PNL-6768
UC-408

/

This report was supported in part, or whole, by funds from the Comprehensive Environmental Response, Compensation, and Liability Act trust fund by interagency agreement with the Agency for Toxic Substances and Disease Registry, United States Public Health Service.

Inhalation Developmental Toxicology Studies: Teratology Study of Acetone in Mice and Rats

Final Report

T. J. Mast, Principal Investigator
J. J. Evanoff
R. J. Weigel
R. L. Rommereim
R. B. Westerberg
K. H. Stoney

November 1988

Prepared for the
National Institute of Environmental
Health Sciences, National Toxicology Program
under a Related Services Agreement
with the U.S. Department of Energy
Contract DE-AC06-76RLO 1830

Pacific Northwest Laboratory
Operated for the U.S. Department of Energy
by Battelle Memorial Institute

Battelle

PNL-6768

PACIFIC NORTHWEST LABORATORY
operated by
BATTELLE MEMORIAL INSTITUTE
for the
UNITED STATES DEPARTMENT OF ENERGY
under Contract DE-AC06-76RLO 1830

Printed in the United States of America
Available from
National Technical Information Service
United States Department of Commerce
5285 Port Royal Road
Springfield, Virginia 22161

NTIS Price Codes
Microfiche A01

Printed Copy

Pages	Price Codes
001-025	A02
026-050	A03
051-075	A04
076-100	A05
101-125	A06
126-150	A07
151-175	A08
176-200	A09
201-225	A10
226-250	A11
251-275	A12
276-300	A13

PNL-6768
UC-408

"This report was supported in part, or whole, by funds from the Comprehensive Environmental Response, Compensation, and Liability Act trust fund by interagency agreement with the Agency for Toxic Substances and Disease Registry, United States Public Health Service."

INHALATION DEVELOPMENTAL TOXICOLOGY STUDIES: TERATOLOGY STUDY OF ACETONE IN MICE AND RATS

Final Report
No. NIH-Y01-ES-70153

T.J. Mast - Principal Investigator

J.J. Evanoff
R.L. Rommereim
K.H. Stoney
R.J. Weigel
R.B. Westerberg

November 1988

Prepared for the
National Institute of Environmental Health Sciences, National Toxicology Program under a Related Services Agreement with the U.S. Department of Energy under Contract DE-AC06-76RLO 1830

Pacific Northwest Laboratory
Richland, Washington 99352

SUMMARY

Acetone, an aliphatic ketone, is a ubiquitous industrial solvent and chemical intermediate; consequently, the opportunity for human exposure is high. The potential for acetone to cause developmental toxicity was assessed in Sprague-Dawley rats exposed to 0, 440, 2200, or 11000 ppm, and in Swiss (CD-1) mice exposed to 0, 440, 2200, and 6600 ppm acetone vapors, 6 h/day, 7 days/week. Each of the four treatment groups consisted of 10 virgin females (for comparison), and ≈32 positively mated rats or mice. Positively mated mice were exposed on days 6-17 of gestation (dg), and rats on 6-19 dg. The day of plug or sperm detection was designated as 0 dg. Body weights were obtained throughout the study period, and uterine and fetal body weights were obtained at sacrifice (rats, 20 dg; mice, 18 dg). Implants were enumerated and their status recorded. Live fetuses were sexed and examined for gross, visceral, skeletal, and soft-tissue craniofacial defects.

Pregnant rats did not exhibit overt symptoms of toxicity other than statistically significant reductions for the 11000-ppm group in body weight (14, 17, 20 dg), cumulative weight gain from 14 dg onward, uterine weight and in extragestational weight gain. (EGWG = maternal body weight [20 dg] - uterine weight - maternal body weight [0 dg].) Mean body weights of treated virgin females were also reduced, but not significantly. There were no maternal deaths and the mean pregnancy rate was ≥93% in all groups. No affect was observed in the mean liver or kidney weights of pregnant dams, the organ to body weight ratios, the number of implantations, the mean percent of live pups/litter, the mean percent of resorptions/litter, or the fetal sex ratio. However, fetal weights were significantly reduced for the 11000-ppm exposure group relative to the 0-ppm group. The incidence of fetal malformations was not significantly increased by gestational exposure to acetone vapors, although the percent of litters with at least one pup exhibiting malformations was greater for the 11000-ppm group than for the 0-ppm group, 11.5 and 3.8%, respectively. The diversity of malformations observed in the 11000-ppm group was greater than that found in the lower dose groups or in the 0-ppm group.

There was no increase in the incidence of fetal variations, reduced ossification sites, or in the mean incidence of fetal variations per litter.

Analysis of rat plasma samples 30 min post-exposure showed an increase in plasma acetone levels which correlated with increasing exposure concentration. Acetone levels dropped to control levels by 17 h post-exposure for all exposure groups except the 11000-ppm group. Plasma acetone levels for this group were still slightly elevated with respect to the controls at 17 h post-exposure. The concentration of plasma acetone levels at either 30 min or 17 h post exposure did not increase over gestation regardless of the exposure concentration. Neither exposure to acetone vapor, nor advancing gestation resulted in alterations of the plasma levels for the other two ketone bodies, acetoacetic acid and β-hydroxybutyric acid, with respect to control animals.

Swiss (CD-1) mice exhibited severe narcosis at the 11000-ppm acetone concentration; consequently, the high exposure concentration was reduced to 6600 ppm acetone after one day of exposure. No further overt signs of toxicity were observed and there were no maternal deaths. No treatment-related effects on maternal or virgin body weight, maternal uterine weight, or on EGWG were noted in mice. There was a treatment-correlated increase in liver to body weight ratios in pregnant dams which may have been indicative of an induction of the P_{450}-monooxygenase enzyme system.

The mean pregnancy rate for all mated mice was ≥85% in all groups. There was no effect on the number of implantations per dam, on any other reproductive indices, or on the fetal sex ratio. Developmental toxicity was observed in mice in the 6600 ppm exposure group as; 1) a statistically significant reduction in fetal weight, and 2) a slight, but statistically significant increase in the percent incidence of late resorptions. However, the increase in the incidence of late resorptions was not sufficient to cause a decrease in the mean number of live fetuses per litter. The incidence of fetal malformations or variations in mice was not altered by exposure to acetone vapors at any of the levels employed.

It may be concluded from the results of this study that the 2200-ppm acetone level was the no observable effect level (NOEL) in both the Sprague-Dawley (CD) rat and the Swiss (CD-1) mouse for developmental toxicity. Furthermore, since only minimal maternal toxicity was observed at 11000 ppm acetone for rats and 6600 ppm acetone for mice, it is possible that the actual maternal NOEL is somewhat greater than 2200 ppm.

ACKNOWLEDGMENTS

Responsibility	Name
Principal Investigator	T.J. Mast
Exposure System	R.J. Weigel
	J.R. Decker
	E.J. Rossignol
Monitoring/Analytical Chemistry	R.B. Westerberg
	K.H. Stoney
Animal Resources Section	M.G. Brown
	S.E. Rowe
	A.E. Jarrell
Teratology Evaluations	T.J. Mast
	R.L. Rommereim
Health and Safety	M.L. Clark
Report Co-ordinator	J.J. Evanoff

Terryl J. Mast

Terryl J. Mast, PhD
Principal Investigator

This work was supported by the National Institute of Environmental Health Sciences, National Toxicology Program under a Related Services Agreement with the U.S. Department of Energy under Contract DE-AC06-76RLO 1830 at the Pacific Northwest Laboratory operated for the U.S. Department of Energy by Battelle Memorial Institute.

The excellent technical support in the Developmental Toxicology Laboratory of B.J. Willemsen, H.W. Hill, and P.J. Boyd is much appreciated.

SIGNATURES

Terry J. Mast, PhD, DABT
Principal Investigator and
Teratology Task Leader

11/29/88
Date

R. Bruce Westerberg, PhD
Chemistry Task Leader

11/29/88
Date

Richard J. Weigel, PhD
Exposure Task Leader

11/29/88
Date

Mark L. Clark, MS
Health & Safety Officer

12/1/88
Date

Stephen E. Rowe, DVM, ACLAM
Laboratory Animal Medicine Veterinarian

11/29/88
Date

CONTENTS

APPENDICES

FIGURES

TABLES

INTRODUCTION

Acetone, an aliphatic ketone, is a ubiquitous industrial solvent and chemical intermediate; consequently, the opportunity for human exposure is high. Acetone production in the United States alone reached nearly one million metric tons in 1974 and world manufacturing capacity was predicted to be greater than 3 million metric tons per year by 1980 (Nelson and Webb 1978). The primary use for acetone is in the synthesis of methacrylates, followed by its use as a multi-purpose solvent or a chemical intermediate. The combination of its high volatility (bp 56.2 °C) and extensive use creates a significant possibility for human exposure to acetone via inhalation, especially in the industrial environment. Acetone is also present in many hazardous waste sites and may reach the groundwater.

The National Institute of Occupational Safety and Health (NIOSH 1978) recommends an exposure limit of 250 ppm (590 mg/m^3) for acetone. The OSHA standard for acetone is 1000 ppm averaged over an 8-h work shift. The American Conference of Governmental Industrial Hygienists (ACGIH 1987) recommends a threshold limit value time-weighted-average (TLV-TWA) of 750 ppm (1,780 mg/m^3) over each 8-h period of a 40-h work week, and a short-term exposure limit (STEL) of 1000 ppm (2,375 mg/m^3) for 15 minutes. The odor threshold is reported to be between 200 and 400 ppm.

Acetone is considered to be one of the least toxic organic solvents used in industry, both in terms of acute and of chronic toxicity. The inhaled vapor is absorbed into the blood stream, and is present in expired air and urine as the parent compound and/or metabolites. Although no permanent effects have been observed from short-term exposures to low concentrations of acetone vapors (≈1000 ppm), subjects exposed to these levels have complained of slight eye, nose, and throat irritation. Inhalation of vapors at higher concentrations (in excess of 10,000 ppm) is likely to produce central nervous system depression and narcosis (Clayton and Clayton 1982). Prolonged or repeated skin contact with the liquid may cause dryness or defatting of the skin followed by erythema and dermatitis. It has been reported that only a small amount of acetone is absorbed through the intact skin (Reynolds and Prasad 1982). However, these results are in contrast to those of another study where Fukabori et al. (1979) applied acetone to the skin and subsequently detected elevated concentrations of acetone in the blood, alveolar air and urine. The skin penetration of acetone was rapid and absorption of acetone increased directly with the frequency and the extent of exposure.

Male volunteers exposed to either 300 or 500 ppm acetone under various regimens of exercise and rest demonstrated that about 45% of the acetone administered was absorbed regardless of the state of exercise or the exposure concentration; however, blood levels increased under a work load due to the increased ventilation rate (Wigeaus et al. 1981). There was no sign of attainment of an equilibrium between blood, alveolar air, and inspired air. The half-life of acetone in alveolar air, arterial blood, and venous blood in the human was 4.3±1.1 h, 3.9±0.7 h, and 6.1±0.7 h, respectively.

In another study, male volunteers were exposed to 100 or 500 ppm acetone vapor for either a single 2- or 4-h period (DiVincenzo et al. 1973). Exposure to the vapor caused no untoward effects, nor were any changes noted in clinical chemistry or hematological values in the human subjects. In concurrence with Wigeaus et al. (1981), exercise during exposure increased the amount of acetone absorbed and retained by the subject. Body burdens of acetone in this, as in the previously mentioned study, were not observed to approach steady state concentrations. Disappearance of acetone from blood appears to follow zero-order kinetics, i.e. the decline rate is not concentration dependent.

Studies in experimental animals have shown that exposure of rats to 52,000 ppm acetone for 1 h produced narcosis, and that exposure to 126,000 ppm for 1 h was fatal (Rowe 1963). The minimum lethal concentration for rats exposed to acetone vapors has been reported as 16,000 ppm for a 4-h exposure (Smyth et al. 1962), and 46,000 ppm for mice exposed for 1 h (Flury and Wirth 1934). Another report gave the minimum lethal concentration for rats as 126,000 ppm following a 2-h exposure period (Verschueren 1977). Rats exposed to 3,000, 6,000, 12,000, and 16,000 ppm of acetone, 4 h/day for 10 days, showed some behavioral changes, particularly at the higher levels, e.g., the inability to climb a pole within 2 seconds of receiving a stimulus (Goldberg et al. 1964). Tolerance developed after additional exposures. Rats exposed to 19,000 ppm acetone, 3 h/day, 5 days/week for 8 weeks, and sacrificed at 2, 4, 8, 10 weeks of exposure, exhibited no biochemical or histological evidence of toxic effects (Bruckner and Peterson 1981b). The 3-h LC_{50} in rats was determined to be 55,700 ppm, approximately 6.5 times that of toluene (Bruckner et al. 1981a).

Subchronic exposure of rats to 19,000 ppm acetone, 3 h/day, 5 days/week, for 8 weeks did not result in any statistically significant changes in the clinical chemistry parameters monitored, in gross pathology or histopathology, or in body weight gain over the course of the study (Bruckner and Peterson, 1981b). There was a slight elevation in serum glutamic-oxaloacetic transaminase (SGOT) levels in acetone-exposed animals at 2, 4, and 8 weeks; however, lactate dehydrogenase (LDH) and blood urea nitrogen (BUN) levels were not significantly affected at any time during the study. Liver specimens showed little sign of lipid vacuolation and liver triglyceride levels were not different from controls. Brain and kidney weights were also reduced in animals with lowered body weights, however, liver weights remained comparable to controls. This finding is consistent with the known ability of acetone to induce the hepatic mixed-function oxidase system. [No female animals were included in this study.]

Single oral doses of acetone prior to the oral administration of a halocarbon have been shown to potentiate the hepatotoxic action of several of these agents in rats, e.g. chloroform, dibromochloromethane (DBCM) and bromodichloromethane (BDCM; Hewitt, Brown and Plaa 1983; Traiger and Plaa 1972; Traiger and Plaa 1974). Acetone has also been shown to enhance the nephrotoxicity of chloroform (Hewitt et al. 1980); however, it did not enhance the nephrotoxic effects of either DBCM or BDCM (Hewitt, Brown and Plaa 1983). A later study, was designed to evaluate the relationship between blood acetone concentrations and the potentiation of chloroform toxicity following oral or inhalation exposure to the halocarbon (Charbonneau et al 1986). These workers found that blood acetone levels were indeed a major determinant in the potentiation of chloroform-induced hepatotoxicity.

The metabolism of acetone was well-characterized by the late 1950's (Mourkides et al. 1959; Sakami et al. 1950; Price and Rittenberg 1950; and Rudney 1950). Acetone was shown to be eliminated in expired air, mostly as carbon dioxide, but also as the parent compound if the initial dose exceeded the metabolic capacity of the test animal. Excretion of parent compound and metabolites into the urine was also determined to be a significant route of elimination. Acetone was found to be converted to acetate, formate, a three-carbon intermediate which entered the glycolytic cycle (later identified as the 1,2-diol), acetoacetic acid, and β-hydroxybutyrate *in vivo*. Administration of ^{14}C-1-acetone in the intact rat demonstrated the utilization of the methyl group in the synthesis of cholesterol and several amino acids, i.e. serine and the methyl groups of choline and methionine (Sakami et al. 1950). Since this author had previously shown the same compounds to contain a methyl group derived from administered formate (Sakami 1948) it is presumed that at least one metabolic pathway of acetone proceeds via formic acid.

Acetone administered to male rats in drinking water (1% v/v for 5 days) increased plasma free fatty acid concentrations from 408.0 ± 40.9 μeq/l to 473.0 ± 37.3 μeq/l (Furner et al. 1972). Measurements of hepatic MFO activity demonstrated no difference in the ability of microsomal preparations from treated animals to N-demethylate ethylmorphine; however, the ability of preparations from treated animals to *p*-hydroxylate aniline or to O-deethylate *p*-nitroanisole was significantly increased as compared to controls. These changes were similar to MFO activity changes found following starvation and physical stress.

When male Sprague-Dawley rats were exposed to 19,000 ppm acetone via inhalation for a 3-h period, whole brain, liver and blood were found to contain 2.7 mg/g, 2.5 mg/g, and 3.3 mg/ml acetone, respectively (Bruckner and Peterson 1981b). Although this exposure is higher than would be used in a developmental toxicity study, the results demonstrate that acetone is distributed more or less homogeneously in the tissues examined and that blood levels are significantly elevated. Since acetone is one of the "ketone bodies" normally found in the blood, levels of this magnitude could result in ketosis and the symptoms concurrent with that metabolic disorder. Furthermore, elevated ketone body levels are of significant impact where developmental studies are concerned since ketosis, a condition present in *Diabetes mellitus*, is known to have adverse effects on pregnancy.

The interactions of maternal metabolic disturbances with fetal development are extremely complex as evidenced by the fact that ketonemia during the embryonic period may result in retarded development of the embryo while the same disturbance in late pregnancy results in excessive fetal growth, macrosomia (Freinkel 1985). The latter may be due in part to elevated insulin levels acting through growth factor receptors. Infusion of insulin into fetal baboons *in utero* recreates the metabolic and growth abnormalities typical of infants with diabetic mothers. Ketonemia during pregnancy may also result in alterations in normal development of the central nervous system and cause such abnormalities as open neural tube, faulty neural tube fusion, microcephaly, and pericardial edema. Offspring of diabetic mothers are at an increased risk for all of these defects. Other human abnormalities, all associated with the early organogenic period, are also linked to diabetic pregnancies and include transposition of the great vessels and sacral dysgenesis (Gabbe 1977).

Fasting has been shown to produce ketosis in rats during late pregnancy more rapidly than it does in nonpregnant animals, and primiparous rats developed a more severe ketosis after 1 day of fasting than multiparous dams did (Cheng and Yang 1970). Adrenal corticoid secretions were also found to be involved in the metabolic changes which subsequently increased the susceptibility to ketosis during pregnancy. Additionally, increased levels of progesterone or estrogen also contributed to these changes.

Several *in vitro* studies have been conducted in attempts to determine the teratogenic potential of acetone and have yielded negative results. No evidence of teratogenicity was found when 39 or 78 mg of acetone was injected into the yolk sacs of fertile chick eggs prior to incubation (McLaughlin et al. 1964). DiPaolo et al. (1969) added 0.2 percent acetone to the growth medium of cultured Syrian hamster embryonic cells and detected no evidence of cellular transformation. Kitchin and Ebron (1984) reported normal growth in rat embryo *in vitro* in the presence of 0.1% or 0.5% (v/v) acetone in the growth medium; however, when the level was raised to 2.5% the embryos failed to thrive. Guntakatta et al. (1984) assayed acetone for teratogenic potential in an *in vitro* mouse embryo limb bud cell culture system designed to detect perturbations in the synthesis of extracellular matrix components and found no effects attributable to acetone.

Acetone was not mutagenic in the Salmonella/microsome test (McCann et al. 1975).

Although these *in vitro* studies did not indicate a significant teratogenic potential for acetone, such studies conducted on another ketone body, β-hydroxybutyrate (β-HB), indicated an involvement in fetal abnormalities. Horton and Sadler (1983) exposed mouse embryos *in vitro* to β-HB, the most common ketone body, at either the 3-4 or the 4-5 somite stage. The concentrations of β-HB employed, 1-4 mg/ml, encompassed ketone body levels in blood reported in cases of severe ketosis in the human. Embryos cultured in the presence of β-HB exhibited neural tube defects, the incidence of which were age- and dose-related, with the younger embryos being the more sensitive. The abnormalities were characterized by inhibition or delay of neural tube closure primarily involving the cranial region.

Acetone is listed as causing birth defects (Schardein 1985; Table 21-2, pp. 572-572), however, no reference source for this information is given nor is any specific abnormality mentioned. At a later point (p.650) the same author states that "reports of acetone testing in teratogenesis or reproductive toxicology apparently have not been published." However, this author does refer to a report in which sacral agenesis was associated with a history of exposure of women to fat solvents during pregnancy (Kucera 1968). In addition to acetone, these women were also exposed to xylene, trichloroethylene, methyl chloride and petrol. Another report, by the same author (Kucera and Benasova 1962) was mentioned "in which a case of camptomelic syndrome [*sic*] in an infant was associated with close [*maternal*] contact with acetone (and other chemicals) during the fifth to eight gestational weeks of pregnancy."

The only other mention found in the published literature regarding the occupational hazards of acetone exposure to women of child-bearing age was an article translated from the Russian language (Nizyayeva 1982 [translator unknown]). The intent of this study was to statistically characterize the reproductive function of female factory workers chronically exposed to acetone at, or slightly above, the Russian TLV, 200 mg/m^3 (85 ppm). They report a statistically significant increase in problem pregnancies among these workers including an increased threat of abortion ($p<0.001$), toxicosis during the second half of pregnancy ($p<0.02$), and diminished hemoglobin level and hypotension ($p<0.001$). A significant reduction in the birth weight and size of infants of the chemical fiber-factory workers relative to a control group was also reported ($p<0.001$). They viewed these complications of pregnancy as being secondary to changes in general body function, notably "acidosis, disturbed carbohydrate and fat metabolism, and disturbed neuroendocrine regulation." Furthermore, they associated these pathologic conditions directly with exposure to relatively low levels of acetone.

In addition to the human epidemiological data presented by Nizyayeva (1982), an inhalation teratology study was performed in an unidentified rodent species [*rats?*]. Animals were exposed to 30 and 300 mg/m^3 acetone for either 1-13 days of gestation (dg) or 1-20 dg. [Details of the daily duration of exposure were not given.] A statistically significant, but not concentration-related, reduction in the percentage of live embryos was reported for both exposure concentrations in animals exposed from 1-20 dg. Percent embryonal deaths for the control, 30 and 300 mg/m^3 groups were 11.3 ± 1.3, 28.4 ± 5.9, and 23.0 ± 3.8, respectively. Fetal weights were not given. They also reported "disorders of the placental barrier", apparently based on morphological changes. This reviewer believes that caution is required when considering the data presented in the report of Nizyayeva (1982) since experimental conditions, as well as results, were not clearly defined. However, the toxic effects referred to are consistent with those which could be expected following exposure to a volatile ketone during pregnancy.

In summary:

- Acetone is a relatively non-toxic solvent whose only established hazard at relatively low exposure levels is its ability to potentiate chlorinated hydrocarbon hepatotoxicity.

- Exposure to relatively high levels of acetone results in an increase in blood ketones and may therefore mimic deleterious effects on pregnancy known to be caused by metabolic ketosis resulting from starvation or *Diabetes mellitus*.

- Acetone has been indirectly linked to several cases of human teratogenesis and one report presents human epidemiological evidence, as well as experimental evidence, that acetone exposure may have deleterious effects on pregnancy and the offspring (Nizyayeva, 1982).

In light of the known ability of acetone vapors to cause ketosis, the strongly suspected harmful effects of maternal ketosis during pregnancy on the offspring, and the ubiquitous nature of acetone, a two-species teratology study was performed with acetone vapors. Maternal organ to body weight ratios for maternal liver and kidneys were obtained, and maternal rat urine was monitored for evidence of metabolic imbalance(s) with respect to controls at the time of sacrifice. By testing acetone for its potential to cause developmental toxicity, the results obtained from these studies would aid in establishing the risk associated with exposure of women of child-bearing age to acetone vapors. The following teratology study was conducted in Swiss (CD-1) mice and Sprague-Dawley rats.

Acetone chamber concentrations, 0, 440, 2200, and 11000 ppm, were chosen with the goals of observing mild maternal toxicity at the highest exposure level and a no observable effect level at the lowest exposure concentration. The 440-ppm exposure concentration is also intermediate with respect to the

NIOSH and ACGIH recommended TLVs (250 ppm and 750 ppm, respectively). The intermediate concentration was chosen with the expectation of obtaining a graded response.

MATERIALS AND METHODS

Four groups each of Sprague-Dawley rats (13 wk; Charles River, Raleigh, NC) were exposed to 0 (filtered air), 440, 2200, or 11000 ppm, and Swiss (CD-1) mice (11 wk; Charles River, Portage, MI) were exposed to 0, 440, 2200, or 6600 ppm acetone vapors, 6 h/day, 7 days/week. Mice were exposed concurrently for 12 consecutive days (6-17 dg for mated mice), followed by the exposure of the rats for 14 consecutive days (6-19 dg for mated rats). Each of the four exposure groups consisted of 10 virgin females per species, 30-31 sperm-positive rats and 33 plug-positive mice; all groups were randomly selected using body weight as the blocking variable. An additional 7 sperm-positive rats were included in each of the 4 exposure groups to be used for blood sampling. Developmental evaluations were conducted on pregnant mice killed on 18 dg, and on pregnant rats killed on 20 dg. Virgin females were killed on the day after the last day of exposure.

The highest exposure chamber concentration, 11000 ppm, was limited to 50% of the lower explosion limit (22000 ppm) for safety considerations. The lowest exposure concentration was set to approximate recommended TLV levels and the mid-level was chosen to furnish a graded response. Although excessive maternal toxicity was not expected, virgin and positively-mated mice in the 11000-ppm chamber exhibited severe narcosis at the end of the first exposure day. Consequently, the highest exposure level for mice was lowered to 6600 ppm acetone vapor for the duration of the mouse study. A new chamber concentration of 6600 ppm was used for the mice because it was the only concentration possible on such short notice. (Since two test material delivery pumps had been used for 11000 ppm, it was possible to shut down one of those pumps in order to provide 6600 ppm acetone vapor.)

In order to assess the effect of acetone exposure on the level of ketone bodies in the blood of rats, and to determine pre- and post-exposure blood levels of acetone, blood samples were analyzed for parent compound and two other ketone bodies, acetoacetic acid (AAA), and β-hydroxybutyrate (β-HB). Urine from maternal and virgin animals was monitored at the time of sacrifice with a urine dip-stick for evidence of metabolic imbalance (e.g. an increase in ketone body level).

EXPOSURE SYSTEM

Inhalation exposures were conducted in Battelle-designed inhalation exposure chambers (Harford System; Lab Products, Inc., Aberdeen, MD). The 2.3-m^3 stainless-steel chamber (1.7-m^3 active mixing volume) contained three levels of caging, each of which was split into two offset tiers. The drawer-like stainless-steel cage units accommodated individual animal cages, feed troughs and automatic waterers. Stainless-steel catch pans designed to aid in maintaining a uniform concentration of vapor throughout the chamber, as well as for the collection of urine and feces, were suspended below each cage unit. Air (HEPA- and charcoal-filtered) containing a uniform mixture of the test article flowed through the chamber at approximately 15 ft^3/min (CFM) which was equivalent to approximately 15 air changes per hour. The uniform mixture was diverted along the inner surfaces of the chamber and a portion of the flow was "peeled off" by each catch pan, thus creating mixing eddies. Exhaust from each tier was cleared through the space between the tiers.

A schematic diagram of the acetone generation and delivery system is shown in Figure 1. The acetone to be vaporized was contained in a 19-liter stainless steel reservoir which was refilled every other day. During exposure the acetone was pumped from the stainless steel reservoir through an eductor tube to delivery tubes which supplied the vaporizers located at the fresh air inlet of each animal exposure chamber. Test material was pumped to the vaporizer by stable micrometering pumps with adjustable, drift-free pump rates. Acetone vapor in the highest exposure chamber was delivered to two vaporizers since the rate of delivery required to generate the desired exposure concentration exceeded the vaporization capability of a single vaporizer.

The vaporizer consisted of a stainless steel cylinder covered with a glass fiber wick. An 80-watt heater and a temperature sensing element were incorporated within the cylinder and connected to a remotely located temperature controller. A second temperature monitor was also incorporated in the vaporizer allowing the operating temperature to be recorded by the automated data acquisition system. The operating temperatures of the vaporizers (93-137°F) were adjusted to completely vaporize supplied test material. All materials which came into contact with the acetone were either stainless-steel, glass, Teflon® or Viton®. All equipment contained in the vented generator cabinet was explosion proof.

Exposure chambers (without animals) and the exposure room, were monitored for particles during one day of test generation with a small particle detector (Gardner Associates, Type CN, Schnectedy, NY). Particle monitoring was also conducted once during the exposure with rats in the chambers. No particles were detected in the control chamber or in any of the exposure chambers during any of the tests. A count of approximately 200 particles/cm^3 was found in the room during generation; however, these particles were not considered to result from test material generation.

The time for the concentration to build up to 90% of the final, stable concentration following the start of generation (T_{90}), and the time for the vapor concentration to decay to 10% of the stable concentration following the cessation of generation (T_{10}), were determined before and after animals were placed in the chambers (Figures 2a and 2b). The experimental value for T_{90}, with or without animals, was found to range from 10 to 12 minutes. At a chamber air flow rate of 15 CFM, the theoretical value for T_{90} is approximately 12.5 minutes. Since there could have been variability in buildup times due to fluctuations in chamber flow rates and sampling accuracy, a T_{90} of 12 minutes was chosen for this study. The value of T_{10} ranged from 10 to 13 without animals present, and from 9 to 13 minutes with animals present.

Uniformity of vapor concentration in the exposure chambers was verified prior to the start of, and once during the study. The vapor concentrations for these determinations were measured using the on-line GC with the automatic sampling valve disabled to allow continuous monitoring from a single input line. Prior to animal loading, 12 chamber positions were measured. The second set of vapor concentration measurements was taken from the front and back positions of the chamber only where cage units contained animals.

The acetone exposures were conducted using an automated data acquisition and control system in an exposure suite. This system monitored and controlled the basic inhalation test system functions including chamber air flow, vacuum, temperature, relative humidity, and test chemical concentrations. Conditions which may have been a threat to the health of the animals or constituted an explosion hazard triggered alarms to personnel who were on call 24 h/day. All data acquisition and exposure control originated from an executive computer which contained the exposure protocols and controlled a multiplexing-interface system.

Chamber and room temperatures were measured by calibrated resistance temperature detectors (RTD) which were located at the measurement site, and were multiplexed to a digital thermometer interfaced to the computer. Chamber temperature was controlled primarily by adjusting the temperature of the exposure room.

Percent relative humidity (%RH) was calculated with an accuracy of 6%RH by pulling an air sample from the measurement location through a Teflon® tube into a dew point hygrometer located in the control center. Measurements were taken from different locations using a valving system which multiplexed the sampling tubes to the hygrometer. Values for %RH were calculated and maintained by the executive computer from temperature and dew point measurements.

Chamber air flow was calculated by measuring the pressure drop across calibrated orifices located at the inlet and exhaust of each chamber. Leaks in the chambers could be detected by comparison of the inlet flow rate with exhaust flow rate. Flow was maintained by a computer-controlled gate valve in the exhaust line of each chamber. Chamber vacuum, relative to the control center, was measured using the same pressure transducer system which measured chamber air flows. Chamber vacuum was maintained at approximately (-)1" H_2O primarily by inlet resistance provided by the HEPA and charcoal filters.

ANALYTICAL CHEMISTRY

Bulk Analysis

Identity of the bulk test material was confirmed by infrared spectroscopy, and the initial percent purity was measured by determining the percent of the total peak area that was represented by the acetone peak. Gas chromatography was performed on a Hewlett Packard (HP) 5890 or 5830A equipped with a glass column packed with Porapak Q 80/100. The purity of the bulk acetone used during the exposures was found to be 100.0% and was acceptable throughout the study.

Exposure Chamber Monitoring

Generation of acetone vapor concentrations utilized ~5.2 kg/day for the rat exposure, and ~3.4 kg/day for mice. A total of approximately 216 kg of test material was consumed during the study. Prior to its use in generation, test material was maintained at room temperature in the LSL-II storage facility. All transfers of the acetone from the storage drum to the reservoir were performed under nitrogen to prevent possible oxidative degradation due to the introduction of air into the drum.

The concentrations of acetone vapor in the chambers were monitored with an HP5840 GC system (1/8" o.d. x 1.0' nickel column, 1% SP-1000 on 60/80 mesh Carbopack B, 130°C). This instrument was equipped with an 8-port stream select valve, and measured acetone vapor levels in the three exposure chambers, the control chamber, the holding chamber, the exposure room, and the on-line standard, and also monitored a nitrogen blank. In order to confirm values generated by the on-line monitor, bubbler grab samples were collected from the chambers and analyzed with an HP5830 or HP5840 GC (2 or 4 mm i.d. x 1.8 m glass column, 10% Carbowax:20M TPA on Chromosorb WAW, 130°C). An on-line, certified standard, ~2000 ppm acetone in nitrogen (MG Industries

Scientific Gases, Los Angeles, CA), was used to check instrument drift throughout the exposure day.

Precision of the on-line GC was estimated by taking 8 consecutive measurements of the on-line standard, one from every active sampling port. A 0.11% coefficient of variation was observed. Accuracy of the on-line GC was assured by calibrating it against a gravimetrically calibrated GC. (See Appendix A.) The minimum detectable limit of the GC was estimated from the decay profile for the 440-ppm chamber and was found to be ≈0.05 ppm acetone.

Degradation and Stability Studies

Chemical stability of the acetone in the generator reservoir was determined by aging the test material in the stainless steel reservoir for 4 days at room temperature. The purity prior to, and after, aging was >99.9%. No impurity peaks representing greater than 0.01% total peak area were observed. These results indicated that acetone was stable in the generator reservoir for periods up to 4 days.

Acetone, a methyl ketone prone to polymerization, was handled in a manner designed to prevent chemical degradation during vapor generation; e.g. low generation temperatures, the use of inert materials, and the short residence time of acetone on the vaporizer. In order to confirm chemical stability, the fiberglass wicks were removed from the vaporizer after several days of test generation and then extracted with methanol and sonification for approximately 30 min. Gas chromatographic analysis of the methanol extract did not reveal any volatile degradation products.

Studies of the stability of acetone vapor in the exposure chambers were conducted on samples taken after the exposure system was allowed to operate for at least 5 hours, and in the case of the highest concentration chamber, also taken at the beginning of vapor generation. Since individual vaporizers were used samples were taken from each of the three chambers.

Samples from the occupied chambers were taken by pulling a measured volume of gas through charcoal sampling tubes. One sample set was eluted with methanol for identification of compounds less volatile than acetone, and the second set was eluted with dimethylformamide (DMF) for identification of compounds more volatile than acetone. Sample size was adjusted to provide adequate sensitivity for impurities without producing substantial breakthrough of acetone. The amount of breakthrough was measured by analysis of secondary beds within the charcoal tubes. Good trapping efficiency for species such as polymers and dimers was assumed when good trapping efficiency was observed for acetone. Charcoal has previously been shown to produce good collection efficiency for numerous organic compounds. Satisfactory recovery of acetone and polymeric products of acetone was shown using a prepared standard containing microgram amounts of diacetone, mesityl oxide and isophorone.

Recoveries were determined by placing 1-ml aliquots of spiked solvent on the charcoal packing used in the adsorption tubes and comparing the extracts to the original solution without charcoal treatment. The original solution contained amounts of possible degradation products at 0.1 to 0.2% w/w of acetone collected during sampling. Although less than 100% recovery of several known impurities of acetone was shown using prepared standards, detection of impurities at 0.1% w/w acetone from the charcoal sampling tubes was possible. Thus an equivalent amount of degradation product collected on the chamber samples could be determined using the systems and solvents employed.

ANIMAL HUSBANDRY

Upon receipt, all animals were housed in quarantine rooms for at least 30 days prior to the start of exposure. Males and females were housed separately on stainless steel wire racks equipped with automatic waterers (10-11 mice per cage, 5-6 rats per cage). During the quarantine period at least five males and five females of each species were killed and examined for gross and microscopic lesions. (See Appendix D for details.) Nasopharyngeal washes from these animals were cultured for bacterial pathogens. Serum from each animal was tested for antibodies to selected pathogens (Appendix D). Another check for antibodies to selected pathogens was performed on serum obtained from at least five females in the control group and from at least five females in the highest exposure group, for each species, at the final sacrifice. [Serum from an additional ten rats, not identified as to group, was also obtained at the end of sacrifice.] All results were negative for significant pathogens and lesions (see Appendix D for complete details). Animals were observed daily for mortality, morbidity, and overt signs of toxicity.

Food, pelleted NIH-07 diet (Ziegler Bros., Inc., Gardner, PA), was provided *ad libitum* during the entire time the animals were in the test facility except during the 6-h exposure period when it was removed to prevent contamination with acetone and oral ingestion of the test material. Water was provided *ad libitum* with automatic waterers throughout the study. Room lighting was maintained on a 12-h on-off cycle (0600-1800 h for the light phase). During the quarantine period animal room temperature was maintained at 75±3°F and the percent relative humidity was maintained at 50±15%.

Target chamber temperatures during the exposure periods were maintained within the limits of 75±3°F. Chamber temperature means for all exposure days were within the specified limits. Mean percent relative humidity in all exposure chambers was within the specified limits of 55±15%. The average air flow in all chambers for the study was within the specified limits of 12 to 18 CFM. A complete summary of the daily chamber environmental data can be found in Appendix B.

DEVELOPMENTAL TOXICOLOGY

Female mice and rats were weighed and individually identified by ear tags 1-2 weeks prior to mating. At this time 40 virgin females of each species were randomly selected using body weight as the blocking variable. The remaining females were bred by caging two to three females overnight with each male. Copulation was established on the following morning by the presence of a vaginal plug in the case of the mice; or for rats, by a sperm-positive vaginal lavage smear. If evidence of mating was detected, this day was designated as 0 dg, and positively mated females were weighed and randomly assigned to exposure groups using body weight as the blocking variable. Mating was conducted for five consecutive nights for each species to obtain 132 positively mated female mice (33/group), and 122 positively mated rats (30-31/group).[1] Seven additional positively mated rats were assigned to each exposure group for monitoring of ketone body levels in rat plasma. In order to acclimate animals to exposure chambers, on 0 dg mated females were individually caged in exposure chambers with the doors open (chambers were in the breeding room). Virgin females were weighed and assigned to exposure groups 2 days prior to the start of exposure for mice and 4 days prior to exposure for rats.

Mice were exposed from 6-17 dg and sacrificed on 18 dg. Rats were exposed from 6-19 dg and sacrificed on 20 dg. Virgin mice were exposed for 12 consecutive days and virgin rats for 14 consecutive days. Virgins were exposed concurrently with positively mated animals and were sacrificed on the day following the last day of exposure. Mated female mice were weighed on 0, 6, 9, 12, 15 and 18 dg, and rats on 0, 6, 10, 14, 17 and 20 dg. Virgin mice and rats were weighed 2 and 6 days prior to the start of exposure, respectively, and on exposure days 1, 5, and 10, and at sacrifice.

On the morning of sacrifice, a urine sample was collected from each female rat, applied to a urine dip-stick and compared to the test color chart on the dip-stick container. The values were recorded for pH, protein, glucose, ketones, bilirubin, blood and urobilinogen.

At the time of sacrifice, rats and mice were euthanized with CO_2, weighed and examined grossly for signs of maternal toxicity. Maternal liver and kidney weights were obtained, and both ovaries were saved for sectioning and quantitative follicle counts (performed by another laboratory designated by the sponsor; data will not be presented in this report). Apparently nongravid uteri from positively mated females were stained with 10% ammonium sulfide to detect possible implantation sites. The number, position and

---

[1] Positively mated females from the first breeding night were designated as Gestation Group A, those from the second night as Gestation Group B, etc.

status of implants were recorded for each gravid uterus. Placentas were examined and discarded unless abnormal.

Live fetuses were weighed, examined for gross defects, and their sex was determined by internal examination of the gonads after euthanasia with an injection of Nembutal® (sodium pentobarbital). Fifty percent of the live fetuses from each litter, (randomly selected) and any fetuses with gross external abnormalities were examined for visceral defects by dissection of fresh tissue. The heads of fifty percent of the live fetuses were removed and placed in Bouin's fixative. After fixation the heads were serially sectioned with a razor blade and examined for soft-tissue craniofacial abnormalities. All fetal carcasses, with and without heads, were prepared for skeletal staining. Cartilage as well as ossified bone was visualized by double-staining with alcian blue and alizarin red S. The individual identity of each skeletal and head specimen was maintained throughout the study.

KETONE BODIES IN PLASMA

Plasma was collected from seven rats in each of the four exposure groups to assess the effect of acetone exposure during pregnancy on the level of ketone bodies in the blood and to determine post-exposure blood levels of acetone. The plasma was analyzed for three ketone bodies: acetone, acetoacetic acid (AAA), and β-hydroxybutyrate (β-HB). Blood was collected by retro-orbital puncture of CO_2-anesthetized rats 30 minutes post-exposure on 7, 14 and 19 dg, and again one hour prior to the start of exposure on the following day. The same seven animals in each exposure group were used for this purpose throughout the study. Blood was collected into iced, EDTA-coated vacutainer tubes (≈1 ml/animal/time point). Plasma was then isolated from whole blood by centrifugation at 4°C for 20 min, stored at 4°C, and analyzed within 24 h of collection. At the time of sacrifice these animals were weighed, their gestational status recorded, uterine and fetal weights obtained and the status of the fetuses recorded. These fetuses were not subjected to a teratological evaluation except for a gross examination for external defects. (See Appendix A for further details.)

An analytical method modified from Lopez-Soriano and Argiles (1985) was used to determine the levels of the three ketone bodies in plasma. In this procedure both AAA and β-HB were decarboxylated and converted to acetone which was measured using a headspace-gas chromatographic technique. Each plasma sample was divided into three 125-µl aliquots and placed in headspace analysis vials. In the first aliquot free acetone was determined following the addition of 25 µl of 4N sodium hydroxide to prevent spontaneous decarboxylation of AAA. The second aliquot was treated with 25 µl of 0.6 M perchloric acid and heated at ~100°C for 90 min to enhance quantitative decarboxylation of AAA to acetone, and the third plasma aliquot was treated with 25 µl of an oxidative reagent (0.2 M $K_2Cr_2O_7$ in 5M phosphoric acid) and heated at 100°C for 90 min. The oxidative treatment of the third sample converts all ketone bodies present to acetone; thus, β-HB concentration was determined by subtracting the amount of acetone and AAA determined in the first two aliquots from the value obtained for the total ketone body level in the third aliquot.

Prepared plasma samples were subjected to headspace analysis by gas chromatography (HP 5890 GC) after a 15-min equilibration period at 60°C (HP 19295 Headspace Analyzer), according to the methods of Lopez-Soriano and Argiles (1985). Aspirated headspace was analyzed on a 1/8" o.d. x 9' nickel column packed with 3% Carbowax 1500 on Chromosorb WAW, 60/80 mesh, operated at 40°C with a short ramp to 45°C for column cleanup. The retention time of acetone was about 1.5 minutes.

The slope of the calibration curve observed for acetone was insensitive to preparation of standards in either saline or plasma. However, as reported by Lopez-Soriano and Argiles (1985), the acetone standards exhibited greater response when prepared in the caustic media. Calibrations for this study were performed using standards of acetone in saline and were prepared fresh every analysis day. The acetone standard concentrations bracketed the acetone concentrations expected in the samples. The relationship between GC peak area and acetone concentration for each reaction mixture was constructed from a composite of all calibration data and was linear with correlation coefficient of 1.0.

A series of experiments was performed to optimize the recovery of AAA and β-HB from the various reaction mixtures. Some decarboxylation of AAA occurred in the sodium hydroxide solution; consequently, less than a 100% recovery from the dichromate/phosphoric acid reaction mixture was observed for both carboxylic acids, β-HB and AAA (See Appendix A for details). The recovery values were analyzed in a series of simultaneous linear equations to account for their deviation from the ideal recovery of either 0% or 100%.

Determination for AAA and β-HB in plasma required subtracting the acetone contribution; therefore, when the acetone level was high, and AAA and β-HB differed from the background by only a small amount, the effective sensitivity of the method for these ketone bodies was limited. The citation of different lower limits of detection for the different time points in Table.16 reflects this dependency of the lower limit of detection upon the acetone concentration encountered for a particular sample. The effective limit of detection was calculated for the determination of AAA and β-HB from the standard deviation of the acetone concentration according to Mandel and Steihler (1964). Sensitivity, γ, is defined as the ratio of the slope to the standard deviation of the measurement:

$$\gamma = \frac{dX/dC}{Sx} = \frac{1}{Sc}$$

where Sx is the standard deviation of the measured value (peak area), X is peak area, C is concentration (mM), γ has units of concentration^{-1}, and Sc is the standard deviation of the concentration. The smallest concentration change that can be measured is then determined as $1/\gamma$. From this statistic, a limit of detection (LD) can be defined by

$$LD = \frac{K}{\gamma} \qquad \text{where} \quad K = \frac{t}{\sqrt{n}}$$

where 't' is the Student 't' statistic for the required confidence level (99% was used for these calculations), and n is the number of determinations made. From this it follows that the limit of detection can also be defined as:

$$LD = \frac{t(Sc)}{\sqrt{n}}$$

Thus, elevated acetone levels have the effect of producing an elevated lower limit of detection for AAA and β-HB for those samples having elevated acetone levels. Values for ketone bodies determined as below the limit of detection are reported as "less than" the calculated limit of detection.

STATISTICAL ANALYSES

All means and standard deviations for animal data were calculated with SAS statistical software on a VAX 11/780 computer. Mean body weights (as a mean of litter means for fetal data) were analyzed using the SAS General Linear Models (GLM) Procedure (SAS, 1985) with an analysis of variance (ANOVA) model for unbalanced data. Response variables, either body weight or the arc-sin transformations of proportional incidence data, were analyzed against the class variable, "treatment", in a one-way ANOVA model. A Tukey's t-test (two-tailed) was used to assess statistically significant differences between control and exposed groups. If appropriate, the dose-response relationship was determined by means of an orthogonal trend test (Winer, 1971). In the case of proportional data the t-tests and trend analyses were performed on transformed variables. The litter was used as the basis for analysis of fetal variables.

RESULTS

EXPOSURE AND CHEMISTRY

Test material stability studies indicated that the materials and techniques used to generate acetone vapor for inhalation exposures did not affect its stability. The chemical stability of acetone was evaluated in both the generator reservoir and in the exposure chambers (with and without animals). Acetone was found to be stable in the generator reservoir for periods of up to 4 days, and there was no evidence of decomposition products greater than 1% of the target acetone concentration present in the exposure chambers (with and without animals). Direct measurements of chamber concentrations of potential acetone degradation products, isophorone, mesityl oxide, and diacetone, demonstrated that none of these compounds were produced in significant amounts. The most prevalent impurity was acetic acid, analyzed as methyl acetate, which ranged from 0.02% (sample worked up immediately after collection) to 1% (sample worked up a day after collection) in samples drawn from occupied exposure chambers after 6 h test generation (Appendix A). Temperature-programmed gas chromatography failed to show evidence of any other volatile degradation products.

