH INFORMATION

LISTED IN:	OSHA SUBPART Z	☐	ACGHI LIST	☐	NTP LIST ☐
	IRAC MONOGRAPH	☐	NONE OF THE ABOVE	☒	

THRESHOLD LIMIT VALUE - None established. The ACGIH nuisance dust limit of 10 mg/m^3 for an eight hour time weighted average applies.

ROUTES OF ENTRY - lungs (breathing), ingestion (swallowing), eye contact, skin contact.

TOXICITY DATA - not available for potash.

For Potassium Chloride	oral, rat LD_{50}: 2,600 mg/kg	eye, rabbit - 500 mg/24 hours - Mild
For Sodium Chloride	oral, mouse - 500 LD_{50}: 4,000 mg/kg	

Not reported to be carcinogenic, mutagenic, teratogenic, or to have effects on reproduction or cause sensitization.

EFFECTS OF OVEREXPOSURE:

SHORT TERM: Irritation of the eyes, skin (especially in cuts or open wounds), nasal passages and trachea. Swallowing a large amount of potash (unlikely) may cause irritation of the gastro-intestinal tract, cramps, vomiting, diarrhea, tingling of hands or feet, weak pulse and circulatory disturbances.

LONG TERM: One epidemiological study of potash miners found indications of lung symptoms. Irritation of mucous membranes of test animals were produced at ten times the recommended exposure limit.

EMERGENCY AND FIRST AID PROCEDURES:

EYES: Flush thoroughly with water for at least 15 minutes, including under the eyelid. See a physician if discomfort or irritation persist.

SKIN: Wash with water. Obtain medical attention if rash develops.

INHALATION: Remove to fresh air. Get medical attention if discomfort persists.

INGESTION: If the person is conscious, dilute stomach contents with water. Swallowing of large amounts usually causes purging of the stomach by vomiting. Get medical attention.

6. REACTIVITY DATA

STABLE Yes SUBJECT TO HAZARDOUS POLYMERIZATION No

INCOMPATIBILITY (Materials to avoid) - Contact with hot nitric acid may cause formation of toxic nitrosyl chloride. Contact with other strong acids may produce irritating hydrogen chloride gas.

7. SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED:
Potash is used as a plant food. However, large spills can kill vegetation. If uncontaminated, sweep up or collect and reuse as product. If contaminated with other materials, collect in suitable containers.

WASTE DISPOSAL METHOD:
Uncontaminated material can generally be disposed of in an approved land disposal facility, in accordance with applicable federal, state, and local regulations. Consult State or Federal environmental regulatory agencies for acceptable disposal procedures and locations.

8. PERSONAL PROTECTION INFORMATION

RESPIRATORY PROTECTION: If dust concentrations exceed recommended exposure limits, use NIOSH-approved dust respirators until feasible engineering controls are completed.

EYE PROTECTION: If high dust concentrations exist, tight-fitting goggles are recommended to reduce dust exposure to the eyes.

VENTILATION: Local exhaust or other ventilation that will reduce dust concentrations to less than the recommended exposure limit.

OTHER PROTECTIVE EQUIPMENT: Optional

9. SPECIAL PRECAUTIONS

Store in a dry location to avoid loss of product by solution in water and to avoid subsequent caking. Avoid contact with carbon steel and aluminum, which could be rapidly corroded.

10. ADDITIONAL INFORMATION

For additional information contact: K. W. Reid, Manager Environmental Affairs
Potash Corporation of Saskatchewan Inc.
Phone: (306) 933-8542 FAX: (306) 933-8510

Although the information contained herein is offered in good faith, SUCH INFORMATION IS EXPRESSLY GIVEN WITHOUT ANY WARRANTY (EXPRESS OR IMPLIED) OR ANY GUARANTEE OF ITS ACCURACY OR SUFFICIENCY and is taken at the user's sole risk. User is solely responsible for determining the suitability of use in each particular situation. PCS Sales specifically DISCLAIMS ANY LIABILITY WHATSOEVER FOR THE USE OF SUCH INFORMATION, including without limitation any recommendations which user may construe and attempt to apply which may infringe or violate valid patents, licenses and/or copyright.

Salt

U.S. DEPARTMENT OF LABOR
Occupational Safety and Health Administration

Form Approved
OMB No. 44-R1387

MATERIAL SAFETY DATA SHEET

Required under USDL Safety and Health Regulations for Ship Repairing, Shipbuilding, and Shipbreaking (29 CFR 1915, 1916, 1917)

SECTION I

MANUFACTURER'S NAME: Leslie Salt Co.	EMERGENCY TELEPHONE NO.: 415-797-1820
ADDRESS (Number, Street, City, State, and ZIP Code): 7200 Central Ave., Newark, California 94560	
CHEMICAL NAME AND SYNONYMS: Sodium Chloride, Salt, Halite, sea salt	TRADE NAME AND SYNONYMS: Special Feed Salt
CHEMICAL FAMILY: Inorganic salt	FORMULA: NaCl

SECTION II - HAZARDOUS INGREDIENTS

PAINTS, PRESERVATIVES, & SOLVENTS	%	TLV (Units)	ALLOYS AND METALLIC COATINGS	%	TLV (Units)
PIGMENTS		none	BASE METAL		none
CATALYST		none	ALLOYS		none
VEHICLE		none	METALLIC COATINGS		none
SOLVENTS		none	FILLER METAL PLUS COATING OR CORE FLUX		none
ADDITIVES		none	OTHERS		
OTHERS Not considered toxic	-	MLD	I.V. in rats 2.5 g/kg		

HAZARDOUS MIXTURES OF OTHER LIQUIDS, SOLIDS, OR GASES	%	TLV (Units)
Not applicable		

SECTION III - PHYSICAL DATA

BOILING POINT (°F.)	2575	SPECIFIC GRAVITY (H_2O=1)	2.17
VAPOR PRESSURE (mm Hg.) @ 1589°F	1mm	PERCENT, VOLATILE BY VOLUME (%)	-0-
VAPOR DENSITY (AIR=1)	NA	EVAPORATION RATE (_____ =1)	-0-
SOLUBILITY IN WATER @ 68°F	36.0g		
APPEARANCE AND ODOR	White or off white crystalline solid with no odor		

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (Method used): None	FLAMMABLE LIMITS: None	Lel	Uel
EXTINGUISHING MEDIA			
SPECIAL FIRE FIGHTING PROCEDURES: Not combustible			
UNUSUAL FIRE AND EXPLOSION HAZARDS: None			

(Continued on reverse side)

SECTION V - HEALTH HAZARD DATA

THRESHOLD LIMIT VALUE
0.5 lb/150 lb. Man

EFFECTS OF OVEREXPOSURE
No acute systemic toxicity. No chronic local toxicity. No chronic systemic toxicity

EMERGENCY AND FIRST AID PROCEDURES
Wash skin and flush eyes with water.

SECTION VI - REACTIVITY DATA

STABILITY			CONDITIONS TO AVOID
	UNSTABLE		Do not store under wet conditions
	STABLE	X	(Store below 75% relative humidity)

INCOMPATABILITY *(Materials to avoid)*
Strong acids and oxidizing agents

HAZARDOUS DECOMPOSITION PRODUCTS
Hydrochloric acid and chlorine

HAZARDOUS POLYMERIZATION			CONDITIONS TO AVOID
	MAY OCCUR		
	WILL NOT OCCUR	X	

SECTION VII - SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED
Sweep up to flush remains with water. No special hazards connected with leaks or spills.

WASTE DISPOSAL METHOD
Dry land fill or dissolve in sufficient amounts of water to meet existing water quality standards.

SECTION VIII - SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION *(Specify type)*
Dust Mask not needed, but may be used for comfort.

VENTILATION	LOCAL EXHAUST	SPECIAL
Normal	Not necessary	
	MECHANICAL *(General)*	OTHER
	Control dust collector may be used	

PROTECTIVE GLOVES	EYE PROTECTION
Desirable, not required	Goggles desirable, not necessary

OTHER PROTECTIVE EQUIPMENT
Not necessary

SECTION IX - SPECIAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING
Store in dry area to avoid caking

OTHER PRECAUTIONS
Protect storage piles from precipitation where run off can contaminate fresh water.

amber chemical inc.
5201 Boylan Street (805) 325-2072
BAKERSFIELD, CALIFORNIA 93308

SODIUM ACID PYROPHOSPHATE

Material Safety Data Sheet

Chemical Names: Sodium Acid Pyrophosphate, SAPP	C.A.S. #: 7758-16-9
Chemical Family: Sodium Polyphosphate	I.D. #: N/A
Chemical Formula: $Na_2H_2P_2O_7 \cdot 6H_2O$	D.O.T. Hazard Class: Non-Hazardous
Label(s) Required: None	Emergency Telephone:
Revision: 01/19/96	Chemtel (800) 255-3924

I. GENERAL INFORMATION

Boiling Point (°C): n/a
Vapor Pressure (mm Hg): n/a
Vapor Density: n/a
Solubility in Water: 17.4g/100g H_2O @ 50°C
Appearance & Odor: White, crystal[illegible], odorless powder
Specific Gravity (H_2O = 1): n/a
Percent, volatile by volume (%): [illegible]
Evaporation Rate (___=1): n/a

II. PHYSIOLOGICAL EFFECTS AND HEALTH INFORMATION

SYSTEMATIC EFFECTS: Mildly acidic; may irritate eyes, skin and mucous membranes.

EYE IRRITATION: Flush affected area with water for 15 minutes. Consult a physician.

SKIN IRRITATION: Flush affected area with water for 15 minutes. Consult a physician.

INHALATION: Remove to fresh air. Consult a physician.

INGESTION: Drink large quantities of water.

THRESHOLD LIMIT VALUE (TLV): Not established

SODIUM ACID PYROPHOSPHATE

III. REACTIVITY DATA

HAZARDOUS DECOMPOSITION PRODUCTS:	INCOMPATIBILITY: (Materials to Avoid)	CONDITIONS TO AVOID:
None	None	None

HAZARDOUS POLYMERIZATION:	MAY OCCUR	
	WILL NOT OCCUR	X

STABILITY: (Thermal, Light, etc.)	STABLE	X
	UNSTABLE	

IV. SPECIAL PROTECTION INFORMATION

EYE PROTECTION: Recommended

RESPIRATORY PROTECTION: NIOSH-approved equipment suitable for nuisance dust when exposure is excessive.

SKIN PROTECTION: Protective gloves recommended

VENTILATION: Local exhaust system is preferred.

OTHER: None required

V. FIRE PROTECTION INFORMATION

FLASH POINT (TEST METHOD): Non-flammable
FLAMMABLE LIMITS (BY VOLUME IN AIR): n/a
LOWER EXPLOSIVE LIMIT: n/a
UPPER EXPLOSIVE LIMIT: n/a
AUTOIGNITION TEMPERATURE: n/a
EXTINGUISHING MEDIA: governed by other materials present
SPECIAL FIRE FIGHTING PROCEDURES: Use NIOSH/MSHA self-contained breathing apparatus when material is involved in a fire.

SODIUM ACID PYROPHOSPHATE

VI. SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED: Sweep up and place bulk material in container and remove to a landfill. Flush small spills into sewer with plenty of water. Flush spill area with water.

WASTE DISPOSAL METHOD: Dispose of in a landfill in accordance with all federal, state, and local regulations.

VII. SPECIAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORAGE: Handle in accordance with good industrial hygiene and safety practices.

OTHER PRECAUTIONS: Avoid unnecessary exposure. Keep away from eyes, skin, and clothing.

We believe that all information given is accurate. It is offered in good faith, but without guarantee. Since conditions of use are beyond our control, user assumes all responsibility and risk.

MATERIAL SAFETY DATA SHEET

WOOD DUST

LONG BEACH SHAVINGS CO., INC.
20915 LAMBERTON AVENUE
LONG BEACH, CALIFORNIA 90810
(310) 639-1145 FAX (310) 639-9232

AUGUST 3, 1994

TRADE NAME: Wood Dust
SYNONYMS: None
CAS. NO.: None
DESCRIPTION: Particles generated by any manual or mechanical cutting or abrasion process performed on wood.

PHYSICAL DATA

Boiling Point . . . . . Not Applicable

Specific Gravity . . . . . .
Variable
Dependent on wood species and moisture content

Vapor Density . . . . . Not Applicable

% Volatiles of Volume . . . . . Not Applicable

Melting Point . . . . . Not Applicable

Vapor Pressure . . . . . Not Applicable

Solubility in H_2O (% by wt.) . . . . . Insoluable

Evaporation Rate
(Butyl Acetate = 1) . . . . . Not Applicable

pH . . . . . Not Applicable

Appearance & Odor . . . . . .
Light to dark colored granular solid
Color and odor are dependent on the wood species and time since dust was generated.

FIRE & EXPLOSION DATA

Flash Point . . . . . Not Applicable

Autoignition Temperature . . . . . .
Variable
Typically 400 500° F.

Explosive Limits in Air . . . . 40 grams M^3 (LEL)

Extinguishing Media . . . . . Water, CO_2, Sand

Special Fire Fighting Procedures . . . . . .
Wet down with water
Wet down wood dust to reduce the likelihood of ignition or dispersion of dust into the air. Remove burned or wet dust to open area after fire is extinguished.

Unusual Fire &
Explosion Hazard . . . . . .
Strong to severe explosion hazard
If wood dust "cloud" contacts an ignition source.

HEALTH EFFECTS DATA

Exposure Limit . . . . . .
ACGIH TLV [1]:
TWA 5.0 mg/m³;
STEL (15 min) 10 mg/m³ Softwood
TWA 1.0 mg/m³
Certain hardwoods such as beech and oak
OSHA PEL: (For OSHA PELs see footnote 1 below)
TWA 5.0 mg/m³;
STEL (15 min) 10 mg/m³
All softwoods, hardwoods, except Western Red Cedar.
Western Red Cedar:
TWA 2.5 mg/m

Skin & Eye Contact . . . . . .
Eye Irritation & Dermatitis
Wood Dust can cause eye irritation. Various species of wood dust can elicit allergic contact dermatitis in sensitized individuals.

Ingestion . . . . . Not Applicable

Skin Absorption . . . . . Not known to occur

Inhalation . . . . . .
May cause
Nasal dryness, irritation & obstruction, coughing, wheezing, & sneezing. Sinusitis & prolonged colds have also been reported.

Chronic Effects . . . . . .
May cause
Wood dust, depending on species, may cause dermatitis on prolonged, repetitive contact; may cause respiratory sensitization and/or irritation. Prolonged exposure to wood dust has been reported by some observers to be associated with nasal cancer. Wood dust is not listed as a carcinogen by IARC, NTP, ACGIH or OSHA.