The test material concentration uniformity data for each chamber during prestart testing, and after animals were in place, are summarized in Table 1. Uniformity in all chambers was acceptable. To provide easier interpretation of the uniformity measurement results, the concentration readings for each port are expressed as a percentage of the mean value at all ports measured. The table includes analysis of Total Port Variability (TPV), Within Port Variability (WPV) and Between Port Variability (BPV), all expressed as Percent Relative Standard Deviation (%RSD). The possible variation of test chemical concentration measured from one sample port to another during the measurement procedure is termed the Total Port Variability and consists of both spatial and temporal variations. Two factors contribute to the TPV. The first, the Between Port Variability (BPV), is the factor of interest as it represents the spatial variation of test chemical distribution within the chamber. The second factor, the Within Port Variability (WPV), represents the temporal fluctuation of the average chemical concentration within the chamber during the time the measurements were taken. This temporal factor includes variations in vapor generation as well as variation of the measurement instrument itself.

The grand means[1] of chamber concentrations for the rat study were 100% of the target, with relative standard deviations in the range of 1 to 6% (Table 2). The daily mean concentrations for all chambers were between 95 and 102% of the target concentrations. At least 97% of individual concentration measurements at each target level were within ±10% of the target levels. Except for 1 day, the %RSD's were less than 10%. The maximum concentration observed in the control chamber was 0.26 ppm, and in the room was 1.06 ppm.

The grand means of the acetone concentrations in each chamber for the mouse study were between 99 and 101% of the target, with relative standard deviations in the range of 3 to 8% (Table 3). Except for the last day of exposure, the daily mean concentrations ranged from 96 to 102% of target and %RSD's were less than 10%. On the last day, one of the generators for the high dose chamber failed. When discovered, the exposure was discontinued after 5 hours and 9 minutes. At least 98% of individual concentration measurements at each target level were within ±10% of the target levels. The maximum concentration observed at any time in the control chamber was 3.8 ppm, and in the room was 16.6 ppm. The average room concentration was 0.21 ± 1.04 ppm acetone.

Chamber air flow, temperature and relative humidity data for both mouse and rat exposures were all within specified limits.

DEVELOPMENTAL TOXICOLOGY: RAT

There were no maternal deaths. Pregnant females in the 11000-ppm group exhibited a significant reduction in body and uterine weight and in extra-gestational weight gain (EGWG; Table 4). The EGWG is the actual maternal body weight gained during pregnancy and is equal to the maternal body weight at sacrifice minus the gravid uterine weight minus the maternal body weight on 0 dg. No other overt symptoms of maternal toxicity were evident. The reductions in body weight, uterine weight and EGWG were also significantly

[1] Grand mean = mean of all individual readings for the duration of the study.

correlated with increasing exposure concentration. Mean maternal body weight at sacrifice, as well as uterine weight and EGWG for the 0-ppm group are consistent with values observed for the contemporary control group (Table 5). Mean body weights of virgin female rats were not significantly affected at any time during the 14-day exposure period or at sacrifice, although there was a 6% reduction in the mean body weight of animals in the 11000-ppm group relative to the 0-ppm group (Table 6). This was the same relative reduction in whole body weight as for the pregnant animals, but data for the virgins lacked statistical significance due to the higher standard deviations relative to body weight. The rate of body weight gain for pregnant rats in the 11000-ppm group was adversely affected by 10 dg (Figure 3). The mean liver and kidney weights of pregnant dams as well as organ to body weight ratios were not affected by exposure to acetone vapors (Table 7).

Maternal and virgin urine was assayed with urine dip-sticks just prior to sacrifice to determine if acetone exposure altered normal urine chemistry. Parameters measured included pH, protein, ketone bodies (determined as acetoacetic acid), blood, glucose, bilirubin, and urobilinogen. No differences with respect to exposure group were noted for either the pregnant or the virgin rats. (See Appendix C for details.)

Gestational exposure of rats to acetone vapors on 6-19 dg had no significant effect on the number of implantations, the mean percent of live pups per litter, or the mean percent of resorptions per litter. However, the percent of litters with resorptions was greater (not statistically significant) for the 11000-ppm group than for the 0-ppm group (50 versus 77%, respectively; Table 8). The number of live fetuses per litter and the percent intrauterine death per litter for all groups were within the range of the contemporary control data (Table 5). Male and female fetal weights (as means of litter means) were slightly, but significantly, reduced for the 11000-ppm exposure group when compared to the 0-ppm group (Table 9). Mean body weights for both male and female fetuses in the 11000-ppm group were ≈85% of the mean weights for the control fetuses; however, fetal weights for the 440- and 2200-ppm group were not noticeably affected. Fetal weight for the highest exposure group was also less than the mean fetal weight for the contemporary controls. The ratio of male to female fetuses in the litters was not altered by gestational exposure to acetone.

The incidence of fetal malformations was not significantly increased by gestational exposure to acetone vapors (Tables 10 and 11); however, the percent of litters with at least one pup exhibiting malformations was greater for the 11000-ppm group than for the 0-ppm group, 11.5 and 3.8%, respectively (Table 10). The percent of affected litters in the 11000-ppm group was also greater than the same value for contemporary control data (Tables 10 and 12), 11.5 and 6.3%, respectively. The mean percent of live fetuses with malformations per litter was also greater for the 11000-ppm group than it was for either the 0-ppm group or for the contemporary control data (Table 11); however, the differences were not statistically significant. None of the major malformations observed in the highest exposure group (e.g. cleft sternum, ectopic heart, major vessel malformations, edema, unilateral arhinia, microstomia, vertebral agenesis, or a missing tail) had been observed in control litters and several fetuses had multiple malformations.

Gestational exposure to acetone did not increase the incidence of fetal variations or reduced ossification sites, nor was the mean incidence of fetal variations per litter increased (Tables 11 and 13). The types of variation observed as well as the incidence of variations was consistent with values for contemporary controls (Table 14).

ACETONE AND KETONE BODY ANALYSES

In general, maternal weights and reproductive data for these animals were consistent with data for animals not used for blood collection although EGWG were less than for non-sampled animals (Table 15). (Complete raw data for these animals is contained in Appendix C.)

Analysis of plasma samples 30 min post-exposure showed an increase in plasma acetone levels which correlated with increasing exposure concentration (Table 16 and Figure 4). Acetone plasma levels dropped to control levels by

17 h post-exposure for all exposure groups except the 11000-ppm group. Plasma acetone levels for this group were still slightly elevated with respect to the controls at 17 h post-exposure. The concentration of acetone 30 min or 17 h post exposure did not increase over gestation regardless of the exposure concentration, (i.e. samples taken on 19 dg were not significantly greater than samples taken on 7 dg). Neither exposure to acetone vapor nor advancing gestation, resulted in alterations of the plasma levels for the other two ketone bodies, AAA and β-HB, with respect to control animals. Since only three out of the seven females in the 440-ppm group were pregnant, values for this group are reported separately. Although the number of animals in each group is too small to perform statistical comparisons, there does not appear to be a significant difference between pregnant and non-pregnant females with respect to plasma levels of any of the three ketone bodies.

DEVELOPMENTAL TOXICOLOGY: MICE

Mice in the 11000-ppm chamber exhibited severe narcosis at the end of the first day of exposure; therefore, the acetone concentration in the highest exposure level was reduced to 6600 ppm for the remainder of the exposure period. Consequently, the 10 virgins and 5 dams from the first gestation group in the highest exposure level were exposed to 11000 ppm acetone on the first exposure day and to 6600 ppm for the remainder of the exposure days. The remaining three gestation groups in the highest exposure level were exposed to 6600 ppm acetone on all exposure days. There were no maternal deaths and no overt symptoms of toxicity were evident in the plug-positive female or virgin mice after the highest exposure level was reduced to 6600 ppm.

Gestational exposure to acetone vapors did not affect maternal body or uterine weight or extragestational weight gain with respect to either the 0-ppm group or contemporary controls (Figure 5; Tables 17 and 18). Mean body weights of virgin mice were not affected at any time during the 12-day exposure period or at sacrifice (Table 19). There were no significant differences in kidney weights between exposure groups; however, the liver weight and the liver to body weight ratio for the 6600-ppm group were significantly greater than for the 0-ppm group (Table 20).

Exposure of pregnant mice to acetone vapors on 6-17 dg resulted in a slight, but significant, increase in the percent of late resorption for the 6600-ppm exposure group (Table 21). Other reproductive measures, the number of implantations per litter, the percent of live fetuses per litter and the percent of total intrauterine deaths, were not affected by gestational exposure to acetone vapors and were consistent with values for contemporary control data (Table 18). Male and female fetal weights (as means of litter means) were significantly reduced for the 6600-ppm exposure group when compared to the 0-ppm exposure group (Table 23). Mean body weights for this group were reduced by ≈8% for both male and female fetuses with respect to the 0-ppm group. The ratio of males to females in the litters was not affected.

The incidence of fetal malformations was not significantly increased by gestational exposure to acetone vapors and was consistent with data for contemporary controls (Tables 24, 25 and 26). No fetal malformations were observed that had not previously been found in control fetuses. There was no increase in the incidence of fetal variations when all types were combined; however, when examined individually there was a statistically significant increase in the incidence of reduced sternebral ossifications (Tables 24 and 26). Data for the 0-ppm group and for the two lower exposure groups were consistent with contemporary control data on fetal variations (Table 25).

DISCUSSION

Exposure of pregnant rats to 0, 440, 2200 or 11000 ppm acetone did not result in selective developmental toxicity, but did cause maternal toxicity as well as a significant decrease in fetal weight (both sexes) at the highest exposure level. The maternal toxicity was evident as exposure-correlated decreases in body and uterine weight and in extra-gestational weight gain when compared to the 0-ppm group. These decreases were statistically significant for the 11000-ppm group. The body weights of virgin females were similarly affected, although the decreases were not statistically significant. There were no treatment-related effects upon reproductive indices for any exposure level nor was there a significant increase in the incidence of fetal malformations or variations. However, it is of interest to note that a greater diversity of malformations was observed in the 11000-ppm group than was found in the lower dose groups or in the 0-ppm group. This increase in diversity was attributable to three pups that had multiple malformations[1], but since maternal toxicity was also present at the 11000-ppm level, this increase in the diversity of malformations cannot be attributed solely to selective developmental toxicity.

The correlation of acetone levels in rat plasma measured 30 min post-exposure with increasing exposure concentrations clearly demonstrates the biological uptake of acetone from the lung. Furthermore, values obtained in this study are consistent with those obtained by Charbonneau, et al (1986) following inhalation exposure of rats to acetone vapor (Table 27). Fetal exposure can also be inferred since acetone, like other volatile organics, has been shown to cross the placenta (Dowty and Laseter 1976). The continued ability of the animals to clear acetone after 14 days of exposure indicates that maternal metabolic processes were not impaired by this compound. Although acetone has been reported to be an inducer of the P_{450}-monooxygenase system (Bruckner and Peterson 1981b), the fact that there was no treatment-related increase in the liver to body weight ratios in the dams suggests that this may not be the case in pregnant females, or, more likely, that such an induction was masked by the normal increase in liver size seen during pregnancy. However, a significant increase in liver size was seen in mice.

The lack of a teratogenic response following gestational exposure of rat fetuses to acetone vapors in this study is consistent with *in vitro* data demonstrating that 10.5 day rat embryos cultured in serum containing ≤0.5% (v/v) acetone grew normally (Kitchin and Ebron 1984). Analysis of maternal plasma in this study showed that maximum plasma levels for dams in the high

---

[1] Maternal body weights and gains for the dams of these pups were not remarkably different from the rest of the group.

exposure group, 11000 ppm acetone, reached 2.15 mg/ml acetone or only 0.22% (v/v), a level lower than that allowing normal embryonic development in the Kitchin and Ebron study. Furthermore, although these exposures caused an increase in plasma acetone levels, circulating concentrations of the other two ketone bodies, AAA and β-HB, were not elevated following inhalation exposure to acetone. The lack of an increase in the β-HB concentration may be of toxicological significance since a previous study showed this compound to be teratogenic to rat embryos *in vitro* (Horton and Sadler, 1983).

Exposure of Swiss (CD-1) mice to 0, 440, 2200, or 6600 ppm acetone did not result in significant selective toxicity to the offspring. However, adult female mice were found to be more sensitive to the acute effects of acetone inhalation than were the rats. The original experimental design called for a high exposure concentration of 11,000 ppm as was used in the rat study; however, since this level produced severe narcosis in mice on the first day of exposure it was necessary to decrease the highest exposure concentration from 11000 ppm to 6600 ppm. No treatment-related effects on maternal body weight, uterine weight, or on extra-gestational weight gain were noted in mice at any concentration employed, but there was a treatment-correlated increase in liver weights and in liver to body weight ratios with respect to controls in the pregnant dams.

Some developmental toxicity was observed in Swiss (CD-1) mice; 1) a slight, but statistically significant reduction in fetal weight for the highest exposure group, and 2) a slight, but statistically significant increase in the percent incidence of late resorptions in the 6600-ppm group. However, the increase in the incidence of late resorptions was not accompanied by an increase in the percent incidence of total intrauterine death (early plus late resorptions) nor by a decrease in the mean number of live fetuses per litter. The incidence of fetal malformations or variations was not significantly affected by exposure to acetone vapors at any of the levels employed with the exception of an increase in the percent of fetuses (on a litter basis) with reduced ossification of the sternebrae. This may not be biologically significant since the incidence was still <10% for the 6600-ppm group and was not accompanied by an increase in the incidence of any other abnormalities.

It may be concluded from the results of this study that the 2200-ppm acetone level was the no observable effect level (NOEL) in both the Sprague-Dawley (CD) rat and the Swiss (CD-1) mouse for developmental toxicity. The NOEL for maternal toxicity in the rat study was 2200 pmm. Furthermore, since only minimal maternal effects were observed at 11000 ppm acetone for rats and at 6600 ppm acetone for mice, it is possible that the actual NOEL is somewhat greater than 2200 ppm in both species .

REFERENCES

American Conference of Governmental Industrial Hygienists. 1987. Threshold Limit Values and Biological Exposure Indices for 1987-1988. Cincinnati: ACGIH.

Bruckner, J. V., and R. G. Peterson. 1981a. "Evaluation of toluene and acetone inhalant abuse: pharmacology and pharmacodynamics." Toxicol. Appl. Pharmacol. 61:27-38.

Bruckner, J. V., and R. G. Peterson. 1981b. "Evaluation of toluene and acetone inhalant abuse: model development and toxicology." Toxicol. Appl. Pharmacol. 61:302-312.

Charbonneau, M., J. Brodeur, P. du Souich, and G. L. Plaa. 1986. "Correlation between acetone-potentiated CCl_4-induced liver injury and blood concentrations after inhalation or oral administration." Toxicol. Appl. Pharmacol. 84:286-294.

Cheng, K. K., and M. P. Yang. 1970. "Study of pregnancy ketosis in the rat." Q. J. Exp. Physiol. 55:83-92.

Clayton, G. D., and F. E. Clayton. 1982. Patty's Industrial Hygiene and Toxicology. 3rd Revised Edition. 2C:4720-4727.

DiPaolo, J. A., P. Donovan, and R. Nelson. 1969. "Quantitative studies of *in vitro* transformation by chemical carcinogens." J. Natl. Cancer Int. 42:867-874.

DiVincenzo, G. D., F. J. Yanno, and B. D. Astill. 1973. "Exposure of man and dog to low concentrations of acetone vapor." Am. Ind. Hyg. Assoc. J. 34:329-336.

Dowty, B.J. and J.L. Laseter. 1976. "The transplacental migration and accumulation in blood of volatile organic constituents." Pediat. Res. 10:696-701.

Flury, F., and W. Wirth. 1934. Arch. Gewerbepathol. Gewerbehyg. 5:1.

Freinkel, N. 1985. "Metabolic Changes in Pregnancy." In Textbook of Endocrinology, J. D. Wilson, and D. W. Foster, Eds., ed 7, pp. 438-451, Saunders Co., Philadelphia.

Fukabori, S., K. Nakaaki, and O. Taga. 1979. "Cutaneous absorption of acetone." Rodo Kagaku 55:525-532.

Furner, R. L., E. D. Neville, K. S. Talarico, and D. B. Feller. 1972. "A common modality of action of simulated space stresses on the oxidative metabolism of ethylmorphine, aniline and p-nitroanisole by male rat liver." Toxicol. Appl. Pharmacol. 21:569-581.

Gabbe, S. G. 1977. "Congenital malformations in infants of diabetic mothers." Obstet. Gynecol. Surv. 32:125-132.

Goldberg, M. E., H. E. Johnson, U. C. Pozzani, and H. F. Smyth. 1964. "Effect of repeated inhalation vapors of industrial solvents on animal behavior." Am. Ind. Hyg. Assoc. J. 25:369-375.

Guntakatta, M., E. J. Matthews, and J. O. Rundell. 1984. "Development of a mouse embryo limb bud cell culture system for the estimation of chemical teratogenic potential." Teratog. Carcinog. Mutagen. 4:349-364.

Hewitt, W. R., E. M. Brown, and G. L. Plaa. 1983. "Acetone-induced potentiation of trihalomethane toxicity in male rats." Toxicol. Lett. 16:285-296.

Hewitt, W. R., H. Miyajima, M. G. Cote, and G. L. Plaa. 1980. "Acute alteration of chloroform-induced hepato- and nephrotoxicity by n-hexane, methyl n-butylketone, and 2,5-hexanedione." Toxicol. Appl. Pharmacol. 53:230-248.

Horton, W. E., and T. W. Sadler. 1983. "Effects of maternal diabetes on early embryogenesis: alteration in morphogenesis produced by the ketone body, β-hydroxybutyrate." Diabetes. 32:610-616.

Kitchin, K. T. and M. T. Ebron. 1984. "Further development of rodent whole embryo culture: Solvent toxicity and water insoluble compound delivery system." Toxicology 30(1):45-57.

Kucera, J. 1968. "Exposure to fat solvents: a possible cause of sacral agenesis in man." J. Pediat. 72:857-859.

Kucera, J., and D. Benasova. 1962. "Poruchy nitrodelozniho vyvoje cloveka zpusobene pokusem o potrat." Cesk. Pediat. 17:483-489.

Lopez-Soriano, F. J., and J. M. Argiles. 1985. "Simultaneous determination of ketone bodies in biological samples by gas chromatographic headspace analysis." J. Chrom. Sci. 23:120-123.

Mandel, J. and R.D. Stiehler. 1964. J. Res. Natl. Bur. Std. A53:155.

McCann, J., E. Choi, E. Yamasaki, and B. N. Ames. 1975. "Detection of Carcinogens as mutagens in the Salmonella/microsome test: Assay of 300 chemicals." Proc. Natl. Acad. Sci. 72:5135-5139.

McLaughlin, J., J. P. Marliac, M. J. Verrett, M. K. Mutchler, and O. G. Fitzhugh. 1964. "Toxicity of 14 volatile chemicals as measured by the chick embryo method." Am. Ind. Hyg. Assoc. J. 25:282-284.

Mourkides, G. A., D. C. Hobbs, and R. E. Koeppe. 1959. "The metabolism of acetone-2-C^{14} by intact rats." J. Biol. Chem. 234:27-30.

Nelson, D. L., and B. P. Webb. 1978. "Acetone." In Kirk-Othmer Encyclopedia of Chemical Technology, H. F. Mark, D. F. Othmer, C. G. Overberger, and G. T. Seaborg, Eds., ed 3, pp 1:179-191. Wiley and Sons, NY,

NIOSH, Criteria for a recommended standard for occupational exposure to ketones. US Dept of Health, Education and Welfare, National Institute for Occupational Safety and Health DHEW (NIOSH) Publication No. 78-173, 1978.

Nizyayeva, I. V. 1982. "On hygienic assessment of acetone." Gig. truda i. prof. zabol. (Russian) June, pp. 24-28.

Parkes, D. G., C. R. Ganz, A. Polinsky, and J. Schulze. 1976. "A simple gas chromatographic method for the analysis of trace organics in ambient air." Amer. Ind. Hyg. Assoc. J. 36:165.

Price, T. D., and D. Rittenberg. 1950. "The metabolism of acetone: I. Gross aspects of catabolism and excretion." J. Biol. Chem. 185:449-459.

Reynolds, J. E. F., and A. B. Prasad, Eds. 1982. Martindale: The Extra Pharmacopeia, 28th Edition. The Pharmaceutical Press, London.

Rowe, V. K. 1963. Industrial Hygiene and Toxicology, 2nd Ed, Vol II, Interscience, NY.

Rudney, H. 1950. "The metabolism of 1,2-propanediol." Arch. Biochem. 29:231-232.

Sakami, W., and J. M. Lasaye. 1950. "Formation of formate and labile methyl groups from acetone in the intact rat." J. Biol. Chem. 187:369-378.

Sakami, W. J. 1948. Biol. Chem. 176:995.

SAS Institute. 1985. SAS® User's Guide: Basics, Version 5 Edition. SAS Institute, Cary, North Carolina, pp 434-506.

Schardein, J. L. 1985. Chemically Induced Birth Defects. Marcel Dekker.

Smyth, H. F., C. P. Carpenter, C. S. Weil, and U. C. Pozzani. 1962. "Range finding toxicity data: list VI." Am. Ind. Hyg. Assoc. J. 23:95-107.

Traiger, G. J., and G. L. Plaa. 1972. "Relationship of alcohol metabolism to the potentiation of CCl_4 hepatotoxicity induced by aliphatic alcohols." J. Pharmacol. Exp. Ther. 183:481-488.

Traiger, G. J. and G. L. Plaa. 1974. "Chlorinated hydrocarbon toxicity, Arch. Environ. Health, 28:276-278.

Verschueren, K. 1977. Handbook of Environmental Data on Organic Chemicals. Van Nostrand Reinhold, New York.

Wigeaus, E., A. Lof, and M. Nordqvist. 1982. "Distribution and elimination of 2-[^{14}C]-acetone in mice after inhalation exposure." Scand. J. Work.Environ. Health. 8:121-128.

Wigeaus, E., S. Holm, and I. Åstrand. 1981. "Exposure to acetone: uptake and elimination in man." Scand. J. Work. Environ. Health 7:84-94.

Winer, B. J. 1971. Statistical Principles in Experimental Design, McGraw-Hill Book Co., NY, pp 170-185.

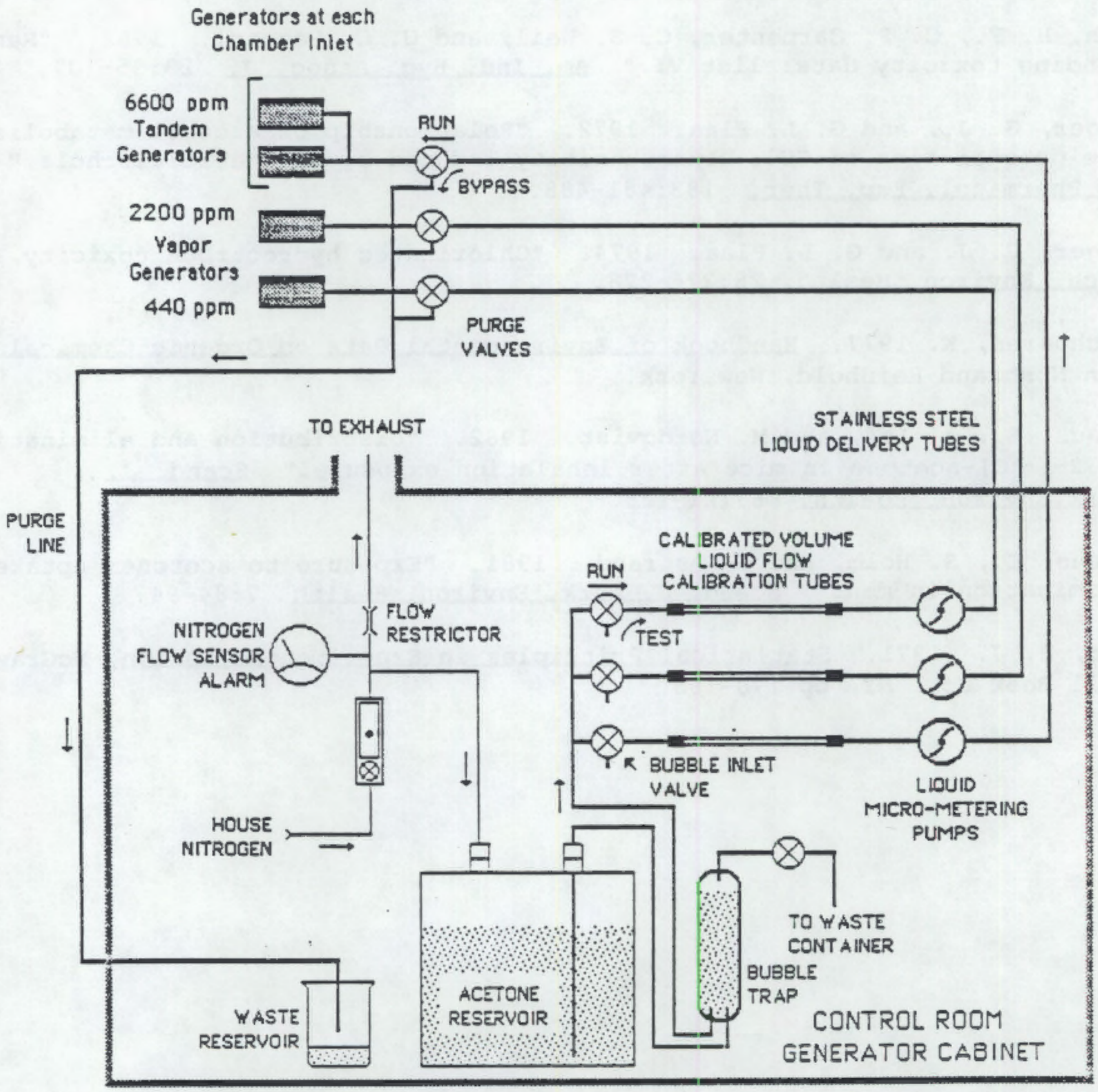


FIGURE 1. Acetone Generation and Delivery System

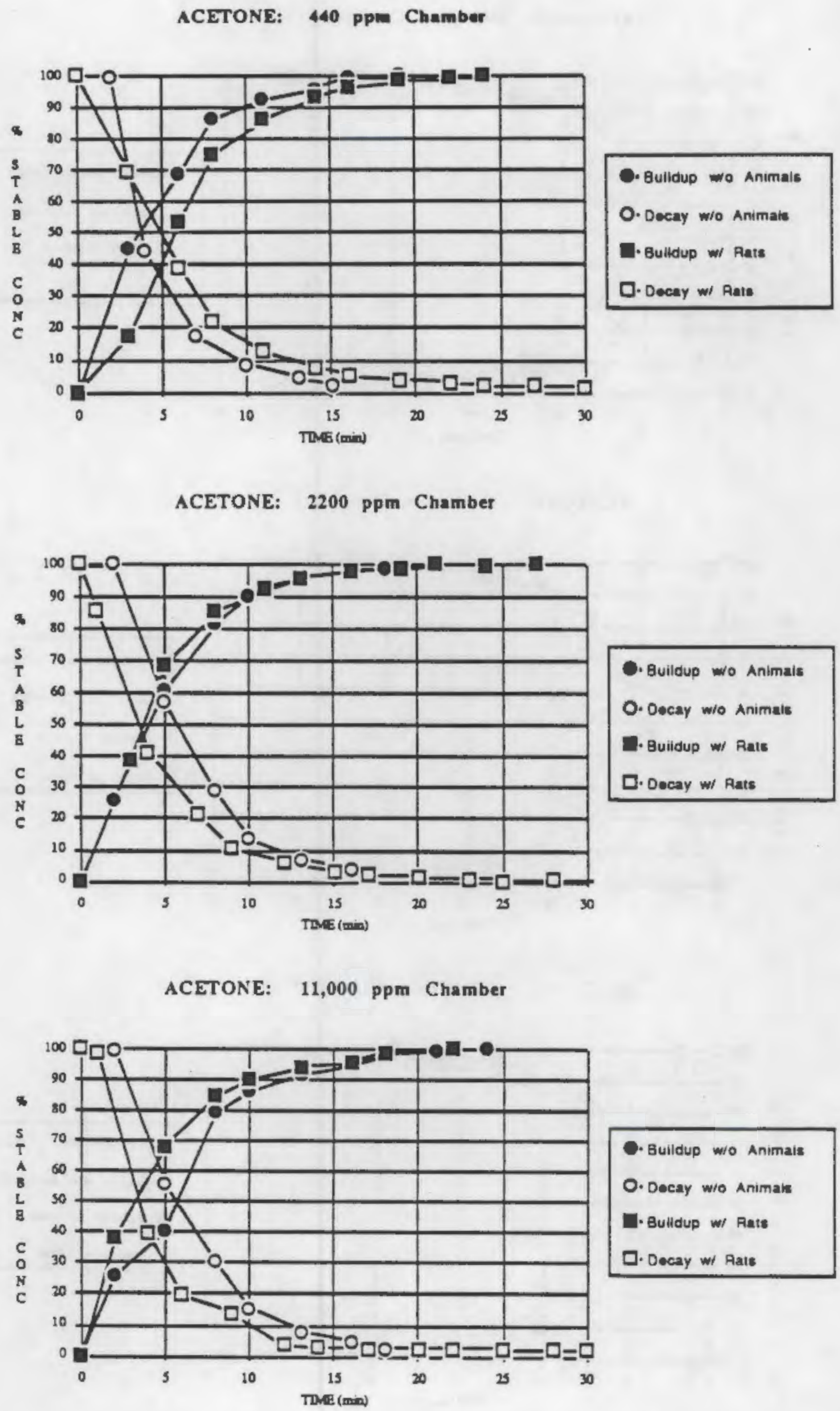


FIGURE 2a. Buildup and Decay of Vapor Concentrations for Exposure of Rats to Acetone With And Without Animals Present.

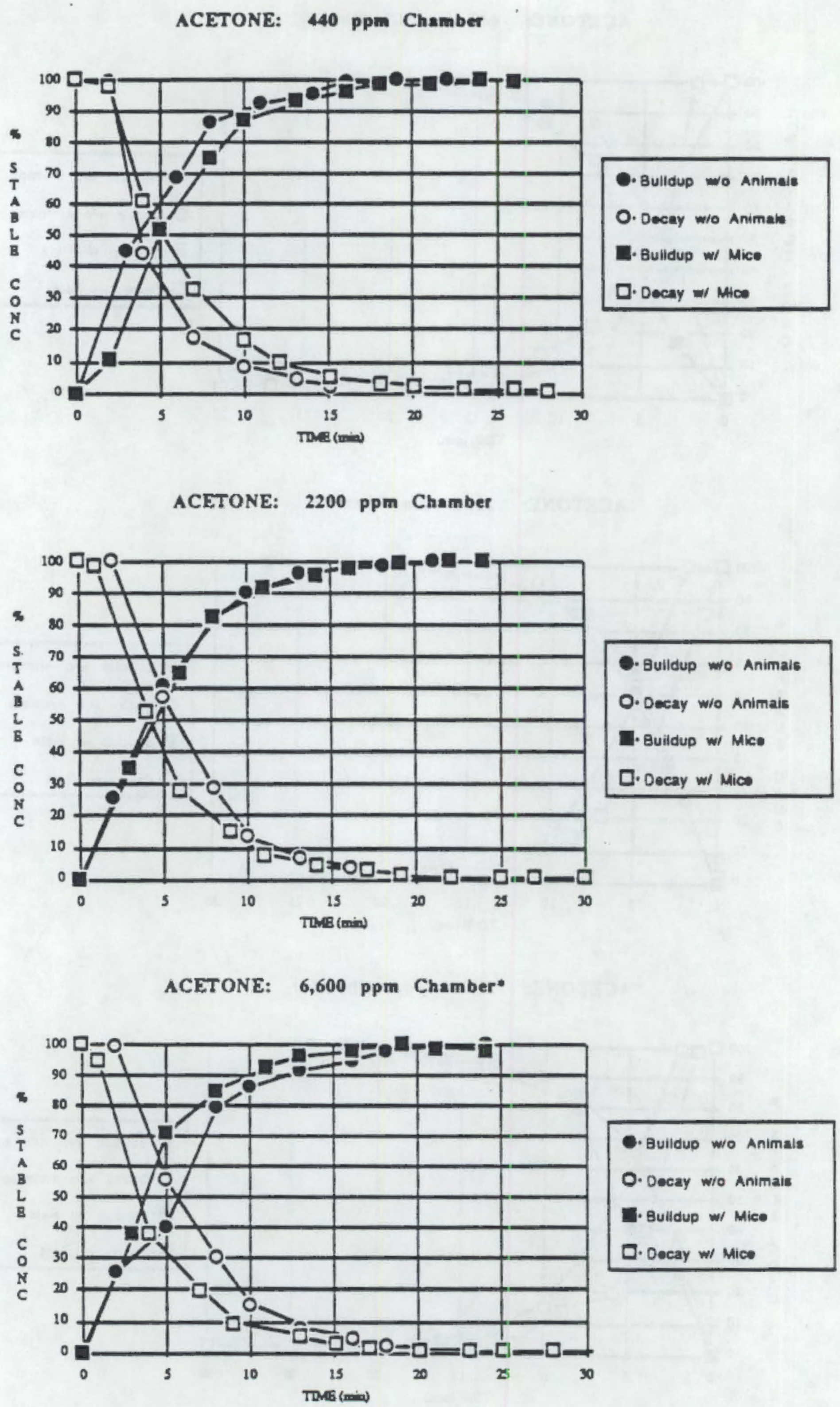
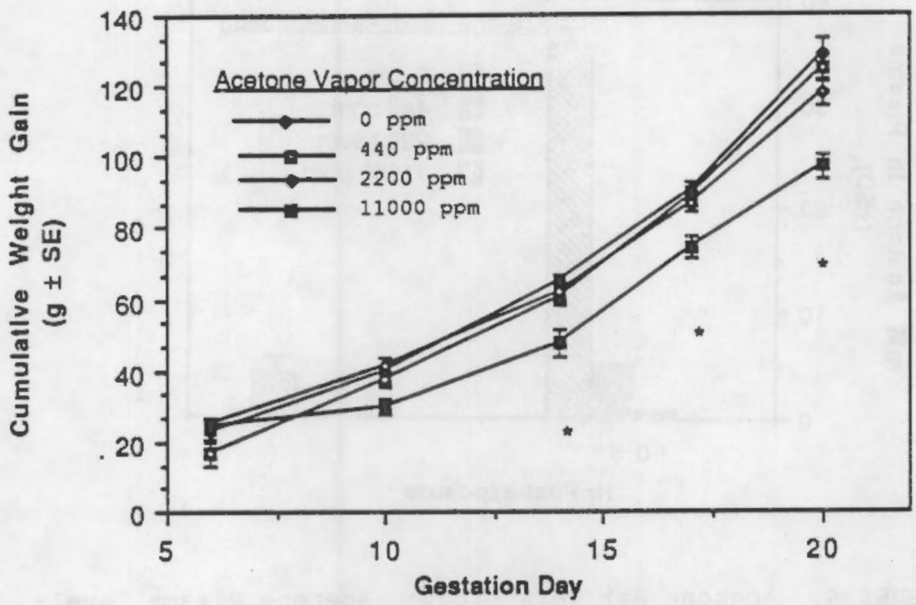


FIGURE 2b. Buildup and Decay of Vapor Concentrations for Exposure of Mice to Acetone With And Without Animals Present.
* Buildup and decay without animals was conducted at 11,000 ppm Acetone for the highest exposure chamber.



* Significantly different from controls at p<0.05.

FIGURE 3. Acetone Rat Teratology: Cumulative Weight Gain Graph

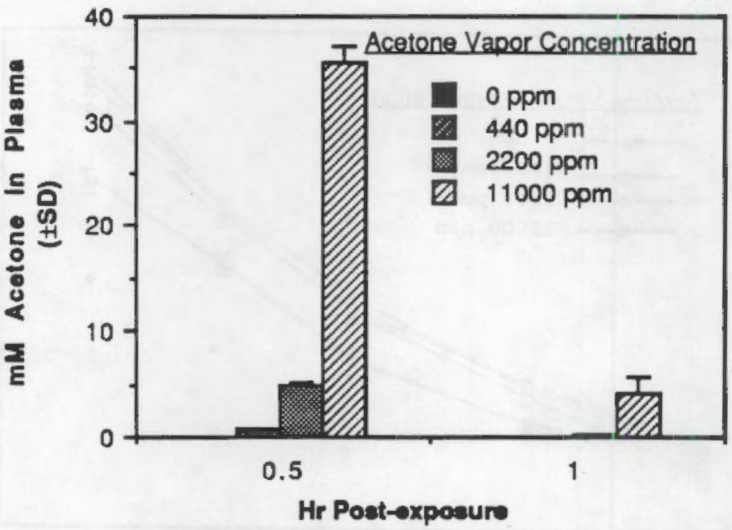


FIGURE 4. Acetone Rat Teratology: Acetone Plasma Levels for Pregnant Females (All Sampling Dates Combined).

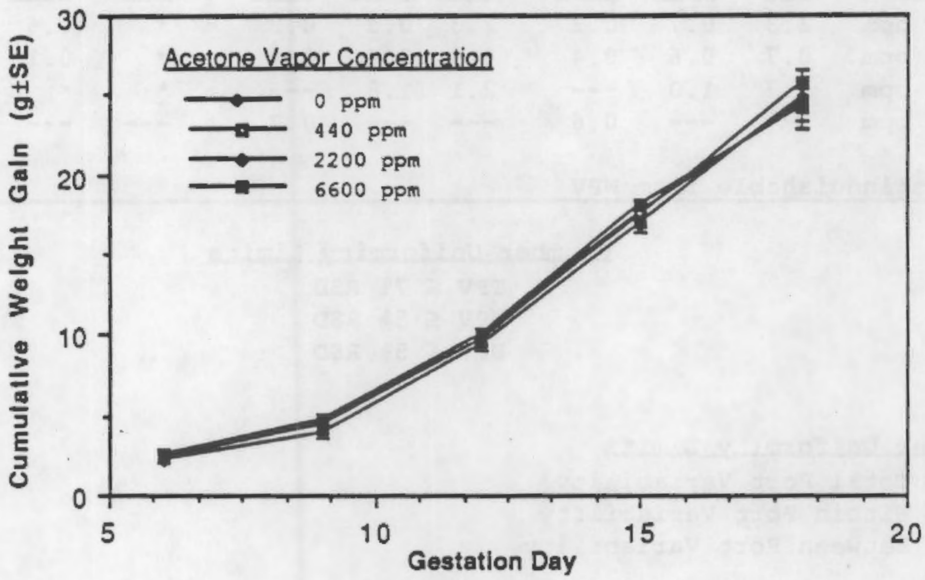


FIGURE 5. Acetone Mouse Teratology: Cumulative Weight Gain Graph

TABLE 1. Teratology Study of Acetone in Mice and Rats: Summary of Chamber Uniformity Data Obtained Before Exposure and During Exposure.

	TPV (%RSD)			WPV (%RSD)			BPV (%RSD)		
Chamber	Pre	Rats	Mice	Pre	Rats	Mice	Pre	Rats	Mice
440 ppm	2.3	0.7	0.2	2.3	0.3	0.2	*	0.6	*
2200 ppm	0.7	0.6	0.4	0.8	0.6	0.4	*	0.1	*
11000 ppm	1.7	1.0	---	2.1	1.8	---	*	*	---
6600 ppm	---	---	0.6	---	---	0.7	---	---	*

*Indistinguishable from WPV

Chamber Uniformity Limits

TPV ≤ 7% RSD
WPV ≤ 5% RSD
BPV ≤ 5% RSD

Chamber Uniformity Limits

TPV: Total Port Variability
WPV: Within Port Variability
BPV: Between Port Variability

TABLE 2. Acetone Teratology Study: Average Daily Exposure Chamber Concentrations for Rat Exposures.

0 ppm Acetone Vapor						
Exposure Day	Mean ±SD (ppm)	Max (ppm)	Min (ppm)	Number Samples	Number in Range (b)	Percent in Range
1	0.13 ± 0.04	0.17	<MDL (a)	17	17	100
2	0.14 ± 0.02	0.16	0.09	17	17	100
3	0.14 ± 0.05	0.26	0.06	14	14	100
4	0.12 ± 0.04	0.17	<MDL	17	17	100
5	0.03 ± 0.05	0.12	<MDL	54	54	100
6	0.03 ± 0.04	0.11	<MDL	19	19	100
7	0.11 ± 0.01	0.15	0.09	15	15	100
8	0.09 ± 0.03	0.11	<MDL	15	15	100
9	0.08 ± 0.03	0.11	<MDL	15	15	100
10	0.09 ± 0.03	0.11	<MDL	15	15	100
11	0.08 ± 0.03	0.11	<MDL	16	16	100
12	0.08 ± 0.03	0.10	<MDL	17	17	100
13	0.06 ± 0.04	0.10	<MDL	18	18	100
14	0.07 ± 0.03	0.10	<MDL	17	17	100
15	0.07 ± 0.04	0.10	<MDL	17	17	100
16	0.07 ± 0.04	0.10	<MDL	17	17	100
17	0.07 ± 0.03	0.09	<MDL	17	17	100
18	0.08 ± 0.01	0.10	0.05	15	15	100
Summary	0.08 ± 0.05	0.26	<MDL	332	332	100

(a) Minimum Detectable Limit (MDL)=0.05 ppm Acetone.
(b) Range=0-25 ppm Acetone.

440 ppm Acetone Vapor						
Exposure Day	Mean ±SD (ppm)	Max (ppm)	Min (ppm)	Number Samples	Number in Range (a)	Percent in Range
1	445 ± 13	464	422	16	16	100
2	429 ± 12	440	396	16	15	94
3	449 ± 14	480	434	13	13	100
4	449 ± 98	797	386	15	12	80
5	419 ± 35	445	322	16	14	88
6	431 ± 24	474	398	11	11	100
7	448 ± 15	494	434	15	14	93
8	434 ± 5	443	424	15	15	100
9	435 ± 6	443	422	15	15	100
10	440 ± 7	448	421	14	14	100
11	442 ± 7	464	435	16	16	100
12	432 ± 10	455	414	17	17	100
13	449 ± 5	456	436	17	17	100
14	450 ± 9	468	435	16	16	100
15	442 ± 7	463	434	16	16	100
16	430 ± 16	451	389	16	15	94
17	446 ± 13	464	412	16	16	100
18	439 ± 8	452	428	14	14	100
Summary	439 ± 27	797	322	274	266	97

(a) Range = ±10% target.

TABLE 2. Acetone Teratology Study: Average Daily Exposure Chamber Concentrations for Rat Exposures. (cont.)

2200 ppm Acetone Vapor						
Exposure Day	Mean ±SD (ppm)	Max (ppm)	Min (ppm)	Number Samples	Number in Range (a)	Percent in Range
1	2230 ± 16	2260	2200	16	16	100
2	2200 ± 22	2230	2150	16	16	100
3	2210 ± 14	2240	2190	13	13	100
4	2220 ± 19	2270	2190	15	15	100
5	2190 ± 44	2240	2070	16	16	100
6	2200 ± 10	2220	2190	10	10	100
7	2220 ± 24	2240	2140	15	15	100
8	2210 ± 11	2240	2200	15	15	100
9	2190 ± 13	2210	2160	15	15	100
10	2200 ± 18	2250	2180	14	14	100
11	2200 ± 13	2230	2180	15	15	100
12	2210 ± 39	2340	2140	17	17	100
13	2160 ± 18	2200	2140	17	17	100
14	2190 ± 17	2210	2150	16	16	100
15	2220 ± 13	2240	2190	16	16	100
16	2210 ± 15	2240	2190	16	16	100
17	2200 ± 15	2220	2170	16	16	100
18	2210 ± 13	2230	2190	14	14	100
Summary	2200 ± 25	2340	2070	272	272	100

(a) Range = ±10% target.

11000 ppm Acetone Vapor						
Exposure Day	Mean ±SD (ppm)	Max (ppm)	Min (ppm)	Number Samples	Number in Range (a)	Percent in Range
1	11100 ± 179	11400	10800	16	16	100
2	11000 ± 116	11200	10800	16	16	100
3	11100 ± 122	11200	10800	13	13	100
4	11000 ± 104	11100	10800	16	16	100
5	11000 ± 113	11100	10700	16	16	100
6	11000 ± 147	11200	10700	10	10	100
7	11100 ± 190	11300	10500	15	15	100
8	11100 ± 139	11400	10900	14	14	100
9	11100 ± 136	11300	10800	13	13	100
10	11100 ± 102	11300	11000	14	14	100
11	11000 ± 108	11200	10900	15	15	100
12	11100 ± 103	11300	10900	16	16	100
13	10900 ± 118	11100	10700	17	17	100
14	11000 ± 67	11100	10900	16	16	100
15	10900 ± 63	11100	10800	16	16	100
16	10800 ± 64	11000	10700	16	16	100
17	10900 ± 88	11100	10800	16	16	100
18	11000 ± 83	11200	10900	14	14	100
Summary	11000 ± 137	11400	10500	269	269	100

(a) Range = ±10% target.

TABLE 3. Acetone Teratology Study: Average Daily Exposure Chamber Concentrations for Mouse Exposures.

0 ppm Acetone Vapor						
Exposure Day	Mean ±SD (ppm)	Max (ppm)	Min (ppm)	Number Samples	Number in Range (b)	Percent in Range
1	0.10 ± 0.03	0.12	<MDL (a)	17	17	100
2	0.06 ± 0.03	0.15	<MDL	15	15	100
3	0.04 ± 0.03	0.08	<MDL	17	17	100
4	0.03 ± 0.03	0.07	<MDL	17	17	100
5	0.29 ± 0.96	3.75	<MDL	15	14	93
6	0.06 ± 0.03	0.10	<MDL	15	15	100
7	0.05 ± 0.03	0.08	<MDL	16	16	100
8	0.04 ± 0.04	0.09	<MDL	15	15	100
9	0.04 ± 0.04	0.08	<MDL	15	15	100
10	0.01 ± 0.03	0.07	<MDL	16	16	100
11	0.01 ± 0.03	0.08	<MDL	17	17	100
12	0.03 ± 0.03	0.08	<MDL	17	17	100
13	0.02 ± 0.03	0.08	<MDL	17	17	100
14	0.01 ± 0.02	0.06	<MDL	15	15	100
15	0.02 ± 0.03	0.08	<MDL	17	17	100
16	0.00 ± 0.00	<MDL	<MDL	11	11	100
Summary	0.05 ± 0.24	3.75	<MDL	252	251	100

(a) Minimum Detectable Limit (MDL)=0.05 ppm Acetone.
(b) Range=0-25 ppm Acetone.