[1] Although OSHA's Air Contaminants Rule, including OSHA's wood dust PELs, was struck down in *AFL-CIO v. OSHA*, 965 F. 2d 962 (11th Cir. 1992), a number of states have incorporated those provisions in their state plans. Additionally, OSHA has announced that it may cite companies under the OSH Act general duty clause under appropriate circumstances for non-compliance with these levels.

MATERIAL SAFETY DATA SHEET CONTINUED

REACTIVE DATA

Conditions Contributing to Instability . . . . . .
Stable
Under normal conditions

Incompatibility . . . . . .
Avoid contact with
Oxidizing agents, drying oils & open flame. Product may ignite at temperatures in excess of 400° F.

Hazardous Decomposition Products . . . . . .
Thermal-oxidative degradation of wood produces:
Irritating & toxic fumes & gases, including CO, aldehydes and inorganic acids

Conditions contributing to Polymerization . . . . . Not Applicable

PRECAUTIONS & SAFE HANDLING

Eye Contact . . . . . Avoid

Skin Contact . . . . . .
Avoid
Repeated or prolonged contact with skin. Careful bathing & clean clothes are indicated after exposure

Inhalation . . . . . .
Avoid
Repeated or prolonged breathing of wood dust in air.

Oxidizing Agents & Drying Oils . . . . . Avoid contact

Open Flame . . . . . Avoid

GENERALLY APPLICABLE CONTROL MEASURES

Ventilation . . . . . .
Provide
Adequate general & local exhaust ventilation to maintain healthful working conditions

Safety Equipment . . . . . .
Provide & Wear
Goggles or safety glasses. Other protective equipment such as gloves & approved dust respirators may be needed depending upon dust conditions.

EMERGENCY & FIRST AID PROCEDURES

Eyes . . . . . .
Flush with water
To remove dust particles. If irritation persists, get medical attention.

Skin . . . . . .
Get medical advice
If a rash or persistent irritation or dermatitis occur, and before returning to work where wood dust is present.

Inhalation . . . . . .
Remove to fresh air
If persistent irritation, severe coughing or breathing difficulties occur, get medical advice before returning to work where wood dust is present.

Ingestion . . . . . Not Applicable

SPILL/LEAK CLEAN-UP PROCEDURES

Recovery or disposal . . . . . .
Clean up
Sweep or vacuum spills for recovery or disposal; avoid creating dust conditions. Provide good ventilation where dust conditions may occur. Place recovered wood dust in a container for proper disposal.

IMPORTANT:
The information and data herein are believed to be accurate and have been compiled from sources believed to be reliable. It is offered for your consideration, investigation and verification. There is no warranty of any kind, express or implied, concerning the accuracy or completeness of the information and data herein. WWPA will not be liable for claims relating to any party's use of or reliance on information and data contained herein regardless of whether it is claimed that the information and data are inaccurate, incomplete or otherwise misleading.

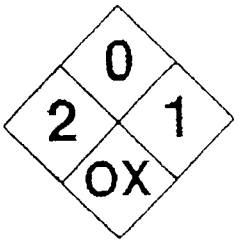
SDIC

GRANULAR CHLORINATING COMPOUND

Material Safety Data Sheet

Emergency 24 Hour Telephone: CHEMTREC 800/424-9300

Corporate Headquarters: 23119 Drayton Street
Saugus, California 91350
805/259-5848
Facsimile: 805/259-1538



IDENTIFICATION OF PRODUCT

Product Name:	HASA GRANULAR CHLORINATING COMPOUND
Common Chemical Names:	Dry Chlorinating Compound; Granular Chlorinating Compound; DCCNa; DICHLOR; Sodium Dichloroisocyanuric Acid; Dichloroisocyanuric Acid, Sodium Salt; Sodium Dichloro-s-triazinetrione; CDB 63; CDB 60; ACL 60, S.D.I.C.
Chemical Names of Ingredients [>1.0% by weight]:	1,3-Dichloro-s-triazinetrione-2,4,6 [1H, 3H, 5H] trione, sodium salt
Chemical Family:	Halogenated triazines
CAS Registry Number:	2893-78-9
Empirical Formula:	$C_3N_3O_3Cl_2Na$

PHYSICAL AND CHEMICAL PROPERTIES

Vapor Pressure:	Very small. Impossible to measure	Flash Point:	Not Applicable
Weight/Gallon:	Not Applicable	pH:	5 - 6 [1% solution]

Density [liquid]:	Not Applicable	**Odor:**	Slight Chlorine
Bulk Density:	0.92-0.95 g/ml [57 - 59 lbs/ft^3]	**Boiling Point:**	Not Applicable
Melting Point:	225-250^{0}C	**Freezing Point:**	Not Applicable
Physical State:	Crystalline solid	**Color:**	White
Solubility in Water:	24.8 g/100 g H_2O at 26.8^{0}C	**Stability:**	Stable

PHYSICAL HAZARDS

Potential for Fire: Addition of this product to a dispensing device containing other products or contamination with organic matter, moisture, or other chemicals may cause a violent reaction leading to fire or explosion

Potential for Explosion: Addition of this product to a dispensing device containing other products or contamination with organic matter, moisture, or other chemicals may cause a violent reaction leading to fire or explosion

Reactivity: Contamination with organic matter, moisture, or other chemicals may start a chemical reaction with the liberation of hazardous gases, including chlorine, nitrogen oxides, and cyanide, and possible generation of fire or explosion

HEALTH HAZARDS

Signs and Symptoms of Exposure: Eye and skin irritation.

Medical Conditions Aggravated by Exposure: No data available.

Oral [ingestion] LD_{50} Rat: No data available

Dermal [skin absorption] LD_{50} Rabbit: 500 mg/24H [Mild]

Inhalation [breathing] LC_{50} Rat: No data available

Eyes: Severe. 10 mg/ 34 hr

Skin Irritation: Mild. Not a skin sensitizer.

OSHA Permissible Exposure Limit [PEL]: None established.

CGIH Threshold Limit Value [TLV]: None established.

POTENTIAL ROUTE[S] OF ENTRY

Inhalation [Breathing]:	Dust may cause irritation to upper respiratory tract.
Dermal [skin]:	Contact with broken skin may cause burning, blistering, and tissue destruction I f not washed of immediately.
Eyes:	Irritating to eyes. Corrosive. May cause permanent eye damage.
Ingestion [swallowing]:	Not anticipated.

CARCINOGENIC [CANCER POTENTIAL] INFORMATION

National Toxicological Program [NTP] *Sixth Annual Report on Carcinogens:*	Not Listed.
International Agency for Research on Cancer [IARC]Monographs, v. 1-53, Supps. 1-8	Not Listed
Listed by Federal OSHA as Carcinogens:	Not Listed.
:fe Drinking Water and Toxic ..forcement Act of 1986 [Proposition 65, California only]:	Not listed

GENERAL PRECAUTIONS FOR SAFE USE AND HANDLING

Mix only with water. Do not mix with other chemicals. Use clean, dry utensils when mixing. Do not add this product to any dispensing device containing remnants of other products.A violent reaction or explosion may result when chemicals are mixed. Do not contaminate with moisture, other chemicals, or human wastes.

PERSONAL PROTECTION AND HYGIENE

Wear goggles or face shield and rubber gloves when handling. Avoid breathing dust. Remove and wash contaminated clothing before reuse. Wash hands after handling.

CLEAN-UP OF SPILLS

Granules should be kept in a tightly closed container in a cool, dry, ventilated area. Spilled materials should be picked up and placed in a dry container. If granules are contaminated by water or other chemicals, or human waste, place in a bucket with lots of clean water. Dissolved granules may be used on-site in pool or spa for disinfection or disposed of in an approved landfill. Small quantities of granules or solution made from granules may be discharged into a sanitary sewer. Granules must be disposed of in :ordance with Federal, State, and./or local laws and regulations. Read the label for additional information. Contact HASA, Inc. for guidance.

FIRST AID

Eye Contact:	Flush with water. Remove contact lenses [if applicable]. Continue flushing with water for 15 minutes. Get prompt medical attention.
Skin Contact:	Brush off any residue. Wash affected area with water for 15 minutes. If irritation persists, get medical attention.
Ingestion [swallowing]:	Feed bread soaked in milk followed by olive oil or other cooking oil. Call a physician immediately.

FEDERAL/STATE LISTS/REGISTRATION/S/REPORTING REQUIREMENTS

CERCLA Hazardous Substance [Section 1010 [4], P.L. 96-510:	Not Listed.
Extremely Hazardous Substance [40 *CFR* 355, Appendix A:	Not Listed.
Pesticide Product 7 *U.S.C.* 136 *et seq.*:	Registered as Pesticide Product by Federal EPA.
Toxic Substance under TSCA	Not Reported
Pesticide Product [various State laws]:	Registered as pesticide Product

MATERIAL CLASSIFICATION

OSHA Hazard Communication Standard, Department of Labor, Occupational Safety and Health Division [29 *CFR* 1910.1200]:	Oxidizer

DOT regulations [49 *CFR* 172.101]:

Material Class [Division]: 5.1	Packaging Group: II
UN/NA Number: 2468	Label: Oxidizer 5.1
Placard: Oxidizer 5.1	Proper Shipping Name: Dichloroisocyanuric acid, sodium salt

National Fire Protection Association [NFPA] 704 [1990]:	2-0-1-OXY
BOCA National Fire Prevention Code/BOCA National Building Code [1993 editions]:	Oxidizer Class 2; Unstable [reactive] Class 1

Standard Fire Prevention Code/Standard Building Code [1994 editions]:	Oxidizer Class 2; Unstable [reactive] Class 1
Uniform Fire Code/Uniform Building Code 1994 editions]:	Oxidizer Class 2; Unstable [reactive] Class 1
Uniform Fire Code Standards 79-3 , *Uniform Fire Code*, v. II [1994 edition]:	2-0-1-OXY

IMPORTANT NOTICE

The information contained herein, while not guaranteed, was prepared by competent technical personnel and is true and accurate to the best of our knowledge and belief. NO WARRANTY OR GUARANTEE, express or implied, is made regarding the product performance, product stability, or as to any other condition or use. The information contained herein is not intended to be all inclusive as to the manner and conditions of use, handling, transportation, and storage. Customer use, handling, transportation, and storage may involve additional safety and/or performance considerations. While our technical personnel will be happy to respond to questions regarding safe handing, storage, transportation, and use procedures, the safe handing, storage, transportation, and use procedures remain the sole responsibility of the customer. No suggestions for handling, storage, transportation, or use are intended as or to be construed as recommendations which may infringe on any existing patents or violate any Federal, State, and/or local law and/or regulation, ordinance, standard, etc. promulgated thereunder.

PREPARATION OF THIS MSDS

This Material Safety Data Sheet has been prepared by HASA, Inc. staff under the direction of Mary Flynn, Director, Government Affairs and Public Relations.from test reports and other information available in the public domain. A bibliography of these materials is available from HASA, Inc. Date of Preparation: June 6, 1995.

MATERIAL SAFETY DATA SHEET

Identity:
Sepiolite Clay (CAS #63800-37-3)

SECTION I

Manufacturer's Name
IMV NEVADA

Address
Route Box 549
Amargosa Valley, Nevada 89020

Emergency Telephone Number
775-372-5341

Telephone Number for Information
702-372-5341

Date Prepared 06-15-92

Date Revised 2/10/99

SECTION II - HAZARDOUS INGREDIENTS/IDENTITY INFORMATION

Hazardous Components: Respirable dust may contain Silica, Crystalline Quartz (CAS #14808-60-7)

Specific Chemical Identity:

Sepiolite ($H_6 Mg_8 Si_{12} O_{30} [OH]_{10}) \bullet 6 H_2O$) CAS #63800-37-3

Common Names: Sepiolite, Meerschaum, Palygorskite, Clay--a natural mineral extracted from the earth (see tradenames, page 4)

OSHA PEL: Classified as a nuisance dust when less than 1% crystalline silica is present, PEL=5.00mg/M^3 (respirable).

If greater than 1% crystalline silica, then exposures shall not exceed an 8-hour time-weighted average limit as stated in 29 CFR §1910.1000 Table Z-1-A for air contaminants, specifically;

Silica, Crystalline Quartz (respirable) 0.1 mg/M^3

ACGIH TLV: Classified as a nuisance dust when less than 1% crystalline silica, TLV-TWA = 10 mg/M^3 (Total dust), 5 mg/M^3 (Respirable)

If greater than 1% crystalline silica, the TLV-TWA = 0.1 mg/M^3 (respirable crystalline quartz). See Threshold Limit Value and Biological Exposure Indices for 1991-1992, American Conference of Governmental Industrial Hygienists.

Other Limits Recommended: National Institute for Occupational Safety and Health (NIOSH). Recommended standard maximum permissible concentration=0.05 mg/M^3 (respirable crystalline quartz) as determined by a full-shift sample up to 10-hour working day, 40-hour work week. See NIOSH Criteria for a Recommended Standard Occupational Exposure to Crystalline Silica.

SECTION III - PHYSICAL/CHEMICAL CHARACTERISTICS

Boiling Point:	More than 1000°F	**Specific Gravity (H_2O = 1):**	1.9-2.4
Vapor Pressure (mm Hg.):	None	**Melting Point:**	None
Vapor Density (AIR = 1):	None	**Evaporation Rate:**	None
Solubility in Water:	Insoluble in water		
Appearance and Odor:	Light gray, tan or reddish tan, granular or powder. Earthy odor when wet.		

SECTION IV —FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Non-flammable

Flammable Limits: None **LEL:** None **UEL:** None

Extinguishing Media: None required

Special Fire Fighting Procedures: None

Unusual Fire and Explosion Hazards: None

SECTION V —REACTIVITY DATA

Stability: Stable **Conditions to Avoid:** None
Incompatibility (Materials to Avoid): None
Hazardous Decomposition or Byproducts: None
Hazardous Polymerization: Will Not Occur **Conditions to Avoid:** None

SECTION VI—HEALTH HAZARD DATA

Route(s) of Entry: Inhalation? Yes **Skin?** No **Ingestion?** No

Health Hazards (Acute and Chronic)
May be harmful if inhaled in sufficient quantities. Prolonged exposure to Bentonite Organoclay dust may cause a relatively benign lung disease, though there is a risk of the development of massive fibrosis. Repeated and prolonged exposure to respirable crystalline quartz which may be contained in Bentonite Organoclay dust may cause delayed (chronic) lung injury (silicosis). Silicosis is a form of disabling pulmonary fibrosis which can be progressive and may lead to death.

Carcinogenicity: NTP? Yes **IARC Monographs?** Yes **OSHA Regulated?** No

IARC has reported that there is inadequate evidence for the carcinogenicity of sepiolite in experimental animals and that there is no data available to evaluate the carcinogenicity of sepiolite in humans (IARC Class 3).