440 ppm Acetone Vapor						
Exposure Day	Mean ±SD (ppm)	Max (ppm)	Min (ppm)	Number Samples	Number in Range (a)	Percent in Range
1	442 ± 23	489	411	16	15	94
2	429 ± 29	472	397	15	15	100
3	434 ± 13	457	407	16	16	100
4	442 ± 21	471	377	16	15	94
5	450 ± 12	471	427	13	13	100
6	445 ± 7	451	421	15	15	100
7	424 ± 15	456	402	14	14	100
8	440 ± 15	479	421	13	13	100
9	439 ± 8	452	426	15	15	100
10	440 ± 7	446	426	15	15	100
11	446 ± 3	449	434	16	16	100
12	444 ± 4	448	432	16	16	100
13	433 ± 6	447	426	16	16	100
14	439 ± 5	447	427	14	14	100
15	435 ± 8	445	416	16	16	100
16	376 ± 136	468	8	10	8	80
Summary	436 ± 33	489	8	236	232	98

(a) Range = ±10% target.

TABLE 3. Acetone Teratology Study: Average Daily Exposure Chamber Concentrations for Mouse Exposures. (cont.)

2200 ppm Acetone Vapor						
Exposure Day	Mean ±SD (ppm)	Max (ppm)	Min (ppm)	Number Samples	Number in Range (a)	Percent in Range
1	2250 ± 69	2450	2200	16	15	94
2	2200 ± 32	2310	2180	15	15	100
3	2190 ± 16	2220	2160	16	16	100
4	2190 ± 37	2240	2080	16	16	100
5	2210 ± 18	2240	2180	13	13	100
6	2190 ± 11	2210	2170	15	15	100
7	2170 ± 16	2190	2130	15	15	100
8	2190 ± 54	2250	2040	13	13	100
9	2180 ± 12	2210	2170	14	14	100
10	2170 ± 15	2190	2140	15	15	100
11	2170 ± 16	2210	2150	16	16	100
12	2180 ± 13	2200	2160	16	16	100
13	2180 ± 12	2190	2150	16	16	100
14	2200 ± 12	2230	2190	14	14	100
15	2200 ± 9	2220	2180	16	16	100
16	1940 ± 678	2200	15	10	9	90
Summary	2180 ± 146	2450	15	236	234	99

(a) Range = ±10% target.

6600 ppm Acetone Vapor						
Exposure Day	Mean ±SD (ppm)	Max (ppm)	Min (ppm)	Number Samples	Number in Range (b)	Percent in Range
1 (a)	11100 ± 336	11700	10700	16	16	100
2	6590 ± 83	6770	6450	15	15	100
3	6560 ± 78	6720	6440	16	16	100
4	6510 ± 98	6730	6370	16	16	100
5	6520 ± 120	6680	6320	14	14	100
6	6610 ± 61	6690	6520	15	15	100
7	6550 ± 107	6730	6380	14	14	100
8	6520 ± 201	6680	5960	12	12	100
9	6580 ± 112	6710	6290	14	14	100
10	6560 ± 82	6760	6450	15	15	100
11	6630 ± 43	6710	6570	16	16	100
12	6630 ± 45	6710	6560	16	16	100
13	6500 ± 80	6620	6380	16	16	100
14	6630 ± 47	6700	6570	14	14	100
15	6560 ± 56	6690	6500	16	16	100
16	5850 ± 2021	6770	113	10	9	90
Summary	6540 ± 448	6770	113	219	218	100

(a) Changed from 11000 ppm to 6600 ppm Acetone vapor after the first day of exposure. See Text.

(b) Range = ±10% target.

TABLE 4. Acetone Rat Teratology Study: Mean Body, Uterine, and Extra-gestational Weights of Pregnant Dams (g ± SD).

Acetone (ppm)	Weight (g)			
	0 ppm	440 ppm	2200 ppm	11000 ppm
N	26	27	29	26
Body Weight				
0 dg	272.6 ± 17.7	273.6 ± 15.7	273.1 ± 18.6	274.5 ± 19.9
6 dg	295.4 ± 22.3	290.5 ± 28.5	298.5 ± 19.2	299.0 ± 23.9
10 dg	312.5 ± 18.8	311.2 ± 20.0	314.7 ± 21.1	304.4 ± 24.9
14 dg	337.6 ± 19.8	333.8 ± 21.5	334.8 ± 22.1	322.1 ± 28.9
17 dg	362.8 ± 21.5	362.0 ± 23.8	359.8 ± 24.5	348.7 ± 26.1
20 dg (b)	401.2 ± 29.5	398.5 ± 27.9	390.8 ± 28.1	371.3 ± 29.1 (a)
Uterine (b)	83.2 ± 19.0	79.7 ± 14.5	74.5 ± 16.3	67.1 ± 13.9 (a)
Extra-gestational Wt. gain (b)	45.3 ± 16.7	45.1 ± 13.2	43.2 ± 15.2	29.7 ± 14.4 (a)

(a) Significantly different from 0-ppm group, p<0.05.
(b) Significantly correlated with exposure concentration, p<0.05.

TABLE 5. Contemporary Control Data for Sprague Dawley Rats (N=80 Litters; Mean ± SD).

	Number	Percent
Maternal Weight; 20 dg	404.8 ± 29.0	—
Gravid Uterine Weight	79.6 ± 18.7	—
Extra-gestational Weight Gain	48.2 ± 15.0	—
Implants	15.7 ± 2.9	—
Live Fetuses	14.7 ± 3.3	92.5 ± 9.0
Early Resorptions	0.9 ± 1.1	6.4 ± 8.6
Late Resorptions	0.2 ± 0.5	1.1 ± 3.3
Dead Fetuses	0.0 ± 0.0	0.0 ± 0.0
Total Intrauterine Death	1.1 ± 1.1	7.5 ± 9.0
Litters with Resorptions	48	60
Fetal Weight	3.55 ± 0.33	—
Male	3.64 ± 0.39	—
Female	3.45 ± 0.32	—

TABLE 6. Acetone Rat Teratology Study: Mean Body Weights for Virgins (g ± SD).

Exposure Concen-tration	N	Exposure Day 1	Exposure Day 5	Exposure Day 10	Sacrifice
0 ppm	10	280.1 ± 16.6	287.5 ± 20.2	290.0 ± 20.1	290.2 ± 21.8
440 ppm	10	277.0 ± 20.1	283.3 ± 17.9	290.6 ± 18.5	286.6 ± 27.7
2200 ppm	10	278.7 ± 23.8	287.1 ± 19.9	292.6 ± 20.2	292.0 ± 16.6
11000 ppm	10	279.0 ± 24.2	277.2 ± 26.8	276.7 ± 26.0	273.1 ± 26.4

TABLE 7. Acetone Rat Teratology Study: Mean Organ Weights of Pregnant Dams (g ± SD).

Exposure Concen-tration	N	Liver	Liver % LBWR (a)	Kidney	Kidney % KBWR (b)
0 ppm	26	16.9 ± 1.7	4.22 ± 0.31	2.2 ± 0.1	0.56 ± 0.04
440 ppm	27	17.1 ± 1.8	4.28 ± 0.27	2.3 ± 0.2	0.57 ± 0.05
2200 ppm	29	16.5 ± 1.6	4.21 ± 0.28	2.2 ± 0.2	0.57 ± 0.05
11000 ppm	26	16.8 ± 2.2	4.51 ± 0.39	2.4 ± 0.2	0.64 ± 0.05

(a) %LBWR=Percent Liver to Body Weight Ratio, (at sacrifice).
(b) %KBWR=Percent Kidney to Body Weight Ratio, (at sacrifice).

TABLE 8. Acetone Rat Teratology Study: Reproductive Measures (Mean ± SD).

	Acetone Chamber Concentration (ppm)			
	0	440	2200	11000
Sperm-positive Females	30	31	31	30
Number Pregnant	28	29	29	29
Pregnant (%)	93	94	94	97
Pregnancies Examined	26(a)	27(b)	29	26(c)
Implantations/Dam	15.9 ± 2.3	15.7 ± 2.5	15.7 ± 2.2	15.4 ± 3.0
Live Fetuses/Litter	14.8 ± 2.5	14.6 ± 2.8	14.0 ± 3.2	14.1 ± 2.8
Resorptions/Litter: Total	1.0 ± 1.3	1.1 ± 1.6	1.6 ± 2.1	1.3 ± 1.3
Early	0.8 ± 1.1	0.9 ± 1.2	1.3 ± 1.8	1.0 ± 1.0
Late	0.2 ± 0.7	0.2 ± 0.8	0.3 ± 1.1	0.3 ± 0.6
Dead Fetuses/Litter	0	0	0	0
Litters with Resorptions	13	16	20	20
PERCENTAGE OF:				
Live Fetuses/Litter	93.4 ± 8.5	92.7 ± 9.6	89.3 ± 14.6	92.1 ± 7.7
Resorptions/Litter: Total	6.6 ± 8.5	7.3 ± 9.6	10.7 ± 14.6	7.9 ± 7.7
Early	5.0 ± 7.3	5.9 ± 7.3	8.6 ± 12.3	6.3 ± 6.1
Late	1.5 ± 4.2	1.4 ± 4.8	2.1 ± 7.3	1.6 ± 3.7
Dead Fetuses/Litter	0	0	0	0
Litters with Resorptions	50	59	69	77

(a) 2 dams removed from study; one with umbilical hernia and one with litter ≤ 2 implants.
(b) 2 dams removed from study; one with dental problems and one with litter ≤ 2 implants.
(c) 3 dams removed from study; two with litters ≤ 2 implants and one with dental problems.

TABLE 9. Acetone Rat Teratology Study: Average Fetal Weights (Means of Litter Means; g ± SD), and Percent Male Fetuses.

	Acetone Chamber Concentration (ppm)			
	0	440	2200	11000
Litter Examined	26	27	28	26
Fetal Weight (c)	3.6 ± 0.4	3.7 ± 0.2	3.5 ± 0.3	3.1 ± 0.3 (b)
Male (c)	3.7 ± 0.4	3.8 ± 0.2	3.6 ± 0.3	3.1 ± 0.3 (b)
Female (c)	3.5 ± 0.3	3.6 ± 0.2	3.4 ± 0.3	3.0 ± 0.3 (b)
Percent Male Fetuses	51.6±13.7	49.9±14.4	51.9±15.5 (a)	49.5±13.2

(a) N= 29 litters; one litter was sexed but inadvertantly not weighed.
(b) Significantly different from 0-ppm group, $p<0.05$.
(c) Significantly correlated with exposure concentration, $p<0.05$.

TABLE 10. Acetone Rat Teratology Study: Malformations Observed in Live Fetuses.

		Fetuses (a)				Litters (a)			
Acetone (ppm)		0	440	2200	11000	0	440	2200	11000
Total Examined (b)		386	393	407	366	26	27	29	26
Heads examined (c)		195	197	204	185	26	27	29	26
Skulls examined (d)		191	196	203	181	26	27	29	26
Viscera examined (e)		192	196	203	181	26	27	29	26
Malformations:									
Exencephaly	NO.	1(f)	0	0	0	1	0	0	0
	(%)	(0.3)				(3.8)			
Anophthalmia	NO.	1 (f)	0	0	0	1	0	0	0
	(%)	(0.3)				(3.8)			
Rachischisis	NO.	1 (f)	0	0	0	1	0	0	0
	(%)	(0.3)				(3.8)			
Fused Ribs	NO.	1 (f)	0	0	0	1	0	0	0
	(%)	(0.3)				(3.8)			
Cleft Sternum	NO.	0	0	0	1 (g)	0	0	0	1
	(%)				(0.3)				(3.8)
Ectopic Heart	NO.	0	0	0	1 (g)	0	0	0	1
	(%)				(0.3)				(3.8)
Major Vessel Malformations	NO.	0	0	0	1 (g)	0	0	0	1
	(%)				(0.3)				(3.8)
Edema	NO.	0	0	0	1 (g)	0	0	0	1
	(%)				(0.3)				(3.8)
Unilateral Arhinia	NO.	0	0	0	1 (h)	0	0	0	1
	(%)				(0.3)				(3.8)
Microstomia	NO.	0	0	0	1(h)	0	0	0	1
	(%)				(0.3)				(3.8)
Missing Tail	NO.	0	0	0	2 (i)	0	0	0	1
	(%)				(0.5)				(3.8)
Rib Agenesis	NO.	0	1	0	0	0	1	0	0
	(%)		(0.3)				(3.7)		
Vertebral Agenesis (lumbar, sacral)	NO.	0	0	0	1 (i)	0	0	0	1
	(%)				(0.3)				(3.8)
Total Malformations (j)	NO.	4	1	0	9	—	—	—	—
Total Fetuses (Litters) with Malformations	NO.	1	1	0	4	1	1	0	3
	(%)	(0.3)	(0.3)		(1.1)	(3.8)	(3.7)		(11.5)

(a) A single fetus or litter may be represented more than once in this table.
(b) All fetuses examined for external and skeletal defects. One-half had heads removed prior to skeletal staining.
(c) Heads fixed in Bouin's solution for soft-tissue craniofacial evaluations.
(d) Heads remaining on the fetuses for skeletal examination; see (b).
(e) Viscerals performed on approx. 50% of live fetuses and all fetuses with external defects.
(f) Three major malformations found in a single fetus.
(g) Four major malformations found in a single fetus.
(h) Two major malformations found in a single fetus.
(i) Two major malformations found in a single fetus.
(j) There may be >1 malformation per fetus.

TABLE 11. Acetone Rat Teratology Study: Mean Percent of Live Fetuses Affected per Litter (Mean ±SD).

	Acetone Vapor Concentration (ppm)			
	0	440	2200	11000
Number Litters	26	27	29	26
Live Fetuses/Litter	14.8 ± 2.5	14.6 ± 2.8	14.0 ± 3.2	14.1 ± 2.8
Malformations:	% ± SD	% ± SD	% ± SD	% ± SD
Exencephaly	0.3 ± 1.5	0	0	0
Anophthalmia	0.3 ± 1.5	0	0	0
Rachischisis	0.3 ± 1.5	0	0	0
Fused Rib	0.3 ± 1.5	0	0	0
Cleft Sternum	0	0	0	0.2 ± 1.0
Ectopic Heart	0	0	0	0.2 ± 1.0
Major Vessel Malformation	0	0	0	0.2 ± 1.0
Edema	0	0	0	0.2 ± 1.0
Unilateral Arhnia	0	0	0	0.3 ± 1.5
Microstomia	0	0	0	0.3 ± 1.5
Missing Tail	0	0	0	0.7 ± 3.6
Rib Agenesis	0	0.2 ± 1.1	0	0
Vertebral Agenesis (lumbar and sacral)	0	0	0	0.3 ± 1.8
% Fetuses per Litter with at Least One Malformation	0.9 ± 4.5	0.2 ± 1.1	0	2.8 ± 8.5
Variations:				
Dilated Ureter	2.9 ± 7.6	3.4 ± 10.9	2.4 ± 6.4	3.8 ± 7.3
Misaligned Sternebra (b)	0.6 ± 2.0	0.7 ± 2.1	0.5 ± 2.0	2.1 ± 3.8
Missing Innominate	0.5 ± 2.5	0.5 ± 2.7	0	0.5 ± 2.8
Supernumerary Rib	6.6 ± 12.9	4.8 ± 12.2	5.0 ± 12.2	3.0 ± 6.5
Renal Pelvic Cavitation	0	0	0.4 ± 2.3	0
Reduced Ossifications:				
Pelvis	1.7 ± 5.3	0.4 ± 2.1	2.2 ± 5.7	0.7 ± 3.6
Phalanges	1.4 ± 5.2	0	0.2 ± 1.0	1.2 ± 3.8
Ribs(c)	0	0	0.4 ± 1.7	0.5 ± 1.8
Skull	1.0 ± 4.9	0	2.4 ± 5.3	4.3 ± 9.7
Sternebrae (b)	6.1 ± 11.1	4.6 ± 5.8	6.3 ± 9.0	11.5 ± 14.1
Vertebral Centra	2.2 ± 4.2	1.1 ± 3.5	1.7 ± 3.8	1.4 ± 3.1
% Fetuses per Litter with at Least One Variation or Reduced Ossification	15.4 ± 13.9	11.3 ± 15.9	15.0 ± 17.2	18.3 ± 15.5

(a) Includes malformations, variations, and reduced ossifications.

(b) Mean percent incidence is linearly correlated with exposure concentration ($p<0.05$).

(c) Includes thoracic rudimentary ribs.

TABLE 12. Contemporary Control Data on Rat Teratology Studies: Malformations.

		Fetuses (a) Number (Percent)	Litters Number (Percent)	Mean Percent per Litter (± SD)
Total examined (b)		1172	80	—
Heads examined (c)		—	—	
Skulls examined (d)		—	—	
Malformations				
Exencephaly	No.	1	1	0.1 ± 0.9
	(%)	(0.1)	(1.3)	
Micropthalmia	No.	1	1	0.1 ± 0.7
	(%)	(0.1)	(1.3)	
Anophthalmia	No.	1	1	0.1 ± 0.9
	(%)	(0.1)	(1.3)	
Rachischisis	No.	1	1	0.1 ± 0.9
	(%)	(0.1)	(1.3)	
Ectopic Ovaries	No.	1	1	0.1 ± 0.6
	(%)	(0.1)	(1.3)	
Total Fetuses (Litters) with Malformations	No.	3	5	0.2 ± 1.3 (e)
	(%)	(0.2)	(6.3)	

(a) A single fetus or litter may be represented more than once in this table.
(b) All fetuses examined for external and skeletal defects. One-half had heads removed prior to skeletal staining.
(c) Heads fixed in Bouin's solution for soft-tissue craniofacial evaluations.
(d) Heads that remained on the fetuses had a skeletal examination; see (b).
(e) Mean percent of fetuses per litter with at least one malformation.

TABLE 13. Acetone Rat Teratology Study: Variations Observed in Live Fetuses.

		Fetuses (a)				Litters (a)			
Acetone (ppm)		0	440	2200	11000	0	440	2200	11000
Total Examined (b)		386	393	407	366	26	27	29	26
Heads examined (c)		195	197	204	185	26	27	29	26
Skulls examined (d)		191	196	203	181	26	27	29	26
Viscera examined (e)		192	196	203	181	26	27	29	26
Variations:									
Dilated Ureter	NO.	5	7	5	7	4	3	4	6
	(%)	(2.6)	(3.6)	(2.5)	(3.9)	(15.4)	(11.1)	(13.8)	(23.1)
Misaligned Sternebrae	NO.	2	3	2	8	2	3	2	7
	(%)	(0.5)	(0.8)	(0.5)	(2.2)	(7.7)	(11.1)	(6.9)	(26.9)
Missing Innominate	NO.	1	1	0	1	1	1	0	1
	(%)	(0.5)	(0.5)		(0.5)	(3.8)	(3.7)		(3.8)
Supernumerary Rib	NO.	27	17	17	12	9	5	7	9
	(%)	(7.0)	(4.3)	(4.2)	(3.3)	(34.6)	(18.5)	(24.1)	(34.6)
Renal Pelvic Cavitation	NO.	0	0	1	0	0	0	1	0
	(%)			(0.5)				(3.4)	
Reduced Ossifications:									
Pelvis	NO.	5	1	7	2	3	1	5	1
	(%)	(1.3)	(0.2)	(1.7)	(0.5)	(11.5)	(3.7)	(17.2)	(3.8)
Phalanges	NO.	4	0	1	4	2	0	1	3
	(%)	(1.0)		(0.2)	(1.1)	(7.7)		(3.4)	(11.5)
Ribs (f)	NO.	0	0	2	2	0	0	2	2
	(%)			(0.5)	(0.5)			(6.9)	(7.7)
Skull	NO.	1	0	5	8	1	0	5	6
	(%)	(0.5)		(2.5)	(4.4)	(3.8)		(17.2)	(23.1)
Sternebrae	NO.	21	18	23	44	11	13	16	15
	(%)	(5.4)	(4.6)	(5.6)	(12.0)	(42.3)	(48.1)	(55.2)	(57.7)
Vertebral Centra	NO.	9	5	7	5	7	3	6	5
	(%)	(2.3)	(1.3)	(1.7)	(1.4)	(26.9)	(11.1)	(20.7)	(19.2)
Total Variations and Reduced Ossifications (g)	NO.	75	52	70	93	—	—	—	—
Total Fetuses (Litters) with Variations or Red.Ossif.	NO.	58	43	55	70	24	16	22	21
	(%)	(15.0)	(10.9)	(13.5)	(19.1)	(92.3)	(59.3)	(75.9)	(80.8)

(a) A single fetus or litter may be represented more than once in this table.
(b) All fetuses examined for external and skeletal defects. One-half had heads removed prior to skeletal staining.
(c) Heads fixed in Bouin's solution for soft-tissue craniofacial evaluations.
(d) Heads remaining on the fetuses for skeletal examination; see (b).
(e) Viscerals performed on approx. 50% of live fetuses and all fetuses with external defects.
(f) Includes rudimentary thoracic ribs.
(g) There may be >1 variation or reduced ossification site per fetus.

TABLE 14. Contemporary Control Data on Rat Teratology Studies: Variations and Reduced Ossifications.

		Fetuses (a) Number (Percent)	Litters Number (Percent)	Mean Percent per Litter (± SD)
Total examined (b)		1172	80	—
Heads examined (c)		—	—	
Skulls examined (d)		—	—	
Variations				
Supernumerary Rib	No.	38	17	3.2 ± 8.4
	(%)	(3.2)	(21.3)	
Missing Innominate	No.	2	2	0.2 ± 1.1
	(%)	(0.2)	(2.5)	
Dilated Ureter	No.	32	15	2.9 ± 8.7
	(%)	(2.7)	(18.8)	
Rudimentary Rib	No.	1	1	0.1 ± 0.7
	(%)	(0.1)	(1.3)	
Renal Pelvic Cavitation	No.	8	4	0.7 ± 3.4
	(%)	(0.7)	(5.0)	
Misaligned Sternabrae	No.	4	4	0.3 ± 1.5
	(%)	(0.3)	(5.0)	
Reduced Ossifications				
Sternebrae	No.	95	38	8.5 ± 15.0
	(%)	(8.1)	(47.5)	
Vertebrae	No.	53	29	4.7 ± 10.2
	(%)	(4.5)	(36.3)	
Phalanges	No.	9	6	1.0 ± 4.0
	(%)	(0.8)	(7.5)	
Pelvic	No.	21	10	2.3 ± 9.8
	(%)	(1.8)	(12.5)	
Skull	No.	15	7	1.5 ± 6.1
	(%)	(1.3)	(8.8)	
Total Fetuses (Litters) with Variations or Red. Ossif.	No.	205	69	18.0 ± 18.3 (e)
	(%)	(17.4)	(86.3)	

(a) A single fetus or litter may be represented more than once in this table.
(b) All fetuses examined for external and skeletal defects. One-half had heads removed prior to skeletal staining.
(c) Heads fixed in Bouin's solution for soft-tissue craniofacial evaluations.
(d) Heads that remained on the fetuses had a skeletal examination; see (b).
(e) Mean percent of fetuses per litter with at least one variation or reduced ossification..

TABLE 15. Acetone Rat Teratology Study (Ketone): Mean Body, Uterine, and Extra-gestational Weights of Pregnant Dams (g ± SD).

	Weights (g)			
	0 ppm	440 ppm	2200 ppm	11000 ppm
N	7	3	7	7
Body Weights				
0 dg	274.8 ± 20.9	278.1 ± 18.2	275.5 ± 15.0	280.3 ± 18.6
6 dg	304.5 ± 23.0	299.1 ± 17.9	298.3 ± 13.6	302.3 ± 21.5
10 dg	309.0 ± 27.6	313.6 ± 17.1	317.0 ± 15.1	305.6 ± 20.4
14 dg	333.4 ± 23.1	337.0 ± 19.4	339.4 ± 14.4	326.6 ± 23.7
17 dg	357.6 ± 29.0	355.3 ± 18.8	361.1 ± 16.8	345.0 ± 28.3
20 dg	393.6 ± 38.7	381.2 ± 24.5	396.0 ± 24.9	366.1 ± 33.9
Uterine	81.9 ± 23.8	65.1 ± 21.4	76.4 ± 10.0	71.2 ± 8.7
Extra-gestational Wt. gain	37.0 ± 17.2	37.9 ± 12.7	44.1 ± 29.4	14.6 ± 25.7

TABLE 16. Concentration of Ketone Bodies Found in the Plasma of Pregnant Rats (except where noted) Exposed to Acetone by Inhalation.

Exposure Group	Time of Sampling	Day of Gestation	Acetone (mM) Mean ±	SD	N	Acetoacetic Acid (mM) Mean ±	SD	N	β-Hydroxybutyric Acid (mM) Mean ±	SD	N
Control	30 min	7	<0.01	--	7	0.05	0.01	7	1.0	0.1	7
	Post-	14	<0.01	--	7	0.03	0.02	7	0.9	0.1	7
	exposure	19	0.03	0.02	7	0.02	0.01	7	1.1	0.2	7
440 ppm (Pregnant)	30 min	7	0.66	0.07	4	<0.02	--	4	<1.5	--	4
	Post-	14	0.74	0.03	4	0.39	0.07	4	2.6	0.3	4
	Exposure	19	0.91	0.08	4	<0.20	--	4	1.4	0.2	4
440 ppm (Non-pregnant)	30 min	7	0.58	0.01	3	0.16	0.05	3	0.8	0.2	3
	Post-	14	0.59	0.06	3	<0.4	--	3	2.0	0.4	3
	exposure	19	0.66	0.06	3	<0.4	--	3	1.1	0.4	3
2,220 ppm	30 min	7	5.1	0.3	7	<0.5	--	7	<0.5	--	7
	Post-	14	4.7	0.5	7	<0.7	--	7	<1.6	--	7
	exposure	19	5.1	0.4	7	<0.5	--	7	4	3	7
11,000 ppm	30 min	7	37	2	7	<3	--	7	<3	--	7
	Post-	14	36	4	7	<5	--	7	<5	--	7
	exposure	19	34	5	7	<7	--	7	<7	--	7
Control	17 h	7	<0.01	--	7	0.06	0.03	7	1.2	0.1	7
	Post-	14	<0.01	--	7	0.03	0.01	7	1.2	0.1	7
	exposure	19	<0.01	--	5	0.03	0.02	7	1.2	0.1	7
440 ppm (Pregnant)	17 h	7	<0.07	--	4	<0.60		4	0.7	0.4	4
	Post-	14	<0.01	--	4	0.03	0.01	4	1.6	0.1	4
	exposure	19	<0.03	--	3	<0.03	--	3	1.6	0.4	3
440 ppm (Non-pregnant)	17 h	7	<0.01	--	3	0.06	0.03	3	0.9	0.2	3
	Post-	14	<0.02	--	3	0.04	0.02	3	1.4	0.1	3
	exposure	19	<0.01	--	2	0.06	--	2	1.1	0.1	2
2,200 ppm	17 h	7	<0.01	--	7	<0.20	--	7	1.0	0.4	7
	Post-	14	0.01	0.01	7	<0.02	--	7	0.9	0.1	7
	exposure	19	0.40	0.20	7	<0.06	--	7	1.4	0.3	7
11,000 ppm	17 h	7	3	1	7	<2	--	7	2	1	7
	Post-	14	<3	--	6	<2	--	6	<2	--	6
	exposure	19	6	2	7	<2	--	7	5.2	0.7	7

TABLE 17. Acetone Mouse Teratology Study: Mean Body, Uterine, and Extra-gestational Weights of Pregnant Dams (g ± SD).

Acetone (ppm)	Weights (g)			
	0 ppm	440 ppm	2200 ppm	6600 ppm
N	26	28	29	31
Body Weight				
0 dg	27.7 ± 2.6	27.3 ± 2.7	27.5 ± 3.3	27.5 ± 2.5
6 dg	29.9 ± 2.6	29.7 ± 2.7	30.0 ± 3.6	30.0 ± 2.7
9 dg	31.5 ± 2.7	31.8 ± 2.6	32.2 ± 3.5	32.2 ± 2.7
12 dg	37.1 ± 3.1	37.1 ± 3.1	37.5 ± 4.1	37.6 ± 3.3
15 dg	44.6 ± 3.9	44.7 ± 4.2	45.1 ± 5.0	45.5 ± 3.7
18 dg	52.5 ± 5.0	53.0 ± 5.9	52.1 ± 8.4	53.0 ± 6.6 (a)
Uterine	18.7 ± 3.4	18.4 ± 3.9	17.9 ± 3.5	17.6 ± 2.7
Extra-gestational Wt. gain	6.1 ± 2.1	7.3 ± 2.8	6.7 ± 4.9	7.7 ± 3.0 (a)

(a) One dam was weighed incorrectly, therefore the weight was entered as -1 and the n=30.

TABLE 18. Contemporary Control Data for Swiss (CD-1) Mice (N=83 Litters; Mean ± SD).

	Number	Percent
Maternal Weight; 18 dg	54.4 ± 5.6	—
Gravid Uterine Weight	20.2 ± 3.6	—
Extra-gestational Weight Gain	6.6 ± 3.0	—
Implants	12.6 ± 2.1	—
Live Fetuses	11.7 ± 2.2	93.5 ± 7.3
Early Resorptions	0.6 ± 0.8	4.6 ± 6.3
Late Resorptions	0.2 ± 0.5	1.9 ± 3.7
Dead Fetuses	0.0 ± 0.0	0.0 ± 0.0
Total Intrauterine Death	0.8 ± 1.0	6.5 ± 7.3
Litters with Resorptions	35	42.2
Fetal Weight	1.4 ± 0.1	—
Male	1.4 ± 0.1	—
Female	1.3 ± 0.1	—

TABLE 19. Acetone Mouse Teratology Study: Mean Body Weights for Virgins (g ± SD).

Exposure Concentration	N	Exposure Day 1	Exposure Day 5	Exposure Day 10	Sacrifice
0 ppm	10	26.6 ± 2.4	27.2 ± 2.2	28.1 ± 2.4	28.3 ± 2.5
440 ppm	10	26.8 ± 2.7	27.4 ± 3.3	27.4 ± 2.5	28.1 ± 2.2
2200 ppm	10	26.9 ± 3.4	27.4 ± 3.3	27.3 ± 3.4	28.3 ± 3.4
6600 ppm	10	26.6 ± 2.4	27.3 ± 2.1	28.6 ± 2.2	29.2 ± 2.5

TABLE 20. Acetone Mouse Teratology Study: Mean Organ Weights of Pregnant Dams (Mean ± SD).

Exposure Concentration	N	Liver (d)	Percent LBWR (a,d)	Kidney	Percent KBWR (b)
0 ppm	26	2.8 ± 0.6	5.36 ± 1.03	0.5 ± 0.1	0.90 ± 0.21
440 ppm	28	2.8 ± 0.6	5.32 ± 1.04	0.6 ± 0.5	1.07 ± 0.89
2200 ppm	29	3.0 ± 0.3	5.85 ± 1.21	0.5 ± 0.1	0.98 ± 0.20
6600 ppm	31	3.4 ± 0.5 (c)	6.53 ± 0.67(c)	0.6 ± 0.5	1.28 ± 1.77

(a) Percent LBWR=Percent Liver to Body Weight Ratio, (at sacrifice).
(b) Percent KBWR=Percent Kidney to Body Weight Ratio, (at sacrifice).
(c) Significantly different from 0-ppm group, $p<0.05$.
(d) Significantly correlated with exposure concentration, $p<0.05$.

TABLE 21. Acetone Mouse Teratology Study: Reproductive Measures (Mean ± SD).

	Acetone Chamber Concentration (ppm)			
	0	440	2200	6600
Plug-positive Females	33	33	33	33
Number Pregnant	28	28	29	31
Pregnant (%)	85	85	88	94
Pregnancies Examined	26(a)	28	29	31
Implantations/Dam	12.2 ± 2.0	12.0 ± 2.2	11.8 ± 1.8	12.6 ± 2.0
Live Fetuses/Litter	11.2 ± 1.9	11.0 ± 2.1	10.9 ± 2.2	11.1 ± 2.1
Resorptions/Litter	1.0 ± 1.0	1.1 ± 1.2	0.9 ± 0.8	1.5 ± 1.1
Early	0.6 ± 0.7	0.7 ± 1.1	0.5 ± 0.7	0.6 ± 0.8
Late	0.4 ± 0.6	0.3 ± 0.7	0.3 ± 0.5	1.0 ± 1.0
Dead Fetuses/Litter	0	0	0.0 ± 0.2	0
Litters with Resorptions	17	17	17	25
PERCENTAGE OF:				
Live Fetuses/Litter	91.9 ± 7.6	91.4 ± 9.7	91.8 ± 8.3	87.7 ± 9.2
Resorptions/Litter	8.1 ± 7.6	8.6 ± 9.7	7.9 ± 8.0	12.3 ± 9.2
Early	4.8 ± 5.8	6.1 ± 9.5	4.7 ± 6.9	4.5 ± 5.6
Late (b)	3.2 ± 4.8	2.5 ± 4.8	3.2 ± 5.1	7.8 ± 7.9(c)
Dead Fetuses/Litter	0	0	0.3 ± 1.7	0
Litters with Resorptions	65	61	59	81

(a) Two dams removed from study. Premature delivery of litters; not treatment related.
(b) Significantly correlated with exposure concentration ($p<0.05$).
(c) Significant different than 0-ppm after arcsin transformation of proportional data ($p<0.05$).

TABLE 22. Acetone Mouse Teratology Study: Average Fetal Weights (Mean of Litter Means; g ± SD) and Percent Male Fetuses.

	Acetone Chamber Concentration (ppm)			
	0	440	2200	6600
Litters Examined	26	28	29	31
Live Fetuses Examined	292	307	316	344
Fetal Weight (b)	1.3 ± 0.1	1.4 ± 0.1	1.3 ± 0.1	1.2 ± 0.1(a)
Male (b)	1.4 ± 0.1	1.4 ± 0.1	1.3 ± 0.1	1.2 ± 0.1(a)
Female (b)	1.3 ± 0.1	1.3 ± 0.1	1.3 ± 0.1	1.2 ± 0.1(a)
Percent Male Fetuses	46.5 ± 13.5	47.3 ± 11.3	47.7 ± 16.9	50.9 ± 16.0

(a) Significantly different from 0-ppm group, $p< 0.05$.
(b) Significantly correlated with exposure concentration, $p<0.05$.

TABLE 23. Acetone Mouse Teratology Study: Malformations Observed in Live Fetuses.

		Fetuses (a)				Litters (a)			
Acetone (ppm)		0	440	2200	6600	0	440	2200	6600
Total Examined (b)		292	307	316	344	26	28	29	31
Heads Examined (c)		146	152	160	171	26	28	29	31
Skulls Examined (d)		146	155	156	173	26	28	29	31
Viscera Examined (e)		146	155	156	173	26	28	29	31
Malformations:									
Folded Retina	NO.	1	0	0	1	1	0	0	1
	(%)	(0.7)			(0.6)	(3.8)			(3.2)
Exencephaly	NO.	0	0	0	1	0	0	0	1
	(%)				(0.3)				(3.2)
Limb Flexure	NO.	4	2	2	1	3	1	1	1
	(%)	(1.4)	(0.6)	(0.6)	(0.3)	(11.5)	(3.6)	(3.4)	(3.2)
Fused Ribs	NO.	0	0	1	0	0	0	1	0
	(%)			(0.3)				(3.4)	
Fused Sternebrae	NO.	0	0	1	0	0	0	1	0
	(%)			(0.3)				(3.4)	
Kinked Tail	NO.	0	1	0	0	0	1	0	0
	(%)		(0.3)				(3.6)		
Total Malformations (f)	NO.	5	3	4	3	—	—	—	—
Total Fetuses (Litters) with Malformations	NO.	5	3	4	3	4	2	3	3
	(%)	(1.7)	(1.0)	(1.3)	(0.9)	(15.4)	(7.1)	(10.3)	(9.7)

(a) A single fetus or litter may be represented more than once in this table.
(b) All fetuses examined for external and skeletal defects. One-half had heads removed prior to skeletal staining.
(c) Heads fixed in Bouin's solution for soft-tissue craniofacial evaluations.
(d) Heads remaining on the fetuses for skeletal examination; see (b).
(e) Viscerals performed on approx. 50% of live fetuses and all fetuses with external defects.
(f) There may be >1 malformation per fetus.

TABLE 24. Acetone Mouse Teratology Study: Mean Percent of Live Fetuses Affected per Litter (Mean ± SD).

	Acetone Concentration (ppm)			
	0	440	2200	6600
Number Litters	26	28	29	31
Live Fetuses/Litter	11.2 ± 1.9	11.0 ± 2.1	10.9 ± 2.2	11.1 ± 2.1
Malformations:				
Folded Retina	0.6 ± 3.3	0	0	0.5 ± 3.0
Exencephaly	0	0	0	0.4 ± 2.2
Limb Flexure	1.3 ± 3.9	0.6 ± 3.4	0.5 ± 2.7	0.2 ± 1.4
Fused Ribs	0	0	0.3 ± 1.9	0
Fused Sternebrae	0	0	0.3 ± 1.5	0
Kinked Tail	0	0.3 ± 1.5	0	0
% Fetuses per Litter with at Least One Malformation	1.6 ± 4.1	0.9 ± 3.7	1.1 ± 3.5	0.9 ± 2.9
Variations:				
Supernumerary Ribs	23.3 ± 27.3	29.5 ± 26.0	20.7 ± 21.8	12.9 ± 17.1
Misaligned Sternebrae	5.1 ± 10.0	8.2 ± 12.2	5.0 ± 7.7	9.4 ± 14.5
Extra Sternebral Ossification Sites	0.4 ± 2.0	3.2 ± 16.8	0.2 ± 1.3	0
Dilated Ureter	0	0	0	1.2 ± 4.6
Reduced Ossification (a)				
Sternebrae(b)	1.5 ± 4.0	2.4 ± 4.9	2.7 ± 6.6	9.9 ± 17.6(c)
% Fetuses per Litter with at Least One Variation or Reduced Ossification	28.2 ± 28.6	38.1 ± 29.4	26.5 ± 24.3	25.4 ± 27.7

(a) Other sites examined included pelvis, phalanges, ribs, skull and vertebrae. There was no reduction in the ossification of these areas.
(b) Significantly correlated with exposure concentration, $p \leq 0.05$.
(c) Significantly different from control after arcsin transformation ($p \leq 0.05$).

TABLE 25. Contemporary Control Data on CD-1 Mouse Teratology Studies: Malformations and Variations.

		Fetuses (a) Number (Percent)	Litters Number (Percent)	Mean Percent per Litter (± SD)
Total examined (b)		975	83	—
Heads examined (c)		—	—	
Skulls examined (d)		—	—	
Variations				
Supernumerary Rib	No.	175	52	18.5 ± 24.4
	(%)	(17.9)	(62.7)	
Misaligned Sternabrae	No.	23	14	2.3 ± 6.3
	(%)	(2.4)	(16.9)	
Reduced Ossifications				
Sternebrae	No.	36	25	3.7 ± 6.4
	(%)	(3.7)	(30.1)	
Skull	No.	10	5	1.1 ± 4.8
	(%)	(1.0)	(6.0)	
Total Fetuses (Litters) with Variations or Reduced Ossifications	No.	230	67	24.0 ± 24.5 (e)
	(%)	(23.6)	(80.7)	
Malformations				
Exencephaly	No.	1	1	0.1 ± 1.2
	(%)	(0.1)	(1.2)	
Folded Retina	No.	2	2	0.2 ± 1.5
	(%)	(0.2)	(2.4)	
Limb Flexure	No.	12	8	1.1 ± 3.8
	(%)	(1.2)	(9.6)	
Total Fetuses (Litters) with Malformations	No.	14	10	1.3 ± 4.0 (f)
	(%)	(1.4)	(12.0)	

(a) A single fetus may be represented more than once in this table.
(b) All fetuses examined for external, visceral and skeletal defects. All fetuses stained with alcian blue and alizarin red S, one-half had heads removed prior to staining.
(c) Heads removed from fetuses and fixed in Bouin's solution then examined for soft-tissue cranio-facial malformations.
(d) Heads remained on the fetuses that were stained for skeletal examination; see a) above.
(e) Mean percent of fetuses per litter with at least one variation or reduced ossification.
(f) Mean percent of fetuses per litter with at least one malformation.

TABLE 26. Acetone Mouse Teratology Study: Variations Observed in Live Fetuses.

		Fetuses (a)				Litters (a)			
Acetone (ppm)		0	440	2200	6600	0	440	2200	6600
Total Examined (b)		292	307	316	344	26	28	29	31
Heads Examined (c)		146	152	160	171	26	28	29	31
Skulls Examined (d)		146	155	156	173	26	28	29	31
Viscera Examined (e)		146	155	156	173	26	28	29	31
Variations:									
Supernumerary Ribs	NO.	67	93	64	44	19	22	19	19
	(%)	(23.0)	(30.3)	(20.3)	(12.8)	(69.2)	(78.6)	(65.5)	(61.3)
Misaligned Sternebra	NO.	16	27	16	29	8	10	10	12
	(%)	(5.5)	(8.8)	(5.1)	(8.4)	(30.8)	(35.7)	(34.5)	(38.7)
Extra Ossification Site(s) Sternum	NO.	1	8	1	0	1	1	1	0
	(%)	(0.3)	(2.6)	(0.3)		(3.8)	(3.6)	(3.4)	
Dilated Ureter	NO.	0	0	0	2	0	0	0	2
	(%)				(1.2)				(6.4)
Reduced Ossifications:									
Sternebrae (f)	NO.	5	8	7	32	4	6	5	10
	(%)	(1.7)	(2.6)	(2.2)	(9.3)	(15.4)	(21.4)	(17.2)	(32.2)
Total Variations and Reduced Ossifications (g)	NO.	89	136	88	107	—	—	—	—
Total Fetuses (Litters) with Variations or Red. Ossif.	NO.	82	120	81	83	21	24	23	23
	(%)	(28.1)	(39.1)	(25.6)	(24.1)	(80.8)	(85.7)	(79.3)	(74.2)

(a) A single fetus or litter may be represented more than once in this table.
(b) All fetuses examined for external and skeletal defects. One-half had heads removed prior to skeletal staining.
(c) Heads fixed in Bouin's solution for soft-tissue craniofacial evaluations.
(d) Heads remaining on the fetuses for skeletal examination; see (b).
(e) Viscerals performed on approx. 50% of live fetuses and all fetuses with external defects.
(f) Other sites examined included pelvis, phalanges, ribs, skull, and vertebrae. There was no reduced ossification noted in these areas.
(g) There may be >1 variation or reduced ossification per fetus.

TABLE 27. Comparison of Acetone Plasma Levels with Literature Values.

	30 min Post-Exposure		17 hr Post-Exposure	
Acetone Vapor Concentration	This Study (a)	Charbonneau et al. (1986) (b)	This Study	Charbonneau et al. (1986)
2200-2500 ppm	5.0 mM	5.2 mM	≈0.1 mM	0.4 mM
10000-11000 ppm	36 mM	40 mM	4.5 mM	2.6 mM

(a) Exposures 7 hr/day, 2200 and 11000 ppm acetone.
(b) Exposures 4 hr/day, 2500 and 10000 ppm acetone.

APPENDIX A

ANALYTICAL CHEMISTRY NARRATIVE AND DATA FOR ACETONE

CHEMISTRY

BULK CHEMICAL

Test Material Receipt, Storage and Usage

Receipt and Inventory

Acetone, manufactured by Ashland Chemical Company (Columbus, OH), was shipped from Research Triangle Park, to Battelle Northwest (BNW). Ten gallons of test material (BNW Lot No. 52446-6, Manufacturer's Lot No. 06/88/7E) were received 9/8/87. Test material was packaged in one-gallon amber glass bottles. An additional 100 gallons of acetone packaged in two metal drums (BNW Lot No. 52446-32, Manufacturer's Lot No. 06/88/7E) were received 10/12/87.

Storage Conditions

The bulk chemical was stored in its original shipping containers at room temperature in a flammable storage facility near the LSL-II building.

Usage

Approximately 216 kg were consumed for the Inhalation Reproductive Toxicology studies. BNW Lot Nos. 52446-6 and 52446-32 were used for test generation. Animal exposures were performed using acetone from BNW Lot No. 52446-32 only. An average of 5.2 kg/day was consumed during the exposures of rats (10/26/87 to 11/12/87), and ≈3.4 kg/day were used for the exposure of mice (12/2/87 to 12/17/87).

Transfer Procedures

Bulk chemical was transferred to the generator reservoir under a nitrogen blanket to avoid the introduction of air.

Waste Disposal

Acetone waste material was transferred to waste bottles and allowed to evaporate in an exhaust hood.

Surplus Disposal

Residual test material was returned to Research Triangle Institute at the direction of the Inhalation Reproductive Toxicology Program after completion of the acetone studies at BNW.

Chemical Analysis

Analysis at Research Triangle Institute

The test material was analyzed at Research Triangle Institute (RTI) prior to shipment to BNW. Battelle did not receive the RTI analytical report.

Reanalysis at Battelle Pacific Northwest Laboratories

Bulk analysis procedure was implemented as BNW SOP #ØB-AC-3A1H. Identity of bulk chemical was confirmed during initial analysis by infrared spectroscopy. Initial purity was determined by percent total peak area using gas chromatography (GC) with a glass column packed with Porapak Q 80/100 . BNW Lot No. 52446-32 was found to be 100.0% pure by area percent upon receipt and again on 12/2/87.

Test Article Concentration Monitoring

Description of Monitoring System

An HP5840 gas chromatographic system monitored the acetone concentration in the exposure chambers. This instrument was equipped with an 8-position stream select valve and employed a 1/8" o.d., one-foot nickel column packed with 1% SP-1000 on 60/80 mesh Carbopack B. The oven temperature was operated at 130°C.

As described in the section that follows (Calibration of the Monitoring System), the monitor was calibrated against gravimetrically prepared standards. These standards were related to the on-line monitor through quantitative analysis of grab samples taken from the chambers.

Additionally, the operation of the chamber monitor was checked daily against an on-line compressed gas standard of acetone in nitrogen. This check provided a measure of day-to-day instrument drift. Additional calibration checks by grab sampling were made when drift of the on-line standard response factor was detected. Daily operating procedures for the concentration monitoring system were contained in SOP #ØB-AC-3B26.

Calibration of the Monitoring System

The calibration of the on-line chamber monitor was based on a quantitative analysis of bubbler grab samples. This procedure tied the calibration of the on-line monitor to gravimetrically prepared standard solutions in dimethylformamide (DMF) through a second off-line GC. The gravimetrically calibrated GC was used to measure the quantity of acetone collected from the exposure chambers in DMF-filled bubblers. The relationship between the peak area observed with the on-line GC and the concentration of acetone in the chamber was defined by comparison with the chamber concentrations determined by the gravimetrically calibrated GC.