Sepiolite Clay, like other naturally occurring minerals, may contain crystalline silica. IARC has concluded that there is limited evidence for the carcinogenicity of crystalline silica to humans and sufficient evidence for the carcinogenicity of crystalline silica to experimental animals (IARC Class 2A). The NTP has concluded that "silica, crystalline (respirable)" may reasonably be anticipated to be a carcinogen, based on sufficient evidence for the carcinogenicity of respirable crystalline silica in experimental animals and limited evidence in humans.

Signs and Symptoms of Exposure: Undue breathlessness, wheezing, cough and sputum production.

Medical Conditions Generally Aggravated by Exposure: Pulmonary function may be reduced by inhalation of respirable crystalline silica that may be in Sepiolite Organoclay dust. Lung scarring produced by such inhalation may lead to a progressive massive fibrosis of the lung which may aggravate other pulmonary conditions and diseases and which increases susceptibility to pulmonary tuberculosis. Progressive massive fibrosis may be accompanied by right heart enlargement, heart failure, and pulmonary failure. Smoking aggravates the effects of exposure.

Emergency and First Aid Procedures: For dust in eyes, wash immediately with water. If irritation persists, seek medical attention. For gross inhalation, remove person immediately to fresh air, give artificial respiration as needed, seek medical attention as needed.

SECTION VII—PRECAUTIONS FOR SAFE HANDLING AND USE

Steps To Be Taken In Case Material Is Released Or Spilled:

Spills: Use dustless methods (vacuum) and place into closable container for disposal, or flush with water. Do not dry sweep. Care should be taken to avoid high aerosol dust concentrations. Wear protective equipment specified below. Spilled material may become very slippery when wet with water, grease, oil, gasoline, or solvents.

Waste Disposal Method: Dispose in accordance with Federal, State, and Local regulations.

Precautions to Be Taken In Handling and Storing: Avoid breakage of bagged material or spills of bulk material. See control measures in Section VIII.

Other Precautions: Use dustless systems for handling, storage, and clean up so that airborne dust does not exceed the PEL. Use adequate ventilation and dust collection. Practice good housekeeping. Do not permit dust to collect on walls, floors, sills, ledges, machinery, or equipment. Maintain, clean, and fit test respirators in accordance with OSHA regulations. Maintain and test ventilation and dust collection equipment. Wash or vacuum clothing which has become dusty. See also control measures in Section VIII.

See OSHA Hazard Communication Rule 29 CFR Sections 1910.1200, 1915.99, 1917.28, 1918.90, 1926.59, and 1928.21, and state and local worker or community "right to know" laws and regulations. We recommend that smoking be prohibited in all areas where respirators must be used. WARN YOUR EMPLOYEES (AND YOUR CUSTOMERS-USERS IN CASE OF RESALE) BY POSTING AND OTHER MEANS OF THE HAZARDS AND OSHA PRECAUTIONS TO BE USED. PROVIDE TRAINING FOR YOUR EMPLOYEES ABOUT THE OSHA PRECAUTIONS.

See also American Society for Testing and Materials (ASTM) standard practice E 1132-86, "Standard Practice for Health Requirements Relating to Occupational Exposure to Quartz Dust."

SECTION VIII—CONTROL MEASURES

Respiratory Protection (Specify Type)

The following chart specifies the types of respirators which may provide respiratory protection for respirable crystalline silica that may be contained in Sepiolite Organoclay dust.

RESPIRATORY PROTECTION FOR CRYSTALLINE SILICA

CONDITION Particulate Concentration	MINIMUM RESPIRATORY PROTECTION*
Up to 5 x PEL	Any dust respirator
Up to 10 x PEL	Any dust respirator, except single-use or quarter-mask respirator. Any fume respirator of high efficiency particulate filter respirator Any supplied-air respirator. Any self-contained breathing apparatus.
Up to 50 x PEL	A high efficiency particulate filter respirator with a full facepiece. Any supplied-air respirator with a full facepiece, helmet, or hood. Any self-contained breathing apparatus with a full facepiece.
Up to 500 x PEL	A powered air-purifying respirator with a high efficiency particulate filter. A Type C supplied-air respirator operated in pressure-demand or other positive pressure or continuous-flow mode.
Greater than 500 x PEL or entry and escape from unknown concentrations	Self-contained breathing apparatus with a full facepiece operated in pressure-demand or other positive pressure mode. A combination respirator which includes a Type C supplied-air respirator with a full facepiece operated in pressure-demand or other positive pressure continuous-flow mode and an auxiliary self-contained breathing apparatus operated in pressure-demand or other positive pressure mode.

*Only NIOSH-approved or MSHA-approved equipment should be used.(See 29 CFR 1910.134).

Ventilation:

Local Exhaust Use sufficient local exhaust to reduce the level of dust to the PEL. See ACGIH "Industrial Ventilation, A Manual of Recommended Practice," the latest edition.

Mechanical
See "Other Precautions" under Section VII.

Special
See "Other Precautions" under Section VII.

Other
See "Other Precautions" under Section VII.

Protective Gloves
Optional.

Eye Protection
Wear protective shield (safety glasses) when exposed to dust particles.

Other Protective Clothing and Equipment
Optional.

Work/Hygienic Practices
Avoid creating and breathing dust. See "Other Precautions" under Section VII.

The information and recommendations contained herein are based upon data believed to be correct. However, no guarantee or warranty of any kind, express or implied, is made with respect to the information contained herein. We accept no responsibility and disclaim all liability for any harmful health effects which may be caused by purchase, resale, use or exposure to our Sepiolite Clay. Customers-users of Sepiolite Clay must comply with all applicable health and safety laws, regulations, and orders.

TRADE NAMES

I G S
SEA MUD
SEPIOGEL - A
SEPIOGEL - R
SEPIOGEL - F
SEPIOGEL - UF
SEPIOGEL - 721
THERMOGEL
THERMOGEL - B
SEPIOLITE NOODLES
SEPIOLITE ORE
WET SEPIOLITE NOODLES
SEPIOGEL - FG
GRANULAR SEPIOLITE
SEPIOGEL FLM
MIN-U-GEL - 200i
SEPIOLITE - 1630i
SEPIOLITE - 3080i

Material Safety Data Sheet

North American Chemical Company
200 Main Street
ona, California 93562

soda ash

or more detailed information on the hazards of this product, write to the address above. Technical Information Bulletin is also vailable. For emergency information, telephone (619) 372-2291 any time.

DUCT IDENTIFICATION

and Name	Soda ash
emical Name	Sodium carbonate
nonon Name	Soda ash
rmula	Na_2CO_3
T Proper	
ing Name	Not applicable
Hazard	
ass	Not applicable
T I.D. Number	Not applicable
rtable Quantity (RQ)	Not applicable
S Number	497-19-8

PHYSICAL AND CHEMICAL PROPERTIES

State	Granular solid
Melting Point C	851
Boiling Point C	Decomposes
Color	White
Odor	None
Bulk Density, lb/cu. ft	50 to 65
Weight Per Gallon	Not applicable
Specific Gravity @ 20C	2.5
Water Solubility, % by wt. @ 20C	22.6
Flash Point And Method	Not applicable
pH	Not applicable

HAZARDOUS INGREDIENTS

Chemical Name	Common Name	CAS Number	Hazard
Sodium carbonate	Soda ash	497-19-8	Irritant to eyes, mucous membranes and skin.

PHYSICAL HAZARD INFORMATION

plosive:	No	Upper Explosive Limit:	Not applicable	Lower Explosive Limit:	Not applicable
rophoric:	No				
ir nable:	No	Flammability Class:	Not applicable		
mbustible:	No	Organic Peroxide:	No		
i zer:	No	Compressed Gas:	No		

activity: Normally stable. May react violently with strong acids. Carbon dioxide gas and large quantities of heat can be evolved. Reacts with hydrated lime in the presence of moisture to form caustic soda, a corrosive.

c npatibilities: Keep away from aluminum powder, fluorine, phosphorous pentoxide, sulfuric acid, ammoniacal silver nitrate and molten lithium.

z dous c mposition: Soda ash decomposes at temperature above 1000C, releasing carbon dioxide gas (CO_2). Carbon dioxide is an asphyxiant and may affect respiration rate or interfere with breathing. The sodium oxide residue sublimes at 1275C, forming vapors and mists of caustic soda on contact with moisture or water.

nditions Avoid: Do not expose to intense heat.

HEALTH INFORMATION

recautionary Information: CAUTION! Causes irritation. This product is a severe irritant to the eyes and a moderate irritant to the nose and skin.

y..ıptoms Of Exposure: Eye, nose, or skin irritation.
Burning sensation to nose, throat and eyes.
Redness of the skin.
Sneezing and coughing.

(trictive Medical :onditions: Eye or skin disease and breathing or respiratory disorder will be aggravated by exposure to this chemical.

PRIMARY ROUTE(S) OF ENTRY

\'~ and skin contact, inhalation (breathing), and ingestion (swallowing).

TOXICITY INFORMATION

'ral - rat LD_{50} 2463 mg/kg; Intraperitoneal - mouse LD_{50} 117 mg/kg;

k ı irritation - rabbit 50 mg/24 hour, moderate; Eye irritation - rabbit 100 mg/24 hour, severe.

EXPOSURE LIMITS

): HA: Not established
.(GIH: Not established
)ther: ACGIH: TLV-TWA for nuisance dust is 10 mg/m^3 total dust or 5 mg/m^3 respirable dust.

Reported As A Potential Carcinogen Or Carcinogen	☒ Not Applicable	☐ National Toxicology Program
	☐ OSHA	☐ International Agency For Research On Cancer

PRECAUTIONS FOR SAFE HANDLING AND USE

Avoid contact with eyes, skin, and clothing.
Avoid breathing dust.
Use with adequate ventilation.
Keep container closed when not in use.
Wash thoroughly after handling.

SPILL AND LEAK PROCEDURES

Soil Release:	Shovel and sweep up. Dispose of in a chemical waste facility as permitted by federal (RCRA), state and local regulations.
Water Spill:	Dilute and disperse with water jets, propellers or similar agitation techniques.
Air Spill:	Keep upwind. Treat impact site as appropriate for soil or water spill.
Occupational Spill:	Shovel and sweep up. As permitted, small spills may be washed to an industrial sewer. Large amounts can be disposed of in a chemical waste facility as permitted by federal, state and local regulations.
RCRA Waste Number:	Not applicable.

ENGINEERING CONTROLS AND PERSONAL PROTECTIVE EQUIPMENT

Ventilation:	Use general dilution and local exhaust ventilation techniques to meet nuisance dust exposure limit.
Respirator:	Use NIOSH/MSHA approved dust type respirator.
Eye Protection:	Use safety glasses or safety goggles. Ensure eyewash fountain is located in immediate work area.
Gloves:	Use gloves that will not allow alkaline solutions to penetrate.
Clothing:	Wear easily washable clothing. Change daily or more often if contaminated. Wash clothing before reuse.

EMERGENCY PROCEDURES

Fire: This product is not flammable and does not support combustion.

Spill or Leak: Sweep up and shovel into containers for later disposal.

FIRST AID PROCEDURES

Ingestion: If swallowed, do not induce vomiting. Give large quantities of water. Never give anything by mouth to an unconscious person. Call a physician.

Inhalation: If inhaled, remove to fresh air. If not breathing, give artificial respiration, preferably mouth-to-mouth. If breathing is difficult, give oxygen. Call a physician.

Skin Contact: Flush with plenty of water. Wash clothing before reuse. Thoroughly clean shoes before reuse.

Eye Contact: Immediately flush eyes with plenty of water for at least 15 minutes. Call a physician.

Note To Physician: The chemical of exposure is sodium carbonate which is alkaline in solution.

LODI NUT COMPANY, INC.

MATERIAL SAFETY DATA SHEET

MSDS DATE: 1/31/98

I. PRODUCT IDENTIFICATION

Product Name: Ground Walnut Shell
Synonym: Abrasive Grain, Soft Blasting, Filtration Media, Drilling Mud

II. PHYSICAL DATA

State: Solid
Appearance: Tan, free flowing, granular or flour-like
Specific Gravity: 1.20 to 1.40
Storage Precautions: Keep dry and cool. Avoid hot, wet, or humid areas.
Note: This product is an agricultural by-product. In warm, humid or hot locales, natural infestation may occur if not stored properly or stored for extended periods of time. Fumigation with an approved insecticide fumigant will reduce the chance of natural infestation and prolong product life. If infestation should occur, tarping or tenting of the product and treatment with phos-toxin, methyl bromide or other approved fumigant will, in most cases, eliminate the infestation without degradation of the material.

III. FIRE, EXPLOSION, AND REACTIVITY DATA

Flash Point: Not applicable
Flammability Limits: Lower - Not determined
Upper - Not determined
Heat of Combustion: Approximately 9,000 BTU / pound
Shock Sensitivity: None
Auto-ignition Point: Not determined
Extinguishing Media: Water, carbon dioxide, or dry chemical
Conditions to Avoid: High temperatures, contact with oxidizers

IV. HEALTH HAZARD DATA

Acute Toxicity: None identified
Chronic Toxicity: None identified
Carcinogenicity: None identified
Medical Conditions Aggravated by Exposure: Dust allergies or other conditions aggravated by nuisance dust. Use of an approved NIOSH/MSHA respirator is recommended where TLV for nuisance dust may be exceeded. Avoid contact with eyes, skin and clothing.

V. SPILL AND DISPOSAL DATA

Material is biodegradable. Sweeping and disposal to a land fill or other normal trash disposal site is satisfactory.