Since the accuracy of the on-line GC calibration depended on accurate analysis of bubbler grab samples, several quality control steps were imposed on the analysis of grab samples. A set of five standards were run for each analysis session. The concentration range of the standards bracketed the concentration range of interest. The breakthrough for the high chamber was measured using a second DMF-filled bubbler. This correction for breakthrough was applied to the chamber measurements.

The analysis of bubbler grab samples was performed using a HP5830 or HP5840 gas chromatograph with a 2 or 4 mm by 1.8 m glass column packed with 10% Carbowax 20M TPA on Chromsorb WAW with an oven temperature of 130°C. The calibration curve over the concentration range of interest was linear.

Sensitivity and Specificity

The minimum detectable limit (MDL) estimated from the decay profile of the 440 ppm chamber was 0.05 ppm. A measure of chromatograph specificity is defined by determination of the analytes partition coefficient. The retention time of methane, assumed to be non-retained, was 0.26 min; the retention time for acetone was 0.62 min. Thus, the partition ratio for acetone on this system was 1.4.

Precision, Linearity, and Absolute Recovery

Precision for the on-line GC was estimated from 8 measurements of an on-line standard using every active sampling port; a 0.11% coefficient of variation (CV) was observed. Linearity of the on-line GC was assured by calibrating it against a gravimetrically calibrated GC (see comments in the "Calibration of the Monitor System" section). A series of bubbler grab samples were acquired during the exposure from the chambers. These samples were analyzed and the results compared to those from gravimetrically prepared standards. The appropriate on-line GC calibration curve was then applied to the data acquisition and control system.

Achievement of linearity for the on-line monitor was therefore dependent upon defining a linear method for analysis of bubbler samples. The calibration curve for this analysis showed good linearity over an extended range. Routine analysis of bubblers was performed using midrange, high, and low level standards in order to assure adequate linearity.

Accuracy depended upon good characterization of the absolute recovery demonstrated by the grab sampling methods used to measure chamber concentration (on-line and bubbler grab). Backup bubblers were installed for the high exposure chamber and were used to correct the measured chamber concentration at all exposure levels for breakthrough encountered during grab sampling. Breakthrough was typically 2-3% with 3-liter samples.

Detection of Drift Using On-Line Standard

An on-line compressed gas standard, 2000 ±2% ppm acetone in nitrogen was used to check instrument drift throughout the exposure day. The standard was checked before the start of each exposure day, then monitored every 8th sample throughout the exposure day by the on-line GC. The measured concentration for the standard had to be within ±10% of the assigned target value before any exposure could begin without consultation with the Exposure Control Task Leader. During the course of the exposure, if the on-line standard was within 5% of the target value, no change in calibration was required. If the on-line standard was between 5% and 10% of its assigned target, the calibration could be updated by an Exposure or Chemistry Specialist. Such a correction was based upon the on-line standard. If the <u>cumulative</u> drift exceeded 15%, then the calibration was checked by quantitative analysis of grab samples.

CHEMICAL STABILITY FOR ACETONE INHALATION STUDIES

The stability of acetone vapor in the exposure chambers and reservoir was examined. The expected degradation products, diacetone, mesityl oxide, and isophorone, were measured in the chambers using gas chromatography. Stability in the generator reservoir was evaluated by gas chromatographic analysis.

Chemical Reservoir Stability

The stability and purity of acetone in the 5-gallon stainless steel reservoir were evaluated. On 9/25/87 the reservoir was filled with acetone from bottles BNW Lot No. 52446-6-6, 7, 9 &10. Samples for analysis were taken directly from the bottle prior to filling the reservoir and from the reservoir immediately after filling, following one day's test generation, and after 4-days' residence in the reservoir (on 9/29/87). These samples were analyzed by gas chromatography with a flame ionization detector using a system shown to identify the known degradation products of acetone (Table 3, System 1). The results of these analyses are shown in Table 1. No impurities greater than 0.01% were observed. A compound having the retention time of diacetone (4-hydroxy-4-methyl-2-pentanone) at a concentration of ≈0.006% was only impurity detected. No degradation or contamination products were found. There was no change in the acetone after 4-days' residence in the reservoir; this was the maximum period of time the test material was allowed to remain in the generator during the study.

Table 1. Stability of Acetone in the Reservoir

Description of Sample	Purity (a) (neat injection)	Relative Purity (b) (0.01% solution)
Directly from original container (9/25/87)	99.993%	100%
From reservoir before generation (9/25/87)	99.994%	102%
From reservoir after generation (9/25/87)	99.994%	102%
From reservoir after 4 days in reservoir (9/29/87)	99.994%	102%

(a) Determined by area percent.
(b) Determined by peak comparison against a reference standard.

Generator Stability

The acetone vapor used for exposure was generated by evaporating acetone from a fiberglass wick on a stainless steel heater. Acetone is a methyl ketone and prone to polymerization. The low generation temperatures (below and near the boiling point of acetone), use of inert materials, and low residence time of acetone on the heater minimized any degradation of acetone. The fiberglass wicks were removed after test generation and then extracted with methanol and ≈30 minutes of ultrasonic treatment. GC analysis of the methanol extract failed to indicate any volatile degradation products.

Stability with the Chemical Delivery System

Acetone liquid was transferred from the 5-gallon stainless steel reservoir to the pump through a 1/8" Teflon® line. A positive pressure nitrogen headspace was maintained over the acetone to prevent the introduction of air to the system. The acetone was distributed in the 1/8" stainless steel lines to the heaters at each chamber using a FMI micrometering pump. The pump piston and cylinder assemblies were constructed of stainless steel. None of these materials of construction are incompatible with acetone.

Chamber Stability

Stability of acetone in the exposure chambers was evaluated at least five hours after the initiation of the exposure using gas sampling tubes. Samples were drawn so as to collect >4500 µg of acetone. Since three individual generation systems were used, samples were collected from each chamber. In addition, samples from the high concentration chamber were taken at the beginning of the exposure period to determine the stability of the acetone under initial generating conditions. These samples were analyzed by the gas chromatography and the results compared to those obtained from analysis of the bulk test material (Table 1).

The chambers were sampled by pulling measured volumes of chamber atmospheres through gas-sampling charcoal tubes containing a secondary charcoal bed which trapped breakthrough of acetone or its polymeric products. We assumed that good trapping efficiency for species such as polymers and dimers was achieved when good trapping efficiency was observed for acetone. Organic compounds are retained on the charcoal by the same type of of partitioning mechanism encountered in gas-solid chromatography. Thus, in agreement with basic chromatographic principles, the less volatile polymer products would be strongly adsorbed to the organic matrix of the gas sampling tube. The porous polymer packings have been shown to have good collection efficiency for numerous organic compounds (D.G. Parkes, C.R. Ganz, A. Polinsky, J. Schulse: *Am. Ind, Hygiene Assoc. J.* March 1976 p165-173). Sample size was adjusted to provide adequate sensitivity for polymeric products without substantial breakthrough of acetone.

Method Validation

Experiments were performed to demonstrate satisfactory recovery of acetone and its polymeric products from the charcoal sorbent in the gas sampling tubes. Standards containing microgram amounts of diacetone, mesityl oxide and isophorone (Table 2) were spiked onto charcoal sorbent in a series of GC autosampling vials. To identify compounds less volatile than acetone, one set of samples was eluted using methanol with ≈30 minutes of ultrasonic treatment. For compounds more volatile than acetone, second set of samples was eluted with dimethylformamide (DMF) and ≈30 minutes of ultrasonic treatment. Acetone and its polymeric products were quantitated using the chromatographic systems described in Table 3. Results of these analyses are given in Table 2. Standards of acetone polymerization products were prepared at the ≈9 µg/sample level. Although recovery varied, all compounds were detected in the standards. The concentration of these containminant standards were about 0.3% of the acetone collected by the grab samples. Thus, all of the potential containminants could be detected well below 1% of the chamber target concentration.

Table 2. Recovery of Acetone, Isophorone, Mesityl oxide, and Diacetone

Sample	Concentration	Solvent: Methanol %Recovery(a)	Solvent: Dimethylformamide % Recovery(a)
Acetone	≈9000 μg/ml	87.0%	97.0%
Isophorone	≈9 μg/ml	15%	(b)
Mesityl Oxide	≈8.6 μg/ml	6%	47.4%
Diacetone (c)	≈9 μg/ml	14%	37.6%

(a) Percent recovery was based on comparison tc untreated samples.
(b) Solvent peak prevented measurement.
(c) 4-Hydroxy-4-methyl-2-pentanone.

Table 3. GC Parameters Used for Acetone Stability Study

System 1

Column: 6 ft x 2 mm glass, Porapak QS 80/100
Initial Temperature: 150°C
Initial Time: 5 minutes
Rate: 10°C/minute
Final Temperature: 250°C
Final Time: 5 minutes

System 2

Column: 8 ft x 2 mm glass, 10% Carbowax 20 on Chromsorb 80/100
Initial Temperature: 70°C
Initial Time: 10 minutes
Rate: 10°C/minute
Final Temperature: 200°C
Final Time: 5 minutes

System 3

Column: 6 ft x 2 mm glass, 0.1% SP-1000 on 80/100 Carbopack
Initial Temperature: 70°C
Initial Time: 10 minutes
Rate: 10°C/minute
Final Temperature: 200°C
Final Time: 10 minutes

Analysis of Chamber Samples

The charcoal sorbent from gas sampling tubes used to collect chamber samples was transferred to a GC autosampler vial and desorbed using either methanol or DMF with ≈30 minutes of ultrasonic treatment. Samples were then analyzed by gas chromatographic systems 1 and 2 (Table 3) to separate and identify the compounds present. A flame ionization detector was used with both systems. Chamber samples desorbed with DMF and analyzed on these systems showed acetone to be ≈100% as a percent of the background corrected peak area. The chamber samples desorbed with methanol and analyzed on Systems 1 and 2 showed a single impurity which was analyzed by GC/MS and found to be methyl acetate. This impurity was ≤0.2% for the set of samples drawn 11/05/87 and analyzed 11/06/87 but its concentration increased to ≈2% when samples were drawn 11/05/87 and analyzed 11/10/87. The concentration of methyl acteate appeared to increase when samples were not eluted from the charcoal and analyzed soon after collection. Thus, the methyl acetate was assumed to result from the esterification of acetic acid with the methanol used to desorb the samples. The acetic acid may have been collected from the chamber or formed during the collection process by air oxidation of acetone on charcoal. Since acetic acid is a common metabolite in animals and only small concentrations were found, no further investigation was done.

Conclusion

Studies at BNW indicate that the materials and techniques used to generate acetone vapor for inhalation exposures did not affect its stability. Analysis of neat samples of acetone taken from the reservoir and generator showed purities of >99.9%. Acetone was stable in the reservoir for a period of 4 days. In both occupied and unoccupied chambers, no degradation products were identified in samples which were drawn from the chambers after five hours of test exposure, then desorbed with DMF and analyzed on three GC systems. However, when similar samples were desorbed with methanol and analyzed on a GC system employing Systems 1 and 2, a 0.2 -2% impurity was observed. The impurity was assumed to be methyl acetate, the ester of acetic acid which may have been formed during sample collection and/or workup.

Thus, we conclude that the condensation products normally encountered in acetone as impurities (isophorone, mesityl oxide, and diacetone) were not produced in significant amounts. The impurity assumed to be methyl acetate did not warrant further investigation since its level was low and acetic acid is a common metabolite in animals.

BULK CHEMICAL REANALYSIS

COMPOUND:	ACETONE
CAS#	67-64-1
LOT#	BNW# 52446-32 Drum #1
APPEARANCE:	Colorless liquid
RECEIPT DATE:	10-12-87
ANALYSIS PERIOD:	Initial
STORAGE TEMPERATURE:	Room temperature
SAMPLE SUBMITTAL DATE:	10/13/87
SAMPLE ANALYSIS DATE:	10/19, 28/87
ANALYSIS PROCEDURE:	ØB-AC-3A1H
NOTEBOOK REFERENCE:	BNW 52446-51

IDENTITY: 10/87 — Infrared spectroscopy, using a 10 cm gas cell with silver chloride windows and scanning from 4000 cm-1 to 600 cm-1.

Instrument: Beckman Acculab 8 Infrared Spectrometer

ASSAY: Gas chromatography using 4 ft x 2 mm glass column packed with porapak Q 80/100 for purity by area %.
Instrument: HP 5890

RESULTS: Bulk % Purity

10/87	100.0	Average
	100.0	
	100.0	100.0% SD=±0.0

Acetone eluted at ~2.85 minutes.

No impurities were observed.

ASSAY: 10/87 — Gas chromatography using 4 ft x 2 mm glass column packed with porapak Q 80/100 for purity by area %.
Instrument: HP 5890

RESULTS: Impurity Profile
A major peak of 100.0% area was observed at a retention time of ~2.06 minutes for the neat test material. No impurity peaks were observed.

Conclusion: Infrared spectroscopy confirms the gross purity and identity of BNW Lot No. 52446-32. Gas chromatography shows lot BNW52446-32-Drum #1 to be 100.0% pure by area percent and acceptable by suggested SOP#OB-AC-3A1H purity limit of >99%. The impurity profile shows a major peak of 100.0% area. No impurities were observed.

Signature of Technician: S. A. Barraclough Date: 11/6/87

Signature of Chemist: [signature] Date: 11/6/87

BULK CHEMICAL REANALYSIS

COMPOUND:	ACETONE
CAS#	67-64-1
LOT#	BNW# 52446-32 Drum #1
APPEARANCE:	Colorless liquid
RECEIPT DATE:	10-12-87
STORAGE TEMPERATURE:	Room temperature
SAMPLE SUBMITTAL DATE:	12/2/87
SAMPLE ANALYSIS DATE:	12/2/87
ANALYSIS PROCEDURE:	ØB-AC-3A1H-ØØ
NOTEBOOK REFERENCE:	BNW 52446-129

IDENTITY: Infrared spectroscopy is performed using a 10 cm gas cell with silver chloride windows and scanning from 4000 cm-1 to 600 cm-1.

Instrument: Beckman Acculab 8 Infrared Spectrometer

RESULTS: The spectrum was similar to that found during previous BNW analyses.

ASSAY: Gas chromatography using a 4 ft x 2 mm glass column packed with Porapak Q 80/100 is used to determine the purity of a solution of 1% acetone in methanol by major peak area %.
Instrument: HP 5830A

RESULTS: Bulk % Purity

Bulk % Purity	Average
99.99	
100.0	100.0 SD=±0.01
100.0	

No impurities greater than 0.01% of the total test material sample area were observed. Acetone eluted at ~3.1 minutes.

ASSAY: Gas chromatography using a 4 ft x 2 mm glass column packed with Porapak Q 80/100 is used to determine the purity of the neat bulk chemical by major peak area %.
Instrument: HP 5830A

RESULTS: Impurity Profile
A major peak of 99.98% area was observed at a retention time of ~2.18 minutes for neat injections of both test and reference material. No impurity peaks with areas greater than 0.01% of the major peak were observed.

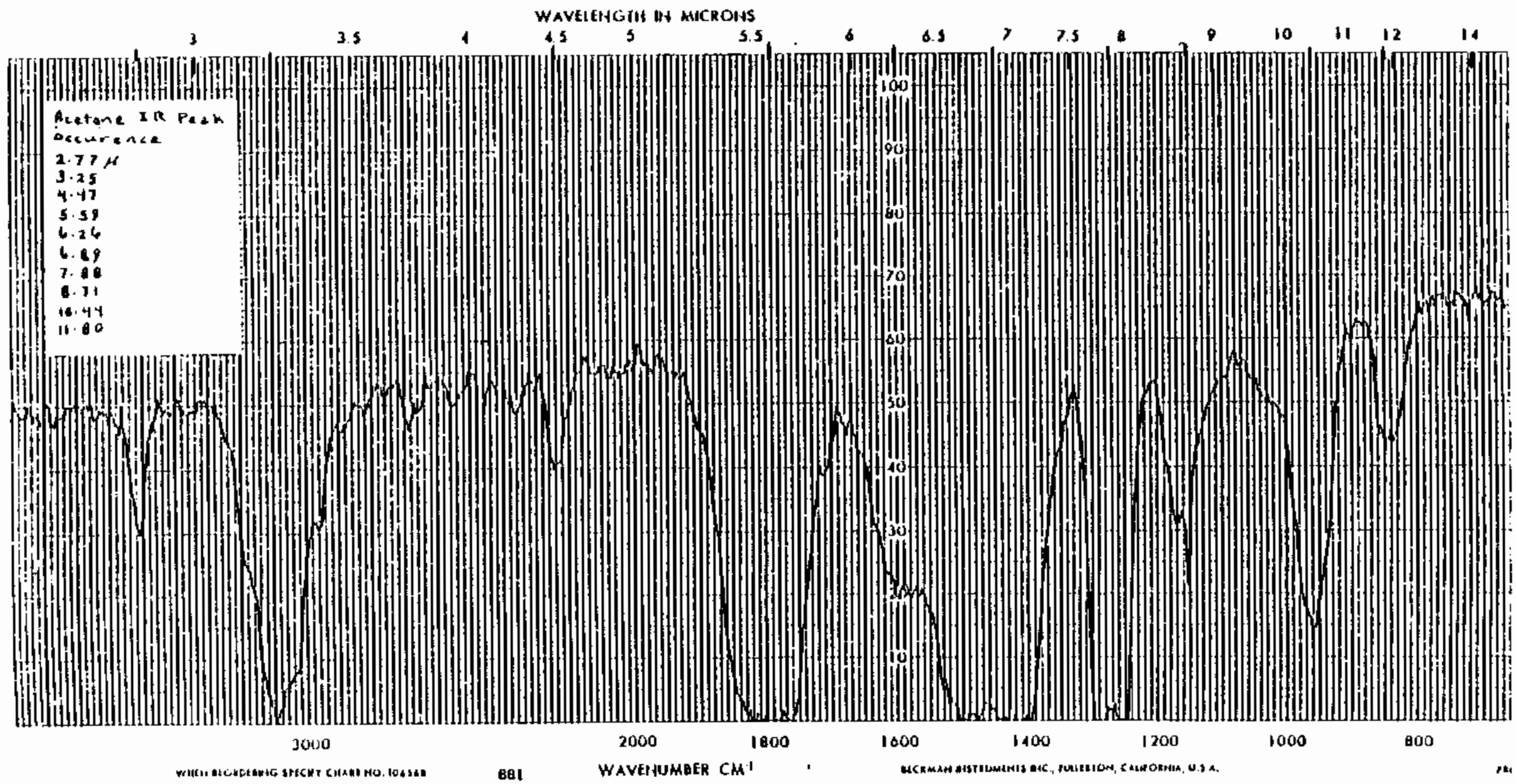
Conclusion: Infrared spectroscopy confirms the gross purity and identity of BNW Lot No. 52446-32. Gas chromatography shows Lot BNW52446-32 Drum #1 to be 100.0% pure by area percent. SOP#ØB-AC-3A1H-ØØ defines the acceptable purity limit as >99%. Gas chromatography of the neat chemical shows a major peak of 99.98% by area. No impurities greater than 0.01% relative to the major peak were observed.

Signature of Technician: S. A. Barraclough Date: 12-17-87

Signature of Chemist: [signature] Date: 12-30-87

10-20-87

10 cm gas cell spiked with
100 µl of Acetone (BNW 52446-35-Bt1 #1)
Silver Chloride windows
Scanned from 4000 cm⁻¹ to 600 cm⁻¹
on Beckman Acculab 8



Purity Analysis of Acetone by G.C

Method: ØB-AC-3A1H

G.C. Run Date: 10-28-87

G.C.: HP 5890 N 813541

Column: 4 ft. x 2mm glass, c̄ Porapack Q 80/100 (TRP)

Acetone: BNW 52446-32-#1

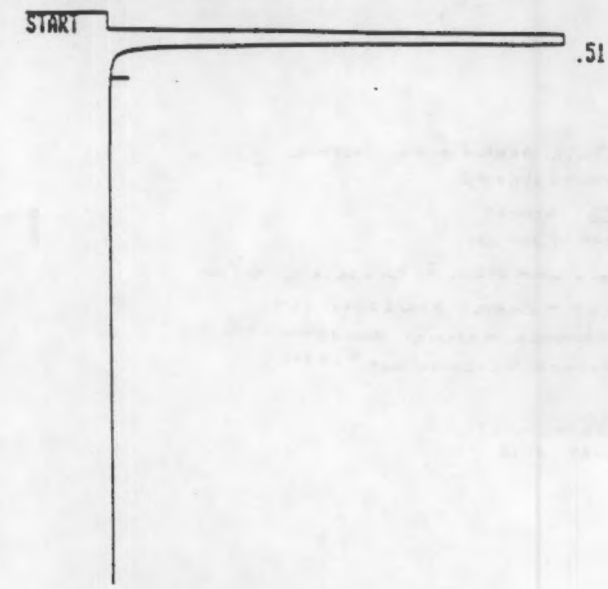
Methanol: Burdick & Jackson, Lot # AP379

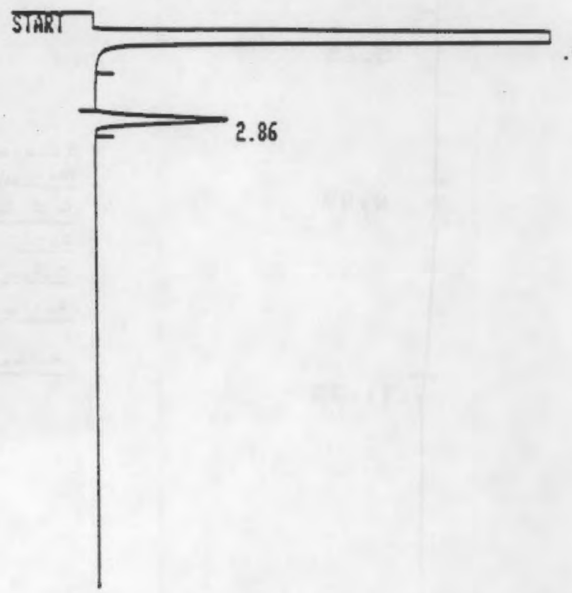
NOTE: This purity was done to replace the original G.C. Run of 10-19-87 due to the lack of base-line separation between the methanol & Acetone Peaks.

LIST: METH 2

RUN PRMTRS
ZERO = 10
ATT 2↑ = 8
CHT SP = 0.5
PK WD = 0.40
THRSH = 11
AR REJ = 0

BNW 52446-51





RUN # 7
WORKFILE ID: C
WORKFILE NAME:
SAMPLE # 1 Methanol BLANK

AREA%

RT	AREA	TYPE	AR/HT	AREA%
0.51	1.4940E+08	↑SBB	0.305	100.000

RUN # 8
WORKFILE ID: C
WORKFILE NAME:
SAMPLE # 2 0.5 % Soln.

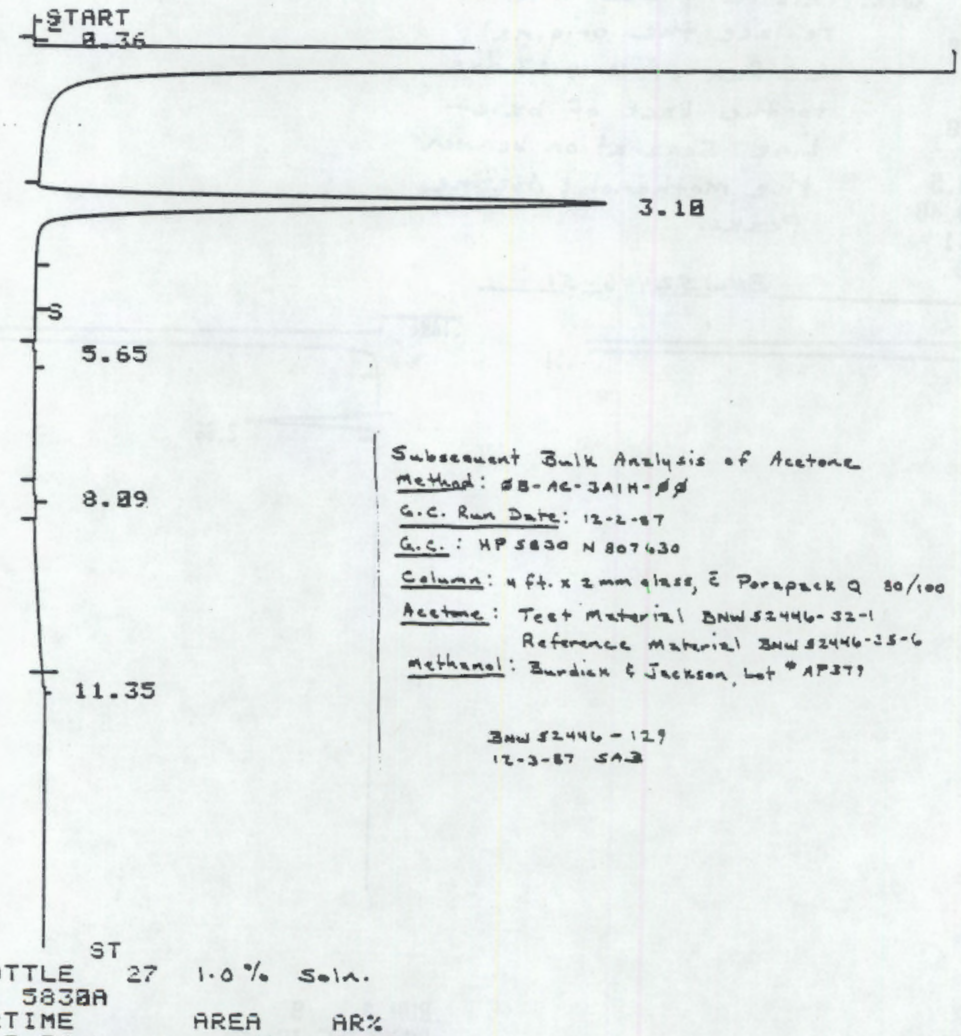
AREA%

RT	AREA	TYPE	AR/HT	AREA%
0.48	1.4672E+08	↑SBB	0.298	95.320
2.86	7204000	PB	0.223	4.680

Bulk Purity
Sample Chromatogram

ST
BOTTLE 26 0.5 % Soln.
hp 5830A

RTIME	AREA	AR%
0.36	46	0.00
0.55	217600000	98.90
3.13	2406000	1.09
5.65	1455	0.00
11.41	8458	0.00



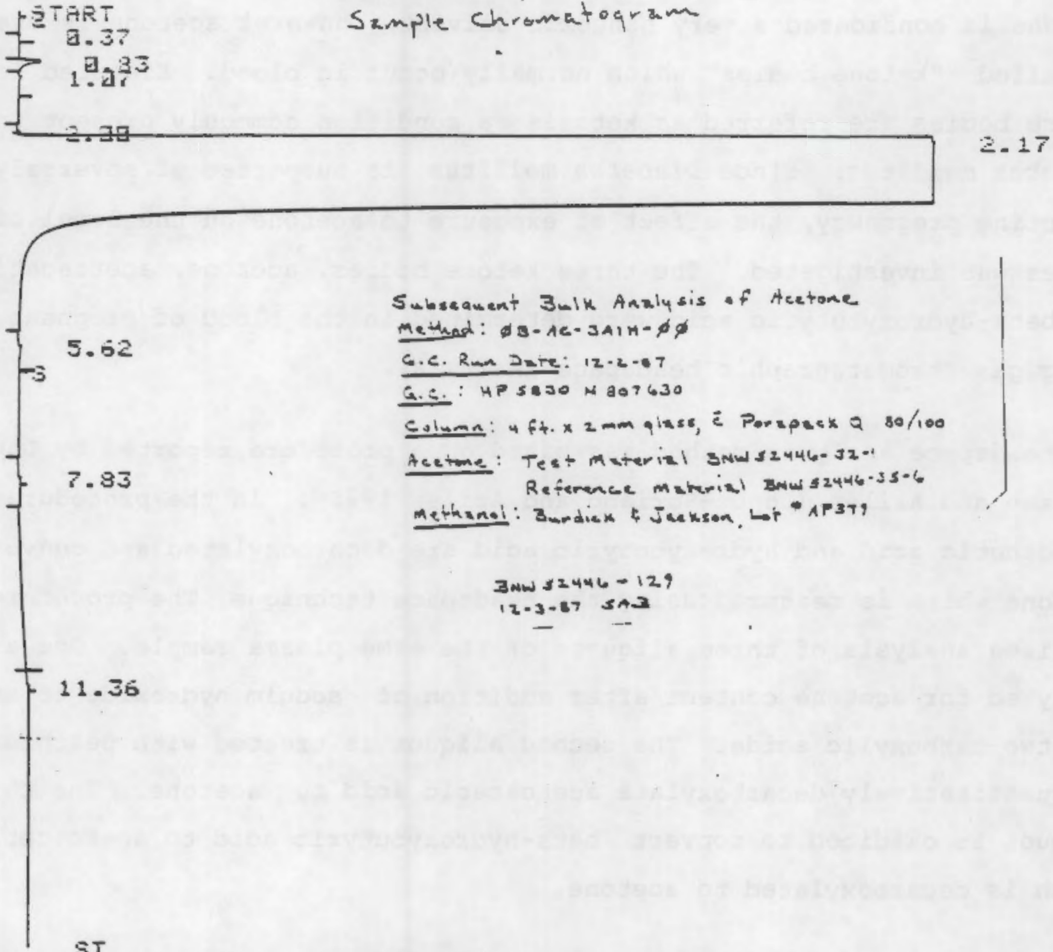
Subsequent Bulk Analysis of Acetone
Method: ØB-AC-3A1H-ØØ
G.C. Run Date: 12-2-87
G.C.: HP 5830 N 807630
Column: 4 ft. x 2 mm glass, c̄ Porapack Q 80/100
Acetone: Test Material BNW 52446-32-1
Reference Material BNW 52446-35-6
Methanol: Burdick & Jackson, Lot # AP379

BNW 52446-129
12-3-87 SAB

ST
BOTTLE 27 1.0 % Soln.
hp 5830A

RTIME	AREA	AR%
0.36	41	0.00
0.55	217200000	97.84
3.10	4801000	2.16
5.65	1440	0.00
8.09	390	0.00
11.35	691	0.00

Bulk Purity
Sample Chromatogram

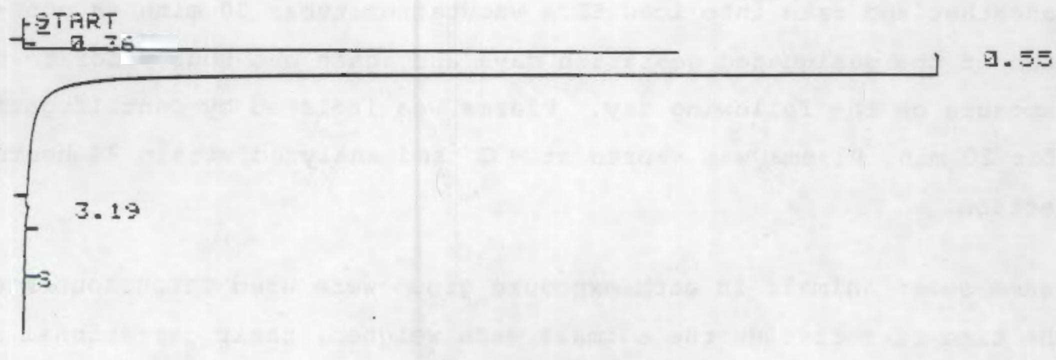


Subsequent Bulk Analysis of Acetone
Method: ØB-AC-3A1H-ØØ
G.C. Run Date: 12-2-87
G.C.: HP 5830 N 807630
Column: 4 ft. x 2 mm glass, c̄ Porapack Q 80/100
Acetone: Test Material BNW 52446-32-1
Reference Material BNW 52446-35-6
Methanol: Burdick & Jackson, Lot # AF379

BNW 52446-129
12-3-87 SAB

BOTTLE 32 NEAT Test Material
hp 5830A

RTIME	AREA	AR%
0.37	335	0.00
0.83	62600	0.01
1.07	9576	0.00
2.00	537	0.00
2.17	563300000	99.98
5.62	9584	0.00
7.83	1593	0.00
11.36	496	0.00



DETERMINATION OF KETONE BODIES IN RAT PLASMA

Acetone is considered a very nontoxic solvent, however acetone is one of the so called "ketone bodies" which normally occur in blood. Elevated levels of ketone bodies are referred as ketosis a condition commonly present in *Diabetes mellitus*. Since *Diabetes mellitus* is suspected of adversely affecting pregnancy, the effect of exposure to acetone on the level of ketone bodies was investigated. The three ketone bodies, acetone, acetoacetic acid, and beta-hydroxybutyric acid were determined in the blood of pregnant rats using gas chromatographic headspace analysis.

The headspace analysis method was based on a procedure reported by Lopez-Soriano and Ariles (Lopez-Soriano and Ariles 1985). In the procedure both acetoacetic acid and hydroxybutyric acid are decarboxylated and converted to acetone which is measured using the headspace technique. The procedure requires analysis of three aliquots of the same plasma sample. One aliquot is analyzed for acetone content after addition of soduim hydroxide to stabilize the two carboxylic acids. The second aliquot is treated with perchloric acid to quantitatively decarboxylate acetoacetic acid to acetone. The third aliquot is oxidized to convert beta-hydroxybutyric acid to acetoacetic acid which is decarboxylated to acetone.

EXPERIMENTAL SECTION

Sampling

Plasma was collected from seven rats in each of the four exposure groups (chamber concentrations of 440, 2200, 11,000 ppm and controls) on the 7, 14, and 19th day of gestation. Blood was collected by retro-orbital puncture of CO_2-anesthetized rats into iced EDTA vacutainer tubes 30 minutes post-exposure on each of the designated gestation days and again one hour prior to the start of exposure on the following day. Plasma was isolated by centrifugation at 4°C for 20 min. Plasma was stored at 4°C and analyzed within 24 hours of collection.

The same seven animals in each exposure group were used throughout the study. At the time of sacrifice the animals were weighed, their gestational status recorded, uterine and fetal weights obtained and the status of the fetuses recorded. These fetuses were not subjected to a teratological evaluation except for a gross examination.

Headspace Analysis

Three 125 ul aliquots were placed in each of three 20 ml headspace-analysis vials, one for each of the three ketone bodies. Plasma samples were subjected to headspace analysis (HP 19295 headspace analyzer) by gas chromatography (HP 5890 GC with a HP 3392 or 3393 integrator and HP 9114B disk drive) according to the methods of Lopez-Soriano and Argiles (1985). All samples were quantified by headspace gas chromatographic analysis using a 15 min equilibration in the analyzer at 60°C. Gas chromatography was performed on a 1/8" o.d. x 9' nickel column packed with 3% Carbowax 1500 on Chromosorb WAW, 60/80 mesh, operated at 40°C with a short ramp to 45°C for column cleanup. The retention time of acetone on this system was about 1.5 minutes.

Free acetone was determined after the addition of 25 ul of 4N sodium hydroxide to one of the 125 ul aliquots to prevent spontaneous decarboxylation of acetoacetic acid. The second and third aliquots were kept in a 100°C sand bath for 90 minutes after addition of reaction solutions. The second aliquot was treated with 25 ul of 0.6 M perchloric acid to enhance quantitative decarboxylation of acetoacetic acid to acetone and the third plasma aliquot was treated with 25 ul of an oxidative reagent (0.2 M $K_2Cr_2O_7$ in 5 M phosphoric acid). The oxidative treatment of the third sample converts all ketone bodies to acetone; thus, beta-hydroxybutyric acid was determined by subtracting the amount of acetone and acetoacetic acid from the value obtained for the total ketone body level.

Headspace Calibration

The slope of the calibration curve observed for acetone was insensitive to standard preparation in either saline or plasma. As reported by Lopez-Soriano and Argiles, the acetone standards exhibited greater response when prepared in the caustic media.

Calibration was performed using standards of acetone in saline. For each set of analyses, standards were prepared in each reaction mixture every analysis day. The acetone concentration bracketed the amount of acetone expected in the samples. Figure 1 shows the relationship between GC peak area and acetone quantity for each reaction mixture constructed from a composite of all calibration data. As shown in the figure the response relationship was linear with correlation coefficients of 1.000.

A series of experiments was performed to optimize the recovery of acetoacetic acid and beta-hydroxybutyric acid from the various reaction mixtures. The recovery values established for the optimized procedure are shown in Table 1. As shown in the table some decarboxylation of acetoacetic acid occurred in the sodium hydroxide solution. Less than the desired 100% recovery was observed for both carboxylic acids from the dichromate/phosphoric acid reaction mixture. The recovery of hydroxybutyric acid from the dichromate/phosphoric acid reaction medium was substaintially less than the desired 100%. The recovery values shown in the table were employed in a series of simultaneous linear equations to account for the deviation from the ideal recoveries of either 0% or 100%.

RESULTS AND DISCUSSION

As shown in Table 2 the plasma concentration of acetone found immediately following exposure is dependent upon the exposure concentration. The plasma concentration is not dependent upon the gestation day. An average plasma concentration of 0.7 mM, 5 mM, and 36 mM was observed for the 440, 2200, and 11000 ppm dose groups. At 7 and 14 days of gestation the control acetone concentrations were below the limit of detection. At 19 days of gestation an average acetone concentration of 0.03 mM was observed for the pre-exposure samples acquired from the control group.

The acetone levels in plasma samples acquired immediately before the start of exposures were very low for all exposure groups. Since acetone is metabolized and excreted unchanged both in urine and expired air it is not surprizing that the compound would be cleared from the test animals after 17 hours off exposure. Pre-exposure samples for all but the 11,000 ppm exposure group are indistinguishable from control values. This group shows elevation of plasma acetone following 17 hours off exposure. Plasma acetone for the 2,200 group is slightly elevated following 17 hours off exposure.

Determinations for acetoacetic acid and beta-hydroxybutyric acid require subtracting the acetone contributions. When the acetone level is high acetoacetic acid and beta-hydroxybutyric acid are determined by small differences against the acetone background. In such instances the effective sensitivity of the method is limited by the uncertainty of determining the high background acetone concentrations. An effective limit of detection has been calculated for the determination of acetoacetic acid and beta-hydroxybutyric acid from the standard deviation of the acetone concentration. The citation of different lower limits of detection in Table 2 reflects the dependency of the lower limit of detection upon acetone concentration encountered for a particular sample. The data conclusively demonstrates that concentrations of acetoacetic acid and beta-hydroxybutyric acid are not elevated to the values observed for acetone for exposed animals.

CONCLUSIONS

Plasma levels of acetone are markedly elevated relative to normal physiological levels in pregnant rats exposed by route of inhalation to concentrations ranging from 440 to 11,000ppm acetone. Elevation of acetoacetic acid and beta-hydroxybutyric acid does not occur. Thus, exposure to acetone should not produce acidosis, a condition which commonly accompanies ketosis.

LITERATURE CITED

Lopez-Soriano, FJ and JM Argiles. Simultaneous Determination of Ketone Bodies in Biological Samples By Gas Chromatogrphic Headspace Analysis. J. Chrom. Sci. 23:120-123, 1986.

Table 1

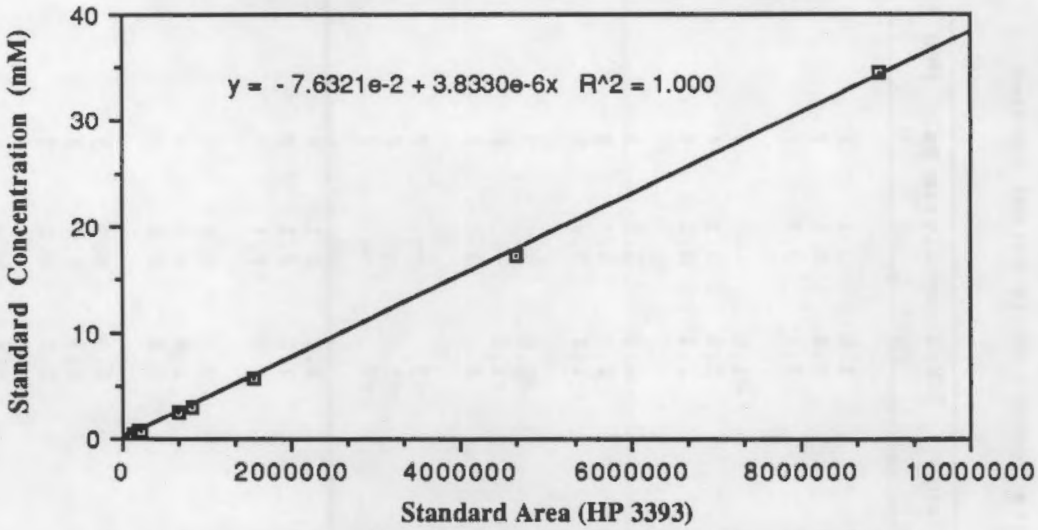
Recoveries for Acetoacetic Acid and Hydroxybutyric Acid from Reaction Media

Ketone	Reaction Medium	Ideal Recovery	Observed Recovery
AAA	NaOH	0%	10.8%
AAA	perchloric	100%	100%
AAA	dichromate/phosphoric	100%	70.1%
HBA	NaOH	0%	0%
HBA	perchloric	0%	0%
HBA	dichromate/phosphoric	100%	26.7%

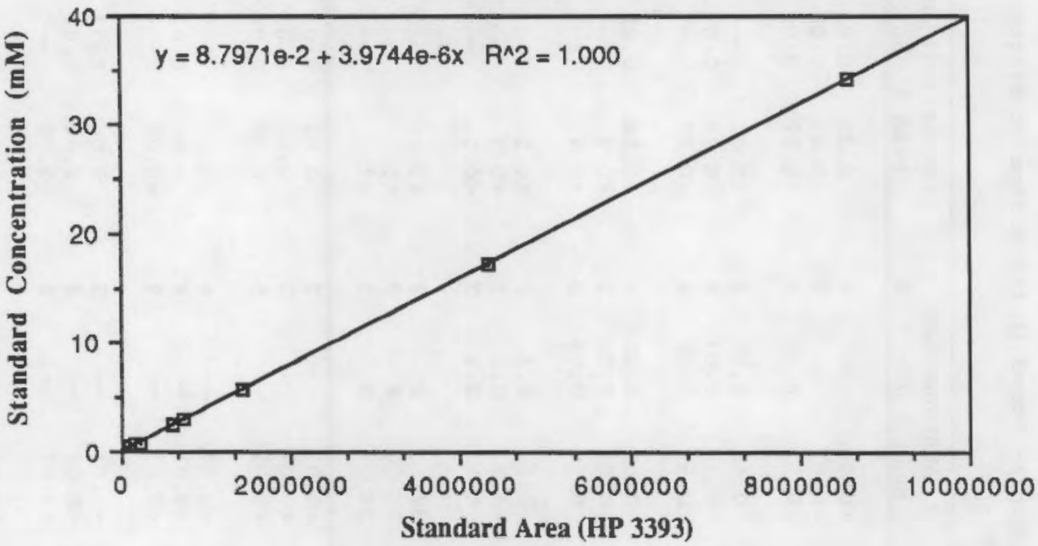
AAA: acetoacetic acid

HBA: beta-hydroxybutyric acid

Calibration Curve for Acetone Determinations



Calibration Curve for Acetoacetic Acid Determinations



Calibration Curve for beta-Hydroxybutyric Acid Determinations

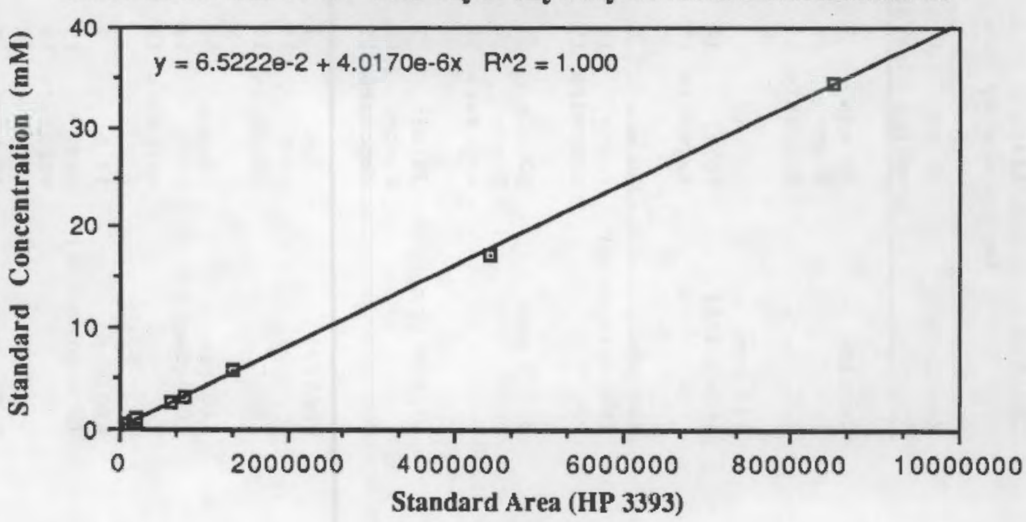


TABLE 2. Concentration of Ketone Bodies Found in the Plasma of Pregnant Rats (except where noted) Exposed to Acetone by Inhalation.

Exposure Group	Time of Sampling	Day of Gestation	Acetone (mM) Mean	± SD	N	Acetoacetic Acid (mM) Mean	± SD	N	β-Hydroxybutyric Acid (mM) Mean	± SD	N
Control	30 min	7	<0.01	--	7	0.05	0.01	7	1.0	0.1	7
	Post-	14	<0.01	--	7	0.03	0.02	7	0.9	0.1	7
	exposure	19	0.03	0.02	7	0.02	0.01	7	1.1	0.2	7
440 ppm (Pregnant)	30 min	7	0.66	0.07	4	<0.02	--	4	<1.5	--	4
	Post-	14	0.74	0.03	4	0.39	0.07	4	2.6	0.3	4
	Exposure	19	0.91	0.08	4	<0.20	--	4	1.4	0.2	4
440 ppm (Non-pregnant)	30 min	7	0.58	0.01	3	0.16	0.05	3	0.8	0.2	3
	Post-	14	0.59	0.06	3	<0.4	--	3	2.0	0.4	3
	exposure	19	0.66	0.06	3	<0.4	--	3	1.1	0.4	3
2,220 ppm	30 min	7	5.1	0.3	7	<0.5	--	7	<0.5	--	7
	Post-	14	4.7	0.5	7	<0.7	--	7	<1.6	--	7
	exposure	19	5.1	0.4	7	<0.5	--	7	4	3	7
11,000 ppm	30 min	7	37	2	7	<3	--	7	<3	--	7
	Post-	14	36	4	7	<5	--	7	<5	--	7
	exposure	19	34	5	7	<7	--	7	<7	--	7
Control	17 h	7	<0.01	--	7	0.06	0.03	7	1.2	0.1	7
	Post-	14	<0.01	--	7	0.03	0.01	7	1.2	0.1	7
	exposure	19	<0.01	--	5	0.03	0.02	7	1.2	0.1	7
440 ppm (Pregnant)	17 h	7	<0.07	--	4	<0.60		4	0.7	0.4	4
	Post-	14	<0.01	--	4	0.03	0.01	4	1.6	0.1	4
	exposure	19	<0.03	--	3	<0.03	--	3	1.6	0.4	3
440 ppm (Non-pregnant)	17 h	7	<0.01	--	3	0.06	0.03	3	0.9	0.2	3
	Post-	14	<0.02	--	3	0.04	0.02	3	1.4	0.1	3
	exposure	19	<0.01	--	2	0.06	--	2	1.1	0.1	2
2,200 ppm	17 h	7	<0.01	--	7	<0.20	--	7	1.0	0.4	7
	Post-	14	0.01	0.01	7	<0.02	--	7	0.9	0.1	7
	exposure	19	0.40	0.20	7	<0.06	--	7	1.4	0.3	7
11,000 ppm	17 h	7	3	1	7	<2	--	7	2	1	7
	Post-	14	<3	--	6	<2	--	6	<2	--	6
	exposure	19	6	2	7	<2	--	7	5.2	0.7	7

APPENDIX B

EXPOSURE NARRATIVE AND DATA

FOR ACETONE

EXPOSURE DATA AND NARRATIVE FOR ACETONE

Animal Exposure Chamber

The Battelle-designed inhalation exposure chamber (commercially available from Harford Systems/Lab Products, Inc., Aberdeen, MD) was used for the inhalation exposures. The 2.3 m^3 (1.7 m^3 active mixing volume) stainless steel chamber contained three levels of caging, each level split into two offset tiers (Figure B.1a). The drawer-like stainless steel cage units were comprised of individual animal cages, feed troughs and automatic watering. Stainless steel catch pans for the collection of urine and feces were suspended below each cage unit.

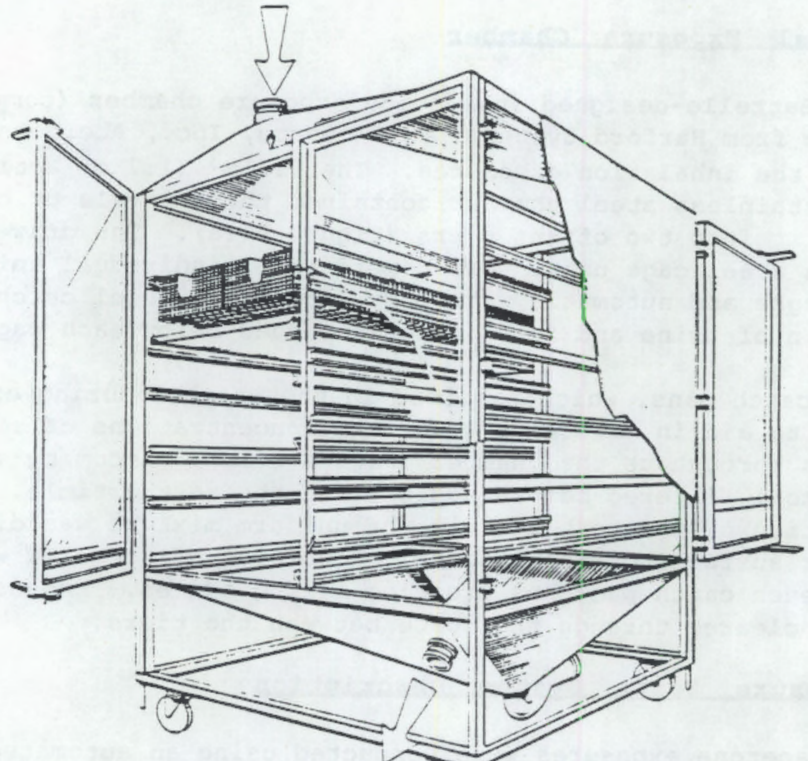
The catch pans, which remained in the chamber during exposure, were designed to aid in maintaining uniform concentrations of aerosol, dust or vapors throughout the chamber (Figure B.1b). Incoming air was HEPA and charcoal filtered before addition of the test article. Following the addition of the test article the uniform mixture was diverted along the inner surfaces of the chamber. A portion of the flow was "peeled off" by each catch pan thus creating mixing eddies. Exhaust from each tier was cleared through the space between the tiers.

Exposure Suite System Description

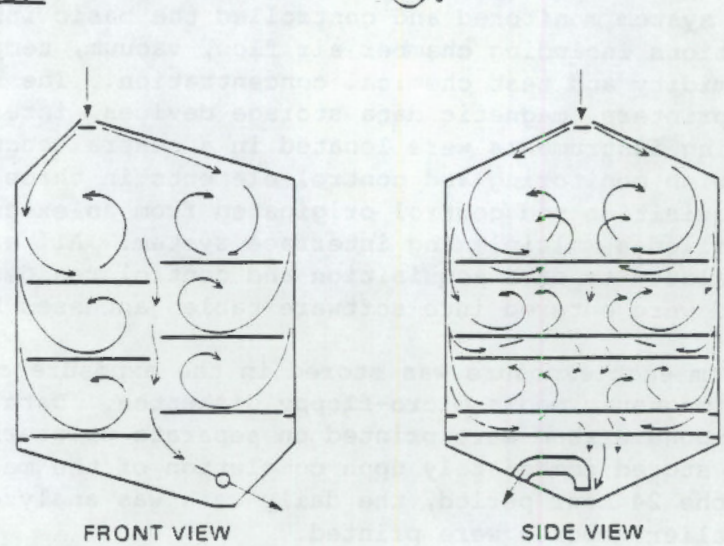
The acetone exposures were conducted using an automated data acquisition and control system in an exposure suite (Figures B.2 and B.3). This system monitored and controlled the basic inhalation test system functions including chamber air flow, vacuum, temperature, relative humidity and test chemical concentration. The system computers, printers, magnetic data storage devices, interface equipment, and monitoring instruments were located in a central control room and interfaced with monitoring and control elements in three exposure rooms. All data acquisition and control originated from an executive computer which controlled a multiplexing interface system. All experimental protocols related to data acquisition and control resided in this computer and were entered into software tables accessed by menus.

Data from each exposure was stored in the exposure control center on separate magnetic media micro-floppy diskettes. Data and comments from each exposure room were printed on separate printers. Data was printed and stored immediately upon completion of the measurement. At the end of the 24 hour period, the daily data was analyzed and summary and data outlier reports were printed.

A dual point alarm system with user-defined set points was available for each parameter measured. Action taken upon alarm depended on the cause and severity of the alarm and ranged from audio/visual alert to automatic shutoff of the exposure generator. Alarm conditions which might be a threat to the health of the animals alerted a building power operator who was on duty 24 hours per day.



B.1a.



B.1b.

FIGURES B.1a. and B.1b. Inhalation Exposure Chamber

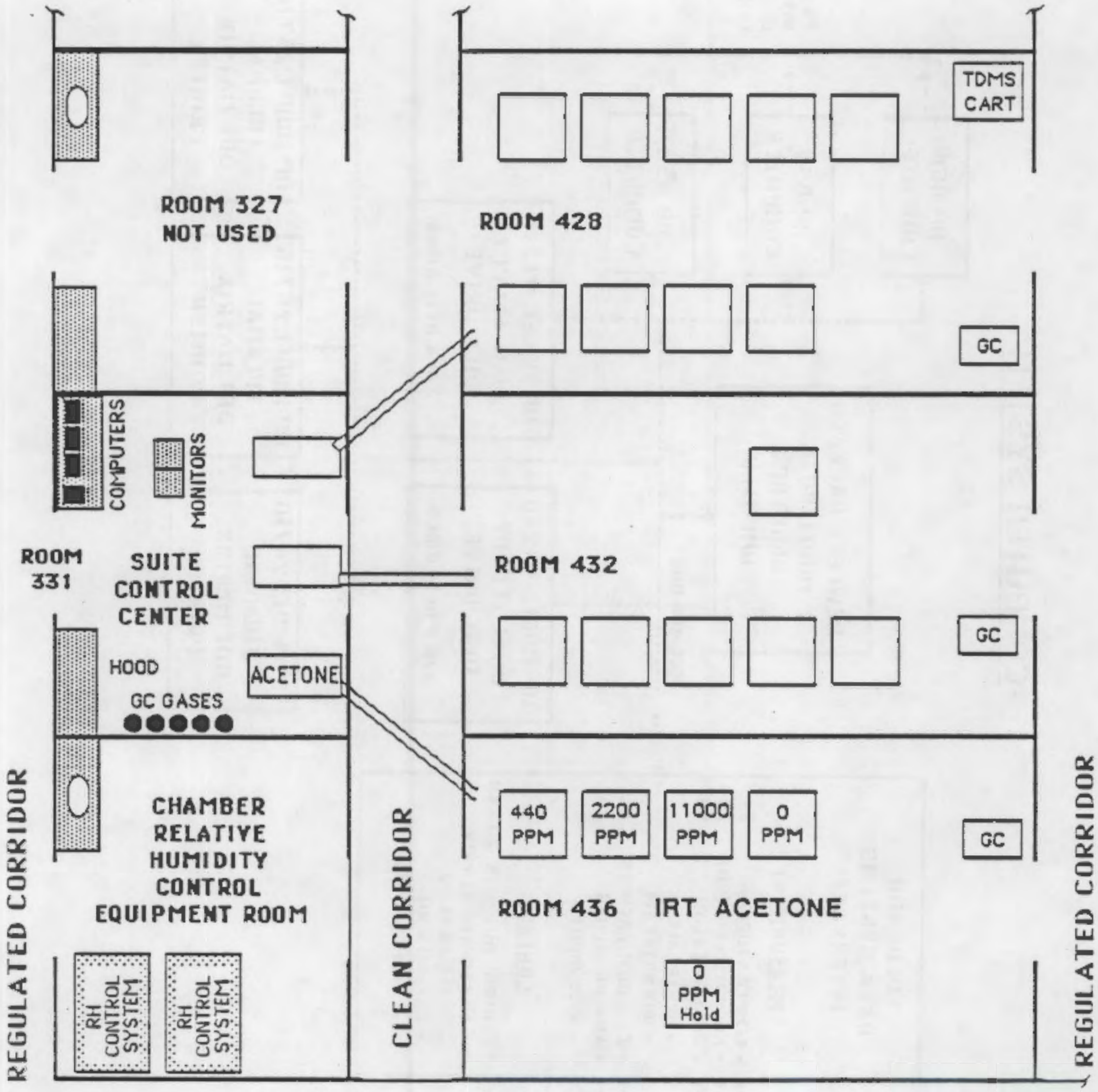


FIGURE B.2. Acetone Exposure Suite

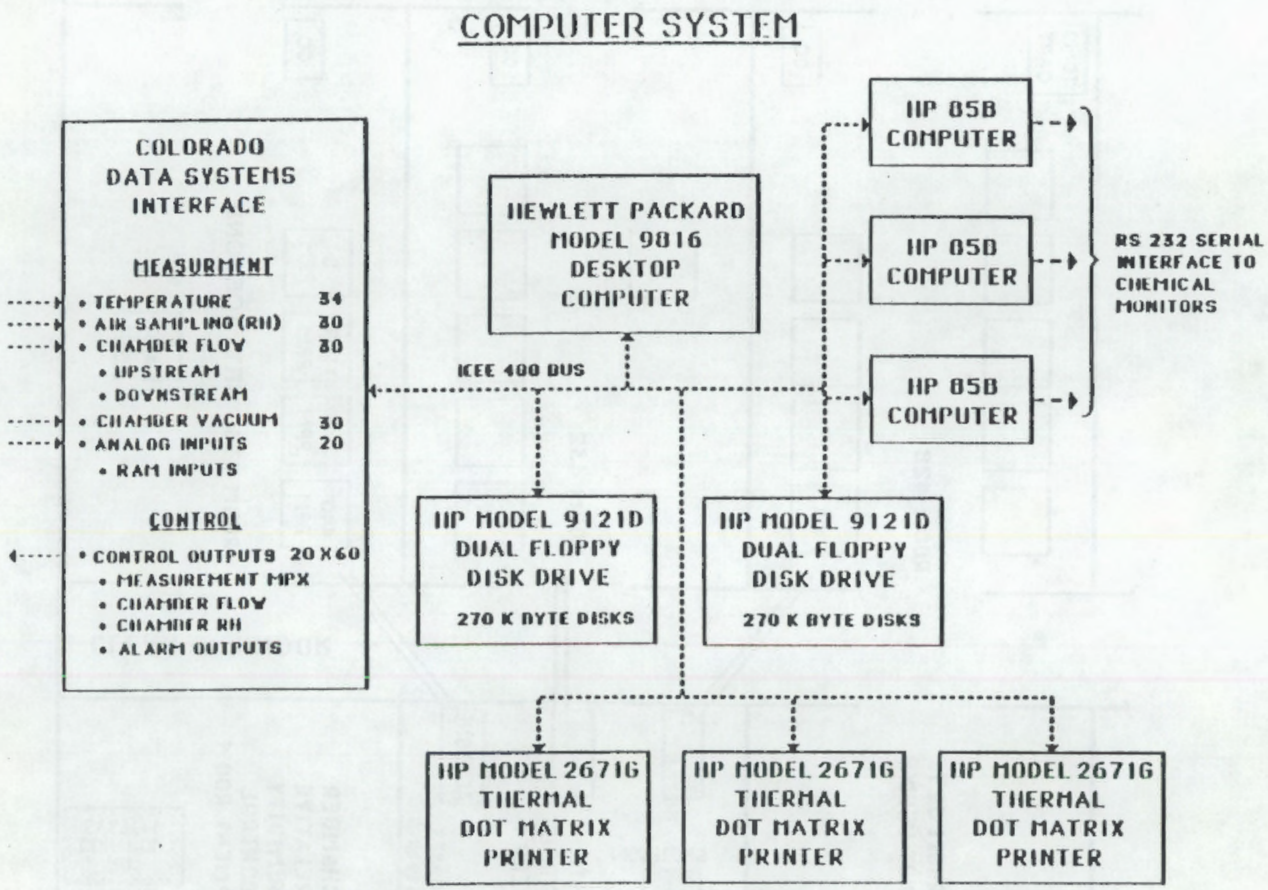


FIGURE B.3. Data Acquisition System for Acetone Exposures

Chamber and room temperatures were measured by Resistance Temperature Detectors (RTDs) located at the measurement site. The RTD's were multiplexed to a digital thermometer which was interfaced to the computer. Chamber temperature was controlled primarily by controlling the temperature of the room housing the chambers. Prior to the start of the study RTD'S were calibrated to within ±0.5°F of a certified mercury thermometer in a temperature controlled water bath.

Relative humidity (RH) was calculated with an accuracy of ±6% by pulling a sample from the measurement location through a Teflon® tube into a dewpoint hygrometer located in the control center. Measurements were made from different locations by a valving system which multiplexed the tubes to the hygrometer. Percent RH was calculated by the executive computer from temperature and dewpoint measurements. Chamber %RH was maintained by a "wet/dry" air source supplied to each chamber. The ratio of "wet" to "dry" air, determined by a computer-controlled mixing valve, determined the chamber %RH.

Chamber air flow was calculated with an accuracy of ±15 *l*/min by measurement of the pressure drop across calibrated orifices located at the inlet and exhaust of each chamber. The desired flow orifice was attached by means of a multiplexed valve system to a calibrated pressure transducer located in the control center. Leaks in the chambers could be detected by comparison of the measurement of inlet flow with that of the exhaust. Flow was maintained by a computer-controlled gate valve in the exhaust line of each chamber.

Chamber vacuum, relative to the control center, was measured with an accuracy of approximately ±0.2 cm H_2O using the same pressure transducer system which measured chamber air flows. Chamber vacuum was maintained at approximately (-)1" H_2O primarily by inlet resistance provided by the HEPA and charcoal filters.

Acetone Generation System

A schematic diagram of the acetone generation and delivery system is shown in Figure B.4. The acetone generator was housed in a vented cabinet located in the Suite Control Center. The acetone to be vaporized was contained in a 19 liter stainless steel reservoir. This reservoir was filled from the original shipping container by the following method which was designed to prevent explosion during transfer. All oxygen in the reservoir was displaced with nitrogen through a purge port. The nitrogen pressure in the shipping container forced acetone through a filter and into the reservoir. All metal containers were grounded. The filled reservoir was then transferred to, and installed into, the generator cabinet. The reservoir was refilled every other day.

During exposure the acetone was pumped from the stainless steel reservoir through an eductor tube and delivery tubes to vaporizers located at the fresh air inlet of each animal exposure chamber. On the high chamber, the chemical was delivered to two vaporizers since the rate of delivery exceeded the vaporization capability of a single vaporizer. Stable micrometering pumps with adjustable drift-free pump rates ranging from less than 1 x 10^{-3} to greater than 20 ml per minute were used.

The vaporizer comprised a stainless steel cylinder covered with a glass fiber wick from which the liquid was vaporized. The wick could be easily and inexpensively replaced if residue buildup occurred. An 80-watt heater and a temperature sensing element were incorporated within the cylinder and connected to a remotely located temperature controller. A second temperature monitor was incorporated in the vaporizer allowing the operating temperature to be recorded by the automated data acquisition system. The operating temperature of the vaporizer was maintained below 135°F.

A clear Teflon® tube of measured volume, preceded by a three-way valve was attached just upstream of the pump to facilitate measurement of the flow rate of the vapor generator. Measurement was accomplished by momentarily switching the three-way valve from the run position to the test position. A small bubble of air was pulled by the pump from the cabinet through the valve and into the clear tube. The progress of this bubble from one end of the tube to the other (a calibrated volume) was timed with a stop watch. Flow rate was calculated by dividing the volume by the time. The concentration in the exposure chamber could be calculated from the flow measurements of liquid and dilution air and was used as a check on chamber concentrations in addition to GC measurements. A three-way valve at the output of the liquid reservoir allowed the liquid to be pumped either to the vaporizer or to a sample vial. In this way, samples could be taken from the reservoir for periodic purity assays, or for calibration of the monitoring equipment.

All generation equipment which came in contact with the acetone was stainless-steel, Teflon® or Viton®. All equipment contained in the vented generator cabinet was explosion proof.

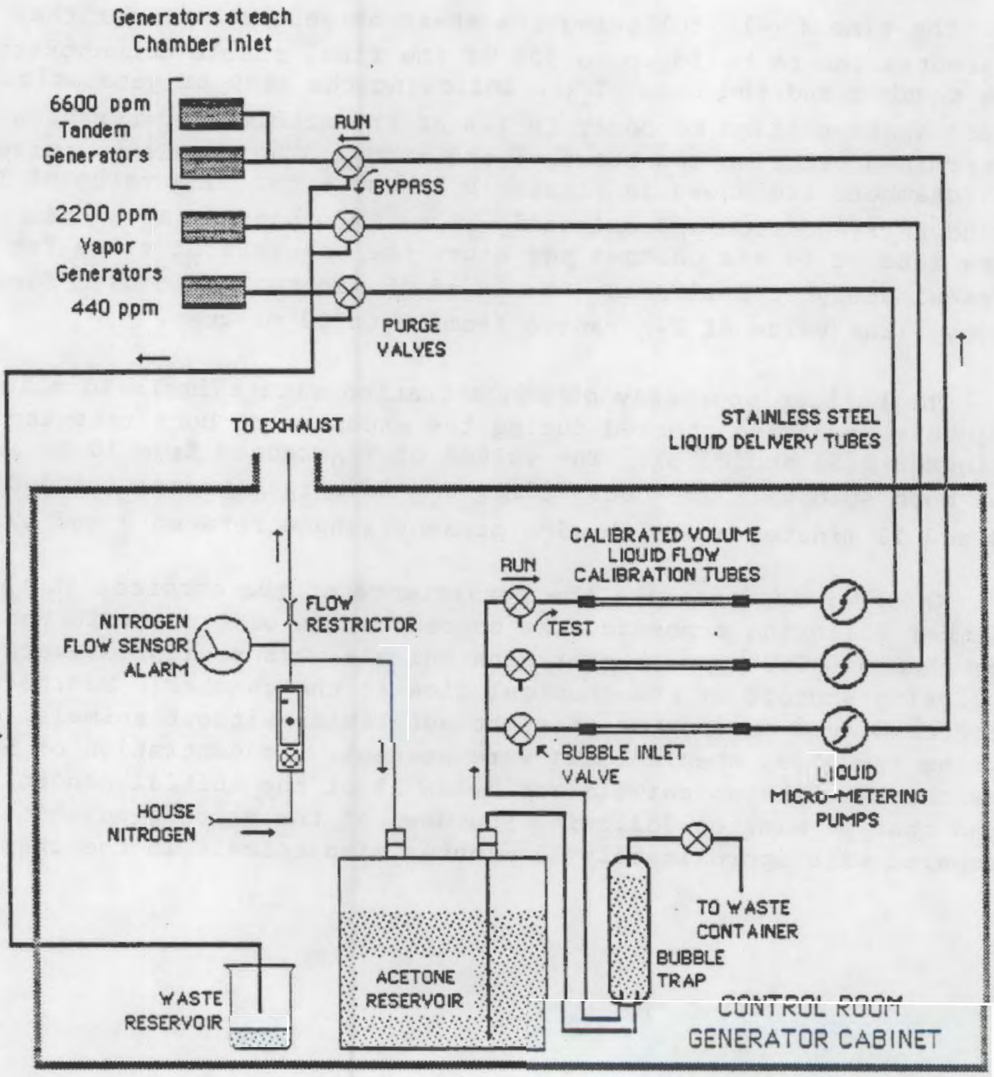


FIGURE B.4. Acetone Generation and Delivery System

A condensation nuclei counter, Gardner Inc. type CN, was used to check the chambers and the room for particles during generation before animals were placed in the chambers and once with rats in the chambers. No particles were found in the control chamber or any of the exposure chambers. A count of approximately 200 particles/cm^3 was found in the room during generation.

The time (T_{90}), following the start of generation, for the concentration to build up to 90% of the final stable concentration in the chamber and the time (T_{10}), following the stop of generation for the vapor concentration to decay to 10% of the stable concentration were determined prior to the start of the study. The resulting curves for all chambers are shown in Figures B.5a and B.5b. The value of T_{90} was found to range from approximately 10 to 12 minutes. At a chamber air flow rate of 15 air changes per hour, the theoretical value for T_{90} is approximately 12.5 minutes. A T_{90} of 12 minutes was chosen for this study. The value of T_{10} ranged from 10 to 13 minutes.

The buildup and decay of concentration with animals in all the chambers were also checked during the exposure of both rats and mice (Figures B.5a and B.5b). The values of T_{90} ranged from 10 to 12 minutes for both species. The decay time, T_{10} with rats present ranged between 10 and 13 minutes and with mice present ranged between 9 and 13 minutes.

In order to determine the persistence of the chemical in the chamber following exposure, the concentration of acetone in the 11000 ppm chamber (6600 ppm chamber with animals) was monitored overnight following shutoff of the chemical flow to the chamber. Monitoring was performed once during the prestart activities without animals, and again during the study when animals were present. Concentration of acetone in the chamber without animals was below 1% of the initial concentration in less than 17 minutes following shutdown of the vapor generation system compared with approximately 23 minutes with animals in the chambers.

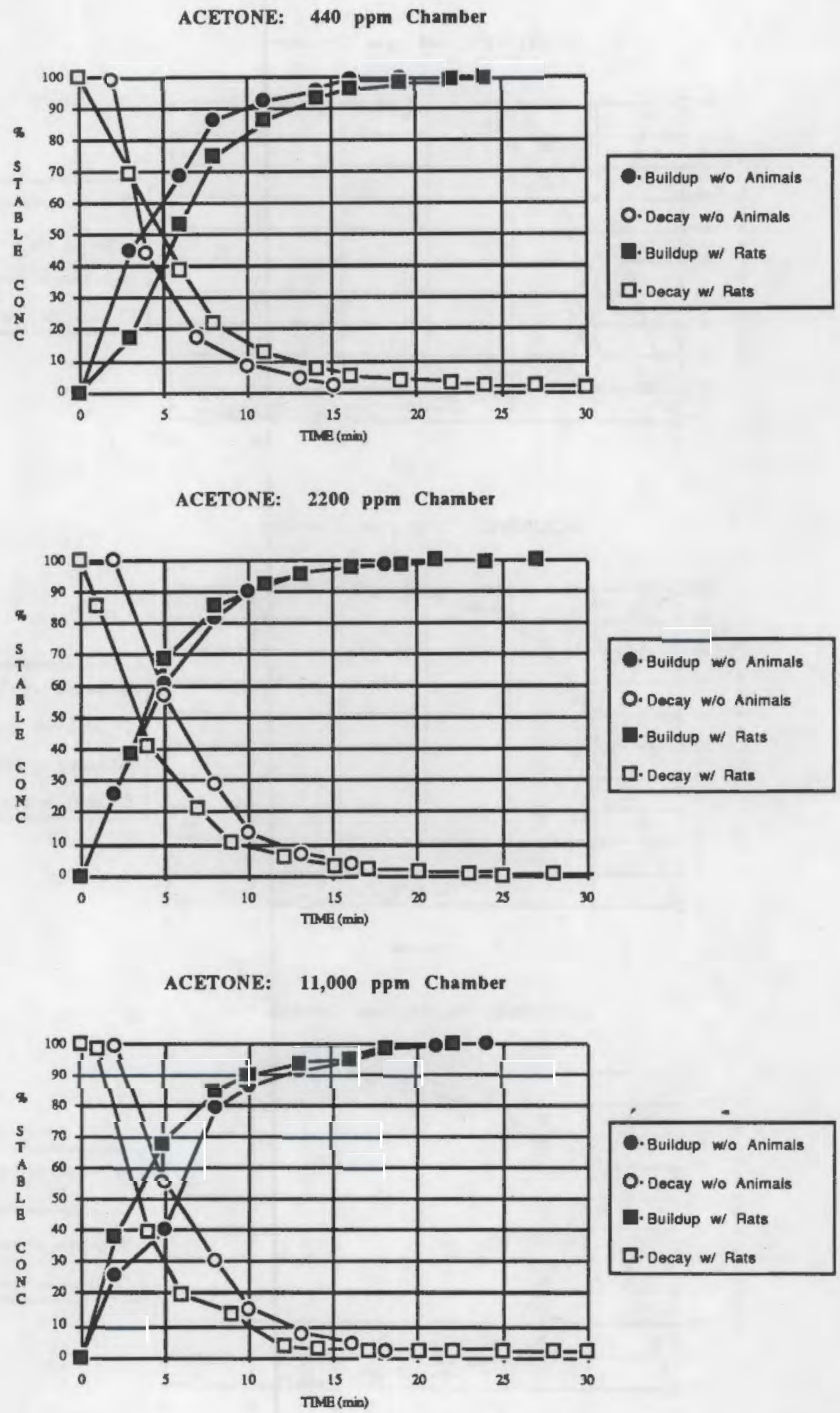


FIGURE B.5a. Buildup and Decay of Vapor Concentrations for Exposure of Rats to Acetone With and Without Animals Present.

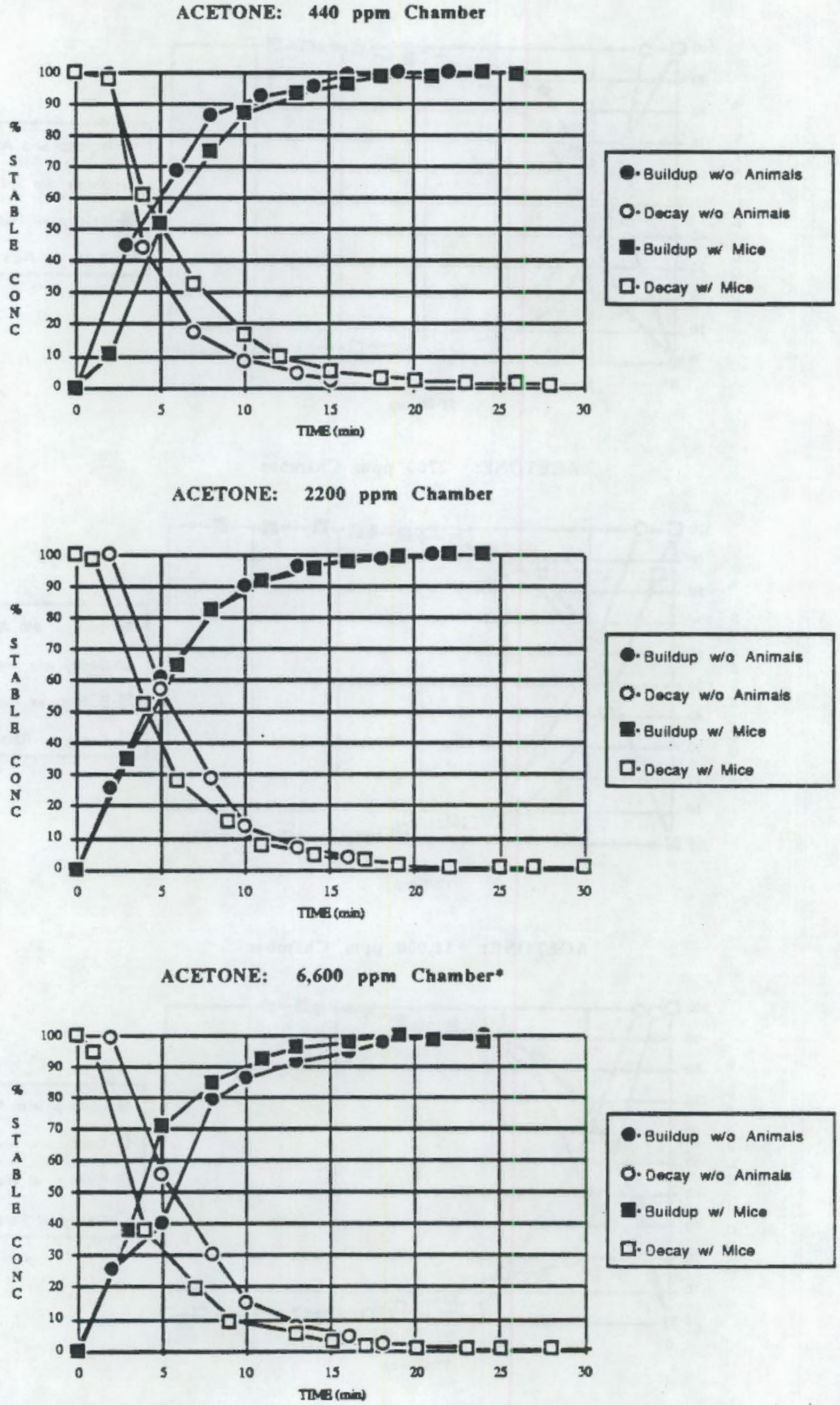


FIGURE B.5b. Buildup and Decay of Vapor Concentrations for Exposure of Mice to Acetone With and Without Animals Present.

Vapor Concentration Uniformity in Chambers

Uniformity of vapor concentration in the exposure chambers was measured prior to the start of and once during the study. The vapor concentration was measured using the on-line GC with the automatic 8-port sample valve disabled to allow continuous monitoring from a single input line. Prior to animal loading, 12 chamber positions (one in front and one in back, for each of the six possible animal cage unit positions per chamber) were measured. The second set of gas concentration measurements was taken from the front and back positions of the chamber only where cage units contained animals.

The sample point was just above and about 10 cm in from the front or back center of each cage unit. The uniformity data for each chamber during prestart testing, and after animals were in place in the chambers, are summarized in Table B.1. Complete data are found later in this Appendix. Uniformity in all chambers was found acceptable. To provide easier interpretation of the uniformity measurement results, the concentration readings in Table IV-3 for each port are expressed as a percentage of the mean value at all ports measured. The tables include analysis of Total Port Variability (TPV), Within Port Variability (WPV) and Between Port Variability (BPV), all expressed as % Relative Standard Deviation (%RSD). These terms are described in detail below. The uniformity criteria listed below were easily met for all chambers.

Chamber Uniformity Limits:

WPV ≤5% RSD   BPV ≤5% RSD   TPV ≤7% RSD

The possible variation of test chemical concentration measured from one sample port to another during the measurement procedure is termed the Total Port Variability (TPV) and consists of both spatial and temporal variations. Two factors contribute to the TPV. The first, the Between Port Variability (BPV), is the factor of interest as it represents the spatial variation of test chemical distribution within the chamber. The second factor, the Within Port variability (WPV), represents the temporal fluctuation of the average chemical concentration within the chamber during the time the measurements were taken. This temportal factor includes variations in vapor generation as well as variation of the measurement instrument itself.

The WPV is determined from a minimum of three measurements taken at the on-line monitor port (1B or 2B) before, during and after all other ports are measured. The TPV is determined from measurements from, at the minimum, the front and back ports at each level on which animals are housed as well as one measurement from the on-line monitor port (whether or not animals are housed on that level). The BPV is determined by applying the following equation:

$$BPV = \sqrt{(TPV)^2 - (WPV)^2}$$

Since the WPV is often determined from fewer measurements than the TPV, statistically it is possible for the WPV to be greater than the TPV. In these cases, the BPV is very small, but it cannot be distinguished from the WPV. The BPV can't be determined using the above equation as it yields the square root of a negative number. In this case, it is reported as indistinguishable from the WPV.

TABLE B.1. Teratology Study of Acetone in Mice and Rats - Summary of Chamber Uniformity Data Obtained Before Exposure (PRE) and During Exposure (Rats and Mice).

	TPV (%RSD)			WPV (%RSD)			BPV (%RSD)		
Chamber	PRE	Rats	Mice	PRE	Rats	Mice	PRE	Rats	Mice
440 ppm	2.3	0.7	0.2	2.3	0.3	0.2	*	0.6	*
2200 ppm	0.7	0.6	0.4	0.8	0.6	0.4	*	0.1	*
11000 ppm	1.7	1.0	---	2.1	1.8	---	*	*	---
6600 ppm	---	---	0.6	---	---	0.7	---	---	*

* Indistinguishable from WPV.

Chamber Uniformity Limits

WPV ≤ 5% RSD

BPV ≤ 5% RSD

TPV ≤ 7% RSD

Environmental Data During Exposure

Summations of chamber air flow, temperature and relative humidity data for the studies in mice and rats are shown in Tables B2 and B3. These tables include the mean, standard deviation, mean expressed as a percentage of the target, the percent relative standard deviation (SD/Mean), maximum, minimum readings, number of readings and the percent of readings for which the value was within the specified operating range.

For the mouse study (Table B.2), the mean values of temperature in all chambers for the entire study were between 73.8 and 75.7°F, all within the specified limits of 72 to 78°F. Temperature extremes ranged from 71.6 to 77.3°F. The percent of temperature readings within the operating range for all chambers were greater than 97%.

The mean values of relative humidity in all chambers for the mouse study were between 51.7 and 55.1%, all within the specified limits of 40 to 70%. Relative humidity extremes (considering all chambers) ranged from 40 to 64%. All readings were within the operating range.

The mean values of chamber air flow in all chambers for the mouse study were between 15.1 and 16.0 CFM (1 CFM = 1 air change per hour), all within the specified limits of 12 to 18 CFM. Flow extremes (considering all chambers) ranged from 13.9 to 17.0 CFM; all readings were within normal operating limits.

For the rat study (Table B.3), the mean values of temperature in all chambers for the entire study were between 74.2 and 75.7°F, all within the specified limits of 72 to 78°F. Temperature extremes ranged from 70.2 to 78.2°F. The percent of temperature readings within the operating range for all chambers were greater than 90%.

The mean values of relative humidity in all chambers for the rat study were between 54.4 and 57.1%, all within the specified limits of 40 to 70%. Relative humidity extremes (considering all chambers) ranged from 36 to 79%. All chambers were above the 90% target for readings within operating range.

The mean values of chamber air flow in all chambers for the rat study were between 14.4 and 15.4 CFM (1 CFM = 1 air change per hour), all within the specified limits of 12 to 18 CFM. Air flow extremes (considering all chambers) ranged from 12.8 to 17.5 CFM; all readings were within normal operating limits.

A complete summary of the daily chamber environmental data and notations on any readings which exceeded critical limits is included in this appendix.

TABLE B.2. Inhalation Teratology Study of Acetone in Mice—Summation of Environmental Data for the Period when Animals were Housed in the Exposure Chambers. Acceptable ranges are also shown.

Temperature (°F)
Acceptable Range = 72 to 78 °F

Target Chamber Conc. (ppm)	Mean ± SD	Percent of Target ±%RSD	Maximum	Minimum	Number of Samples	% Samples in Range
0	74.9±0.7	100±1%	76.6	73.2	128	100
Hold	75.0±0.8	100±1%	76.2	73.3	71	100
440	74.2±0.6	99±1%	75.4	72.3	128	100
2200	73.8±0.7	98±1%	75.0	71.6	128	98
11000	75.7±0.9	101±1%	77.3	72.9	128	100

Relative Humidity (% RH)
Acceptable Range = 40 to 70 %RH

Target Chamber Conc. (ppm)	Mean ± SD	Percent of Target ±%RSD	Maximum	Minimum	Number of Samples	% Samples in Range
0	51.7±4.6	94±9%	61	42	128	100
Hold	55.1±3.7	100±7%	62	47	57	100
440	54.4±4.0	99±7%	62	45	128	100
2200	53.6±4.4	97±8%	61	45	128	100
11000	52.8±5.5	96±10%	64	40	128	100

Air Flow (CFM)
Acceptable Range = 12 to 18 CFM

Target Chamber Conc. (ppm)	Mean ± SD	Percent of Target ±%RSD	Maximum	Minimum	Number of Samples	% Samples in Range
0	15.1±0.1	101±0%	15.3	15.0	128	100
Hold	15.7±0.2	105±1%	15.9	14.7	73	100
440	15.7±0.7	104±4%	16.9	13.9	128	100
2200	15.8±0.2	105±1%	16.3	15.3	128	100
11000	16.0±0.4	106±2%	17.0	15.2	128	100

TABLE B.3. Inhalation Teratology Study of Acetone in Rats—Summation of Environmental Data for the Period when Animals were Housed in the Exposure Chambers. Acceptable ranges are also shown.

Temperature (°F)
Acceptable Range = 72 to 78 °F

Target Chamber Conc. (ppm)	Mean ± SD	Percent of Target ±%RSD	Maximum	Minimum	Number of Samples	% Samples in Range
0	75.2±1.3	100±2%	78.2	72.1	161	99
Hold	74.2±1.6	99±2%	78.0	71.4	53	91
440	74.3±1.0	99±1%	77.1	70.7	138	99
2200	75.3±1.5	100±2%	77.8	70.2	138	99
11000	75.7±1.4	101±2%	78.1	70.5	138	99

Relative Humidity (% RH)
Acceptable Range = 40 to 70 %RH

Target Chamber Conc. (ppm)	Mean ± SD	Percent of Target ±%RSD	Maximum	Minimum	Number of Samples	% Samples in Range
0	54.8±7.2	100±13%	79	45	163	96
Hold	56.7±4.7	103± 8%	65	47	54	100
440	57.1±7.0	104±12%	75	37	140	95
2200	54.6±4.8	99± 9%	70	36	140	98
11000	54.4±4.5	99± 8%	68	38	139	99

Air Flow (CFM)
Acceptable Range = 12 to 18 CFM

Target Chamber Conc. (ppm)	Mean ± SD	Percent of Target ±%RSD	Maximum	Minimum	Number of Samples	% Samples in Range
0	14.9±0.1	99±0%	15.0	14.5	156	100
Hold	14.4±0.1	96±0%	14.5	14.1	51	100
440	15.4±1.0	103±7%	17.5	12.8	135	100
2200	15.1±0.1	100±1%	15.2	14.5	133	100
11000	15.4±0.1	103±1%	15.6	15.0	133	100

Exposure Data

Summaries of the concentration data for both the mouse and rat studies for all chambers and the exposure room are included in Tables B.4 and B.5. Summaries of concentration by exposure day follow in this Appendix along with graphic illustrations of the daily mean and standard deviation for each chamber. Note that the target concentration was reduced to 6600 ppm from 11000 ppm for the mice high dose chamber after 1 day of exposure. To maintain consistency within the data analysis program, however, the notations describing the high dose chamber were kept at 11000 ppm in the tables and graphs.

For the mouse study (Table B.4), the grand means of the concentrations in each chamber for the entire study were between 99 and 101% of the target, with relative standard deviations in the range of 3 to 8%. Except for the last day of exposure, the daily mean concentrations ranged from 96 to 102% of target (the protocol required the daily means to be within ±10% of the target concentrations) and % RSD's were less than 10%. On the last day, one of the generators for the high dose chamber failed. When discovered, the exposure was discontinued after 5 hours and 9 minutes. At least 98% of individual concentration measurements at each target level were within ±10% of the target levels, the specified operating limits. The maximum concentration observed in the control chamber was 3.8 ppm and 0.1 ppm in the hold chamber. The maximum concentration observed in the room was 16.6 ppm. The high readings were apparently a result of opening a chamber before the concentration level had decayed following shutdown. The next highest readings during the study were 0.3 ppm in the room and 0.15 ppm in the control chamber. Carryover of acetone in the sample lines had been observed, resulting in most of these small residual readings.

For the rat study (Table B.5), the grand means of concentrations in all chambers for the entire study were 100% of the target, with relative standard deviations in the range of 1 to 6%. The daily mean concentrations for all chambers were between 95 and 102% of the target concentrations (the daily protocol required the daily means to be within ±10% of the target concentrations). At least 97% of individual concentration measurements at each target level were within ±10% of the target levels, the specified operating limits. Except for 1 day, the %RSD's were less than 10%. The maximum concentration in the control chamber was 0.26 ppm and in the holding chamber, 0.34 ppm. Again, carryover in the sample lines gave readings of the same level. The maximum concentration observed in the room was 1.06 ppm.

A complete discussion of all concentration excursions is included in this appendix.

TABLE B.4. Inhalation Teratology Study of Acetone in Mice—Summation of Concentration Data for the Period when Animals were Housed in the Exposure Chambers.

Concentration (PPM)
Acceptable Range = Target ± 10%

Target Conc. (ppm)	Mean ± SD	Percent Target ±RSD	Max	Min	Number Samples	Number In Range	% Samples in Range
Room	0.21 ± 1.04	------	16.6	0	251	*250	*>99
0	0.05 ± 0.24	------	3.8	0	252	*251	*>99
Hold	0.01 ± 0.03	------	0.1	0	112	*112	*100
440	436 ± 32.9	99±8%	489	7.6	236	232	98
2200	2180 ± 146	99±7%	2450	15.2	236	234	99
11000	11100 ± 336	101±3%	11700	10700	16	16	100
6600**	6540 ± 448	99±7%	6770	113	219	218	>99
Std. Gas	2270 ± 5.4	101±0%	2280	2260	252	252	100

* Samples with concentration less than 2 ppm
** Target concentration was reduced to 6600 ppm from 11000 ppm after 1 day of exposure

TABLE B.5. Inhalation Teratology Study of Acetone in Rats—Summation of Concentration Data for the Period when Animals were Housed in the Exposure Chambers.