VI. TRANSPORTATION DATA

D.O.T. Shipping Name: Not currently regulated
Hazard Class: Not applicable
International (I.M.O.) Shipping Name: Not currently regulated
Marine Pollutants: No
Air (I.C.A.O.) Shipping Name: Not currently regulated
Hazard Class: Not applicable

1230 S. FAIRMONT AVE. ❐ LODI,. CA 95240-5595 ❐ (209) 334-2081

XCD-XANVIS

Kelco Oil Field Group
3300 Bingle Road
Houston, Texas 77055

Tel.: (713) 895-7575
Fax. (713) 895-7586

MATERIAL SAFETY DATA SHEET

KELCO IS A UNIT OF MONSANTO COMPANY

Emergency Telephone. (713) 895-7575

SECTION I - PRODUCT IDENTIFICATION

Product Name: Kelzan XC, Kelzan XCD, XANVIS
Kelzan XC Hi-Vis & Kelzan XCD Hi-Vis

Product Use: Rheology control in water based systems.
Chemical Family or Formula: Xanthan gum.
Description: White to tan powder
Manufacturer. Kelco, a unit of Monsanto Company. San Diego, CA

HMIS RATING:

Health	0
Flammability	1
Reactivity	0

SECTION II - INGREDIENTS

Toxic & Hazardous Ingredients: The ingredients of this product are on the TSCA Chemical Substance Inventory, the Canadian Domestic Substances List and are included in the European inventory of Existing Commercial Chemical Substances (EINECS). As of the date of this MSDS, Kelzan XC, Kelzan XCD and XANVIS are not specifically regulated under CERCLA, CWA, DOT or TSCA. It is not "toxic" under SARA Title III. All hazardous ingredients are below de minimis concentrations. Components: Xanthan gum - CAS # 11138-66-2

SECTION III - CHEMICAL AND PHYSICAL PROPERTIES

Form: White to tan powder
Specific Gravity (water=1): NA
Melting Point: NA
% Volatile by %WT: NA
Vapor Pressure (mm Hg): NA
pH: @ 1.0 %: 7
Viscosity SUS at 100 F: NA

Odor: slight
Boiling Point: NA
Solubility in Water: Complete
Evap. Rate (n-BuAc=1). NA
Vapor Density (air=1). NA
Stable: Yes

SECTION IV - FIRE AND EXPLOSION DATA

For fires involving this material do not enter without proper protective equipment including self-contained breathing apparatus. In common with most organic materials this product should be treated as a combustible dust in the finely divided and suspended state
Flash Point: NA
Extinguishing Agents: Drychemical, CO_2, Foam.

SECTION V - HEALTH HAZARD DATA

NATURE OF PRINCIPLE HAZARD: Not a health hazard as defined by OSHA.
Permissible Concentrations (Air): NA. Excessive inhalation may cause minor respiratory discomfort.
Effects of Overexposure: Prolonged contact with the dry powder may cause drying of the skin.
Non-toxic through ingestion and dermal absorption

EMERGENCY FIRST AID PROCEDURES: Eyes: Flush with plenty of water. If irritation develops, call a physician. Skin Contact: No harmful effects expected. Inhalation: If large quantities have been inhaled, keep airway open as necessary. If swallowed: Symptomatic treatment. No harmful effects are expected

NA = NOT APPLICABLE NDA = NO DATA AVAILABLE + = GREATER THAN - = LESS THAN

MATERIAL SAFETY DATA SHEET
PRODUCT: Kelzan XC, Kelzan XCD, XANVIS, Kelzan XC Hi-Vis & Kelzan XCD Hi-Vis

SECTION VI - PERSONAL PROTECTION INFORMATION

Ventilation Type Required: Local exhaust.
Respiratory Protection: In heavy product dust exposure a NIOSH approved mask is recommended.
Protective Gloves: Not normally required.
Eye Protection: Not normally required.
Other Protective Equipment: None.

SECTION VII - HANDLING OF SPILLS OR LEAKS

Procedures For Clean-Up: Sweep up spilled material and repackage. Hose spill area thoroughly with water. Use caution as the product is extremely slippery when wet.

Waste Disposal: Dispose of in accordance with local, state, and federal regulations.

SECTION VIII - REACTIVITY DATA

Stability: Product is stable.
Incompatibility: Strong oxidants.
Hazardous decomposition Products: Thermal decomposition products may include carbon dioxide and carbon monoxide.
Hazardous polymerization: Will not occur.
Conditions to avoid: None

SECTION IX - TOXICOLOGICAL INFORMATION

Aquatic Toxicity (96 hr LC50 API Test Procedure): Mysid shrimp > 1,000,000 ppm
Microtox Toxicity: Photobacterium phosphoreum - Non Toxic

SECTION X - SPECIAL PRECAUTIONS

Precautions to be taken in Handling and Storage: Normal precautions common to good manufacturing practice should be followed in handling and storage.

SECTION XI - REGULATORY INFORMATION

US DOT. Proper Shipping Name: Drilling Mud Compound
US DOT. Hazard Class: None
ID Number: NA Label(S) Required None
Freight Classification: Item #138640 NMF 100 G Class 50 Special Transportation Notes None
OSHA Hazard Communication Status: NA

Revision Date: 10/95

We believe the statements, technical information and recommendations contained herein are reliable, but they are given without warranty or guarantee of any kind, express or implied, and we assume no responsibility for any loss, damage, or expense, direct or consequential, arising out of their use. Kelzan and XANVIS are a trademarks of Kelco, a unit of Monsanto Company, and are Reg. in US Pat & TM Off

Starpak

emstar Products Company
5 Hiawatha Avenue
Minneapolis, Minnesota U.S.A. 55406-3203
Phone: (612) 722-0079
Fax: (612) 722-2473

CHEMSTAR

Material Safety Data Sheet

SECTION I

Product Name: STARPAK DP CAS #: 69331-40-4

Chemical Name: Corn Starch Ether

Manufacturer: Chemstar Products Company
3915 Hiawatha Ave
Minneapolis, MN 55406

Emergency Phone: 800-328-5037

Date Prepared: 01/09/96

SECTION II - HAZARDOUS INGREDIENTS IDENTITY INFORMATION

Hazardous Components	% by Wt.	CAS #
None		

SECTION III - PHYSICAL DATA

Physical State: Solid Solubility: Complete Ph (4% Sol): 10.0-11.0

Density(lbs/ft3): 30-40 Appearance and Odor: Off White Powder, Slight Odor.

SECTION IV - FIRE AND EXPLOSION DATA

Flammable Limits: LEL NA UEL NA

Flashpoint (Method Used): NA

Extinguishing Media: Water, CO2, Dry Powder or Foam.

Special Fire Fighting Procedures: None

Unusual Fire and Explosion Hazards:
Dust-air mixtures may be explosive. The minimum ignition temperature reported for starch, through 200 mesh, is 380 degrees C. (716 degrees F.). The minimum explosive concentration of a dust cloud is 0.04 oz./cu.ft. Avoid open lights, flames, welding and spark producing sources.

SECTION V - HEALTH HAZARD DATA

ute(s) of Entry: Inhalation - May cause irritation to respiratory system.
Skin - None known.
Ingestion - Not edible.

Health Hazards *(Acute or Chronic)*:
In eyes or respiratory systems it may cause irritation if heavy concentrations are encountered.

Emergency and First Aid Procedures:
If inhaled, remove to fresh air. Wash skin with soap and water. Flush eyes with water for 15 minutes, seek medical attention. If accidentaly swallowed, dilute by drinking large quantities of water, seek medical attention.

SECTION VI - REACTIVITY DATA

Stability: Stable **Conditions to Avoid:** Damp or wet conditions will lead to spoilage.

Incompatibility *(Materials to Avoid)*: Strong oxidizing agents.

Hazardous Decomposition Products: Oxides of carbon.

Hazardous Polymerization: Will not occur.

SECTION VII - SPILL OR LEAK PROCEDURE

Steps To Be Taken in Case Material is Released or Spoiled:
Sweep up and flush area with water. Caution: Wet floors may be slippery when material is present. Avoid production of dust (Refer to Section IV).

Waste Disposal Method: Dispose of in a manner in accordance with state and local regulations.

Precautions to be Taken in Handling and Storing: Avoid practices which produce dust. Store away from heat, flame and spark source (Refer to Section IV).

SECTION VIII - SPECIAL PROTECTION SECTION

Respiratory Protection: Dust respirator (NIOSH/MSHA TC-21C-132) as needed.

Ventilation: As needed to control dust. **Protective Gloves:** Recommended.

Eye Protection: Recommended **Other Protective Clothing or Equipment:** None

Work/Hygenic Practices: Avoid creation of dust (Refer to Sections IV and VII).

MATERIAL SAFETY DATA SHEET

SECTION I—NAME AND PRODUCT

Manufacturer: Chemstar, Inc.
Emergency Telephone: (702) 643-7702 Contact: Dr. Starr Curtis
Address: P.O. Box 127, Henderson, NV 89015
Trade Name, Common Name: **CALCIUM HYDROXIDE**

CALCIUM HYDROXIDE, Ca(OH)2, Hydrated Lime, Slaked Lime, CAS# 1305-62-0
Genstar High Calcium Hydroxide, Genstar Type N Lime
Specification: ASTM C51, C206, C207, C911, C977
Chemical Family: Alkaline Earth Hydroxide

SECTION II—COMPOSITION

Chemical Name	%	Common Name	REG* (Y/N)	CAS No.	OSHA Permissive Exposure Limit	ACGIH TLV/TWA	Carcinogen? (Y/N)
Calcium Hydroxide	>95	Hydrated Lime	N	1305-62-0	—	5 mg/cu.m.	N
Calcium Carbonate	< 5	Limestone	N	1317-65-3	—	10 mg/cu.m.	N
Magnesium Hydroxide	< 5	Brucite	N	1309-42-8	—	—	N
Silicon Dioxide	< 3	Quartz	Y	14808-60-7	0.1 mg/cu.m.	0.1 mg/cu.m.	N
Other (Fe203, A1203)	< 3	—	N	—	—	—	N

Purity depends on the limestone starting material and the manufacturing, handling, and storage techniques. GENSTAR LIME COMPANY strives to maintain high purity and production quality standards.

SECTION III—PHYSICAL AND CHEMICAL DATA

Appearance and Odor: Soft white crystalline powder; Odorless. Genstay High Calcium Hydrated Lime or Genstar Type N Hydrated Lime is available in bags or bulk as a fine powder, generally 95% passing 200 mesh.

Melting Point: dehydrates at 580 C
Boiling Point: 5162 F/2850 C
Vapor Pressure: N/A
Vapor Density: N/A
Evaporation Rate: N/A
% Volatile by Vol: N/A
Solubility in Alcohol: NAIF**

Particle Specific Gravity: 2.3-2.4 g/cc
Water Solubility: Slight.

Temp.	Solubility
0 C	1.85 g Ca(OH)2/1
25 C	1.59
50 C	1.28
100 C	0.71

Bulk Density: 25-35 lbs/cu.ft.
Aqueous Solution Behavior:

pH (sat'd sol'n)
13.42
12.44
11.71
—

Solubility in other solvents: Calcium hydroxide reacts with acids, forming calcium salts which may be soluble.

SECTION IV—FIRE AND EXPLOSION HAZARD DATA

Special Fire Fighting Procedures: Hydrated lime decomposes to calcium oxide (quicklime) and steam at 580 C (1079 F). If these temperatures prevail, wear self-contained breathing apparatus approved by NIOSH. Protect eyes from dust. The presence of hydrated lime in a fire does not hinder the use of any standard extinguishing medium.
Flashpoint: Not Flammable Flammable Limits: N/A Extinguishing Media: Not Flammable Explosion Potential: None

SECTION V—HEALTH, FIRST AID AND MEDICAL DATA

Threshold Limit Value (TLV): 5 mg/cu.m. Calcium hydroxide is an alkaline material. In presence of moisture, contact with skin and eyes will cause irritation and possible severe corrosion damage. Inhalation of dust may cause coughing, sneezing, or inflammation of the respiratory passages. While short term exposure and irritation are generally without permanent effects, untreated contact and irritation can cause dermatitis and chemical burns. Prevention of contact and exposure under good working conditions is much preferred to first aid after injury. See Section VIII below.

FIRST AID:

Inhalation: Remove from exposure to dust and get prompt medical help.
Eye Contact: Wash eyes immediately with running water for 15 minutes, including under eyelids. Get prompt medical attention!
Skin Contact: Wash exposure area with large amounts of water. Remove and wash contaminated clothing.
Ingestion: Immediately dilute the chemical by drinking large amounts of water or milk. Then neutralize by drinking dilute vinegar or fruit juice.

SECTION VI—CORROSIVITY AND REACTIVITY DATA

Stability:	STABLE Hazardous polymerization will NOT occur.
Incompatibilities:	Calcium hydroxide is incompatible with acids, ammonium salts, phosphorous, and some organic compounds. Hydrated lime is stable in sealed containers at normal temperatures.
Decomposition Products:	When exposed to air, this strongly alkaline compound will absorb and react with carbon dioxide, producing calcium carbonate. This forms lumps, reduces the chemical activity and results in a limited shelf life. Calcium salts are normal reaction products with other materials.
Conditions to be avoided:	Handling procedures which may generate dust. Contact with nitroparaffins, maleic anhydride or phosphorous.

SECTION VII—STORAGE, HANDLING AND USE PROCEDURES

Normal Storage and Handling:	Dry area, out of weather and flood danger. Avoid dusting in handling.
Normal Use:	Standard equipment for hydrated lime use. Make adequate provision for dust-free operations.
Steps to be taken in Case of Leaks or Spills:	Those involved in clean up must protect against skin contact and inhalation of dust or mist. See Section VIII. Carefully pick up the powder with a minimum of dusting and collect in metal containers with covers for disposal. The small amounts of residue after shoveling and sweeping can be flushed to the drain, using plenty of water.
Waste Disposal Method:	Several methods may be suitable: a) Spread in a protected area to permit reaction with carbon dioxide in air. (Prevent air current dusting.) b) Neutralize with acid or waste acid. c) Use as a soil amendment. d) Use to stabilize clay soils. Follow Federal, State and local regulations.

SECTION VIII—PERSONAL PROTECTION INFORMATION

Respiratory Protection:	NIOSH approved dust filter respirator in dusty conditions. In absence of dust, mechanic exhaust is adequate.
Eye Protection:	Approved tight-fitting safety goggles.
Protective Gloves:	Clean, dry rubber gloves.
Clothing:	Clean, body-covering protective clothing, such as long-sleeve shirt with buttoned collar; long pants extending over tops of work shoes.
Ventilation:	Provide general ventilation and local exhaust ventilation with appropriate dust collection to meet TLV requirements for lime dust.
Other Equipment:	An eyewash station and safety shower should be readily available near the work area.

SECTION IX—SPECIAL PRECAUTIONS

Store materials in sealed containers in a dry place. Avoid contact with acids and other incompatible materials. Exposure to air lowers the available calcium hydroxide reactivity over time.

SPECIAL REFERENCE: LIME HANDLING, APPLICATION, AND STORAGE, Nat. Lime Assoc. Bull. 213, 4th ed., 1982.

Rev. 03/04/86 HSC

Received by GEO

APPROVED: _____ DATE: June 8, 1987

ECTION VI—**CORROSIVITY AND REACTIVITY DATA**

Stability:	STABLE Hazardous polymerization will NOT occur.
Incompatibilities:	Calcium hydroxide is incompatible with acids, ammonium salts, phosphorous, and some organic compounds. Hydrated lime is stable in sealed containers at normal temperatures.
Decomposition Products:	When exposed to air, this strongly alkaline compound will absorb and react with carbon dioxide, producing calcium carbonate. This forms lumps, reduces the chemical activity and results in a limited shelf life. Calcium salts are normal reaction products with other materials.
Conditions to be avoided:	Handling procedures which may generate dust. Contact with nitroparaffins, maleic anhydride or phosphorous.