Concentration (PPM)
Acceptable Range = Target ± 10%

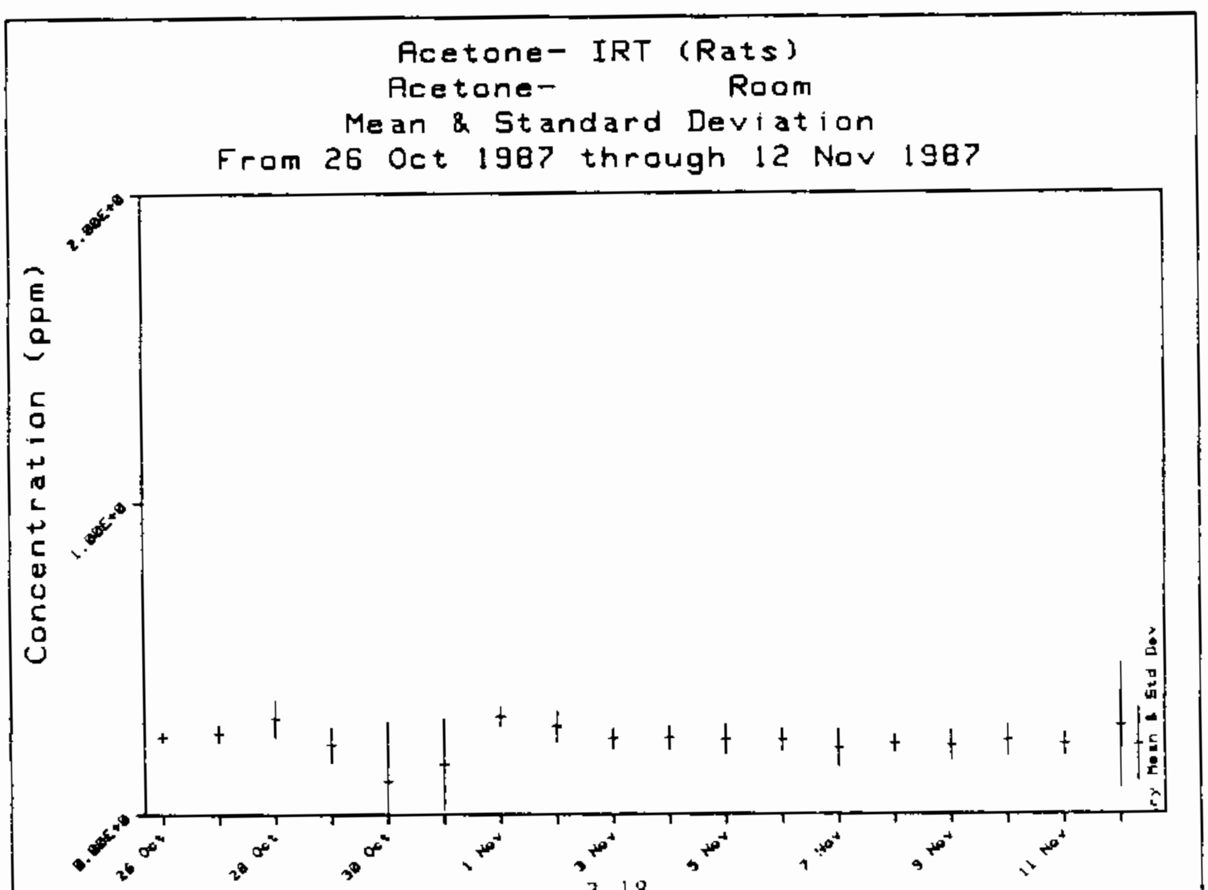
Target Conc. (ppm)	Mean ± SD	Percent Target ±RSD	Max	Min	Number Samples	Number In Range	% Samples in Range
Room	0.22 ± 0.12	------	1.06	0	330	*330	*100
0	0.08 ± 0.05	------	0.26	0	332	*332	*100
Hold	0.05 ± 0.06	------	0.34	0	70	*70	*100
440	439 ± 27.4	100±6%	797	322	274	266	97
2200	2200 ± 25.2	100±1%	2340	2070	272	272	100
11000	11000 ± 137	100±1%	11400	10500	269	269	100
Std. Gas	2260 ± 4.8	101±0%	2290	2240	285	285	100

* Samples with concentration less than 2 ppm

Daily Summation For Acetone- IRT (Rats)   From 26 Oct 1987 through 12 Nov 1987

Summary Data for: Acetone-   Room/Concentration   0.00E+0 to 2.00E+0

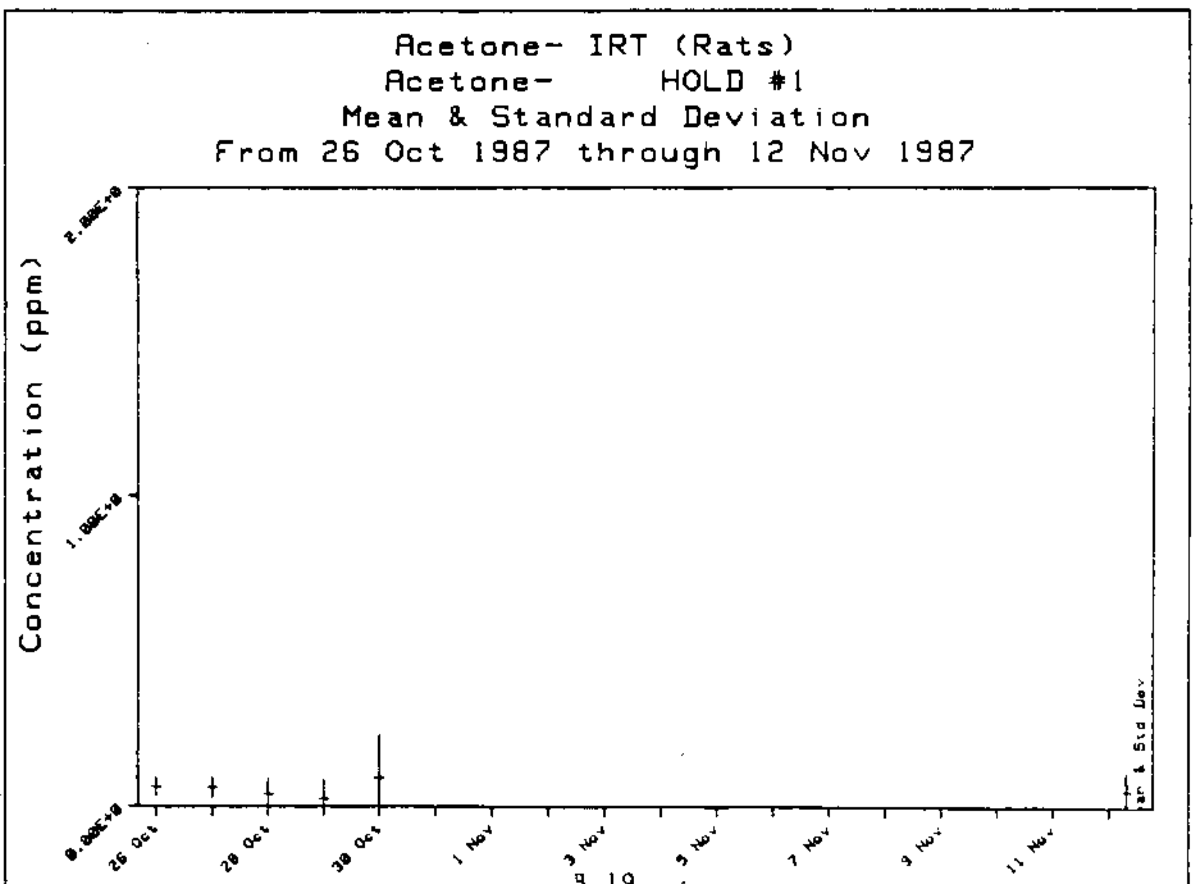
Date	Mean	% Target	Std Dev	% RSD	Maximum	Minimum	N	N in	% N in
26 Oct 1987	2.52E-1	25%	1.476E-2	6%	2.76E-1	2.26E-1	16.	16.	100%
27 Oct 1987	2.63E-1	26%	2.763E-2	10%	2.95E-1	1.77E-1	17.	17.	100%
28 Oct 1987	3.10E-1	31%	6.057E-2	20%	4.26E-1	2.30E-1	14.	14.	100%
29 Oct 1987	2.26E-1	23%	5.545E-2	25%	3.02E-1	1.03E-1	17.	17.	100%
30 Oct 1987	1.08E-1	11%	1.898E-1	176%	1.06E+0	0.00E+0	54.	54.	100%
31 Oct 1987	1.63E-1	16%	1.451E-1	89%	3.63E-1	0.00E+0	18.	18.	100%
1 Nov 1987	3.15E-1	31%	3.040E-2	10%	3.59E-1	2.72E-1	15.	15.	100%
2 Nov 1987	2.82E-1	28%	4.979E-2	18%	3.65E-1	2.15E-1	15.	15.	100%
3 Nov 1987	2.45E-1	24%	3.304E-2	13%	3.02E-1	1.56E-1	15.	15.	100%
4 Nov 1987	2.47E-1	25%	3.591E-2	15%	3.12E-1	2.00E-1	15.	15.	100%
5 Nov 1987	2.41E-1	24%	4.657E-2	19%	2.81E-1	9.71E-2	16.	16.	100%
6 Nov 1987	2.39E-1	24%	3.459E-2	14%	3.38E-1	1.75E-1	17.	17.	100%
7 Nov 1987	2.13E-1	21%	5.843E-2	27%	2.53E-1	0.00E+0	18.	18.	100%
8 Nov 1987	2.26E-1	23%	2.968E-2	13%	2.66E-1	1.43E-1	17.	17.	100%
9 Nov 1987	2.22E-1	22%	4.714E-2	21%	2.91E-1	9.71E-2	17.	17.	100%
10 Nov 1987	2.37E-1	24%	4.832E-2	20%	2.89E-1	9.50E-2	17.	17.	100%
11 Nov 1987	2.26E-1	23%	3.528E-2	16%	2.60E-1	1.16E-1	17.	17.	100%
12 Nov 1987	2.84E-1	28%	1.988E-1	70%	9.96E-1	1.92E-1	15.	15.	100%
Summary	2.22E-1	22%	1.159E-1	52%	1.06E+0	0.00E+0	330.	330.	100%



Daily Summation For Acetone- IRT (Rats)   From 26 Oct 1987 through 12 Nov 1987

Summary Data for: Acetone-   HOLD #1/Concentration   0.00E+0 to 2.00E+0

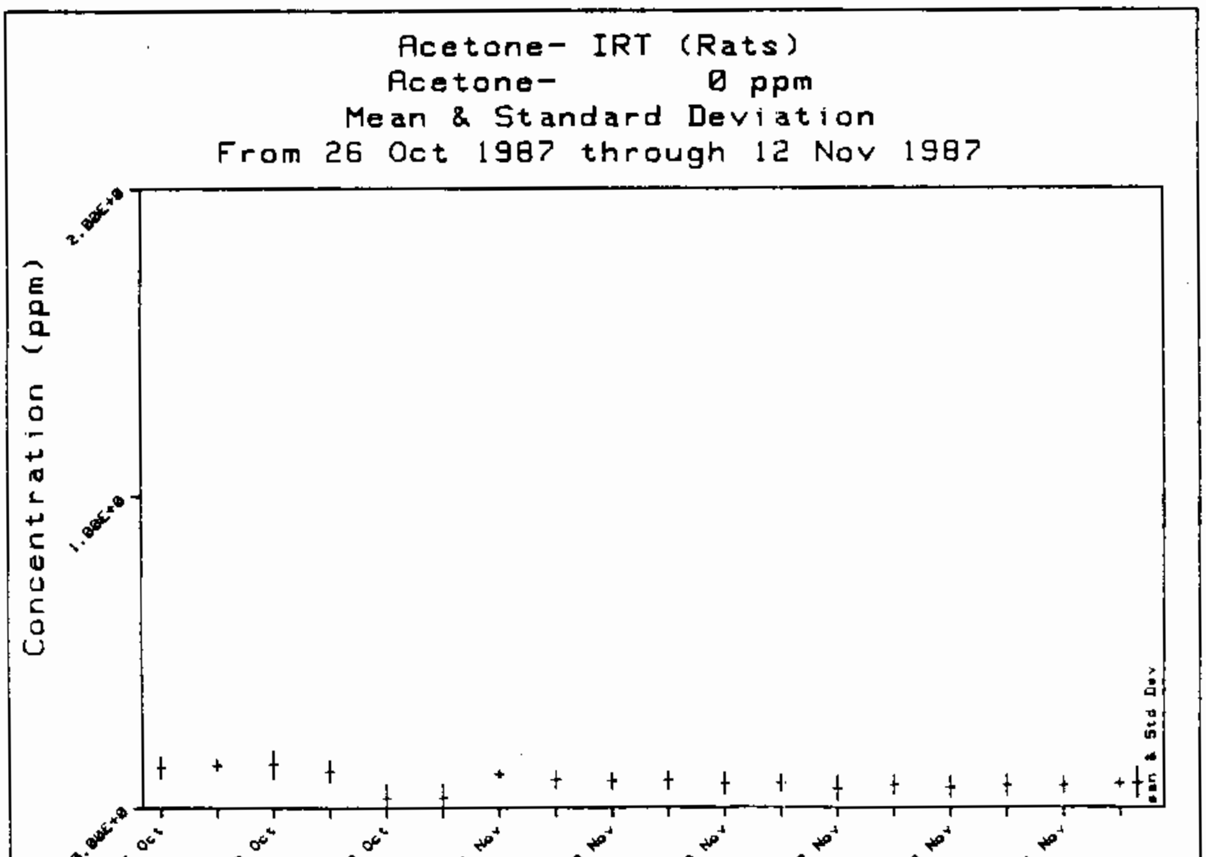
Date	Mean	% Target	Std Dev	% RSD	Maximum	Minimum	N	N in	% N in
26 Oct 1987	6.31E-2	6%	2.925E-2	46%	9.50E-2	0.00E+0	17.	17.	100%
27 Oct 1987	6.06E-2	6%	3.339E-2	55%	9.08E-2	0.00E+0	17.	17.	100%
28 Oct 1987	3.91E-2	4%	5.074E-2	130%	1.58E-1	0.00E+0	14.	14.	100%
29 Oct 1987	2.37E-2	2%	6.288E-2	265%	2.60E-1	0.00E+0	17.	17.	100%
30 Oct 1987	9.42E-2	9%	1.386E-1	147%	3.42E-1	2.74E-2	5.	5.	100%
31 Oct 1987									
1 Nov 1987									
2 Nov 1987									
3 Nov 1987									
4 Nov 1987									
5 Nov 1987									
6 Nov 1987									
7 Nov 1987									
8 Nov 1987									
9 Nov 1987									
10 Nov 1987									
11 Nov 1987									
12 Nov 1987									
Summary	5.03E-2	5%	5.812E-2	115%	3.42E-1	0.00E+0	70.	70.	100%



Daily Summation For Acetone- IRT (Rats)   From 26 Oct 1987 through 12 Nov 1987

Summary Data for: Acetone-   0 ppm/Concentration   0.00E+0 to 2.00E-0

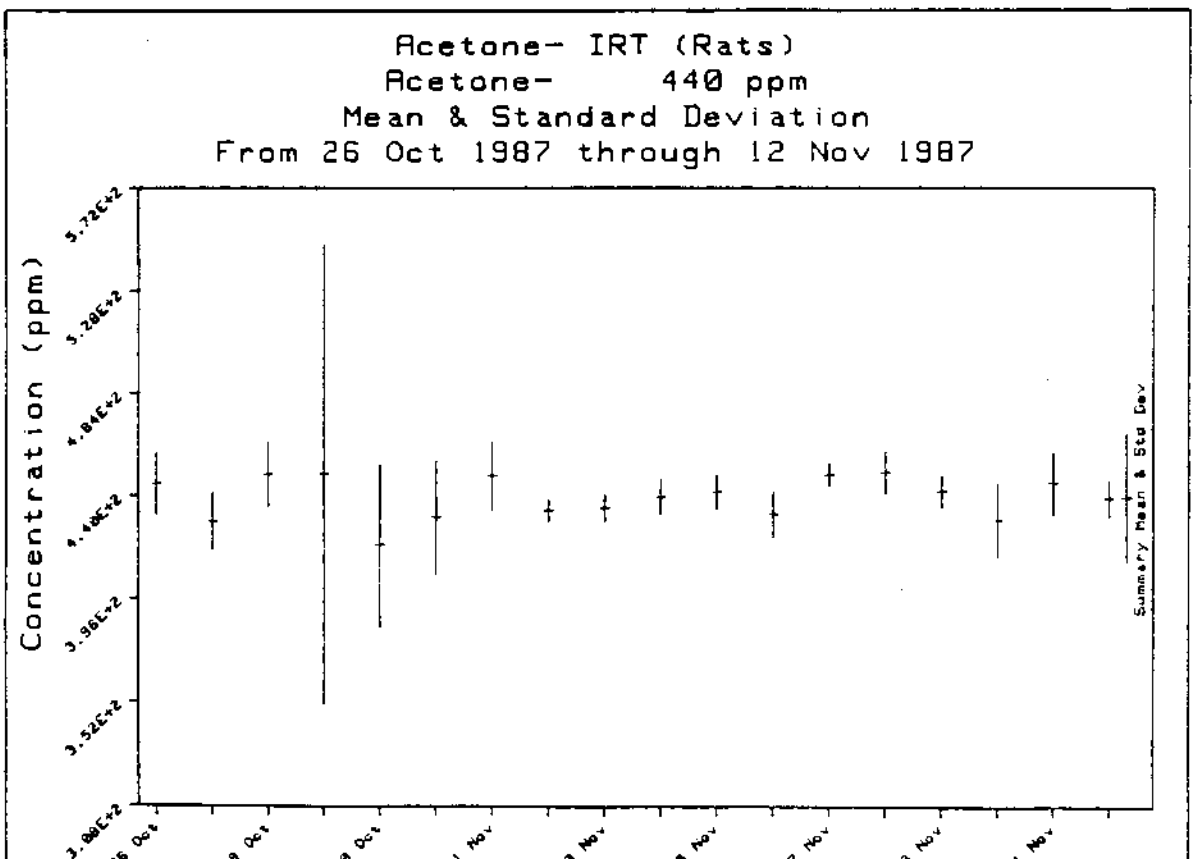
Date	Mean	% Target	Std Dev	% RSD	Maximum	Minimum	N	N in	% N in
26 Oct 1987	1.31E-1	13%	3.611E-2	28%	1.67E-1	0.00E+0	17.	17.	100%
27 Oct 1987	1.37E-1	14%	1.857E-2	14%	1.60E-1	8.87E-2	17.	17.	100%
28 Oct 1987	1.41E-1	14%	4.618E-2	33%	2.57E-1	5.70E-2	14.	14.	100%
29 Oct 1987	1.16E-1	12%	3.551E-2	31%	1.67E-1	0.00E+0	17.	17.	100%
30 Oct 1987	3.10E-2	3%	4.697E-2	151%	1.18E-1	0.00E+0	54.	54.	100%
31 Oct 1987	3.29E-2	3%	4.474E-2	136%	1.06E-1	0.00E+0	19.	19.	100%
1 Nov 1987	1.09E-1	11%	1.356E-2	12%	1.48E-1	9.29E-2	15.	15.	100%
2 Nov 1987	8.91E-2	9%	2.713E-2	30%	1.10E-1	0.00E+0	15.	15.	100%
3 Nov 1987	8.47E-2	8%	2.620E-2	31%	1.08E-1	0.00E+0	15.	15.	100%
4 Nov 1987	8.77E-2	9%	2.779E-2	32%	1.12E-1	0.00E+0	15.	15.	100%
5 Nov 1987	7.71E-2	8%	3.430E-2	45%	1.12E-1	0.00E+0	16.	16.	100%
6 Nov 1987	7.96E-2	8%	2.744E-2	34%	1.01E-1	0.00E+0	17.	17.	100%
7 Nov 1987	6.20E-2	6%	4.023E-2	65%	1.03E-1	0.00E+0	18.	18.	100%
8 Nov 1987	7.31E-2	7%	3.105E-2	42%	9.92E-2	0.00E+0	17.	17.	100%
9 Nov 1987	6.56E-2	7%	3.500E-2	53%	9.71E-2	0.00E+0	17.	17.	100%
10 Nov 1987	7.18E-2	7%	3.515E-2	49%	1.01E-1	0.00E+0	17.	17.	100%
11 Nov 1987	7.12E-2	7%	2.732E-2	38%	8.65E-2	0.00E+0	17.	17.	100%
12 Nov 1987	7.61E-2	8%	1.399E-2	18%	9.71E-2	4.64E-2	15.	15.	100%
Summary	7.83E-2	8%	4.794E-2	61%	2.57E-1	0.00E+0	332.	332.	100%



Daily Summation For Acetone- IRT (Rats)   From 26 Oct 1987 through 12 Nov 1987

Summary Data for: Acetone-   440 ppm/Concentration   3.96E+2 to 4.84E+2

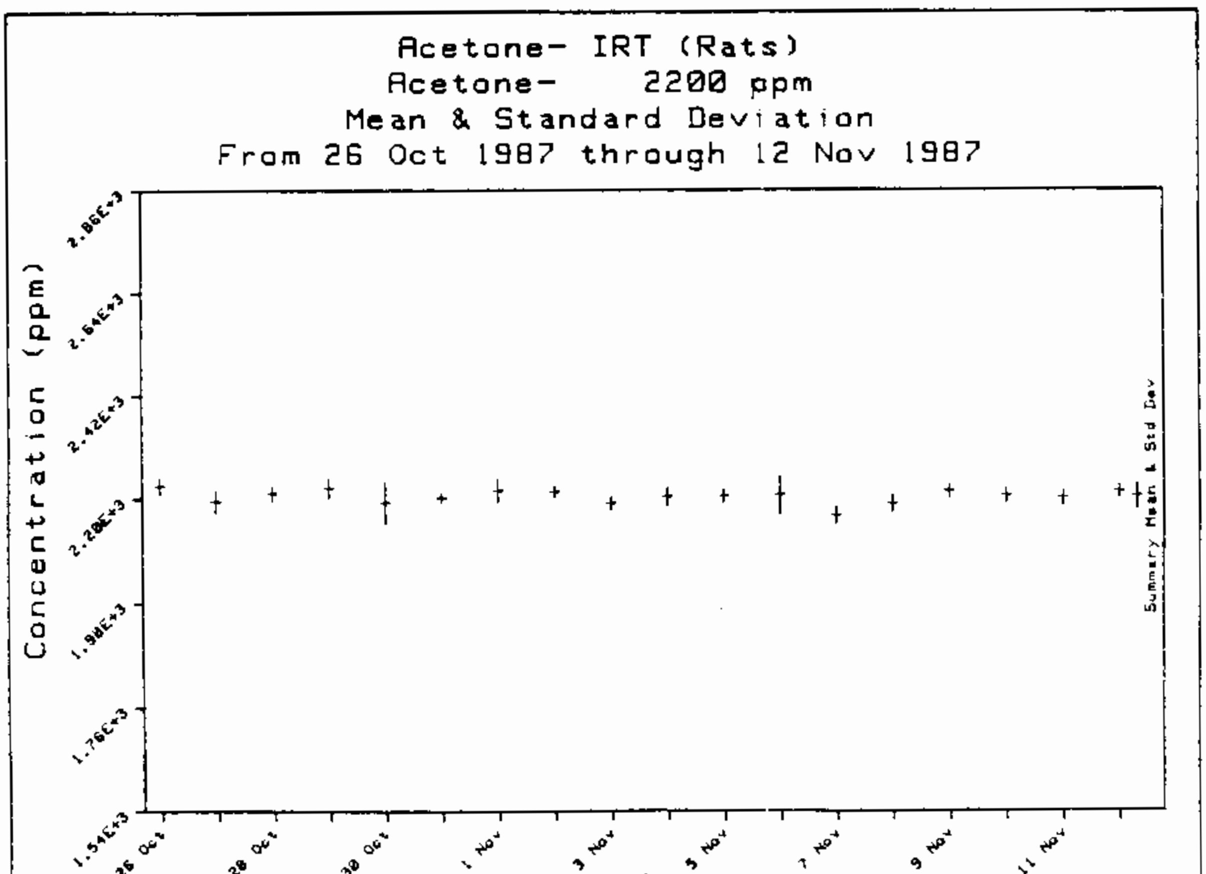
Date	Mean	% Target	Std Dev	% RSD	Maximum	Minimum	N	N in	% N in
26 Oct 1987	4.45E+2	101%	1.301E+1	3%	4.64E+2	4.22E+2	16.	16.	100%
27 Oct 1987	4.29E+2	97%	1.228E+1	3%	4.40E+2	3.96E+2	16.	15.	94%
28 Oct 1987	4.49E+2	102%	1.374E+1	3%	4.80E+2	4.34E+2	13.	13.	100%
29 Oct 1987	4.49E+2	102%	9.831E+1	22%	7.97E+2	3.86E+2	15.	12.	80%
30 Oct 1987	4.19E+2	95%	3.475E+1	8%	4.45E+2	3.22E+2	16.	14.	88%
31 Oct 1987	4.31E+2	98%	2.448E+1	6%	4.74E+2	3.98E+2	11.	11.	100%
1 Nov 1987	4.48E+2	102%	1.488E+1	3%	4.94E+2	4.34E+2	15.	14.	93%
2 Nov 1987	4.34E+2	99%	4.642E+0	1%	4.43E+2	4.24E+2	15.	15.	100%
3 Nov 1987	4.35E+2	99%	5.624E+0	1%	4.43E+2	4.22E+2	15.	15.	100%
4 Nov 1987	4.40E+2	100%	7.387E+0	2%	4.48E+2	4.21E+2	14.	14.	100%
5 Nov 1987	4.42E+2	100%	7.365E+0	2%	4.64E+2	4.35E+2	16.	16.	100%
6 Nov 1987	4.32E+2	98%	9.988E+0	2%	4.55E+2	4.14E+2	17.	17.	100%
7 Nov 1987	4.49E+2	102%	4.887E+0	1%	4.56E+2	4.36E+2	17.	17.	100%
8 Nov 1987	4.50E+2	102%	9.009E+0	2%	4.68E+2	4.35E+2	16.	16.	100%
9 Nov 1987	4.42E+2	100%	6.755E+0	2%	4.63E+2	4.34E+2	16.	16.	100%
10 Nov 1987	4.30E+2	98%	1.593E+1	4%	4.51E+2	3.89E+2	16.	15.	94%
11 Nov 1987	4.46E+2	101%	1.337E+1	3%	4.64E+2	4.12E+2	16.	16.	100%
12 Nov 1987	4.39E+2	100%	7.734E+0	2%	4.52E+2	4.28E+2	14.	14.	100%
Summary	4.39E+2	100%	2.739E+1	6%	7.97E+2	3.22E+2	274.	266.	97%



Daily Summation For Acetone- IRT (Rats)   From 26 Oct 1987 through 12 Nov 1987

Summary Data for: Acetone-   2200 ppm/Concentration   1.98E+3 to 2.42E+3

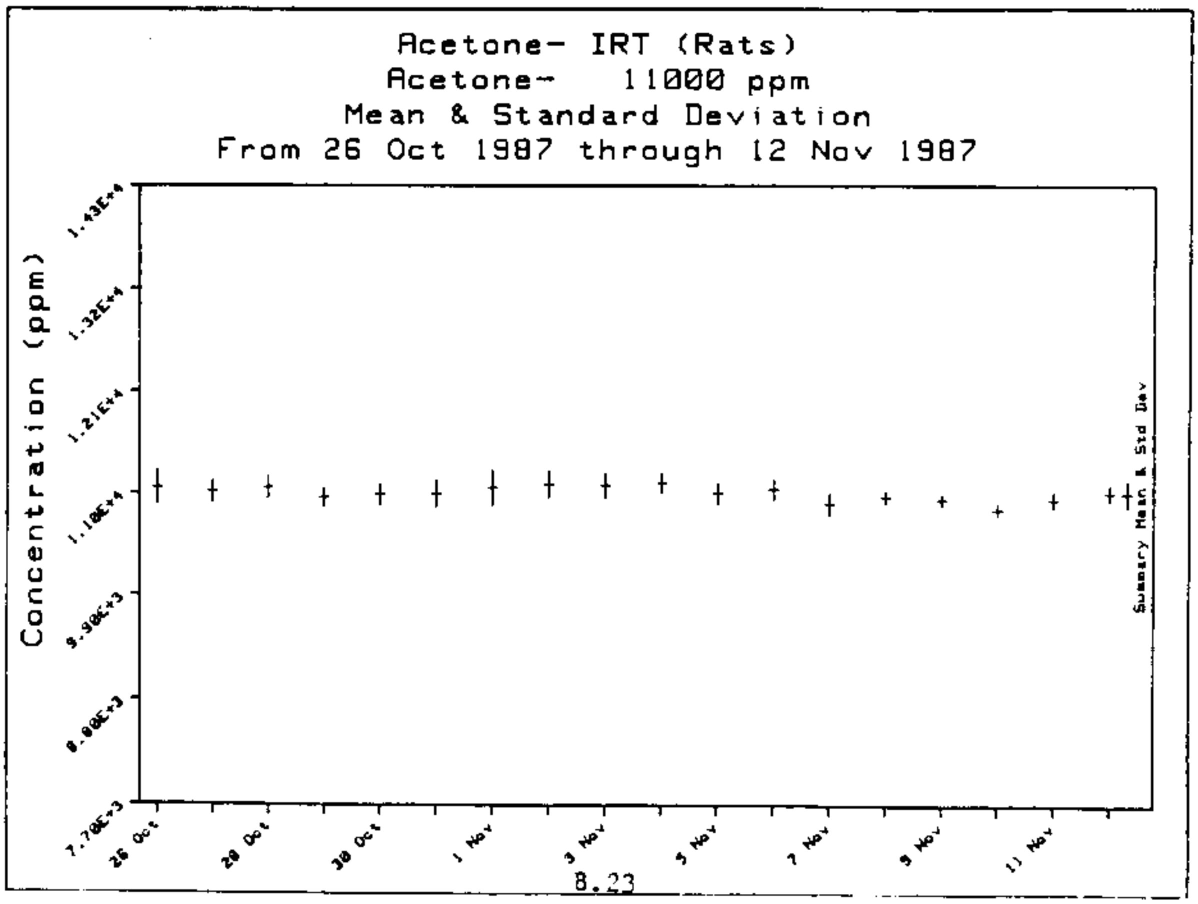
Date	Mean	% Target	Std Dev	% RSD	Maximum	Minimum	N	N in	% N in
26 Oct 1987	2.23E+3	101%	1.633E+1	1%	2.26E+3	2.20E+3	16.	16.	100%
27 Oct 1987	2.20E+3	100%	2.237E+1	1%	2.23E+3	2.15E+3	16.	16.	100%
28 Oct 1987	2.21E+3	101%	1.403E+1	1%	2.24E+3	2.19E+3	13.	13.	100%
29 Oct 1987	2.22E+3	101%	1.920E+1	1%	2.27E+3	2.19E+3	15.	15.	100%
30 Oct 1987	2.19E+3	100%	4.366E+1	2%	2.24E+3	2.07E+3	16.	16.	100%
31 Oct 1987	2.20E+3	100%	9.796E+0	0%	2.22E+3	2.19E+3	10.	10.	100%
1 Nov 1987	2.22E+3	101%	2.392E+1	1%	2.24E+3	2.14E+3	15.	15.	100%
2 Nov 1987	2.21E+3	101%	1.078E+1	0%	2.24E+3	2.20E+3	15.	15.	100%
3 Nov 1987	2.19E+3	100%	1.255E+1	1%	2.21E+3	2.16E+3	15.	15.	100%
4 Nov 1987	2.20E+3	100%	1.818E+1	1%	2.25E+3	2.18E+3	14.	14.	100%
5 Nov 1987	2.20E+3	100%	1.327E+1	1%	2.23E+3	2.18E+3	15.	15.	100%
6 Nov 1987	2.21E+3	100%	3.863E+1	2%	2.34E+3	2.14E+3	17.	17.	100%
7 Nov 1987	2.16E+3	98%	1.776E+1	1%	2.20E+3	2.14E+3	17.	17.	100%
8 Nov 1987	2.19E+3	99%	1.737E+1	1%	2.21E+3	2.15E+3	16.	16.	100%
9 Nov 1987	2.22E+3	101%	1.301E+1	1%	2.24E+3	2.19E+3	16.	16.	100%
10 Nov 1987	2.21E+3	100%	1.511E+1	1%	2.24E+3	2.19E+3	16.	16.	100%
11 Nov 1987	2.20E+3	100%	1.460E+1	1%	2.22E+3	2.17E+3	16.	16.	100%
12 Nov 1987	2.21E+3	101%	1.333E+1	1%	2.23E+3	2.19E+3	14.	14.	100%
Summary	2.20E+3	100%	2.522E+1	1%	2.34E+3	2.07E+3	272.	272.	100%



Daily Summation For Acetone- IRT (Rats)   From 26 Oct 1987 through 12 Nov 1987

Summary Data for: Acetone- 11000 ppm/Concentration   9.90E+3 to 1.21E+4

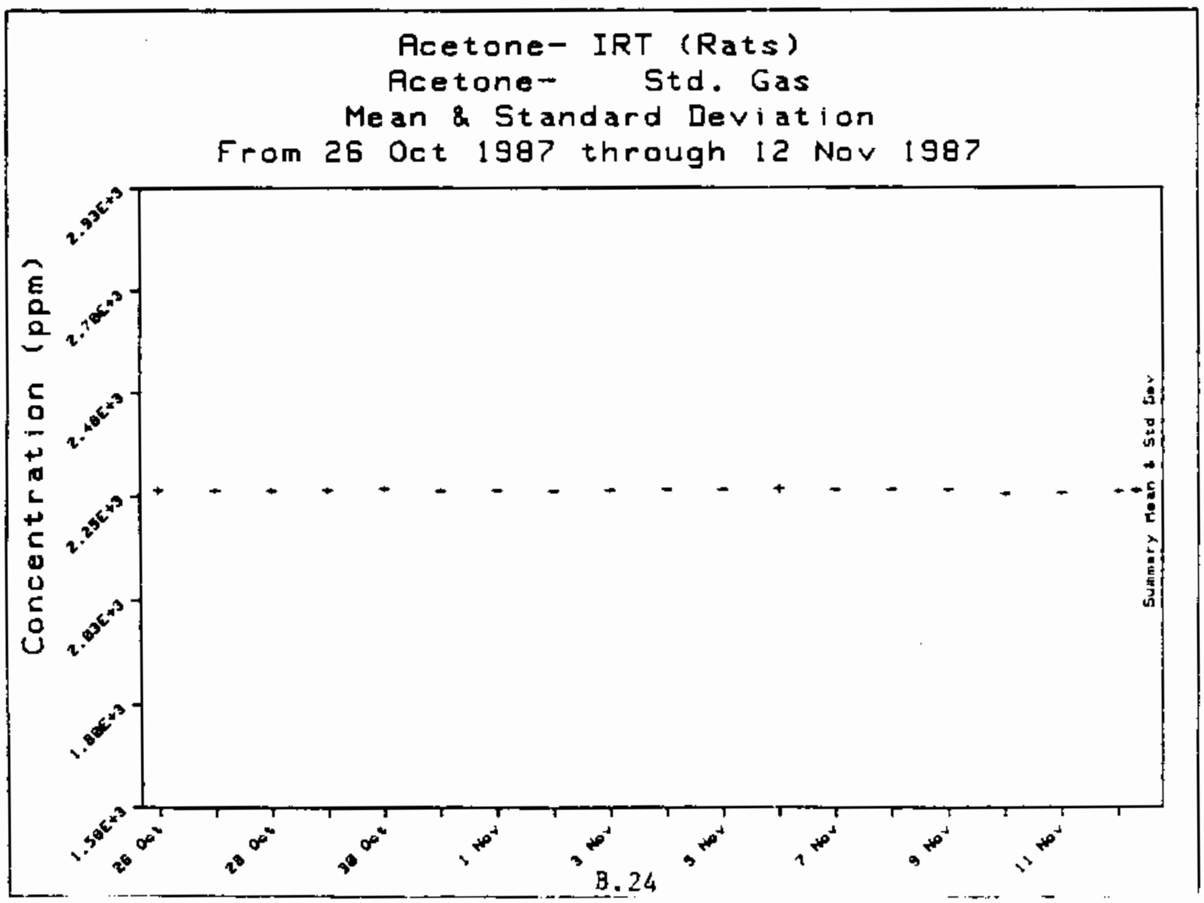
Date	Mean	% Target	Std Dev	% RSD	Maximum	Minimum	N	N in	% N in
26 Oct 1987	1.11E+4	101%	1.790E+2	2%	1.14E+4	1.08E+4	16.	16.	100%
27 Oct 1987	1.10E+4	100%	1.163E+2	1%	1.12E+4	1.08E+4	16.	16.	100%
28 Oct 1987	1.11E+4	101%	1.219E+2	1%	1.12E+4	1.08E+4	13.	13.	100%
29 Oct 1987	1.10E+4	100%	1.037E+2	1%	1.11E+4	1.08E+4	16.	16.	100%
30 Oct 1987	1.10E+4	100%	1.129E+2	1%	1.11E+4	1.07E+4	16.	16.	100%
31 Oct 1987	1.10E+4	100%	1.471E+2	1%	1.12E+4	1.07E+4	10.	10.	100%
1 Nov 1987	1.11E+4	101%	1.903E+2	2%	1.13E+4	1.05E+4	15.	15.	100%
2 Nov 1987	1.11E+4	101%	1.392E+2	1%	1.14E+4	1.09E+4	14.	14.	100%
3 Nov 1987	1.11E+4	101%	1.364E+2	1%	1.13E+4	1.08E+4	13.	13.	100%
4 Nov 1987	1.11E+4	101%	1.017E+2	1%	1.13E+4	1.10E+4	14.	14.	100%
5 Nov 1987	1.10E+4	100%	1.079E+2	1%	1.12E+4	1.09E+4	15.	15.	100%
6 Nov 1987	1.11E+4	101%	1.026E+2	1%	1.13E+4	1.09E+4	16.	16.	100%
7 Nov 1987	1.09E+4	99%	1.178E+2	1%	1.11E+4	1.07E+4	17.	17.	100%
8 Nov 1987	1.10E+4	100%	6.728E+1	1%	1.11E+4	1.09E+4	16.	16.	100%
9 Nov 1987	1.09E+4	99%	6.253E+1	1%	1.11E+4	1.08E+4	16.	16.	100%
10 Nov 1987	1.08E+4	98%	6.386E+1	1%	1.10E+4	1.07E+4	16.	16.	100%
11 Nov 1987	1.09E+4	100%	8.799E+1	1%	1.11E+4	1.08E+4	16.	16.	100%
12 Nov 1987	1.10E+4	100%	8.269E+1	1%	1.12E+4	1.09E+4	14.	14.	100%
Summary	1.10E+4	100%	1.369E+2	1%	1.14E+4	1.05E+4	269.	269.	100%



Daily Summation For Acetone- IRT (Rats) From 26 Oct 1987 through 12 Nov 1987

Summary Data for: Acetone- Std. Gas/Concentration 2.03E+3 to 2.48E+3

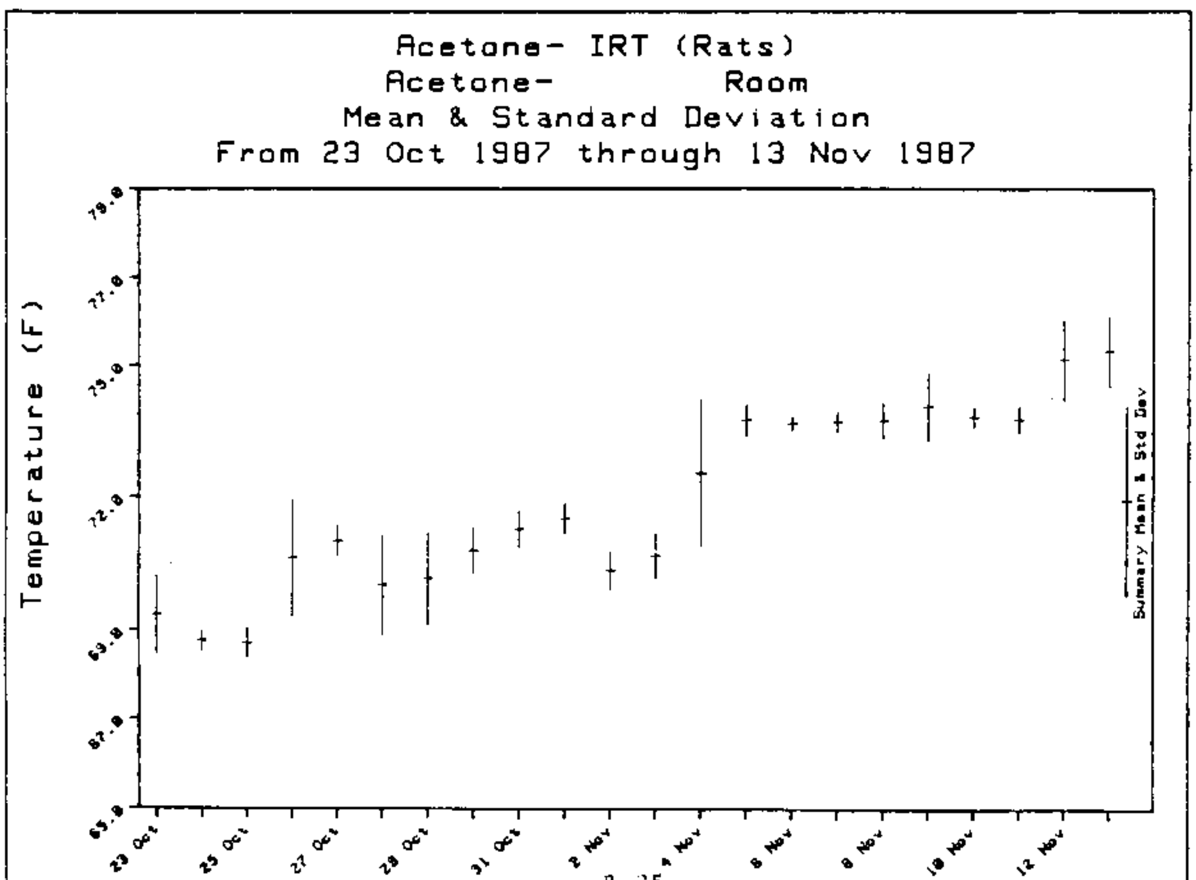
Date	Mean	% Target	Std Dev	% RSD	Maximum	Minimum	N	N in	% N in
26 Oct 1987	2.26E+3	101%	6.997E+0	0%	2.27E+3	2.24E+3	16.	16.	100%
27 Oct 1987	2.26E+3	101%	2.633E+0	0%	2.27E+3	2.26E+3	16.	16.	100%
28 Oct 1987	2.26E+3	101%	4.830E+0	0%	2.27E+3	2.25E+3	14.	14.	100%
29 Oct 1987	2.26E+3	101%	5.503E+0	0%	2.27E+3	2.25E+3	17.	17.	100%
30 Oct 1987	2.27E+3	101%	3.746E+0	0%	2.27E+3	2.26E+3	17.	17.	100%
31 Oct 1987	2.26E+3	100%	3.129E+0	0%	2.27E+3	2.26E+3	12.	12.	100%
1 Nov 1987	2.26E+3	101%	2.808E+0	0%	2.27E+3	2.26E+3	15.	15.	100%
2 Nov 1987	2.26E+3	100%	2.306E+0	0%	2.27E+3	2.26E+3	16.	16.	100%
3 Nov 1987	2.26E+3	101%	2.673E+0	0%	2.27E+3	2.26E+3	14.	14.	100%
4 Nov 1987	2.26E+3	101%	2.690E+0	0%	2.27E+3	2.26E+3	15.	15.	100%
5 Nov 1987	2.26E+3	101%	1.981E+0	0%	2.27E+3	2.26E+3	15.	15.	100%
6 Nov 1987	2.26E+3	101%	8.268E+0	0%	2.29E+3	2.25E+3	18.	18.	100%
7 Nov 1987	2.26E+3	101%	2.093E+0	0%	2.27E+3	2.26E+3	17.	17.	100%
8 Nov 1987	2.26E+3	101%	2.107E+0	0%	2.27E+3	2.26E+3	17.	17.	100%
9 Nov 1987	2.26E+3	101%	2.936E+0	0%	2.27E+3	2.26E+3	17.	17.	100%
10 Nov 1987	2.25E+3	100%	2.984E+0	0%	2.26E+3	2.25E+3	17.	17.	100%
11 Nov 1987	2.26E+3	100%	1.976E+0	0%	2.26E+3	2.25E+3	17.	17.	100%
12 Nov 1987	2.26E+3	100%	3.869E+0	0%	2.27E+3	2.26E+3	15.	15.	100%
Summary	2.26E+3	101%	4.803E+0	0%	2.29E+3	2.24E+3	285.	285.	100%



Daily Summation For Acetone- IRT (Rats)   From 23 Oct 1987 through 13 Nov 1987

Summary Data for: Acetone-   Room/Temperature   69.0 to 75.0

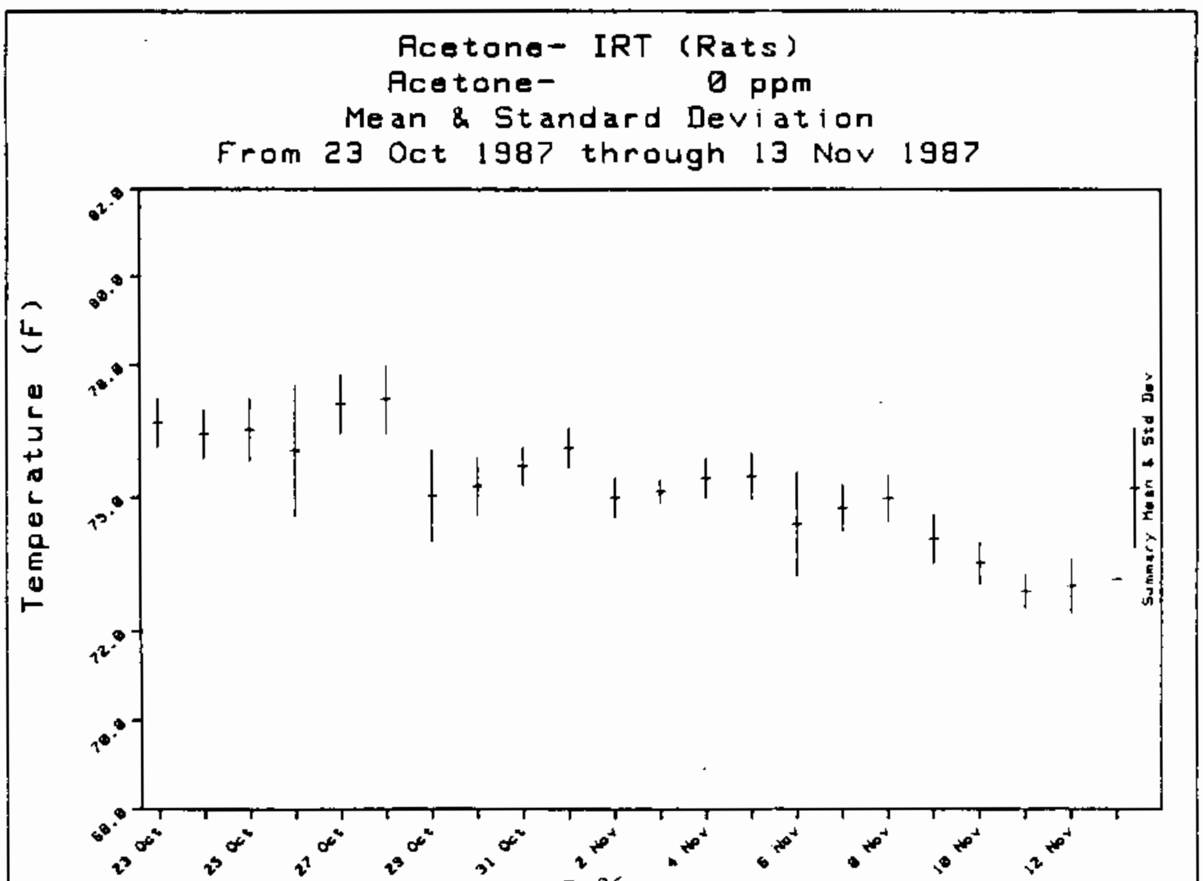
Date	Mean	% Target	Std Dev	% RSD	Maximum	Minimum	N	N in	% N in
23 Oct 1987	69.3	96%	.87	1%	70.8	68.7	8.	5.	63%
24 Oct 1987	68.8	96%	.23	0%	69.2	68.6	8.	2.	25%
25 Oct 1987	68.7	95%	.33	0%	69.2	68.3	8.	2.	25%
26 Oct 1987	70.6	98%	1.31	2%	73.2	68.8	8.	7.	88%
27 Oct 1987	71.0	99%	.33	0%	71.3	70.3	7.	7.	100%
28 Oct 1987	70.0	97%	1.12	2%	71.6	68.6	8.	7.	88%
29 Oct 1987	70.2	97%	1.04	1%	71.0	68.1	8.	7.	88%
30 Oct 1987	70.8	98%	.49	1%	71.5	70.1	7.	7.	100%
31 Oct 1987	71.3	99%	.41	1%	72.0	70.6	8.	8.	100%
1 Nov 1987	71.5	99%	.34	0%	71.9	70.8	8.	8.	100%
2 Nov 1987	70.3	98%	.41	1%	71.0	69.7	8.	8.	100%
3 Nov 1987	70.7	98%	.50	1%	71.5	70.0	8.	8.	100%
4 Nov 1987	72.6	101%	1.66	2%	74.2	70.1	8.	8.	100%
5 Nov 1987	73.8	102%	.35	0%	74.1	73.2	8.	8.	100%
6 Nov 1987	73.7	102%	.14	0%	73.9	73.4	8.	8.	100%
7 Nov 1987	73.7	102%	.22	0%	74.0	73.4	8.	8.	100%
8 Nov 1987	73.8	102%	.39	1%	74.2	73.2	8.	8.	100%
9 Nov 1987	74.1	103%	.76	1%	74.9	72.4	8.	8.	100%
10 Nov 1987	73.8	103%	.22	0%	74.1	73.6	8.	8.	100%
11 Nov 1987	73.8	102%	.29	0%	74.3	73.4	8.	8.	100%
12 Nov 1987	75.1	104%	.90	1%	76.3	73.5	7.	2.	29%
13 Nov 1987	75.3	105%	.78	1%	76.1	73.7	8.	2.	25%
Summary	71.9	100%	2.13	3%	76.3	68.1	173.	144.	83%