SECTION VII—**STORAGE, HANDLING AND USE PROCEDURES**

Normal Storage and Handling:	Dry area, out of weather and flood danger. Avoid dusting in handling.
Normal Use:	Standard equipment for hydrated lime use. Make adequate provision for dust-free operations.
Steps to be taken in Case of Leaks or Spills:	Those involved in clean up must protect against skin contact and inhalation of dust or mist. See Section VIII. Carefully pick up the powder with a minimum of dusting and collect in metal containers with covers for disposal. The small amounts of residue after shoveling and sweeping can be flushed to the drain, using plenty of water.
Waste Disposal Method:	Several methods may be suitable: a) Spread in a protected area to permit reaction with carbon dioxide in air. (Prevent air current dusting.) b) Neutralize with acid or waste acid. c) Use as a soil amendment. d) Use to stabilize clay soils. Follow Federal, State and local regulations.

SECTION VIII—**PERSONAL PROTECTION INFORMATION**

spiratory Protection:	NIOSH approved dust filter respirator in dusty conditions. In absence of dust, mechanical exhaust is adequate.
e Protection:	Approved tight-fitting safety goggles.
Protective Gloves:	Clean, dry rubber gloves.
Clothing:	Clean, body-covering protective clothing, such as long-sleeve shirt with buttoned collar, long pants extending over tops of work shoes.
Ventilation:	Provide general ventilation and local exhaust ventilation with appropriate dust collection to meet TLV requirements for lime dust.
Other Equipment:	An eyewash station and safety shower should be readily available near the work area.

SECTION IX—**SPECIAL PRECAUTIONS**

Store materials in sealed containers in a dry place. Avoid contact with acids and other incompatible materials. Exposure to air lowers the available calcium hydroxide reactivity over time.

SPECIAL REFERENCE: LIME HANDLING, APPLICATION, AND STORAGE, Nat. Lime Assoc. Bull. 213, 4th ed., 1982.

Rev. 03/04/86 HSC

Received by GEO

PROVED: _____ DATE: June 8, 1987

MATERIAL SAFETY DATA SHEET

Identity:
Sepiolite Clay (CAS #63800-37-3)

SECTION I

Manufacturer's Name
IMV NEVADA

Address
Route Box 549
Amargosa Valley, Nevada 89020

Emergency Telephone Number
775-372-5341

Telephone Number for Information
702-372-5341

Date Prepared 06-15-92

Date Revised 2/10/99

SECTION II - HAZARDOUS INGREDIENTS/IDENTITY INFORMATION

Hazardous Components: Respirable dust may contain Silica, Crystalline Quartz (CAS #14808-60-7)

Specific Chemical Identity:

Sepiolite ($H_6 Mg_8 Si_{12} O_{30} [OH]_{10}$) ● $6 H_2O$) CAS #63800-37-3

Common Names: Sepiolite, Meerschaum, Palygorskite, Clay--a natural mineral extracted from the earth (see tradenames, page 4)

OSHA PEL: Classified as a nuisance dust when less than 1% crystalline silica is present, PEL=5.00mg/M^3 (respirable).

If greater than 1% crystalline silica, then exposures shall not exceed an 8-hour time-weighted average limit as stated in 29 CFR §1910.1000 Table Z-1-A for air contaminants, specifically;

Silica, Crystalline Quartz (respirable) 0.1 mg/M^3

ACGIH TLV: Classified as a nuisance dust when less than 1% crystalline silica, TLV-TWA = 10 mg/M^3 (Total dust), 5 mg/M^3 (Respirable)

If greater than 1% crystalline silica, the TLV-TWA = 0.1 mg/M^3 (respirable crystalline quartz). See Threshold Limit Value and Biological Exposure Indices for 1991-1992, American Conference of Governmental Industrial Hygienists.

Other Limits Recommended: National Institute for Occupational Safety and Health (NIOSH). Recommended standard maximum permissible concentration=0.05 mg/M^3 (respirable crystalline quartz) as determined by a full-shift sample up to 10-hour working day, 40-hour work week. See NIOSH Criteria for a Recommended Standard Occupational Exposure to Crystalline Silica.

SECTION III - PHYSICAL/CHEMICAL CHARACTERISTICS

Boiling Point:	More than 1000°F	**Specific Gravity (H_2O = 1):**	1.9-2.4
Vapor Pressure (mm Hg.):	None	**Melting Point:**	None
Vapor Density (AIR = 1):	None	**Evaporation Rate:**	None
Solubility in Water:	Insoluble in water		
Appearance and Odor:	Light gray, tan or reddish tan, granular or powder. Earthy odor when wet.		

SECTION IV —FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): Non-flammable

Flammable Limits: None **LEL:** None **UEL:** None

Extinguishing Media: None required

Special Fire Fighting Procedures: None

Unusual Fire and Explosion Hazards: None

SECTION V —REACTIVITY DATA

Stability: Stable **Conditions to Avoid:** None
Incompatibility (Materials to Avoid): None
Hazardous Decomposition or Byproducts: None
Hazardous Polymerization: Will Not Occur **Conditions to Avoid:** None

SECTION VI—HEALTH HAZARD DATA

Route(s) of Entry: Inhalation? Yes **Skin?** No **Ingestion?** No

Health Hazards (Acute and Chronic)
May be harmful if inhaled in sufficient quantities. Prolonged exposure to Bentonite Organoclay dust may cause a relatively benign lung disease, though there is a risk of the development of massive fibrosis. Repeated and prolonged exposure to respirable crystalline quartz which may be contained in Bentonite Organoclay dust may cause delayed (chronic) lung injury (silicosis). Silicosis is a form of disabling pulmonary fibrosis which can be progressive and may lead to death.

Carcinogenicity: NTP? Yes **IARC Monographs?** Yes **OSHA Regulated?** No

IARC has reported that there is inadequate evidence for the carcinogenicity of sepiolite in experimental animals and that there is no data available to evaluate the carcinogenicity of sepiolite in humans (IARC Class 3).

Sepiolite Clay, like other naturally occurring minerals, may contain crystalline silica. IARC has concluded that there is limited evidence for the carcinogenicity of crystalline silica to humans and sufficient evidence for the carcinogenicity of crystalline silica to experimental animals (IARC Class 2A). The NTP has concluded that "silica, crystalline (respirable)" may reasonably be anticipated to be a carcinogen, based on sufficient evidence for the carcinogenicity of respirable crystalline silica in experimental animals and limited evidence in humans.

Signs and Symptoms of Exposure: Undue breathlessness, wheezing, cough and sputum production.

Medical Conditions Generally Aggravated by Exposure: Pulmonary function may be reduced by inhalation of respirable crystalline silica that may be in Sepiolite Organoclay dust. Lung scarring produced by such inhalation may lead to a progressive massive fibrosis of the lung which may aggravate other pulmonary conditions and diseases and which increases susceptibility to pulmonary tuberculosis. Progressive massive fibrosis may be accompanied by right heart enlargement, heart failure, and pulmonary failure. Smoking aggravates the effects of exposure.

Emergency and First Aid Procedures: For dust in eyes, wash immediately with water. If irritation persists, seek medical attention. For gross inhalation, remove person immediately to fresh air, give artificial respiration as needed, seek medical attention as needed.

SECTION VII—PRECAUTIONS FOR SAFE HANDLING AND USE

Steps To Be Taken In Case Material Is Released Or Spilled:

Spills: Use dustless methods (vacuum) and place into closable container for disposal, or flush with water. Do not dry sweep. Care should be taken to avoid high aerosol dust concentrations. Wear protective equipment specified below. Spilled material may become very slippery when wet with water, grease, oil, gasoline, or solvents.

Waste Disposal Method: Dispose in accordance with Federal, State, and Local regulations.

Precautions to Be Taken In Handling and Storing: Avoid breakage of bagged material or spills of bulk material. See control measures in Section VIII.

Other Precautions: Use dustless systems for handling, storage, and clean up so that airborne dust does not exceed the PEL. Use adequate ventilation and dust collection. Practice good housekeeping. Do not permit dust to collect on walls, floors, sills, ledges, machinery, or equipment. Maintain, clean, and fit test respirators in accordance with OSHA regulations. Maintain and test ventilation and dust collection equipment. Wash or vacuum clothing which has become dusty. See also control measures in Section VIII.

See OSHA Hazard Communication Rule 29 CFR Sections 1910.1200, 1915.99, 1917.28, 1918.90, 1926.59, and 1928.21, and state and local worker or community "right to know" laws and regulations. We recommend that smoking be prohibited in all areas where respirators must be used. WARN YOUR EMPLOYEES (AND YOUR CUSTOMERS-USERS IN CASE OF RESALE) BY POSTING AND OTHER MEANS OF THE HAZARDS AND OSHA PRECAUTIONS TO BE USED. PROVIDE TRAINING FOR YOUR EMPLOYEES ABOUT THE OSHA PRECAUTIONS.

See also American Society for Testing and Materials (ASTM) standard practice E 1132-86, "Standard Practice for Health Requirements Relating to Occupational Exposure to Quartz Dust."

SECTION VIII—CONTROL MEASURES

Respiratory Protection (Specify Type)

The following chart specifies the types of respirators which may provide respiratory protection for respirable crystalline silica that may be contained in Sepiolite Organoclay dust.

RESPIRATORY PROTECTION FOR CRYSTALLINE SILICA

CONDITION Particulate Concentration	MINIMUM RESPIRATORY PROTECTION*
Up to 5 x PEL	Any dust respirator
Up to 10 x PEL	Any dust respirator, except single-use or quarter-mask respirator. Any fume respirator of high efficiency particulate filter respirator Any supplied-air respirator. Any self-contained breathing apparatus.
Up to 50 x PEL	A high efficiency particulate filter respirator with a full facepiece. Any supplied-air respirator with a full facepiece, helmet, or hood. Any self-contained breathing apparatus with a full facepiece.
Up to 500 x PEL	A powered air-purifying respirator with a high efficiency particulate filter. A Type C supplied-air respirator operated in pressure-demand or other positive pressure or continuous-flow mode.
Greater than 500 x PEL or entry and escape from unknown concentrations	Self-contained breathing apparatus with a full facepiece operated in pressure-demand or other positive pressure mode. A combination respirator which includes a Type C supplied-air respirator with a full facepiece operated in pressure-demand or other positive pressure continuous-flow mode and an auxiliary self-contained breathing apparatus operated in pressure-demand or other positive pressure mode.

*Only NIOSH-approved or MSHA-approved equipment should be used.(See 29 CFR 1910.134).

Ventilation:

Local Exhaust Use sufficient local exhaust to reduce the level of dust to the PEL. See ACGIH "Industrial Ventilation, A Manual of Recommended Practice," the latest edition.

Mechanical
See "Other Precautions" under Section VII.

Special
See "Other Precautions" under Section VII.

Other
See "Other Precautions" under Section VII.

Protective Gloves
Optional.

Eye Protection
Wear protective shield (safety glasses) when exposed to dust particles.

Other Protective Clothing and Equipment
Optional.

Work/Hygienic Practices
Avoid creating and breathing dust. See "Other Precautions" under Section VII.

The information and recommendations contained herein are based upon data believed to be correct. However, no guarantee or warranty of any kind, express or implied, is made with respect to the information contained herein. We accept no responsibility and disclaim all liability for any harmful health effects which may be caused by purchase, resale, use or exposure to our Sepiolite Clay. Customers-users of Sepiolite Clay must comply with all applicable health and safety laws, regulations, and orders.

TRADE NAMES

I G S
SEA MUD
SEPIOGEL - A
SEPIOGEL - R
SEPIOGEL - F
SEPIOGEL - UF
SEPIOGEL - 721
THERMOGEL
THERMOGEL - B
SEPIOLITE NOODLES
SEPIOLITE ORE
WET SEPIOLITE NOODLES
SEPIOGEL - FG
GRANULAR SEPIOLITE
SEPIOGEL FLM
MIN-U-GEL - 200i
SEPIOLITE - 1630i
SEPIOLITE - 3080i

AMBER CHEMICAL INCORPORATED

MATERIAL SAFETY DATA

MSDS NUMBER : 5001

REVISION DATE : 10/27/95

EMERGENCY TELEPHONE NUMBER: (805) 325-2072

SECTION ONE - PRODUCT DESCRIPTION

PRODUCT NAME: TBP-EX DEFOAMER

CHEMICAL DESCRIPTION: Blend of Trialkyl Phosphate/Aliphatic Alcohol/Hydrocarbon

SYNONYMS: None

DOT HAZARD CLASS: Non-Hazardous

DOT SHIPPING NAME:: Chemicals, n.o.i.

SECTION TWO - HAZARDOUS INGREDIENT

CHEMICAL	CAS NUMBER	% PRESENT	TLV OR PEL
Tributyl Phosphate	126-73-8	35%	TWA=0.2ppm

SECTION THREE - PHYSICAL DATA

BOILING POINT - 285°F

SOLUBILITY IN WATER (% BY VOLUME) - Slightly

EVAPORATION RATE (BUTYL ACETATE = 1) - N.A.

% VOLATILES BY VOLUME - Nil

SPECIFIC GRAVITY (H_2O=1) - .91

FREEZING POINT - N.A.

VAPOR PRESSURE @ 20°C - <1mm

VAPOR DENSITY - >1

APPEARANCE AND ODOR - Clear, pale brown liquid with characteristic odor

SECTION FOUR - FIRE AND EXPLOSION HAZARD

FLASH POINT [TEST METHOD(S)] 310°F (Cleveland Open Cup)

FLAMMABLE LIMITS IN AIR, % BY VOLUME -- Not Established

EXTINGUISHING MEDIA - Water, Dry Chemical, Carbon Dioxide, Foam

UNUSUAL FIRE AND EXPLOSION HAZARDS - NONE

SPECIAL FIRE FIGHTING PROCEDURES - As with most chemical fires, it is advised that firemen be supplied with self-contained breathing devices equipped with full face piece..

While Amber Chem. believes that the data contained herein are factual and the opinions expressed are those of qualified experts regarding the results of the tests conducted the data are not to be taken as a warranty or representation for which Amber Chem. assumes legal responsibility. They are offered solely for your consideration, investigation and verification. Any use of these data and information must be determined by the user in accordance with applicable Federal, State and local laws and regulations.

SECTION FIVE - HEALTH AND FIRST AID DATA

ACUTE EFFECTS OF OVEREXPOSURE:

SWALLOWING - Ingestion may cause irritation to the membrances of the mouth, throat and gastrointestinal tract. Nausea, vomiting, cramps and diarrhea may occur. In severe cases, tissue ulceration and central nervous system effects may result.

SKIN ABSORPTION - None currently known.

INHALATION - No health effects are known to occur from inhalation of this product. Inhalation of mists or sprays may result in non-specific irritation of the upper respiratory tract.

SKIN CONTACT - Contact with skin could produce severe local irritation.

EYE CONTACT - Severe local irritation may result. CORNEAL DAMAGE MAY OCCUR IF NOT PROMPTLY WASHED AWAY WITH WATER.

CHRONIC EFFECTS OF OVEREXPOSURE - No chronic effects, either systemic or local are known.

OTHER HEALTH HAZARDS - None currently known.

EMERGENCY AND FIRST AID PROCEDURES:

SWALLOWING - Give large amounts of warm salt water to induce vomiting or by putting finger down the patient's throat. Vomiting should be encouraged until vomitus is clear. Milk, eggs, or olive oil may be given after vomiting, for their soothing effect. Obtain medical attention.

SKIN - Flush affected area with water, followed by washing with soap and water until all material is removed. Obtain medical attention if irritation persists.

INHALATION - Remove from contaminated atmosphere. If symptoms of respiratory discomfort persist, obtain medical attention.

EYES - Immediately flush eyes with large quantities of water. Do not attempt to neutralize with chemical agents. Obtain medical attention if irritation persists.

TLV OR PEL AND SOURCE - None currently established.

HAZARDOUS MATERIALS IDENTIFICATION SYSTEM:

HEALTH: (2)

FLAMMABILITY: (1)

REACTIVITY: (1)

PERSONAL PROTECTION EQUIPMENT: (C)

Goggles, gloves, synthetic apron.

HAZARD INDEX *
4 SEVERE HAZARD
3 SERIOUS HAZARD
2 MODERATE HAZARD
1 SLIGHT HAZARD
0 MINIMAL HAZARD

*USED AND ASSIGNED BY AMBER CHEMICAL INC. TO IDENTIFY HAZARDS OF THE MATERIAL. SEE

SECTION SIX - REACTIVITY DATA

STABILITY: Stable

CONDITIONS TO AVOID IF UNSTABLE: None.

INCOMPATIBILITY WITH OTHER MATERIALS: None currently known.

HAZARDOUS DECOMPOSITION PRODUCTS: None currently known.

HAZARDOUS POLYMERIZATION: Will not occur.

CONDITIONS TO AVOID: None currently known.

SECTION SEVEN - SPILL AND DISPOSAL PROCEDURES

STEPS TO BE TAKEN IF MATERIAL IS RELEASED OR SPILLED: Wear suitable protective equipment. Small Spills: Absorb liquid with absorbent material. Large Spills: Stop spill at source. Dike area of the spill to prevent spreading. Pump liquids into waste containers. Remaining liquids can be absorbed.

WASTE DISPOSAL METHOD: Incinerate or landfill where permitted under appropriate federal, state and local regulations. TBP-EX DEFOAMER would be defined as hazardous (Corrosive) by the U.S. EPA, and must be disposed of in accordance with the law. Questions concerning disposal should be directed to Amber Chemical.

SECTION EIGHT - SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION: Self-contained breathing apparatus in high concentrations. Normally not required.

VENTILATION: General (mechanical) room ventilation is expected to be satisfactory.

PROTECTIVE GLOVES: Butyl or neoprene rubber.

EYE PROTECTION: Monogoggles.

OTHER PROTECTIVE EQUIPMENT: Synthetic apron, eye wash station.

SECTION NINE - SPECIAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING: Do not get in eyes, on skin, or on clothing. Wash thoroughly after handling. Soiled clothing should be removed and laundered before reuse. Store below 120°F.

Material Safety Data Sheet

May be used to comply with OSHA's Hazard Communication Standard, 29 CFR 1910.1200. Standard must be consulted for specific requirements.

U.S. Department of Labor
Occupational Safety and Health Administration
(Non-Mandatory Form)
Form Approved
OMB No. 1218-0072

CC: b LC: D

IDENTITY *(As Used on Label and List)* Super Lig (Lignite)

Note: Blank spaces are not permitted. If any item is not applicable, or no information is available, the space must be marked to indicate that.

Section I

Manufacturer's Name American Colloid Company	Emergency Telephone Number 312-392-4600
Address *(Number, Street, City, State, and ZIP Code)* 1500 W. Shure Drive	Telephone Number for Information 312-392-4600
One North Arlington	Date Prepared May 1, 1986
Arlington Heights, Illinois 60004	Signature of Preparer *(optional)*

Section II — Hazardous Ingredients/Identity Information

Hazardous Components (Specific Chemical Identity; Common Name(s))	OSHA PEL	ACGIH TLV	Other Limits Recommended	% *(optional)*
Mineral Dusts:				
Respirable	1.5 mg/m3	1.5 mg/m3	N/A	-
Total Mass	4 mg/m3	4 mg/m3	N/A	-

* PRODUCT IDENTIFICATION *

Chemical Name : Leonardite
Chemical Family: North Dakota Crude Humic Acid
CAS NO. : 1415-93-6
NFPA/HMIS : Health - 0, Fire - 2, Reactivity - 0, Specific Hazard
DOT Class : Not Regulated

Section III — Physical/Chemical Characteristics

Boiling Point	N/A	Specific Gravity (H_2O = 1)	1.5
Vapor Pressure (mm Hg.)	N/A	Melting Point	10-20%
Vapor Density (AIR = 1)	N/A	Evaporation Rate (Butyl Acetate = 1)	N/A

Solubility in Water 0% - Negligible

Appearance and Odor Deep brown to black powder, almost odorless

Section IV — Fire and Explosion Hazard Data

Flash Point (Method Used)	Flammable Limits	LEL	UEL
Over 130°F	N/A	-	-

Extinguishing Media
Water

Special Fire Fighting Procedures
NONE

Unusual Fire and Explosion Hazards
May explode if suspended in air.

Section V — Reactivity Data

Stability	Unstable		Conditions to Avoid
	Stable	X	NONE

Incompatibility (*Materials to Avoid*) NONE

Hazardous Decomposition or Byproducts NONE

Hazardous Polymerization	May Occur		Conditions to Avoid
	Will Not Occur	X	NONE

Section VI — Health Hazard Data

Route(s) of Entry: Inhalation? Yes Skin? No Ingestion? No

Health Hazards (*Acute and Chronic*)
May be harmful if inhaled over prolonged period and may cause delayed lung injury.

Carcinogenicity: NTP? No IARC Monographs? No OSHA Regulated? No

Signs and Symptoms of Exposure N/A

Medical Conditions Generally Aggravated by Exposure N/A

Emergency and First Aid Procedures N/A

Section VII — Precautions for Safe Handling and Use

Steps to Be Taken in Case Material Is Released or Spilled
Vacuum if possible to avoid generating airborne dust. Avoid breathing dust. Wear approved respirator.

Waste Disposal Method
Bury in an approved sanitary landfill, in accordance with Federal, State & Local regulations

Precautions to Be Taken in Handling and Storing
Avoid breathing dust. Use NIOSH/MSHA approved respirator where TLV limits for Coal Dust may be exceeded.

Other Precautions
Keep away from heat, sparks, and open flame.

Section VIII — Control Measures

Respiratory Protection (*Specify Type*)
NIOSH/MSHA approved respirator

Ventilation	Local Exhaust Required	Special N/A
	Mechanical (*General*) N/A	Other N/A

Protective Gloves N/A | Eye Protection Optional use of goggles

Other Protective Clothing or Equipment N/A

Work/Hygienic Practices N/A

U.S.G.P.O. 1986-491-529/65775

Attachment
CDR-292

MATERIAL SAFETY DATA SHEET

I. PRODUCT IDENTIFICATION

TRADE NAME (as labeled): Pure Bright Industrial Bleach 12.5%
EPA Reg. No. 70271-12

MANUFACTURER'S NAME: KIK International-SoCal. Inc.

ADDRESS: 9028 Dice Road
Santa Fe Springs, CA 90670

Certified to Std 60
Max Use: 85 mg/L

DATE PREPARED OR REVISED: January 2, 2002

II. HAZARDOUS INGREDIENTS

CHEMICAL NAMES	CAS Number	Percent*	Exposure limits in air ACGHI TLV	OSHA PEL	OTHER:
Sodium Hypochlorite	7681-52-9	--	1 ppm (Chlorine Gas)	1 ppm	N/A

III. PHYSICAL PROPERTIES

Vapor density (air=1): N/A
Specific Gravity: 1.19-1.21 @ 20°C
Solubility on water: 100%
Vapor pressure, mm Hg @ 20: N/A
Melting point or range, F: N/A
Boiling point or range, F: N/A
Evaporation rate (butyl acetate=1): N/A
Appearance and odor: Pale yellow liquid with typical bleach odor.

IV. FIRE AND EXPLOSION

Flash point, F (Give method): N/A
Flammable limits in air, volume %: Non-Flammable Lower: Upper:

Fire Extinguishing materials: Use water in flooding quantities as fog.

Water Spray: X Carbon Dioxide: Foam: Dry Chemical: Other:

Special firefighting procedures: Wear Niosh-approved self contained breathing apparatus for chlorine gas vapors. Cool fire exposed containers with water.

Unusual fire and explosion hazards: Bleach decomposes when heated to high temperatures.

NFPA Hazard Classification:

Health: 3 Flammability: 0 Reactivity: 2 Special: COR

*Not a required category

V. HEALTH HAZARD INFORMATION

SYMPTOMS OF OVEREXPOSURE FOR EACH POTENTIAL ROUTE OF EXPOSURE:

Inhaled: Inhalation of vapors may cause bronchial irritation, coughing, difficulty breathing, pulmonary irritation.

Contact with skin or eyes: Accidental eye contact with liquid or vapors may cause severe irritation. May cause severe skin irritation or chemical burns to broken skin.

Absorbed through skin: May result in blistering and eczema.

Swallowed: May cause burning sensation and corrosion of mucous membranes, esophageal or gastric perforation, laryngeal edema, vomiting and nausea.

HEALTH EFFECTS OR RISKS FROM EXPOSURE

Acute: Depending on solution concentration, material may be corrosive to skin, mucous membranes, and eyes. Vapors may cause respiratory irritation.

Chronic: May cause damage or injury to eyes, skin and respiratory organs.

FIRST AID AND EMERGENCY PROCEDURES

Eye Contact: Flush eyes with plenty of water holding eyelids apart to ensure complete irrigation of all eye and lid tissue for at least 15 minutes. Get medical attention.

Skin Contact: Immediately remove contaminated clothing and wash thoroughly with running water. If irritation persists, contact physician or local poison control center.

Inhaled: If effects occur, remove victim to fresh air. Provide symptomatic care and support respiration. Get prompt medical attention.

Swallowed: Drink large quantities of milk to dilute or gelatin solution. If these are not available, drink large quantities of water. **DO NOT** give vinegar or other acids. **DO NOT** induce vomiting. Get prompt medical attention.

SUSPECT CANCER AGENT ?

NO: X This product's ingredients are not found in the lists below.

YES: **Federal OSHA:** **NTP:** **IARC:**

VI. REACTIVITY DATA

STABILITY **STABLE:** **UNSTABLE:** X

Conditions to avoid: Heat

Incompatibility (materials to avoid): Acids, ammonia, organic compounds, heavy metals and salts thereof, and oxidizing or reducing compounds.

Hazardous decomposition products (including combustion products): Chlorine, chlorine dioxide, chloramines. Decomposition products may cause containers to rupture.

Hazardous polymerization: **May occur:** **Will not occur:** X

VII. SPILL, LEAK, AND DISPOSAL PROCEDURES

Spill response procedures (including employee protection measures): Dilute with copious amounts of water and then mop up. Avoid splashing into eyes. Avoid repeated or prolonged skin contact, avoid inhalation of fumes, stay up wind of spill.

Preparing wastes for disposal (container types, neutralization, etc.): Product rinsates that cannot be used should be diluted with water before disposal in a sanitary sewer. Do not re-use empty container. Dispose in accordance with federal, state, and local regulations.

NOTE: This product is toxic to fish and aquatic organisms. Do not discharge into lakes, streams, ponds, estuaries, oceans or public waters unless in accordance with the requirements of a National Pollutant Discharge Elimination System (NPDES) permit and the permitting authority has been notified in writing prior to discharge. Do not discharge effluent containing this product to sewer systems without previously notifying the local sewage treatment plant authority. For guidance contact your State Water Board or Regional Office of the EPA.

VIII. SPECIAL HANDLING PROCEDURES

Ventilation and engineering controls: Provide adequate ventilation.
Respiratory protection (type): Wear Niosh-approved respiratory protection. Wear chemical cartridge (acid gas) respirator.
Eye protection (type): Wear splash-proof chemical resistant safety goggles.
Gloves (specify material): Wear protective clothing including rubber gloves, rubber boots, and face shield.
Other clothing and equipment: See above.
Work practices, hygienic practices: Provide eye bath and emergency showers. Launder work clothes when soiled.

Other handling and storage requirements: Store in cool, dark place away from heat and light to avoid deterioration. Store below 90°F. Keep containers well closed. Provide adequate ventilation.

The information contained herein is provided in good faith and is believed to be correct as of the date hereof. However, KIK International-SoCal Inc. makes no representation as to the comprehensiveness or accuracy of the information. It is expected that the individuals receiving the information will exercise their judgement in determining its appropriateness for a particular purpose. Accordingly, KIK International-SoCal Inc. will not be responsible for damages of any kind resulting from the use of or reliance upon such information. No representations, or warranties, either expressed or implied of merchantability. Fitness for a particular purpose or of any other nature are made hereunder with respect to the information set forth herein or to the product to which the information refers.

For general information or Material Safety Data Sheet requests please call our offices at:

(800) 997-4413 Monday through Friday 9 am to 5 pm

All KIK International-SoCal Inc. are listed with Hazard Information Services. For Emergency Response and Hazard Communication ONLY call:

1 (800) 228-5635 Extension 179

NALCO

MATERIAL SAFETY DATA SHEET

PRODUCT

NALCO 97ND048

Emergency Telephone Number
Medical (800) 462-5378 (24 hours) (800) I-M-ALERT

SECTION 01 CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

TRADE NAME: NALCO 97ND040
DESCRIPTION: An alkyl aryl sulfonate in water

NFPA 704M/HMIS RATING: 2/2 HEALTH 1/1 FLAMMABILITY 0/0 REACTIVITY 0 OTHER
0=Insignificant 1=Slight 2=Moderate 3=High 4=Extreme

SECTION 02 COMPOSITION AND INFORMATION ON INGREDIENTS

Our hazard evaluation has identified one or more hazardous ingredient(s) under OSHA's Hazard Communication Rule, 29 CFR 1910.1200. Their identity is being claimed a trade secret. Consult Section 15 for the nature of the hazard(s).