Daily Summation For Acetone- IRT (Rats)   From 23 Oct 1987 through 13 Nov 1987

Summary Data for: Acetone-   0 ppm/Temperature   72.0 to 78.0

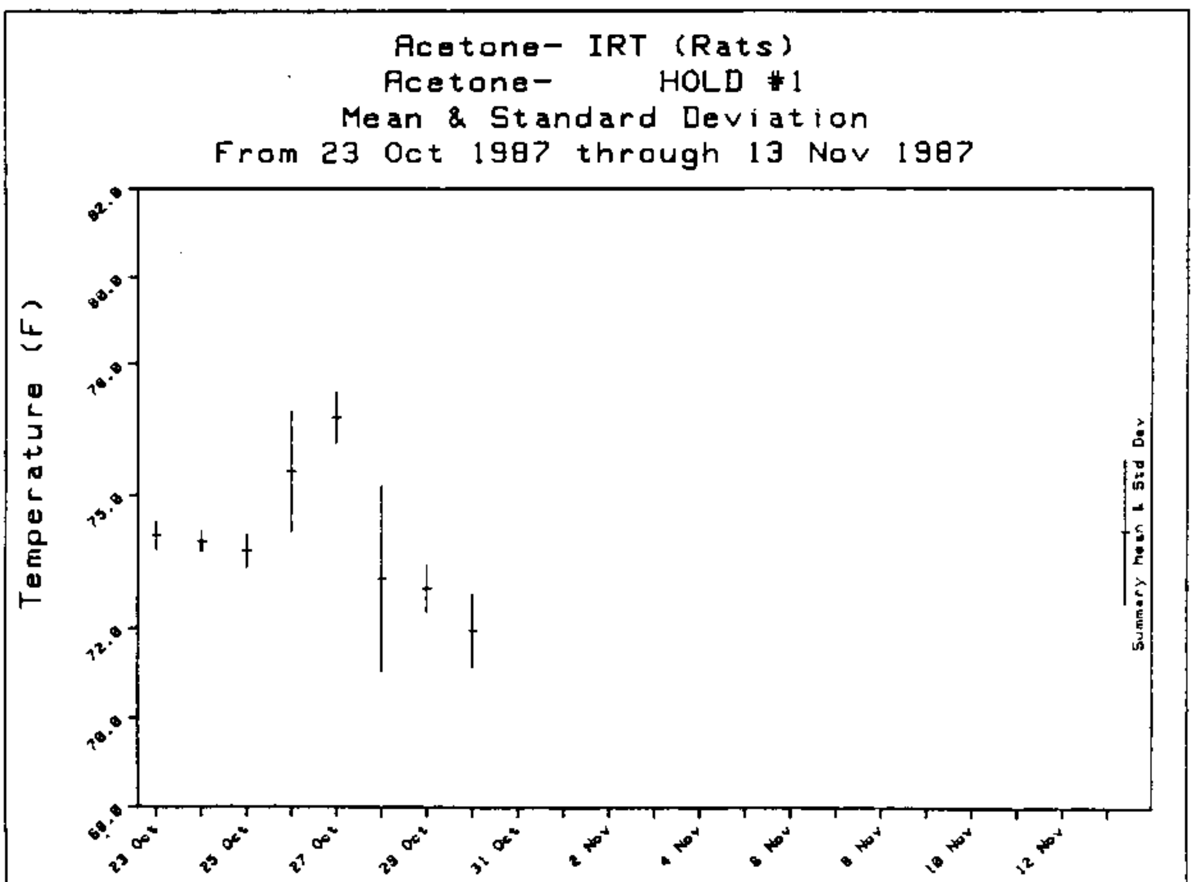
Date	Mean	% Target	Std Dev	% RSD	Maximum	Minimum	N	N in	% N in
23 Oct 1987	76.7	102%	.55	1%	77.5	76.0	6.	6.	100%
24 Oct 1987	76.4	102%	.54	1%	77.2	75.9	8.	8.	100%
25 Oct 1987	76.5	102%	.70	1%	77.8	75.8	8.	8.	100%
26 Oct 1987	76.0	101%	1.47	2%	77.7	73.0	8.	8.	100%
27 Oct 1987	77.1	103%	.66	1%	78.2	76.4	7.	6.	86%
28 Oct 1987	77.2	103%	.76	1%	78.1	76.3	5.	4.	80%
29 Oct 1987	75.0	100%	1.03	1%	77.5	74.3	8.	8.	100%
30 Oct 1987	75.2	100%	.64	1%	76.0	74.4	7.	7.	100%
31 Oct 1987	75.7	101%	.41	1%	76.2	75.1	8.	8.	100%
1 Nov 1987	76.1	101%	.43	1%	76.7	75.5	8.	8.	100%
2 Nov 1987	75.0	100%	.45	1%	75.9	74.3	8.	8.	100%
3 Nov 1987	75.1	100%	.25	0%	75.7	74.9	8.	8.	100%
4 Nov 1987	75.4	101%	.46	1%	76.1	74.7	8.	8.	100%
5 Nov 1987	75.5	101%	.51	1%	76.2	74.7	8.	8.	100%
6 Nov 1987	74.4	99%	1.15	2%	76.0	72.1	8.	8.	100%
7 Nov 1987	74.8	100%	.50	1%	75.3	74.1	8.	8.	100%
8 Nov 1987	75.0	100%	.51	1%	75.7	74.1	8.	8.	100%
9 Nov 1987	74.1	99%	.54	1%	75.3	73.6	8.	8.	100%
10 Nov 1987	73.5	98%	.47	1%	74.1	72.6	8.	8.	100%
11 Nov 1987	72.9	97%	.38	1%	73.8	72.5	8.	8.	100%
12 Nov 1987	73.0	97%	.59	1%	74.0	72.2	7.	7.	100%
13 Nov 1987	73.2	98%	0.00	0%	73.2	73.2	1.	1.	100%
Summary	75.2	100%	1.33	2%	78.2	72.1	161.	159.	99%



Daily Summation For Acetone- IRT (Rats)   From 23 Oct 1987 through 13 Nov 1987

Summary Data for: Acetone-   HOLD #1/Temperature   72.0 to 78.0

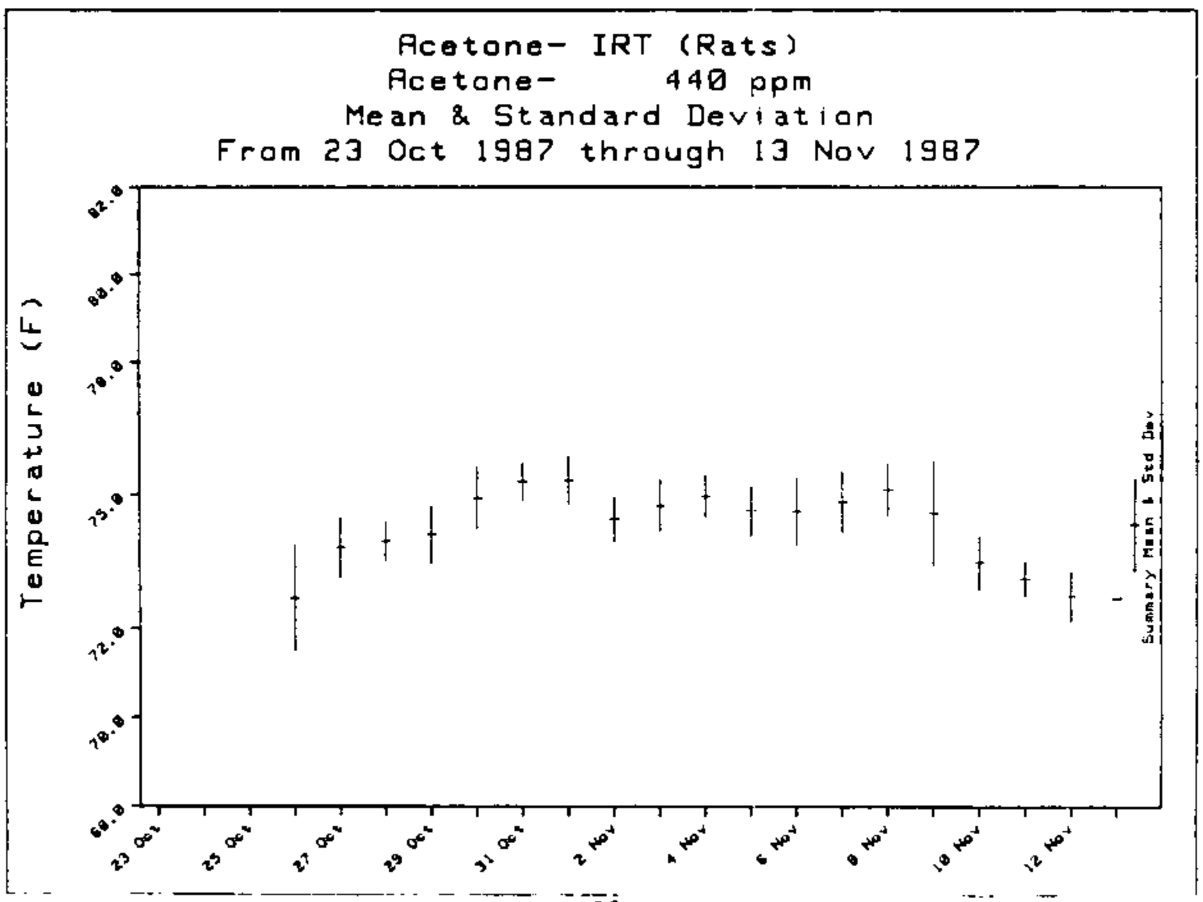
Date	Mean	% Target	Std Dev	% RSD	Maximum	Minimum	N	N in	% N in
23 Oct 1987	74.1	99%	.31	0%	74.5	73.5	6.	6.	100%
24 Oct 1987	73.9	99%	.24	0%	74.3	73.5	8.	8.	100%
25 Oct 1987	73.8	98%	.37	1%	74.4	73.3	8.	8.	100%
26 Oct 1987	75.6	101%	1.37	2%	78.0	73.5	8.	8.	100%
27 Oct 1987	76.8	102%	.58	1%	77.6	76.2	7.	7.	100%
28 Oct 1987	73.1	98%	2.09	3%	76.8	71.8	5.	3.	60%
29 Oct 1987	72.9	97%	.53	1%	73.5	71.9	8.	7.	88%
30 Oct 1987	72.0	96%	.82	1%	72.9	71.4	3.	1.	33%
31 Oct 1987									
1 Nov 1987									
2 Nov 1987									
3 Nov 1987									
4 Nov 1987									
5 Nov 1987									
6 Nov 1987									
7 Nov 1987									
8 Nov 1987									
9 Nov 1987									
10 Nov 1987									
11 Nov 1987									
12 Nov 1987									
13 Nov 1987									
Summary	74.2	99%	1.61	2%	78.0	71.4	53.	48.	91%



Daily Summation For Acetone- IRT (Rats) From 23 Oct 1987 through 13 Nov 1987

Summary Data for: Acetone- 440 ppm/Temperature 72.0 to 78.0

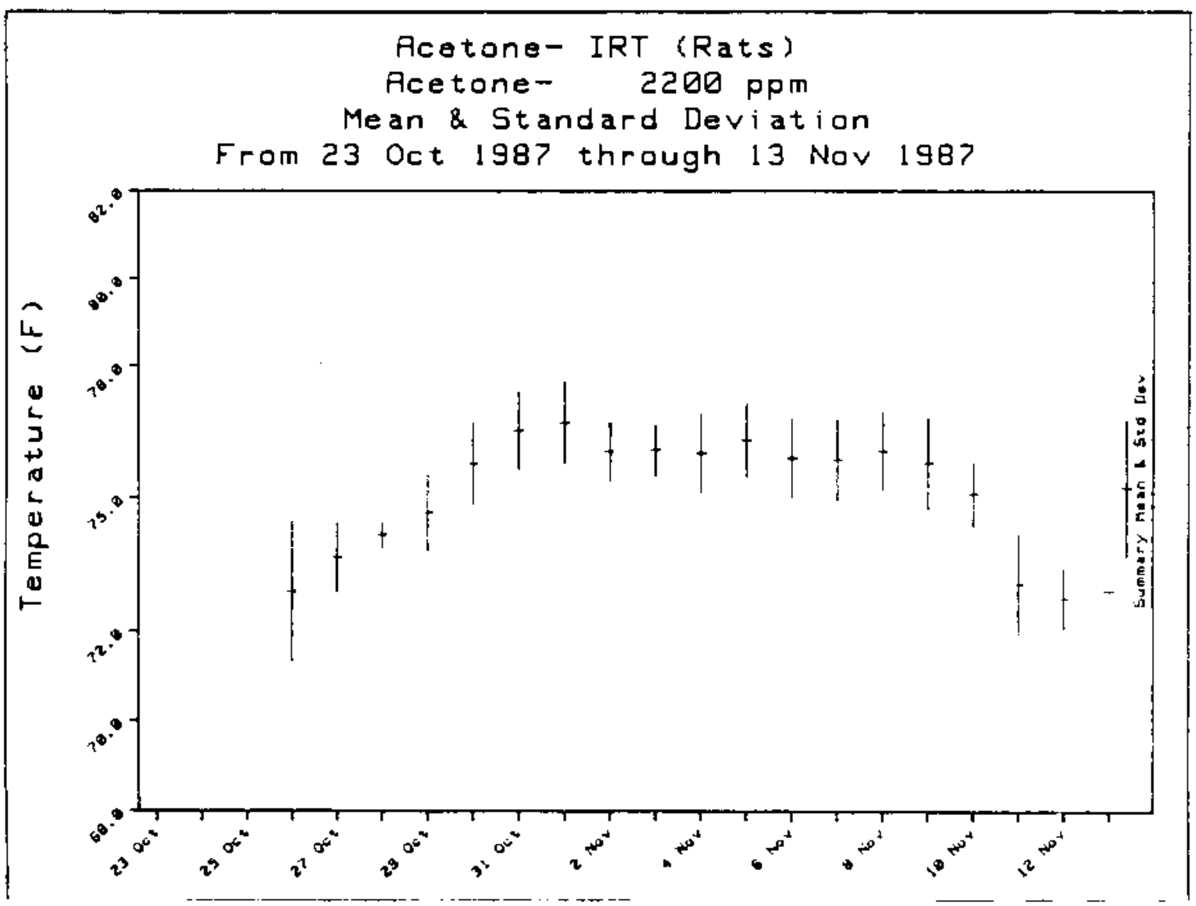
Date	Mean	% Target	Std Dev	% RSD	Maximum	Minimum	N	N in	% N in
23 Oct 1987									
24 Oct 1987									
25 Oct 1987									
26 Oct 1987	72.7	97%	1.17	2%	74.5	70.7	7.	6.	86%
27 Oct 1987	73.8	98%	.66	1%	74.7	72.9	7.	7.	100%
28 Oct 1987	74.0	99%	.43	1%	74.5	73.5	5.	5.	100%
29 Oct 1987	74.1	99%	.64	1%	74.9	73.3	8.	8.	100%
30 Oct 1987	74.9	100%	.70	1%	75.8	74.2	7.	7.	100%
31 Oct 1987	75.3	100%	.40	1%	75.7	74.7	8.	8.	100%
1 Nov 1987	75.3	100%	.54	1%	75.9	74.7	8.	8.	100%
2 Nov 1987	74.5	99%	.50	1%	75.3	73.7	8.	8.	100%
3 Nov 1987	74.7	100%	.58	1%	75.7	73.8	8.	8.	100%
4 Nov 1987	75.0	100%	.45	1%	75.7	74.5	8.	8.	100%
5 Nov 1987	74.6	100%	.55	1%	75.3	73.9	8.	8.	100%
6 Nov 1987	74.6	99%	.74	1%	75.4	73.5	8.	8.	100%
7 Nov 1987	74.8	100%	.68	1%	75.5	73.9	8.	8.	100%
8 Nov 1987	75.1	100%	.58	1%	75.8	74.4	8.	8.	100%
9 Nov 1987	74.6	99%	1.18	2%	77.1	73.7	8.	8.	100%
10 Nov 1987	73.5	98%	.59	1%	74.4	72.6	8.	8.	100%
11 Nov 1987	73.1	97%	.39	1%	73.9	72.6	8.	8.	100%
12 Nov 1987	72.7	97%	.55	1%	73.4	71.7	7.	6.	86%
13 Nov 1987	72.7	97%	0.00	0%	72.7	72.7	1.	1.	100%
Summary	74.3	99%	1.03	1%	77.1	70.7	138.	136.	99%



Daily Summation For Acetone- IRT (Rats)   From 23 Oct 1987 through 13 Nov 1987

Summary Data for: Acetone-   2200 ppm/Temperature   72.0 to 78.0

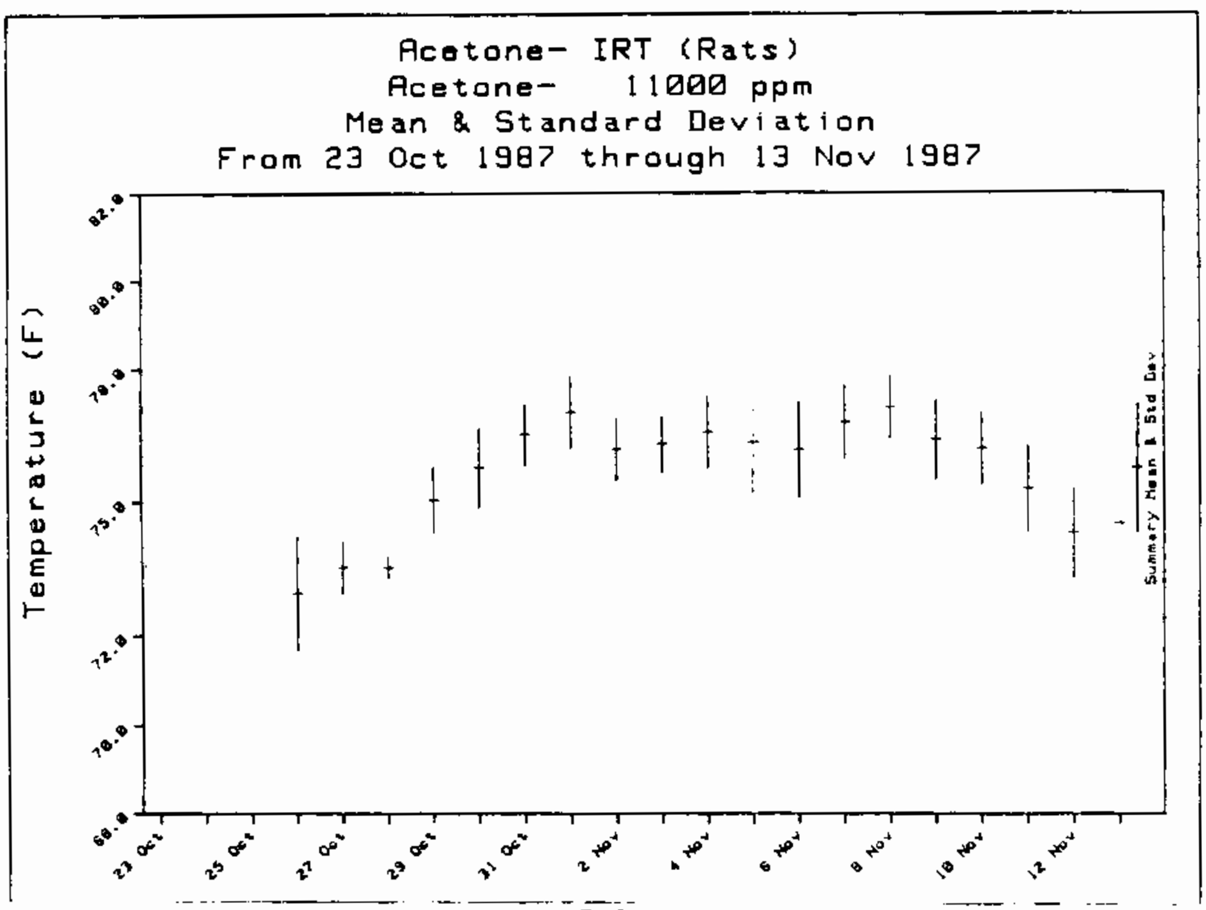
Date	Mean	% Target	Std Dev	% RSD	Maximum	Minimum	N	N in	% N in
23 Oct 1987									
24 Oct 1987									
25 Oct 1987									
26 Oct 1987	72.9	97%	1.58	2%	75.0	70.2	7.	6.	86%
27 Oct 1987	73.7	98%	.76	1%	74.9	72.8	7.	7.	100%
28 Oct 1987	74.2	99%	.28	0%	74.6	73.9	5.	5.	100%
29 Oct 1987	74.7	100%	.85	1%	75.5	73.4	8.	8.	100%
30 Oct 1987	75.8	101%	.92	1%	77.2	74.9	7.	7.	100%
31 Oct 1987	76.5	102%	.88	1%	77.5	75.3	8.	8.	100%
1 Nov 1987	76.7	102%	.93	1%	77.8	75.6	8.	8.	100%
2 Nov 1987	76.1	101%	.67	1%	76.9	75.1	8.	8.	100%
3 Nov 1987	76.1	101%	.57	1%	76.9	75.3	8.	8.	100%
4 Nov 1987	76.0	101%	.87	1%	77.1	75.0	8.	8.	100%
5 Nov 1987	76.3	102%	.84	1%	77.3	75.0	8.	8.	100%
6 Nov 1987	75.9	101%	.90	1%	77.1	74.7	8.	8.	100%
7 Nov 1987	75.9	101%	.92	1%	76.9	74.7	8.	8.	100%
8 Nov 1987	76.1	101%	.88	1%	77.3	75.0	8.	8.	100%
9 Nov 1987	75.8	101%	1.03	1%	77.6	74.7	8.	8.	100%
10 Nov 1987	75.1	100%	.70	1%	76.1	74.4	8.	8.	100%
11 Nov 1987	73.1	97%	1.12	2%	75.8	72.2	8.	8.	100%
12 Nov 1987	72.8	97%	.66	1%	73.5	71.4	7.	6.	86%
13 Nov 1987	73.0	97%	0.00	0%	73.0	73.0	1.	1.	100%
Summary	75.3	100%	1.52	2%	77.8	70.2	138.	136.	99%



Daily Summation For Acetone- IRT (Rats)   From 23 Oct 1987 through 13 Nov 1987

Summary Data for: Acetone-   11000 ppm/Temperature   72.0 to 78.0

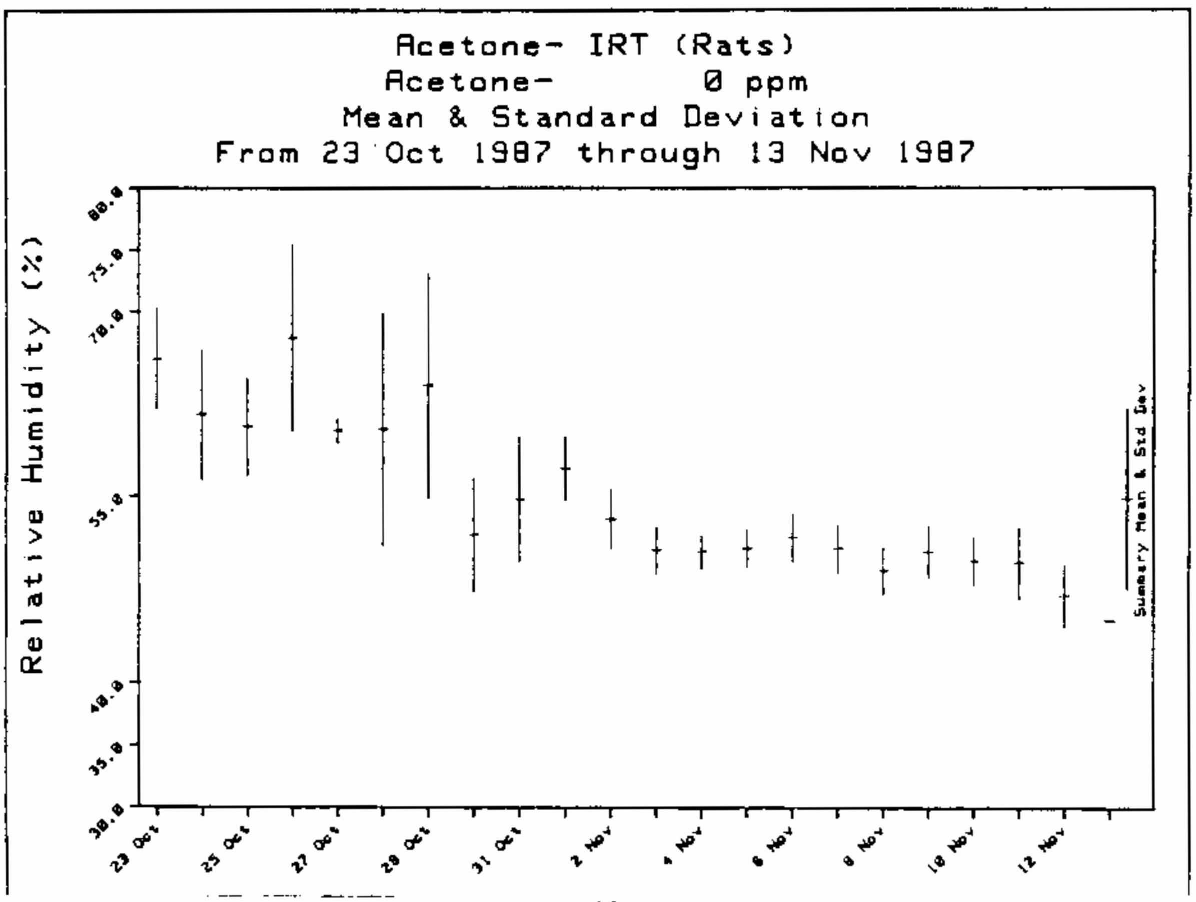
Date	Mean	% Target	Std Dev	% RSD	Maximum	Minimum	N	N in	% N in
23 Oct 1987									
24 Oct 1987									
25 Oct 1987									
26 Oct 1987	73.0	97%	1.28	2%	74.5	70.5	7.	6.	86%
27 Oct 1987	73.5	98%	.58	1%	74.3	72.8	7.	7.	100%
28 Oct 1987	73.5	98%	.24	0%	73.8	73.2	5.	5.	100%
29 Oct 1987	75.0	100%	.73	1%	75.7	73.6	8.	8.	100%
30 Oct 1987	75.8	101%	.89	1%	77.1	74.4	7.	7.	100%
31 Oct 1987	76.5	102%	.67	1%	77.2	75.3	8.	8.	100%
1 Nov 1987	77.0	103%	.81	1%	78.1	76.0	8.	7.	88%
2 Nov 1987	76.2	102%	.70	1%	77.4	75.3	8.	8.	100%
3 Nov 1987	76.3	102%	.62	1%	77.2	75.6	8.	8.	100%
4 Nov 1987	76.5	102%	.83	1%	77.5	75.6	8.	8.	100%
5 Nov 1987	76.3	102%	1.11	1%	77.4	74.5	8.	8.	100%
6 Nov 1987	76.1	102%	1.06	1%	77.4	74.7	8.	8.	100%
7 Nov 1987	76.8	102%	.82	1%	77.6	75.7	8.	8.	100%
8 Nov 1987	77.1	103%	.70	1%	78.0	76.1	8.	8.	100%
9 Nov 1987	76.4	102%	.88	1%	77.9	75.3	8.	8.	100%
10 Nov 1987	76.2	102%	.80	1%	77.2	75.2	8.	8.	100%
11 Nov 1987	75.3	100%	.95	1%	76.9	74.1	7.	7.	100%
12 Nov 1987	74.3	99%	1.00	1%	75.7	72.5	8.	8.	100%
13 Nov 1987	74.5	99%	0.00	0%	74.5	74.5	1.	1.	100%
Summary	75.7	101%	1.43	2%	78.1	70.5	138.	136.	99%



Daily Summation For Acetone- IRT (Rats)   From 23 Oct 1987 through 13 Nov 1987

Summary Data for: Acetone-   0 ppm/Relative Humidity   40.0 to 70.0

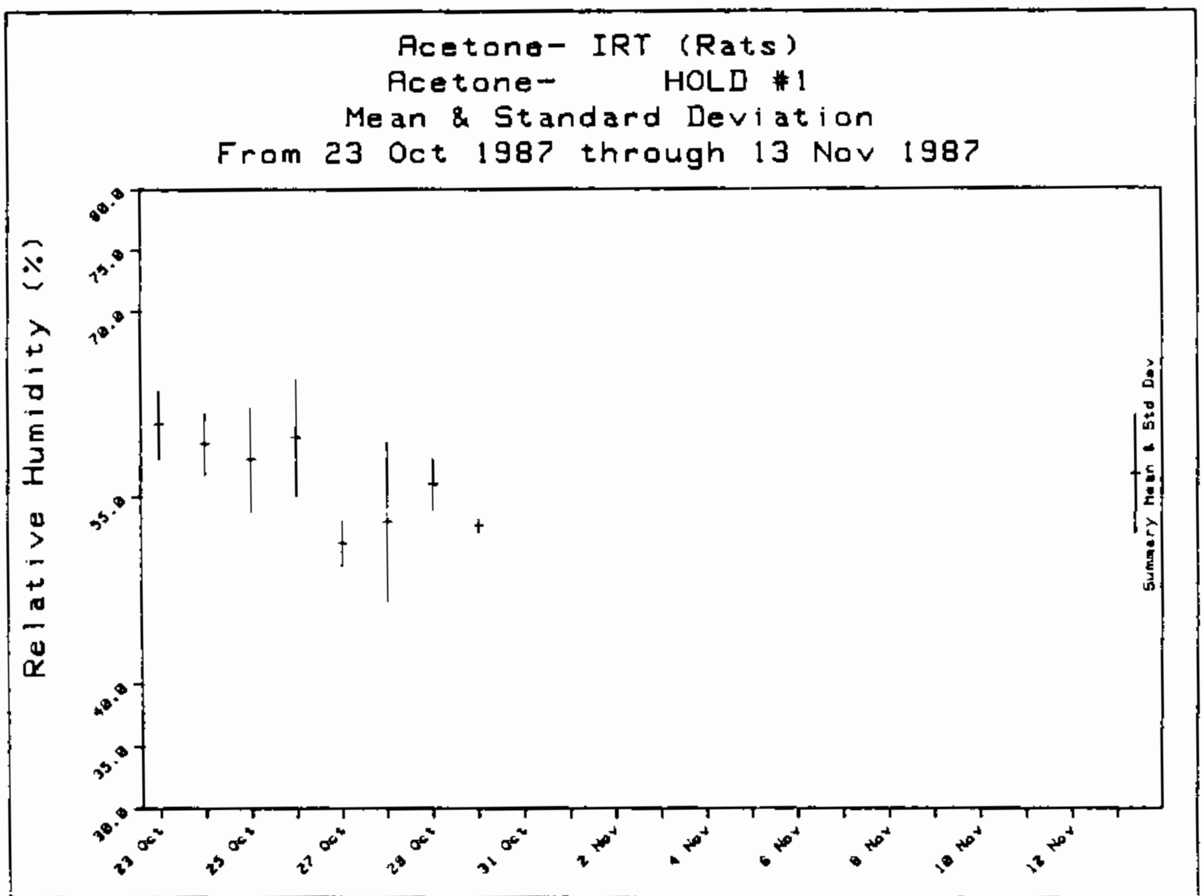
Date	Mean	% Target	Std Dev	% RSD	Maximum	Minimum	N	N in	% N in
23 Oct 1987	66.2	120%	4.07	6%	70.0	59.0	6.	6.	100%
24 Oct 1987	61.6	112%	5.26	9%	68.0	54.0	8.	8.	100%
25 Oct 1987	60.6	110%	3.93	6%	65.0	55.0	8.	8.	100%
26 Oct 1987	67.9	123%	7.54	11%	79.0	59.0	7.	5.	71%
27 Oct 1987	60.3	110%	.95	2%	62.0	59.0	7.	7.	100%
28 Oct 1987	60.4	110%	9.43	16%	74.0	49.0	7.	5.	71%
29 Oct 1987	64.0	116%	9.10	14%	75.0	53.0	8.	5.	63%
30 Oct 1987	51.9	94%	4.56	9%	60.0	47.0	7.	7.	100%
31 Oct 1987	54.7	100%	5.06	9%	63.0	48.0	8.	8.	100%
1 Nov 1987	57.3	104%	2.55	4%	62.0	53.0	8.	8.	100%
2 Nov 1987	53.1	97%	2.36	4%	58.0	50.0	8.	8.	100%
3 Nov 1987	50.6	92%	1.85	4%	54.0	48.0	8.	8.	100%
4 Nov 1987	50.5	92%	1.31	3%	52.0	48.0	8.	8.	100%
5 Nov 1987	50.8	92%	1.49	3%	53.0	49.0	8.	8.	100%
6 Nov 1987	51.6	94%	1.92	4%	54.0	49.0	8.	8.	100%
7 Nov 1987	50.8	92%	1.91	4%	54.0	49.0	8.	8.	100%
8 Nov 1987	49.0	89%	1.85	4%	51.0	46.0	8.	8.	100%
9 Nov 1987	50.5	92%	2.07	4%	53.0	46.0	8.	8.	100%
10 Nov 1987	49.7	90%	1.91	4%	53.0	47.0	8.	8.	100%
11 Nov 1987	49.6	90%	2.88	6%	53.0	45.0	8.	8.	100%
12 Nov 1987	47.0	85%	2.45	5%	52.0	45.0	8.	8.	100%
13 Nov 1987	45.0	82%	0.00	0%	45.0	45.0	1.	1.	100%
Summary	54.8	100%	7.21	13%	79.0	45.0	163.	156.	96%



Daily Summation For Acetone- IRT (Rats)   From 23 Oct 1987 through 13 Nov 1987

Summary Data for: Acetone-   HOLD #1/Relative Humidity   40.0 to 70.0

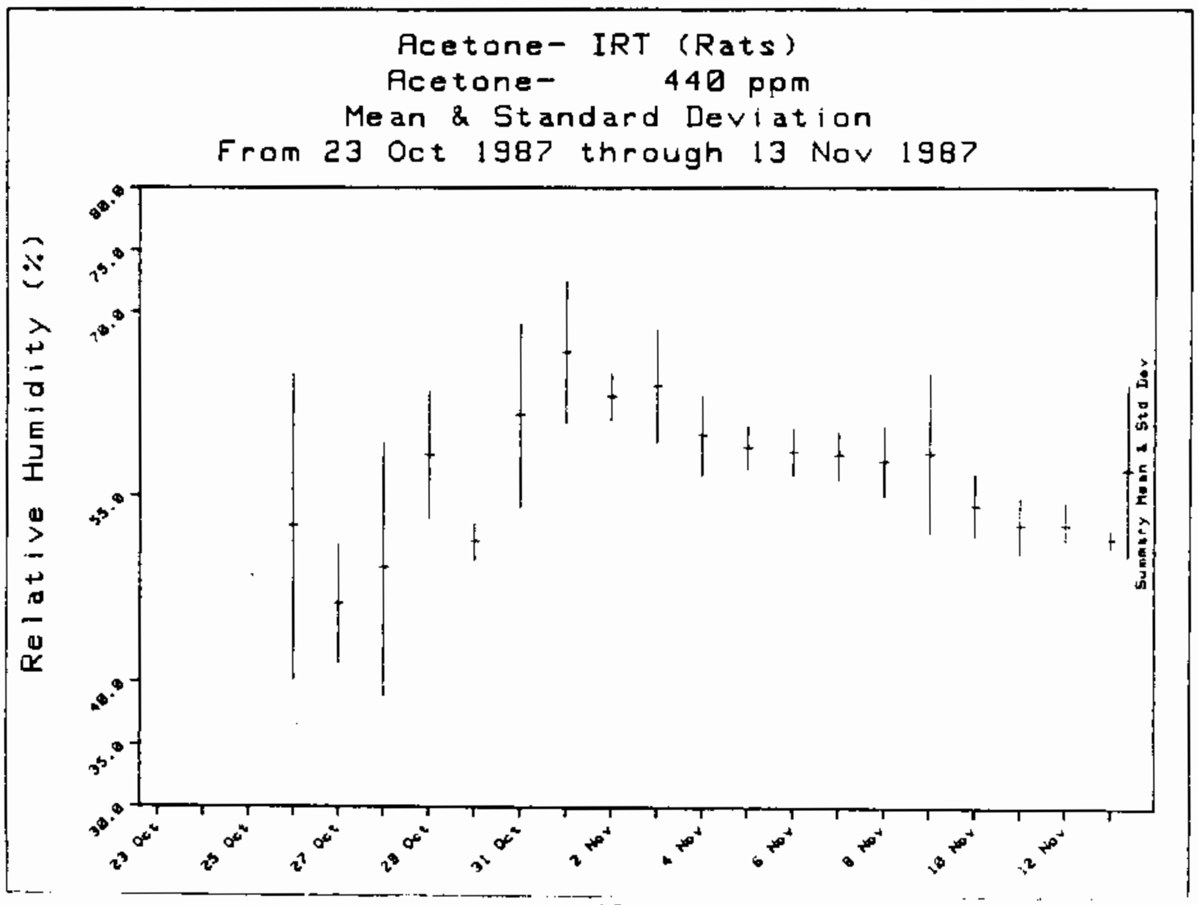
Date	Mean	% Target	Std Dev	% RSD	Maximum	Minimum	N	N in	% N in
23 Oct 1987	60.8	111%	2.79	5%	65.0	57.0	6.	6.	100%
24 Oct 1987	59.3	108%	2.49	4%	62.0	54.0	8.	8.	100%
25 Oct 1987	58.0	105%	4.14	7%	65.0	54.0	8.	8.	100%
26 Oct 1987	59.8	109%	4.71	8%	65.0	52.0	8.	8.	100%
27 Oct 1987	51.3	93%	1.80	4%	53.0	49.0	7.	7.	100%
28 Oct 1987	53.0	96%	6.39	12%	62.0	47.0	6.	6.	100%
29 Oct 1987	56.0	102%	2.00	4%	60.0	54.0	8.	8.	100%
30 Oct 1987	52.7	96%	.58	1%	53.0	52.0	3.	3.	100%
31 Oct 1987									
1 Nov 1987									
2 Nov 1987									
3 Nov 1987									
4 Nov 1987									
5 Nov 1987									
6 Nov 1987									
7 Nov 1987									
8 Nov 1987									
9 Nov 1987									
10 Nov 1987									
11 Nov 1987									
12 Nov 1987									
13 Nov 1987									
Summary	56.7	103%	4.74	8%	65.0	47.0	54.	54.	100%



Daily Summation For Acetone- IRT (Rats)   From 23 Oct 1987 through 13 Nov 1987

Summary Data for: Acetone-   440 ppm/Relative Humidity   40.0 to 70.0

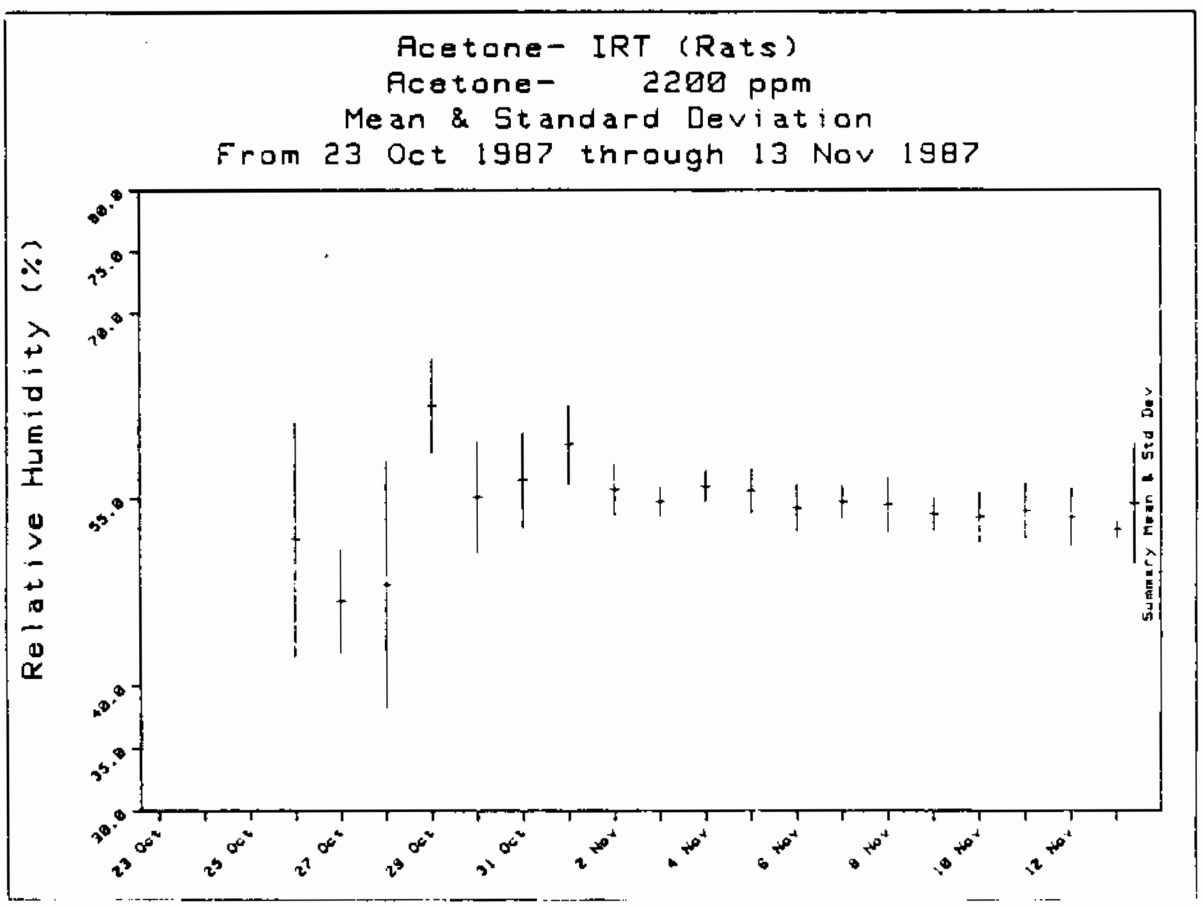
Date	Mean	% Target	Std Dev	% RSD	Maximum	Minimum	N	N in	% N in
23 Oct 1987									
24 Oct 1987									
25 Oct 1987									
26 Oct 1987	52.6	96%	12.30	23%	69.0	37.0	5.	4.	80%
27 Oct 1987	46.3	84%	4.68	10%	53.0	41.0	7.	7.	100%
28 Oct 1987	49.1	89%	10.16	21%	64.0	37.0	7.	5.	71%
29 Oct 1987	58.4	106%	5.18	9%	68.0	52.0	8.	8.	100%
30 Oct 1987	51.3	93%	1.50	3%	53.0	49.0	7.	7.	100%
31 Oct 1987	61.6	112%	7.52	12%	71.0	51.0	8.	7.	88%
1 Nov 1987	66.7	121%	5.80	9%	75.0	59.0	8.	6.	75%
2 Nov 1987	63.1	115%	1.89	3%	67.0	61.0	8.	8.	100%
3 Nov 1987	64.0	116%	4.63	7%	70.0	57.0	8.	8.	100%
4 Nov 1987	60.0	109%	3.21	5%	66.0	56.0	8.	8.	100%
5 Nov 1987	59.0	107%	1.69	3%	61.0	57.0	8.	8.	100%
6 Nov 1987	58.6	107%	1.85	3%	61.0	56.0	8.	8.	100%
7 Nov 1987	58.4	106%	1.92	3%	61.0	55.0	8.	8.	100%
8 Nov 1987	57.9	105%	2.85	5%	63.0	54.0	8.	8.	100%
9 Nov 1987	58.5	106%	6.52	11%	74.0	53.0	8.	7.	88%
10 Nov 1987	54.2	99%	2.55	5%	58.0	52.0	8.	8.	100%
11 Nov 1987	52.6	96%	2.26	4%	56.0	49.0	8.	8.	100%
12 Nov 1987	52.6	96%	1.92	4%	57.0	51.0	8.	8.	100%
13 Nov 1987	51.5	94%	.71	1%	52.0	51.0	2.	2.	100%
Summary	57.1	104%	6.97	12%	75.0	37.0	140.	133.	95%