INGREDIENT(S)	CAS #	APPROX.%
Linear alkylbenzenesulfonate	Proprietary	10-20

SECTION 03 HAZARD IDENTIFICATION

EMERGENCY OVERVIEW:
WARNING! Causes irritation to skin and eyes. Do not get in eyes, on skin, or on clothing. Wear goggles and face shield when handling. Avoid prolonged or repeated breathing of vapor. Use with adequate ventilation. Do not take internally.

Empty containers may contain residual product. Do not reuse container unless properly reconditioned.

PRIMARY ROUTE(S) OF EXPOSURE: Eye, Skin

EYE CONTACT: Can cause moderate to severe irritation.
SKIN CONTACT: Can cause moderate to severe irritation.

SYMPTOMS OF EXPOSURE: A review of available data does not identify any symptoms from exposure not previously mentioned.

AGGRAVATION OF EXISTING CONDITIONS: A review of available data does not identify any worsening of existing conditions.

SECTION 04 FIRST AID INFORMATION

EYES: Immediately flush with water for at least 15 minutes while holding eyelids open. Call a physician at once.
SKIN: Flush with water for 15 minutes.
INGESTION: Do not induce vomiting. Give water. Call a physician.
INHALATION: Remove to fresh air. Treat symptoms. Call a physician.

NOTE TO PHYSICIAN: Based on the individual reactions of the patient, the physician's judgment should be used to control symptoms and clinical condition.

CAUTION: If unconscious, having trouble breathing or in convulsions, do not induce vomiting or give water.

SECTION 05 FIRE FIGHTING MEASURES

FLASH POINT: Greater than 200 Degrees F (PMCC) ASTM D-93

EXTINGUISHING MEDIA: Not applicable

NALCO CHEMICAL COMPANY ONE NALCO CENTER • NAPERVILLE, ILLINOIS 60563-1198
AREA (630) 305-1000

NALCO

MATERIAL SAFETY DATA SHEET

PRODUCT

NALCO 97ND048

Emergency Telephone Number
Medical (800) 462-5378 (24 hours) (800) I-M-ALERT

UNUSUAL FIRE AND EXPLOSION HAZARD: May evolve SOx under fire conditions.

SECTION 06 ACCIDENTAL RELEASE MEASURES

IN CASE OF TRANSPORTATION ACCIDENTS, CALL THE FOLLOWING 24-HOUR TELEPHONE NUMBER (800) I-M-ALERT or (800) 462-5378.

SPILL CONTROL AND RECOVERY:

Small liquid spills: Contain with absorbent material, such as clay, soil or any commercially available absorbent. Shovel reclaimed liquid and absorbent into recovery or salvage drums for disposal. Refer to CERCLA in Section 15.

Large liquid spills: Dike to prevent further movement and reclaim into recovery or salvage drums or tank truck for disposal. Refer to CERCLA in Section 15.

SECTION 07 HANDLING AND STORAGE

Storage : Keep container closed when not in use.

SECTION 08 EXPOSURE CONTROLS AND PERSONAL PROTECTION

RESPIRATORY PROTECTION: Respiratory protection is not normally needed.

For large spills, entry into large tanks, vessels or enclosed small spaces with inadequate ventilation, a positive pressure, self-contained breathing apparatus is recommended.

VENTILATION: General ventilation is recommended.

PROTECTIVE EQUIPMENT: Use impermeable gloves and chemical splash goggles when attaching feeding equipment, doing maintenance or handling product. Examples of impermeable gloves available on the market are neoprene, nitrile, PVC, natural rubber, viton and butyl (compatibility studies have not been performed).

The availability of an eye wash fountain and safety shower is recommended.

If clothing is contaminated, remove clothing and thoroughly wash the affected area. Launder contaminated clothing before reuse.

HUMAN EXPOSURE CHARACTERIZATION: Based on Nalco's recommended product application and our recommended personal protective equipment, the potential human exposure is: LOW.

SECTION 09 PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE:	Clear, colorless	
FORM:	Liquid	
DENSITY:	8.5 lbs/gal.	
SPECIFIC GRAVITY:	1.02 @ 60 Degrees F	ASTM D-1298
pH (at 10%) =	8.0-9.3	ASTM E-70
FLASH POINT:	Greater than 200 Degrees F (PMCC)	ASTM D-93

NOTE: These physical properties are typical values for this product.

SECTION 10 STABLILITY AND REACTIVITY

NALCO CHEMICAL COMPANY ONE NALCO CENTER • NAPERVILLE, ILLINOIS 60563-1198
AREA (630) 305-1000

NALCO

MATERIAL SAFETY DATA SHEET

PRODUCT

NALCO 97ND048

Emergency Telephone Number
Medical (800) 462-5378 (24 hours) (800) I-M-ALERT

INCOMPATIBILITY: Avoid contact with strong oxidizers (eg. chlorine, peroxides, chromates, nitric acid, perchlorates, concentrated oxygen, permanganates) which can generate heat, fires, explosions and the release of toxic fumes.

THERMAL DECOMPOSITION PRODUCTS: In the event of combustion CO, CO2, SOx may be formed. Do not breathe smoke or fumes. Wear suitable protective equipment.

SECTION 11 TOXICOLOGICAL INFORMATION

TOXICITY STUDIES: No toxicity studies have been conducted on this product.

HUMAN HAZARD CHARACTERIZATION: Based on our hazard characterization, the potential human hazard is: MODERATE.

SECTION 12 ECOLOGICAL INFORMATION

AQUATIC DATA:

Results below are based on the active ingredient

96 hour static acute LC50 to Bluegill Sunfish = Greater than 1 but Less than 10 ppm

TOXICITY RATING: Toxic

96 hour static acute LC50 to Pathead Minnow = Greater than 1 but Less than 10 ppm

TOXICITY RATING: Toxic

If released into the environment, see CERCLA in Section 15.

ENVIRONMENTAL HAZARD AND EXPOSURE CHARACTERIZATION: Based on our Hazard Characterization, the potential environmental hazard is: MODERATE. Based on Nalco's recommended product application and the product's characteristics, the potential environmental exposure is: MODERATE.

SECTION 13 DISPOSAL CONSIDERATIONS

DISPOSAL: If this product becomes a waste, it does not meet the criteria of a hazardous waste as defined under the Resource Conservation and Recovery Act (RCRA) 40 CFR 261, since it does not have the characteristics of Subpart C, nor is it listed under Subpart D.

As a non-hazardous liquid waste, it should be solidified with stabilizing agents (such as sand, fly ash, or cement) so that no free liquid remains before disposal to an industrial waste landfill. A non-hazardous liquid waste can also be incinerated in accordance with local, state and federal regulations.

SECTION 14 TRANSPORTATION INFORMATION

PROPER SHIPPING NAME/HAZARD CLASS MAY VARY BY PACKAGING, PROPERTIES, AND MODE OF TRANSPORTATION. TYPICAL PROPER SHIPPING NAMES FOR THIS PRODUCT ARE:

ALL TRANSPORTATION MODES : PRODUCT IS NOT REGULATED

NALCO CHEMICAL COMPANY ONE NALCO CENTER • NAPERVILLE, ILLINOIS 60563-1198
AREA (630) 305-1000

NALCO

MATERIAL SAFETY DATA SHEET

PRODUCT

NALCO 97ND048

Emergency Telephone Number
Medical (800) 462-5378 (24 hours) (800) I-M-ALERT

DURING TRANSPORTATION

SECTION 15 REGULATORY INFORMATION

The following regulations apply to this product.

FEDERAL REGULATIONS:

OSHA HAZARD COMMUNICATION RULE, 29 CFR 1910.1200:
Based on our hazard evaluation, the following ingredient in this product is hazardous and the reason is shown below.

Linear alkylbenzenesulfonate - Irritant

CERCLA/SUPERFUND, 40 CFR 117, 302:
Notification of spills of this product is not required.

SARA/SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT OF 1986
(TITLE III) - SECTIONS 302, 311, 312 AND 313:

SECTION 302 - EXTREMELY HAZARDOUS SUBSTANCES (40 CFR 355):
This product does not contain ingredients listed in Appendix A and B as an Extremely Hazardous Substance.

SECTIONS 311 and 312 - MATERIAL SAFETY DATA SHEET REQUIREMENTS (40 CFR 370):
Our hazard evaluation has found this product to be hazardous. The product should be reported under the following EPA hazard categories:

XX Immediate (acute) health hazard
-- Delayed (chronic) health hazard
-- Fire hazard
-- Sudden release of pressure hazard
-- Reactive hazard

Under SARA 311 and 312, the EPA has established threshold quantities for the reporting of hazardous chemicals. The current thresholds are: 500 pounds or the threshold planning quantity (TPQ), whichever is lower, for extremely hazardous substances and 10,000 pounds for all other hazardous chemicals.

SECTION 313 - LIST OF TOXIC CHEMICALS (40 CFR 372):
This product does not contain ingredients (at a level of 1% or greater) on the List of Toxic Chemicals.

TOXIC SUBSTANCES CONTROL ACT (TSCA):
The chemical ingredients in this product are on the 8(b) Inventory List (40 CFR 710).

RESOURCE CONSERVATION AND RECOVERY ACT (RCRA), 40 CFR 261 SUBPART C & D:
Consult Section 13 for RCRA classification.

FEDERAL WATER POLLUTION CONTROL ACT, CLEAN WATER ACT, 40 CFR 401.15/
formerly Sec. 307, 40 CFR 116/formerly Sec. 311:
None of the ingredients are specifically listed.

CLEAN AIR ACT, Sec. 111 (40 CFR 60), Sec. 112 (40 CFR 61, 1990 Amendments),
Sec. 611 (40 CFR 82, CLASS I and II Ozone depleting substances):
This product does not contain ingredients covered by the Clean Air Act.

STATE REGULATIONS:

NALCO CHEMICAL COMPANY ONE NALCO CENTER • NAPERVILLE, ILLINOIS 60563-1198
AREA (630) 305-1000

NALCO

MATERIAL SAFETY DATA SHEET

PRODUCT

NALCO 97ND048

Emergency Telephone Number
Medical (800) 462-5378 (24 hours) (800) I-M-ALERT

CALIFORNIA PROPOSITION 65:
This product does not contain any chemicals which require warning under California Proposition 65.

MICHIGAN CRITICAL MATERIALS:
This product does not contain ingredients listed on the Michigan Critical Materials Register.

STATE RIGHT TO KNOW LAWS:
This product does not contain ingredients listed by State Right To Know Laws.

INTERNATIONAL REGULATIONS:

This is a WHMIS controlled product under The House of Commons of Canada Bill C-70 (Class D2B). The product contains the following substance(s), from the Ingredient Disclosure List or has been evaluated based on its toxicological properties, to contain the following hazardous ingredients(s):

Chemical Name	CAS #	% Concentration Range
Linear alkylbenzenesulfonate	Proprietary	20-40

SECTION 16 OTHER INFORMATION

None

SECTION 17 RISK CHARACTERIZATION

Due to our commitment to Product Stewardship, we have evaluated the human and environmental hazards and exposures of this product. Based on our recommended use of this product, we have characterized the product's general risk. This information should provide assistance for your own risk management practices. We have evaluated our product's risk as follows:

* The human risk is: LOW.
* The environmental risk is: MODERATE.

Any use inconsistent with Nalco's recommendations may affect our risk characterization. Our sales representative will assist you to determine if your product application is consistent with our recommendations. Together we can implement an appropriate risk management process.

This product material safety data sheet provides health and safety information. The product is to be used in applications consistent with our product literature. Individuals handling this product should be informed of the recommended safety precautions and should have access to this information. For any other uses, exposures should be evaluated so that appropriate handling practices and training programs can be established to insure safe workplace operations. Please consult your local sales representative for any further information.

SECTION 18 REFERENCES

Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices, American Conference of Governmental Industrial Hygienists, OH.

Hazardous Substances Data Bank, National Library of Medicine, Bethesda,

NALCO CHEMICAL COMPANY ONE NALCO CENTER • NAPERVILLE, ILLINOIS 60563-1198
AREA (630) 305-1000

NALCO

MATERIAL SAFETY DATA SHEET

PRODUCT

NALCO 97ND048

Emergency Telephone Number
Medical (800) 462-5378 (24 hours) (800) I-M-ALERT

Maryland (CD-ROM version), Micromedex, Inc., Englewood, CO.

IARC Monographs on the Evaluation of the Carcinogenic Risk of Chemicals to Man, Geneva: World Health Organization, International Agency for Research on Cancer.

Integrated Risk Information System, U.S. Environmental Protection Agency, Washington, D.C. (CD-ROM version), Micromedex, Inc., Englewood, CO.

Annual Report on Carcinogens, National Toxicology Program, U.S. Department of Health and Human Services, Public Health Service.

Title 29 Code of Federal Regulations, Part 1910, Subpart Z, Toxic and Hazardous Substances, Occupational Safety and Health Administration (OSHA).

Registry of Toxic Effects of Chemical Substances, National Institute for Occupational Safety and Health, Cincinnati, Ohio (CD-ROM version), Micromedex, Inc., Englewood, CO.

Shepard's Catalog of Teratogenic Agents (CD-ROM version), Micromedex, Inc., Englewood, CO.

Suspect Chemicals Sourcebook (a guide to industrial chemicals covered under major regulatory and advisory programs), Roytech Publications (a Division of Ariel Corporation), Bethesda, MD.

The Teratogen Information System, University of Washington, Seattle, Washington (CD-ROM version), Micromedex, Inc., Englewood, CO.

PREPARED BY: William S. Utley, PhD., DABT, Manager, Product Safety
DATE CHANGED: 02/21/1997 DATE PRINTED: 03/28/1999

NALCO CHEMICAL COMPANY ONE NALCO CENTER • NAPERVILLE, ILLINOIS 60563-1198
AREA (630) 305-1000

Attachment
CDR-294

Dear Mr. Aearne,

ARB staff are finalizing the regulatory package to be submitted to the Office of Administrative Law (OAL) for review. This should occur within the next month and, barring any unforeseen issues, the regulatory package and rulemaking record for the PM10 and PM2.5 annual standards should come to closure in the next few months. Regardless of when that date will be, the revised PM10 and new PM2.5 annual standards will be in the regulations this year and will likely become part of the state attainment planning process this fall. In addition, the short-term standards will remain under review as the information on the statistical issues affecting many of the key studies is made available and reviewed by ARB staff.

Please feel free to contact me ar (916) 445-9488 or my manager, Dr. Linda Smith at (916)327-8225.

Regards,

David Mazzera, Ph.D.
ARB

Attachment
CDR-305

Elmore Filter Cake 1998 to 2002

1998		1999		2000		2001		2002	
Non-Haz	**Hazardous**	**Non-Haz**	**Hazardous**	**Non-Haz**	**Hazardous**	**Non-Haz**	**Hazardous**	**Non-Haz**	**Hazardous**
5,730.39	3,933.78	7,542.04	2,863.52	9,201.33	1,211.03	8,641.1	0	8,304.23	572.34
Total for 1998		**Total for 1999**		**Total for 2000**		**Total for 2001**		**YTD Total for 2002**	
9,664.17 tons		**10,405.56 tons**		**10,412.36 tons**		**8,641.1 tons**		**8,876.57 tons**	

Totals for last 5 years

Non- Haz 39,419.09 tons **Hazardous 8,580.67 tons**

Grand total last 5 years

47,999.76 tons

Leathers Filter Cake 1998 to 2002

1998		1999		2000		2001		2002	
Non-Haz	**Hazardous**	**Non-Haz**	**Hazardous**	**Non-Haz**	**Hazardous**	**Non-Haz**	**Hazardous**	**Non-Haz**	**Hazardous**
6,718.29	2,095.01	5,904.56	2,733.66	8,062.36	1,413.85	6,131.76	1,797.72	6,588.57	2,494.48
Total for 1998		**Total for 1999**		**Total for 2000**		**Total for 2001**		**YTD Total for 2002**	
8,813.30 tons		**8,638.22 tons**		**9,476.21 tons**		**7,929.48 tons**		**9,083.05 tons**	

Totals for last 5 years

Non- Haz 33,405.54 tons **Hazardous 10,534.72 tons**

Grand total last 5 years

43,940.26 tons

Attachment
CDR-317

Vail 460

	1st Half	2nd Half
2002	Broccoli	Sudan
2001	Broccoli	Sudan
2000	Onion Seed / Flowers	Sudan
1999	Alfalfa	Alfalfa
1998	Alfalfa	Alfalfa
1997	Alfalfa	Alfalfa
1996	Alfalfa	Alfalfa
1995	Broccoli	Cantaloupes
1994	Broccoli	Sudan
1993	Cotton	Cotton
1992	Broccoli	Sudan

Attachment
CDR-322

Date	Facility Location	Location of Incident	Amount of Spill by Gallons
2/7/2003	Elmore	well header	393
1/24/2003	RR6	up stream of FE meter	15-20
1/7/2003	Elmore 16	production line west of well	500 - 700
12/7/2002	Elmore Power Plant	Production line west of plant	13,000 - 15,000
10/23/2002	Del Ranch Power Plant	DR-12 and M-9 Production Header Flange	30
5/30/2002	Elmore Power Plant	Elmore 14 Production Header	Unknown
5/30/2002	Elmore Power Plant	Elmore 14	678
5/29/2002	Del Ranch Power Plant	DR-IW-1	393
5/28/2002	Del Ranch Power Plant	DR-IW-6	Unknown
5/27/2002	Del Ranch Power Plant	DR-IW-1	Unknown
4/29/2002	Elmore Power Plant	Elmore 12	15
4/29/2002	Elmore Power Plant	Elmore 12	613
4/21/2002	Units 3, 4&5 (Reg. 1)	Sinclair 10	30
4/19/2002	Leathers Power Plant	Leathers	11,980
4/12/2002	Leathers Power Plant	Injection Header	3
4/3/2002	Vulcan Power Plant	M-10 Well	5
3/29/2002	Elmore Power Plant	El-6 Brine Header Flange	5
3/19/2002	Elmore Power Plant	EL-6	100
1/25/2002	Units 3, 4&5 (Reg. 1)	Vonderahe 2 Production Line	800
7/28/2001	Units 3, 4&5 (Reg. 1)	Production Pipeline for IID-16	16,000
7/16/2001	Units 3, 4&5 (Reg. 1)	Production Pipeline for IID-16	100
7/8/2001	Units 3, 4&5 (Reg. 1)	IID 16 Well	800
5/21/2002	Unit 5 (Reg. 1)	Flange at Unit 5 Brine Line	280
5/2/2001	Units 3, 4&5 (Reg. 1)	Production Line for Von 3 Well	300
4/9/2001	Units 3, 4&5 (Reg. 1)	Sinclair 27 Well	220
2/20/2001	Units 3, 4&5 (Reg. 1)	Vonderahe 2 Production Line	3,860
2/10/2001	Leathers Power Plant	Header pipeline for RR-18	200
2/2/2001	Leathers Power Plant	Under injection piping south of plant	1,500
1/20/2001	Leathers Power Plant	Production line leak near RR-9	380
11/20/2000	Units 3, 4&5 (Reg. 1)	Production line for Von 2 Well	2,500
8/18/2000	Elmore Power Plant	Under injection line	640
8/18/2000	Leathers Power Plant	Production line leak near RR-9	380
2/10/2000	Elmore Power Plant	Production line leak near RR-12	115
12/31/1998	Unit 3 Power Plant	Reinjection line to the west of Unit 3	1,100
10/18/1998	Unit 3 Power Plant	Pipeline valve between IID-16 and Von 3 - flange	440
8/15/1998	Elmore Power Plant	Elmore Plant Vulcan IW-3	500
5/21/1998	Leathers Power Plant	Injection line	407
4/6/1998	Vulcan Power Plant	Production Line	200
1/10/1998	Elmore Power Plant	Under old production line near PIVs in plant	100
9/4/1997	Del Ranch Power Plant	Production header east of Vulcan	300
8/12/1997	Del Ranch Power Plant	Production line near transformer near DR-5	620
6/9/1997	Del Ranch Power Plant	Production line near DR-6	Unknown
4/19/1997	Vulcan Power Plant	North pad near IW-6, East pad near IW-1	100
1/11/1997	Del Ranch Power Plant	DR-3 Production header	4,200

Date	Facility Location	Location of Incident	Amount of Spill by Gallons
10/9/1995	Elmore Power Plant	Corner of Bannister Road & Hwy. 86	10
10/7/1995	Leathers Power Plant	Production line near DR-17	350
9/10/1995	Leathers Power Plant	Brine Production Pipeline	420
7/14/1995	Elmore Power Plant	EL-11 Well - leak between master & HIV	950
6/4/1995	Elmore Power Plant	Injection line near IW-4	520
4/28/1995	Elmore Power Plant	Injection line near IW-4	378
3/31/1995	Elmore Power Plant	Injection line near IW-4	113
1/31/1995	Leathers Power Plant	Production line near RR-11	5,850
11/5/1990	Elmore Power Plant	EL-11 Production Well	Minimal Vegetation
9/18/1990	Elmore Power Plant	Injection Well #4	1,100

Attachment
CDR-325

Intermittant Sources

	Overpressure Vent System Emergency Relief Emission per unit		HP Vent Tanks Plant Upset Turbine Trip Emission per unit		SP Vent Tank Turbine Trip Emission		LP Vent Tank Turbine Trip Emission		LP Vent Tank Condensate
Stream Flow	830,649 lb/hr		727,636 lb/hr		647,440 lb/hr		839,413 lb/hr		5,000 lb/hr
Chemical Species	lb/hr	ppm	lb/hr	ppm	lb/hr	ppm	lb/hr	ppm	ppm
H^+	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.00
Li^+	0.209	0.252	0.002	0.002	0.001	0.002	0.001	0.002	0.31
Be^{+2}	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.00
NH_4^+	0.412	0.497	0.003	0.004	0.002	0.003	0.003	0.003	0.60
Na^+	56.115	67.555	0.428	0.588	0.281	0.434	0.345	0.410	82.09
Mg^{+2}	0.044	0.053	0.000	0.000	0.000	0.000	0.000	0.000	0.06
Al^{+3}	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.00
K^+	14.299	17.214	0.109	0.150	0.072	0.111	0.088	0.105	20.92
Ca^{+2}	27.497	33.104	0.210	0.288	0.138	0.213	0.169	0.201	40.23
Cr^{+3}	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.00
Mn^{+2}	1.100	1.324	0.008	0.012	0.006	0.009	0.007	0.008	1.61
Fe^{+2}	1.320	1.589	0.010	0.014	0.007	0.010	0.008	0.010	1.93
Ni^{+2}	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.00
Cu^{+2}	0.004	0.005	0.000	0.000	0.000	0.000	0.000	0.000	0.01
Zn^{+2}	0.357	0.430	0.003	0.004	0.002	0.003	0.002	0.003	0.52
Rb^+	0.077	0.093	0.001	0.001	0.000	0.001	0.000	0.001	0.11
Sr^{+2}	0.495	0.596	0.004	0.005	0.002	0.004	0.003	0.004	0.72
Ag^+	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.00
Cd^{+2}	0.001	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.00
Sb^{+3}	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.00
Cs^+	0.014	0.017	0.000	0.000	0.000	0.000	0.000	0.000	0.02
Ba^{+2}	0.198	0.238	0.002	0.002	0.001	0.002	0.001	0.001	0.29
Hg^{+2}	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.07
Pb^{+2}	0.088	0.106	0.001	0.001	0.000	0.001	0.001	0.001	0.13
HCO_3^-	0.077	0.093	0.001	0.001	0.000	0.001	0.000	0.001	0.11
NO_3^-	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.00
F^-	0.022	0.026	0.000	0.000	0.000	0.000	0.000	0.000	0.03
SO_4^{-2}	0.110	0.132	0.001	0.001	0.001	0.001	0.001	0.001	0.16
Cl^-	153.986	185.380	1.175	1.614	0.771	1.191	0.945	1.126	225.27
AsO_4^{-3}	0.022	0.026	0.000	0.000	0.000	0.000	0.000	0.000	0.03
SeO_4^{-2}	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.00
Br^-	0.099	0.119	0.001	0.001	0.000	0.001	0.001	0.001	0.14
I^-	0.011	0.013	0.000	0.000	0.000	0.000	0.000	0.000	0.02
SiO_2	0.484	0.583	0.004	0.005	0.002	0.004	0.003	0.004	0.71
CO_2	10,639.392	12,808.532	21,164.235	29,086.309	84.736	130.879	0.086	0.103	20.53
$B(OH)_3$	2.013	2.423	0.015	0.021	0.010	0.016	0.012	0.015	2.94
NH_3	189.690	228.364	350.140	481.202	68.820	106.296	17.211	20.504	11.00
CH_4	12.653	15.232	56.714	77.943	12.602	19.465	0.000	0.000	0.00
H_2S	47.422	57.091	86.326	118.639	13.542	20.917	4.213	5.019	50.00
Benzene	0.883	1.063	1.584	2.177	0.352	0.544	0.000	0.000	0.00
Toluene	0.012	0.015	0.022	0.030	0.005	0.007	0.000	0.000	0.00
Xylenes	0.001	0.002	0.003	0.004	0.001	0.001	0.000	0.000	0.00
Ethylbenzene	0.001	0.001	0.001	0.001	0.000	0.000	0.000	0.000	0.00
Arsine	0.005	0.006	0.009	0.012	0.002	0.003	0.000	0.000	0.00
Radon, (Ci)pm	0.004	0.004	0.006	0.009	0.001	0.002	0.000	0.000	0.00
TDS	11,149.119	13,422.181	21,661.016	29,769.042	181.360	280.118	23.102	27.521	460.58

Attachment
CDR-328

Bibb and associates	Made by: SAG	Date: 12/10/02	Job No. 2002094 01 02
	Checked by: —	Date: —	Sheet No. 1/6
For: Cure Data Requests SET TWO (#112) - S. Sea U6 PROJECT			

Cure Data Request item 112

Refer to Cost Data by BJE, 12/11/02

A. Tank Cost

C_1 = 1 mil GAL Tank (Tank installed) = Avg of Quotes

$C_1 = (214,461 + \$372,500 + 320,000 + 344,416 + 580,000)/5$

$C_1 = \$368,000$

C_2 = 2 mil Gal Tank (installed) = Avg of Quotes

$C_2 = (\$422,148 + 591,250 + 580,000 + 523,543 + 660,000)/5$

$C_2 = \$623,000$

Salton Sea U-6 requires a 1.6 MIL gal Tank

$\therefore C_{SSG} = \begin{cases} \$368^K + (623-368)\left(\frac{1.6-1}{2-1}\right) = \$521^K \text{ (extrapolated)} \\ \text{(OR)} \\ (368+623)/2 = \$496^K \\ \therefore \text{ use } \$521^K \text{ for Salton Sea U6 Tank} \end{cases}$

B. Ring Wall (Reinforced Concrete) Cost

Base cost on Kiewit U-6 estimate & cost Data by BJE

Ring Wall ϕ (= Tank ϕ) = $\begin{cases} 72'\phi, \text{ 1 mil gal Tk} \\ 103'\phi / \text{2 mil gal Tk} \end{cases}$ = RW_d

$RW_d = 72'\phi + (103-72)\left(\frac{1.6-1}{2-1}\right) = 91'\phi$, Say $95'\phi$ Ring Wall

From ATTACHED S. Sea U-6 Estimate by Dalvin Tott

Kiewit, Fire Water Tank (47.5'ϕ), item 15 : Conc = 26 cu yd

& " , 2ND Clarifier, (135'ϕ), item 28 : Conc = 3464 cu yd

S. Sea U6 Tank (interpolate) = $26 yd^3 + (3464-26)\left(\frac{95-47.5}{135-47.5}\right) = C_{RW}$

$\therefore C_{RW} \doteq 1900 yd^3$; Assume Installed Fdn Cost = $\$400/yd^3$

$C_{RW} = 1900 \times \$400 = \$760,000$, use $\$700^K$

C. Total of Tank & Ring Wall Fdn, $C_{TT} = \$521_M + \$700_M = 1.221M$

Bibb and associates	Made by: SAG	Date: 12/11/02	Job No. 2002094
	Checked by: —	Date: —	Sheet No. 2
For: DITTO			

.... (Installed)

E. Costs for other work (all costs assumed)

- Piping, PS FDNS, and Pipe Supports installed = $500,000
- Pumps & FOUNDATIONS = $100,000
- ALL ELECTRICAL WORK & EQUIPMENT = $200,000
- CONTROLS & INSTRUMENTATION = $50,000
- UNKNOWNS = $50,000

GRAND TOTAL = $630K = C_{OW}

F. SUMMARY OF COSTS

C = TOTAL INSTALLED COST FOR TANK OPTION = $C_T + C_{OW}$

C = $1.671M + $0.630M

$\boxed{\therefore C = \$2.301M}$

D. Stone Columns for Tank FDN

Assume 150 S.Columns @ $3K (per S.Col, ASSUMED)

C_{SC} = $450K

$\therefore C_T$ = Cost of Tank = C_{TT} (SHT 1) + C_{SC} = $1.221M + $0.450M

C_T = $1.671M

G. Salton Sea U-6 water Pond (Ref. UNITG Proposal, 8/2002)

$668K FOR 2.7M GAL → $668K × 1.6M / 2.7M = $396K VS C = $2.301M