Daily Summation For Acetone- IRT (Rats)   From 23 Oct 1987 through 13 Nov 1987

Summary Data for: Acetone-   2200 ppm/Relative Humidity   40.0 to 70.0

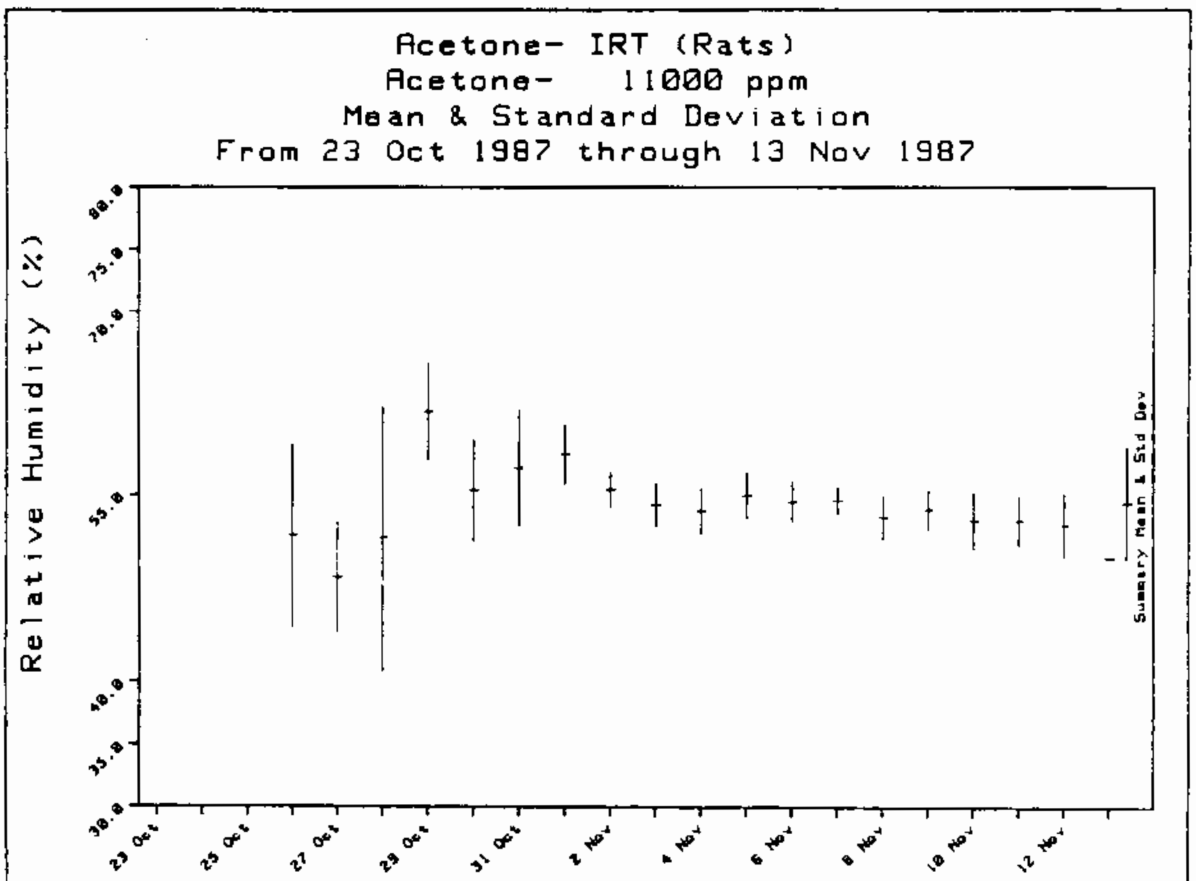
Date	Mean	% Target	Std Dev	% RSD	Maximum	Minimum	N	N in	% N in
23 Oct 1987									
24 Oct 1987									
25 Oct 1987									
26 Oct 1987	51.8	94%	9.36	18%	61.0	38.0	5.	4.	80%
27 Oct 1987	46.9	85%	4.10	9%	53.0	42.0	7.	7.	100%
28 Oct 1987	48.1	88%	9.89	21%	61.0	36.0	7.	5.	71%
29 Oct 1987	62.5	114%	3.82	6%	70.0	58.0	8.	8.	100%
30 Oct 1987	55.1	100%	4.45	8%	62.0	48.0	7.	7.	100%
31 Oct 1987	56.5	103%	3.78	7%	64.0	53.0	8.	8.	100%
1 Nov 1987	59.4	108%	3.16	5%	65.0	56.0	8.	8.	100%
2 Nov 1987	55.7	101%	2.05	4%	60.0	53.0	8.	8.	100%
3 Nov 1987	54.7	100%	1.16	2%	57.0	53.0	8.	8.	100%
4 Nov 1987	56.0	102%	1.20	2%	58.0	54.0	8.	8.	100%
5 Nov 1987	55.6	101%	1.77	3%	58.0	52.0	8.	8.	100%
6 Nov 1987	54.2	99%	1.83	3%	57.0	52.0	8.	8.	100%
7 Nov 1987	54.7	100%	1.28	2%	57.0	53.0	8.	8.	100%
8 Nov 1987	54.5	99%	2.14	4%	57.0	51.0	8.	8.	100%
9 Nov 1987	53.7	98%	1.28	2%	55.0	52.0	8.	8.	100%
10 Nov 1987	53.5	97%	2.00	4%	57.0	52.0	8.	8.	100%
11 Nov 1987	54.0	98%	2.20	4%	58.0	51.0	8.	8.	100%
12 Nov 1987	53.5	97%	2.33	4%	58.0	51.0	8.	8.	100%
13 Nov 1987	52.5	95%	.71	1%	53.0	52.0	2.	2.	100%
Summary	54.6	99%	4.81	9%	70.0	36.0	140.	137.	98%



Daily Summation For Acetone- IRT (Rats)   From 23 Oct 1987 through 13 Nov 1987

Summary Data for: Acetone- 11000 ppm/Relative Humidity   40.0 to 70.0

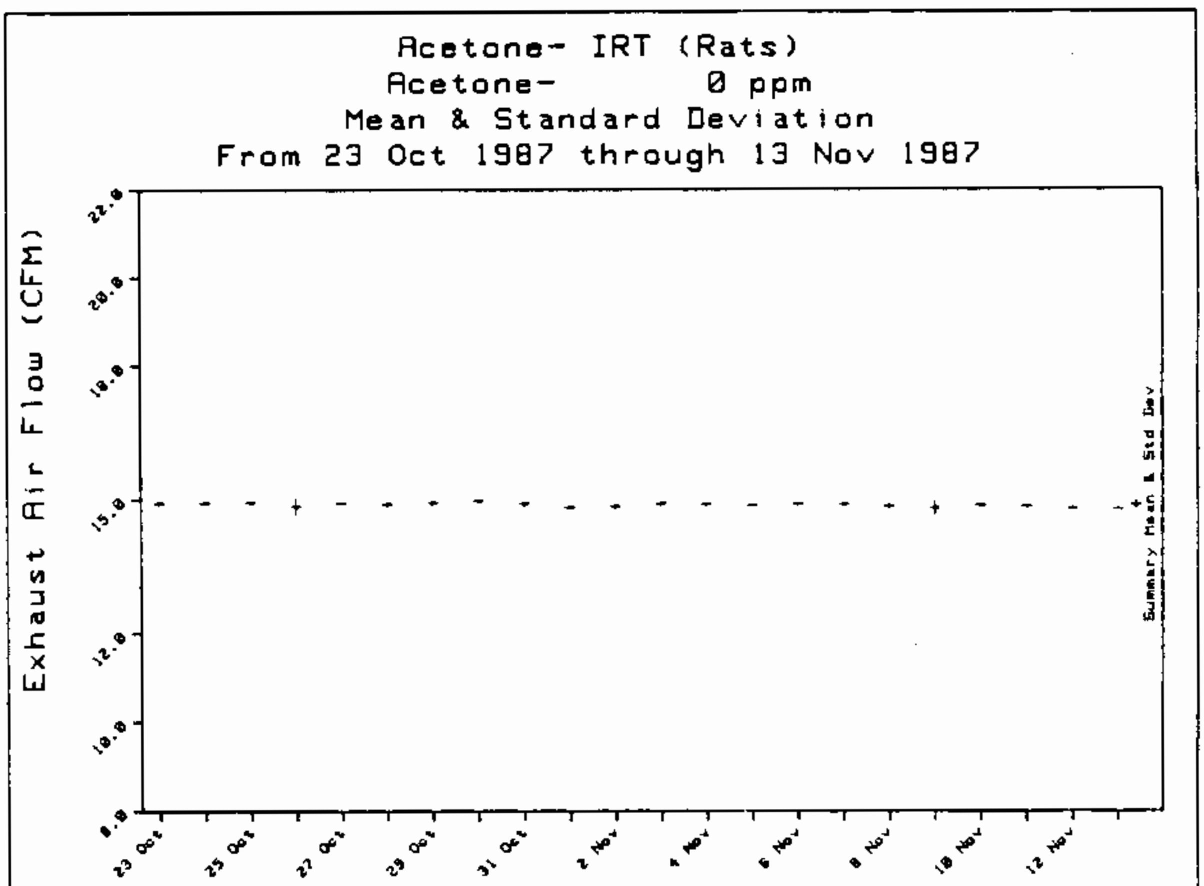
Date	Mean	% Target	Std Dev	% RSD	Maximum	Minimum	N	N in	% N in
23 Oct 1987									
24 Oct 1987									
25 Oct 1987									
26 Oct 1987	51.8	94%	7.40	14%	62.0	42.0	5.	5.	100%
27 Oct 1987	48.4	88%	4.43	9%	56.0	44.0	7.	7.	100%
28 Oct 1987	51.6	94%	10.66	21%	66.0	38.0	7.	5.	71%
29 Oct 1987	61.9	113%	3.98	6%	68.0	54.0	8.	8.	100%
30 Oct 1987	55.4	101%	4.12	7%	62.0	51.0	7.	7.	100%
31 Oct 1987	57.3	104%	4.71	8%	65.0	53.0	8.	8.	100%
1 Nov 1987	58.4	106%	2.39	4%	62.0	55.0	8.	8.	100%
2 Nov 1987	55.5	101%	1.41	3%	58.0	54.0	8.	8.	100%
3 Nov 1987	54.2	99%	1.75	3%	57.0	52.0	8.	8.	100%
4 Nov 1987	53.7	98%	1.83	3%	56.0	51.0	8.	8.	100%
5 Nov 1987	55.0	100%	1.85	3%	57.0	52.0	8.	8.	100%
6 Nov 1987	54.5	99%	1.60	3%	57.0	53.0	8.	8.	100%
7 Nov 1987	54.6	99%	1.06	2%	56.0	53.0	8.	8.	100%
8 Nov 1987	53.2	97%	1.75	3%	56.0	51.0	8.	8.	100%
9 Nov 1987	53.9	98%	1.55	3%	57.0	52.0	8.	8.	100%
10 Nov 1987	53.0	96%	2.27	4%	57.0	50.0	8.	8.	100%
11 Nov 1987	53.0	96%	2.00	4%	56.0	50.0	8.	8.	100%
12 Nov 1987	52.6	96%	2.56	5%	57.0	50.0	8.	8.	100%
13 Nov 1987	50.0	91%	0.00	0%	50.0	50.0	1.	1.	100%
Summary	54.4	99%	4.48	8%	68.0	38.0	139.	137.	99%



Daily Summation For Acetone- IRT (Rats) From 23 Oct 1987 through 13 Nov 1987

Summary Data for: Acetone- 0 ppm/Exhaust Air Flow 12.0 to 18.0

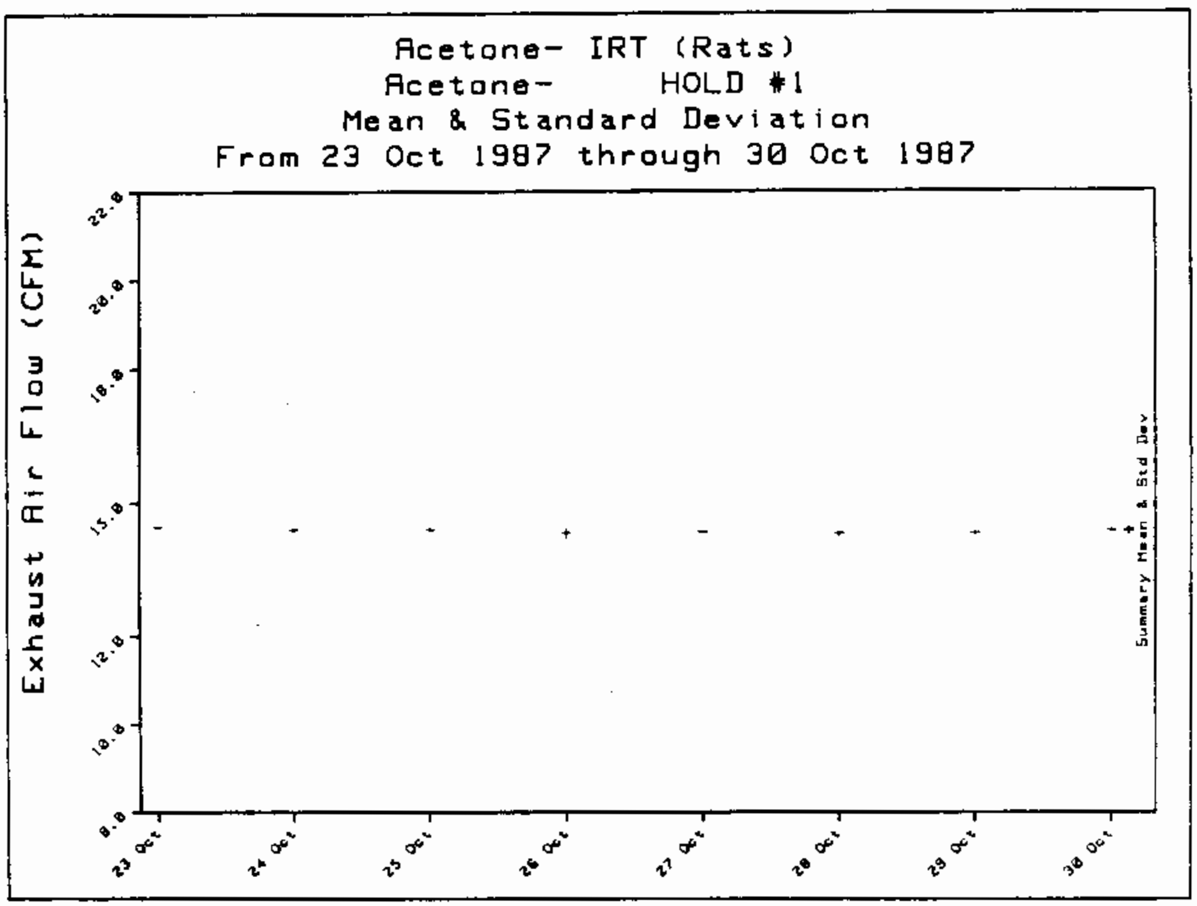
Date	Mean	% Target	Std Dev	% RSD	Maximum	Minimum	N	N in	% N in
23 Oct 1987	14.9	99%	.03	0%	15.0	14.9	7.	7.	100%
24 Oct 1987	14.9	99%	.02	0%	14.9	14.9	8.	8.	100%
25 Oct 1987	14.9	99%	.01	0%	14.9	14.9	8.	8.	100%
26 Oct 1987	14.8	99%	.16	1%	14.9	14.5	7.	7.	100%
27 Oct 1987	14.9	99%	.02	0%	14.9	14.9	7.	7.	100%
28 Oct 1987	14.9	99%	.04	0%	14.9	14.8	4.	4.	100%
29 Oct 1987	14.9	99%	.05	0%	15.0	14.8	8.	8.	100%
30 Oct 1987	15.0	100%	.02	0%	15.0	14.9	8.	8.	100%
31 Oct 1987	14.9	99%	.05	0%	15.0	14.8	8.	8.	100%
1 Nov 1987	14.8	99%	.04	0%	14.9	14.7	8.	8.	100%
2 Nov 1987	14.8	99%	.04	0%	14.9	14.8	8.	8.	100%
3 Nov 1987	14.9	99%	.03	0%	14.9	14.8	7.	7.	100%
4 Nov 1987	14.9	99%	.03	0%	14.9	14.8	8.	8.	100%
5 Nov 1987	14.8	99%	.03	0%	14.9	14.8	8.	8.	100%
6 Nov 1987	14.9	99%	.02	0%	14.9	14.8	7.	7.	100%
7 Nov 1987	14.9	99%	.02	0%	14.9	14.8	7.	7.	100%
8 Nov 1987	14.8	99%	.03	0%	14.9	14.8	8.	8.	100%
9 Nov 1987	14.8	99%	.14	1%	14.9	14.5	7.	7.	100%
10 Nov 1987	14.8	99%	.02	0%	14.8	14.8	8.	8.	100%
11 Nov 1987	14.8	99%	.01	0%	14.8	14.8	7.	7.	100%
12 Nov 1987	14.8	98%	.02	0%	14.8	14.7	7.	7.	100%
13 Nov 1987	14.7	98%	0.00	0%	14.7	14.7	1.	1.	100%
Summary	14.9	99%	.07	0%	15.0	14.5	156.	156.	100%



Daily Summation For Acetone- IRT (Rats) From 23 Oct 1987 through 30 Oct 1987

Summary Data for: Acetone- HOLD #1/Exhaust Air Flow Range= 12.0 to 18.0

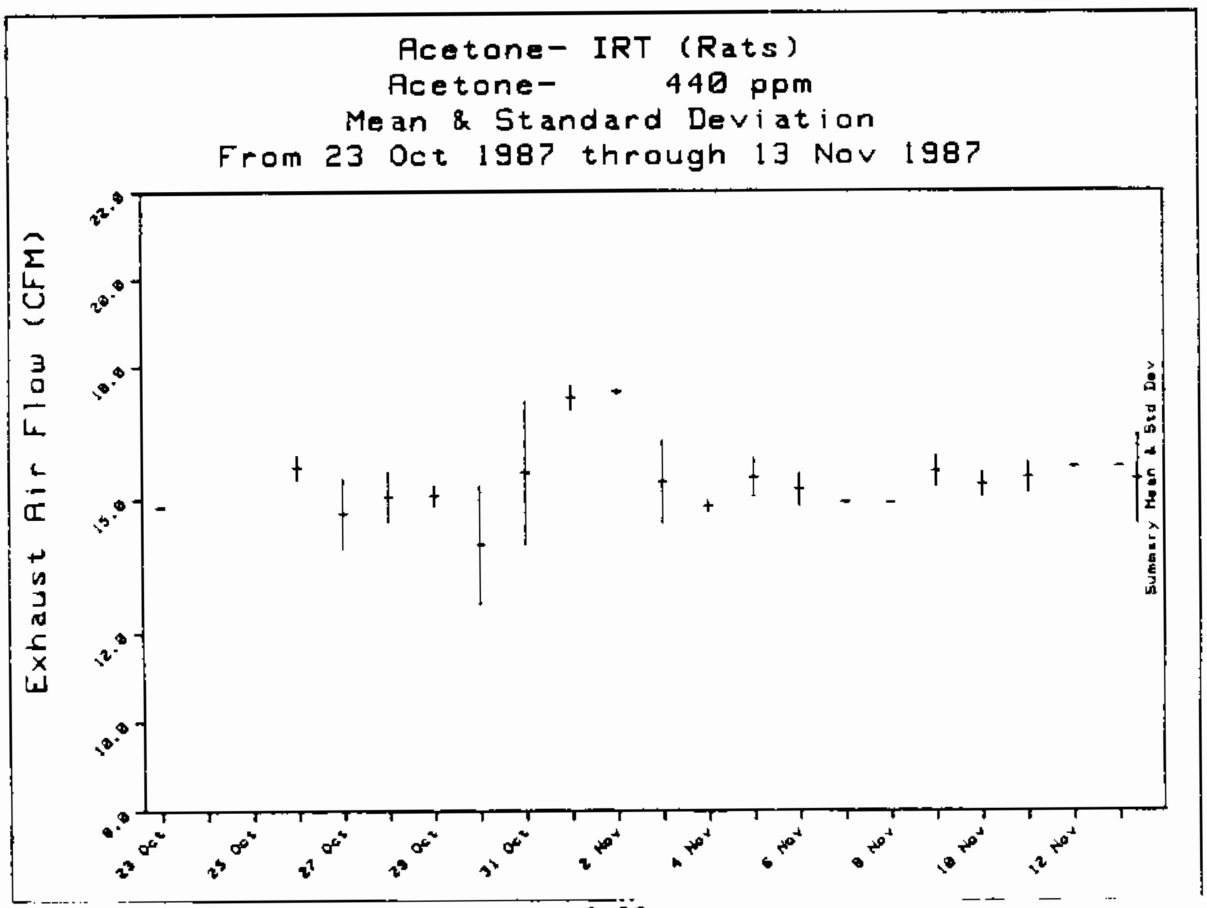
Date	Mean	% Target	Std Dev	% RSD	Maximum	Minimum	N	N in	% N in
23 Oct 1987	14.5	96.4%	.01	.1%	14.5	14.5	6	6	100.0%
24 Oct 1987	14.4	96.0%	.04	.3%	14.5	14.4	8	8	100.0%
25 Oct 1987	14.4	96.0%	.02	.1%	14.4	14.4	8	8	100.0%
26 Oct 1987	14.3	95.5%	.11	.8%	14.4	14.1	7	7	100.0%
27 Oct 1987	14.4	95.7%	.01	0.0%	14.4	14.3	7	7	100.0%
28 Oct 1987	14.3	95.4%	.05	.3%	14.4	14.3	4	4	100.0%
29 Oct 1987	14.3	95.5%	.02	.1%	14.4	14.3	8	8	100.0%
30 Oct 1987	14.4	95.9%	.04	.3%	14.4	14.3	3	3	100.0%
Summary	14.4	95.8%	.07	.5%	14.5	14.1	51	51	100.0%



Daily Summation For Acetone- IRT (Rats) From 23 Oct 1987 through 13 Nov 1987

Summary Data for: Acetone- 440 ppm/Exhaust Air Flow 12.0 to 18.0

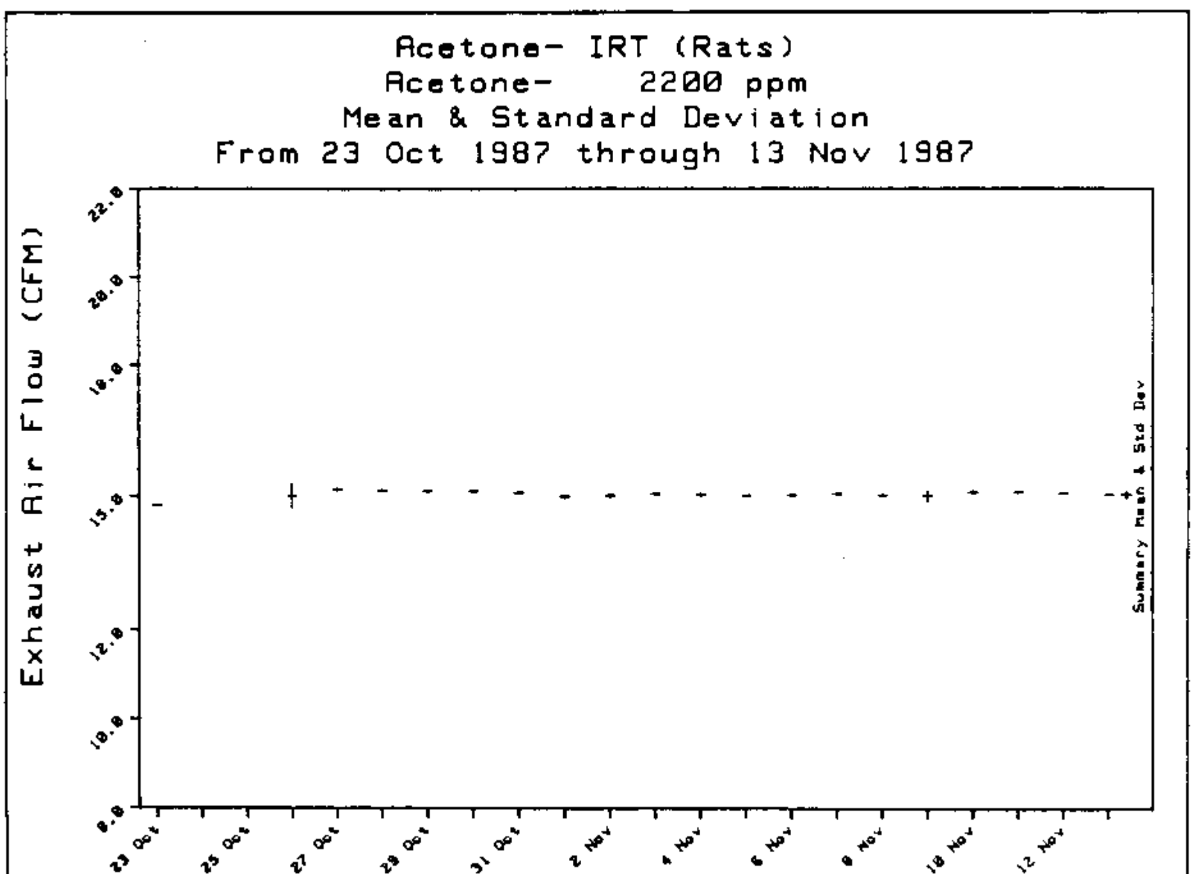
Date	Mean	% Target	Std Dev	% RSD	Maximum	Minimum	N	N in	% N in
23 Oct 1987	14.8	99%	0.00	0%	14.8	14.8	1.	1.	100%
24 Oct 1987									
25 Oct 1987									
26 Oct 1987	15.7	105%	.27	2%	16.1	15.3	6.	6.	100%
27 Oct 1987	14.7	98%	.78	5%	15.8	14.1	7.	7.	100%
28 Oct 1987	15.1	100%	.56	4%	15.5	14.1	5.	5.	100%
29 Oct 1987	15.1	101%	.22	1%	15.5	14.9	8.	8.	100%
30 Oct 1987	14.0	93%	1.32	9%	16.9	13.2	8.	8.	100%
31 Oct 1987	15.6	104%	1.61	10%	16.6	12.8	8.	8.	100%
1 Nov 1987	17.3	115%	.27	2%	17.4	16.6	8.	8.	100%
2 Nov 1987	17.4	116%	.06	0%	17.5	17.3	8.	8.	100%
3 Nov 1987	15.4	103%	.92	6%	17.5	15.0	7.	7.	100%
4 Nov 1987	14.8	99%	.14	1%	15.1	14.7	8.	8.	100%
5 Nov 1987	15.5	103%	.43	3%	15.8	14.8	8.	8.	100%
6 Nov 1987	15.2	101%	.36	2%	15.8	14.9	7.	7.	100%
7 Nov 1987	14.9	100%	.02	0%	15.0	14.9	7.	7.	100%
8 Nov 1987	14.9	99%	.01	0%	14.9	14.9	8.	8.	100%
9 Nov 1987	15.6	104%	.34	2%	15.9	14.9	8.	8.	100%
10 Nov 1987	15.3	102%	.31	2%	15.8	15.1	8.	8.	100%
11 Nov 1987	15.5	103%	.35	2%	15.7	14.8	7.	7.	100%
12 Nov 1987	15.7	105%	.03	0%	15.7	15.6	7.	7.	100%
13 Nov 1987	15.7	105%	0.00	0%	15.7	15.7	1.	1.	100%
Summary	15.4	103%	1.01	7%	17.5	12.8	135.	135.	100%



Daily Summation For Acetone- IRT (Rats)   From 23 Oct 1987 through 13 Nov 1987

Summary Data for: Acetone-   2200 ppm/Exhaust Air Flow   12.0 to 18.0

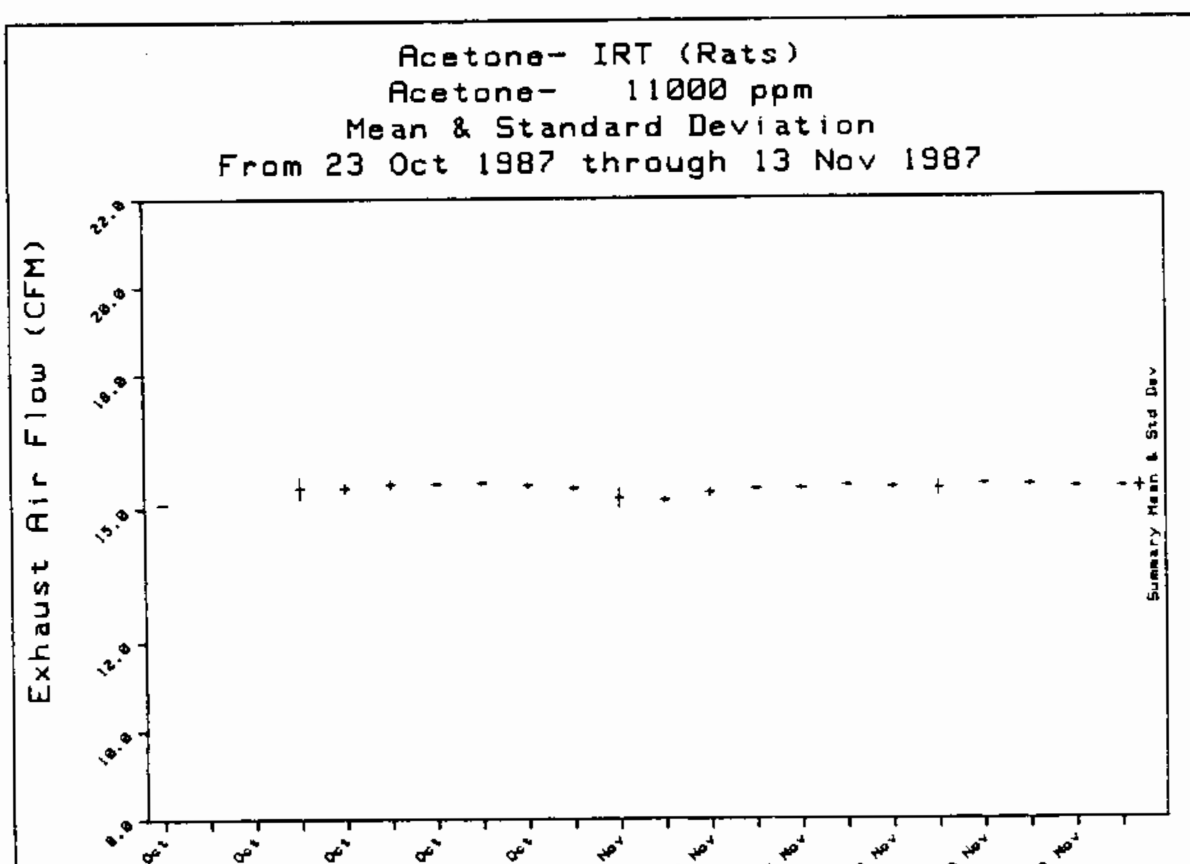
Date	Mean	% Target	Std Dev	% RSD	Maximum	Minimum	N	N in	% N in
23 Oct 1987	14.8	99%	0.00	0%	14.8	14.8	1.	1.	100%
24 Oct 1987									
25 Oct 1987									
26 Oct 1987	15.0	100%	.27	2%	15.2	14.5	6.	6.	100%
27 Oct 1987	15.2	101%	.03	0%	15.2	15.1	7.	7.	100%
28 Oct 1987	15.1	101%	.02	0%	15.2	15.1	4.	4.	100%
29 Oct 1987	15.1	101%	.02	0%	15.1	15.1	8.	8.	100%
30 Oct 1987	15.1	101%	.02	0%	15.1	15.1	8.	8.	100%
31 Oct 1987	15.1	101%	.03	0%	15.1	15.0	8.	8.	100%
1 Nov 1987	15.0	100%	.04	0%	15.1	14.9	8.	8.	100%
2 Nov 1987	15.0	100%	.03	0%	15.0	14.9	8.	8.	100%
3 Nov 1987	15.1	100%	.01	0%	15.1	15.0	7.	7.	100%
4 Nov 1987	15.0	100%	.03	0%	15.1	15.0	8.	8.	100%
5 Nov 1987	15.0	100%	.02	0%	15.0	15.0	8.	8.	100%
6 Nov 1987	15.0	100%	.02	0%	15.1	15.0	7.	7.	100%
7 Nov 1987	15.1	100%	.02	0%	15.1	15.0	7.	7.	100%
8 Nov 1987	15.0	100%	.02	0%	15.1	15.0	8.	8.	100%
9 Nov 1987	15.0	100%	.12	1%	15.1	14.7	7.	7.	100%
10 Nov 1987	15.1	101%	.03	0%	15.1	15.1	8.	8.	100%
11 Nov 1987	15.1	101%	.02	0%	15.1	15.1	7.	7.	100%
12 Nov 1987	15.1	101%	.01	0%	15.1	15.1	7.	7.	100%
13 Nov 1987	15.1	100%	0.00	0%	15.1	15.1	1.	1.	100%
Summary	15.1	100%	.08	1%	15.2	14.5	133.	133.	100%



Daily Summation For Acetone- IRT (Rats)   From 23 Oct 1987 through 13 Nov 1987

Summary Data for: Acetone-   11000 ppm/Exhaust Air Flow   12.0 to 18.C

Date	Mean	% Target	Std Dev	% RSD	Maximum	Minimum	N	N in	% N in
23 Oct 1987	15.1	101%	0.00	0%	15.1	15.1	1.	1.	100%
24 Oct 1987									
25 Oct 1987									
26 Oct 1987	15.4	103%	.24	2%	15.6	15.1	6.	6.	100%
27 Oct 1987	15.4	103%	.10	1%	15.6	15.4	7.	7.	100%
28 Oct 1987	15.5	103%	.10	1%	15.6	15.4	4.	4.	100%
29 Oct 1987	15.5	103%	.02	0%	15.6	15.5	8.	8.	100%
30 Oct 1987	15.5	104%	.03	0%	15.6	15.5	8.	8.	100%
31 Oct 1987	15.5	103%	.06	0%	15.6	15.4	8.	8.	100%
1 Nov 1987	15.4	103%	.04	0%	15.5	15.3	8.	8.	100%
2 Nov 1987	15.2	101%	.19	1%	15.5	15.0	8.	8.	100%
3 Nov 1987	15.2	101%	.05	0%	15.2	15.1	7.	7.	100%
4 Nov 1987	15.3	102%	.09	1%	15.4	15.2	8.	8.	100%
5 Nov 1987	15.4	103%	.03	0%	15.4	15.4	8.	8.	100%
6 Nov 1987	15.4	103%	.03	0%	15.5	15.4	7.	7.	100%
7 Nov 1987	15.5	103%	.03	0%	15.5	15.4	7.	7.	100%
8 Nov 1987	15.4	103%	.04	0%	15.5	15.4	8.	8.	100%
9 Nov 1987	15.4	103%	.15	1%	15.5	15.1	7.	7.	100%
10 Nov 1987	15.5	103%	.04	0%	15.5	15.4	8.	8.	100%
11 Nov 1987	15.5	103%	.05	0%	15.5	15.4	7.	7.	100%
12 Nov 1987	15.4	103%	.03	0%	15.5	15.4	7.	7.	100%
13 Nov 1987	15.4	103%	0.00	0%	15.4	15.4	1.	1.	100%
Summary	15.4	103%	.13	1%	15.6	15.0	133.	133.	100%



CHAMBER UNIFORMITY DATA SHEET

COMPOUND: Acetone IRT

EXPOSURE ROOM NUMBER: 436

TPV MEASUREMENTS

CHAMBER:	#7 / 2200 ppm		#8 / 11000 ppm		#6 /440 ppm					
DATE:	9/18/87		9/22/87		9/22/87					
SAMPLE PORT	MONITOR READING	% of Mean	MONITOR READING	% of Mean	MONITOR READING	% of Mean	MONITOR READING	% of Mean	MONITOR READING	% of Mean
BACK: 1B	1240000.0	100.1%	3071000.0	97.5%	250600.0	96.7%				
2B	1244000.0	100.4%	3195000.0	101.4%	268800.0	103.7%				
3B	1247000.0	100.7%	3079000.0	97.8%	256300.0	98.9%				
4B	1261000.0	101.8%	3155000.0	100.2%	255800.0	98.7%				
5B	1237000.0	99.9%	3142000.0	99.8%	258200.0	99.6%				
6B	1236000.0	99.8%	3188000.0	101.2%	265800.0	102.5%				
FRONT: 1F	1229000.0	99.2%	3249000.0	103.1%	267100.0	103.0%				
2F	1229000.0	99.2%	3181000.0	101.0%	264700.0	102.1%				
3F	1235000.0	99.7%	3136000.0	99.6%	255500.0	98.6%				
4F	1236000.0	99.8%	3098000.0	98.4%	258200.0	99.6%				
5F	1243000.0	100.3%	3119000.0	99.0%	254600.0	98.2%				
6F	1229000.0	99.2%	3185000.0	101.1%	255300.0	98.5%				
MEAN:	1238833.3	100.0%	3149833.3	100.0%	259241.7	100.0%				
TPV:	9183.32	0.7%	52818.44	1.7%	5833.67	2.3%				
BPV:	///////////////	≤0%	///////////////	≤0%	///////////////	≤0%	///////////////		///////////////	

WPV MEASUREMENTS

IN-LINE 1st	1220000.0	99.1%	3195000.0	100.3%	250600.0	97.5%				
2nd	1240000.0	100.7%	3244000.0	101.9%	262000.0	102.0%				
3rd	1233000.0	100.2%	3114000.0	97.8%	258100.0	100.5%				
MEAN:	1231000.0	100.0%	3184333.3	100.0%	256900.0	100.0%				
WPV:	10148.89	0.8%	65653.13	2.1%	5793.96	2.3%				

MONITOR TYPE: GC

SERIAL # : N809422

MONITOR DATA LOCATION: 2B

COMMENTS: Pre-Exposure Chamber balance. No Animals Present

ENTERED BY: LL Trent DATE: 9/23/87

REVIEWED BY: RJ Weigel DATE: 3/18/88

CHAMBER UNIFORMITY DATA SHEET

COMPOUND: Acetone IRT **EXPOSURE ROOM NUMBER:** 436

TPV MEASUREMENTS

CHAMBER:		#6 / 440 ppm		#7 / 2200 ppm		#8 /11000 ppm					
DATE:		10/28/87		10/28/87		10/28/87					
SAMPLE PORT		MONITOR READING	% of Mean	MONITOR READING	% of Mean	MONITOR READING	% of Mean	MONITOR READING	% of Mean	MONITOR READING	% of Mean
BACK:	1B	210700.0	100.2%	1064000.0	101.1%	5168000.0	98.4%				
	2B	212600.0	101.1%	1042000.0	99.0%	5330000.0	101.5%				
	3B	210800.0	100.3%	1048000.0	99.5%	5277000.0	100.5%				
	4B	209600.0	99.7%	1055000.0	100.2%	5269000.0	100.4%				
	5B										
	6B										
FRONT:	1F										
	2F	208200.0	99.0%	1054000.0	100.1%	5247000.0	100.0%				
	3F	210500.0	100.1%	1054000.0	100.1%	5231000.0	99.6%				
	4F	209200.0	99.5%	1053000.0	100.0%	5225000.0	99.5%				
	5F										
	6F										
MEAN:		210228.6	100.0%	1052857.1	100.0%	5249571.4	100.0%				
TPV:		1403.23	0.7%	6743.60	0.6%	50345.00	1.0%				
BPV:		//////////////////	0.6 %	//////////////////	0.1 %	//////////////////	≤0 %	//////////////////		//////////////////	

WPV MEASUREMENTS

IN-LINE	1st	210700.0	100.0%	1064000.0	100.7%	5168000.0	98.2%				
	2nd	211400.0	100.3%	1055000.0	99.8%	5261000.0	100.0%				
	3rd	210200.0	99.7%	1051000.0	99.5%	5358000.0	101.8%				
MEAN:		210766.7	100.0%	1056666.7	100.0%	5262333.3	100.0%				
WPV:		602.77	0.3%	6658.33	0.6%	95007.02	1.8%				

MONITOR TYPE: GC SERIAL # : N809422

MONITOR DATA LOCATION: 2B

COMMENTS: BNW 52369 Page 36

Study with Rats

ENTERED BY: LL Trent DATE: 10/28/87 REVIEWED BY: RJ Weigel RJW DATE: 3/18/88

EXPOSURE OPERATION DISCUSSION SHEET

INCLUDES DISCUSSIONS AND/OR EXPLANATIONS OF PROBLEMS AFFECTING ANIMAL ENVIRONMENT AND EXPOSURES. EXPLANATIONS ARE INCLUDED FOR DATA IN WHICH THERE WERE EXCURSIONS OF DAILY MEAN OR STANDARD DEVIATION BEYOND ALLOWABLE OPERATING LIMITS OR EXCURSIONS OF INDIVIDUAL DATUM BEYOND CRITICAL LIMITS.

STUDY: IRT Acetone Inhalation Reproductive Teratology Study

REPORTING PERIOD: October 23-31, 1987
NOTE: 24 Hour Data Collection Period extends from ~5:00 a.m. to ~5:00 a.m.

COMPILED BY: R.J. Weigel RJW **DATE:** 11 / 9 / 87

CHAMBER CONCENTRATION

DATE	DISCUSSION OR EXPLANATION
10/29/87	Concentration in the 440 ppm chamber (797 ppm) exceeded the critical high operating limit (528 ppm) at 14:44. The excursion was caused by an overadjustment of the chemical delivery pump following a low reading the previous time. The operator adjusted the pump downward and continued exposures for the remaining 17 minutes of the exposure day. Exceeding the critical high resulted in automatic shutdown of exposure, but it was restarted immediately. Due to the high reading, % relative standard deviation exceeded the 10% limit for the 440 ppm chamber.
10/30/87	Following the misadjustment of the pump at the end of the previous day's exposure, the 440 ppm chemical pump setting was intentionally set low and slowly brought to target over three successive readings. As a result, the concentration in the 440 ppm chamber exceeded the critical low operating limit (352 ppm) twice. The readings were 342 ppm at 09:19 322 ppm at 09:42 At 10:04, the concentration in the 440 ppm chamber was 431 ppm. Daily mean concentration and %RSD remained within the normal limits.

TEMPERATURE & RELATIVE HUMIDITY

DATE	DISCUSSION OR EXPLANATION
10/26/87	Relative humidity (79%) in the 0 ppm chamber exceeded the upper critical operating level (75%) at 15:46, soon after animal care had resealed the chambers. No adjustments were made and normal levels were maintained thereafter.
10/28/87	At 15:30, environmental monitoring switch was off for animal observations and was left off until 02:04. Data was manually taken at that time and normal environmental monitoring was resumed

CHAMBER FLOW & VACUUM

DATE	DISCUSSION OR EXPLANATION
10/28/87	At 15:30, environmental monitoring switch was off for animal observations and was left off until 02:04. Data was manually taken at that time and normal environmental monitoring was resumed

EXPOSURE OPERATION DISCUSSION SHEET

INCLUDES DISCUSSIONS AND/OR EXPLANATIONS OF PROBLEMS AFFECTING ANIMAL ENVIRONMENT AND EXPOSURES. EXPLANATIONS ARE INCLUDED FOR DATA IN WHICH THERE WERE EXCURSIONS OF DAILY MEAN OR STANDARD DEVIATION BEYOND ALLOWABLE OPERATING LIMITS OR EXCURSIONS OF INDIVIDUAL DATUM BEYOND CRITICAL LIMITS.

STUDY: IRT Acetone Inhalation Reproductive Teratology Study

REPORTING PERIOD: November 1-30, 1987

NOTE: 24 Hour Data Collection Period extends from ~5:00 a.m. to ~5:00 a.m.

COMPILED BY: R.J. Weigel RJW **DATE:** 12 / 9 / 87

CHAMBER CONCENTRATION

DATE	DISCUSSION OR EXPLANATION
	No problems or excursions to report during this period.

TEMPERATURE & RELATIVE HUMIDITY

DATE	DISCUSSION OR EXPLANATION
	No problems or excursions to report during this period.

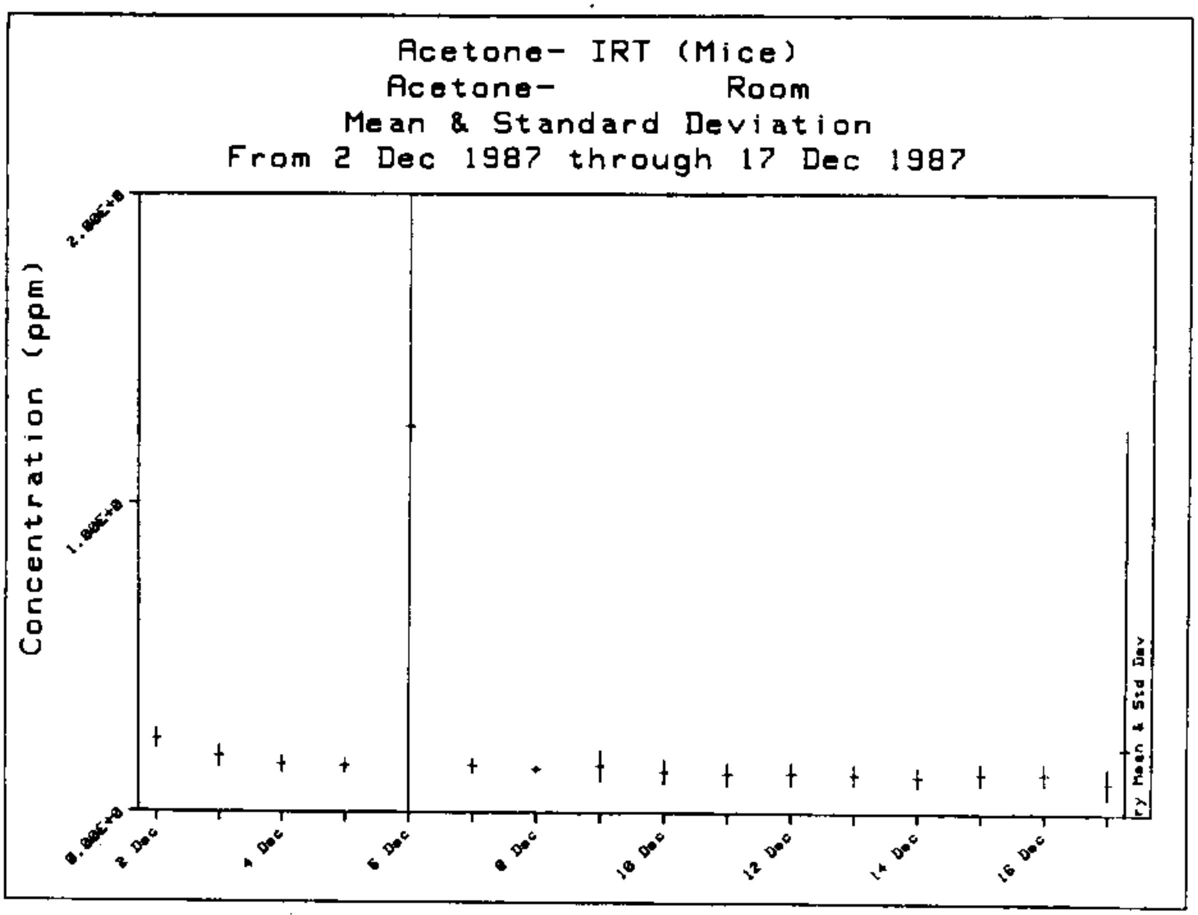
CHAMBER FLOW & VACUUM

DATE	DISCUSSION OR EXPLANATION
	No problems or excursions to report during this period.

Daily Summation For Acetone- IRT (Mice)   From 2 Dec 1987 through 17 Dec 1987

Summary Data for: Acetone-   Room/Concentration   0.00E+0 to 2.00E+0

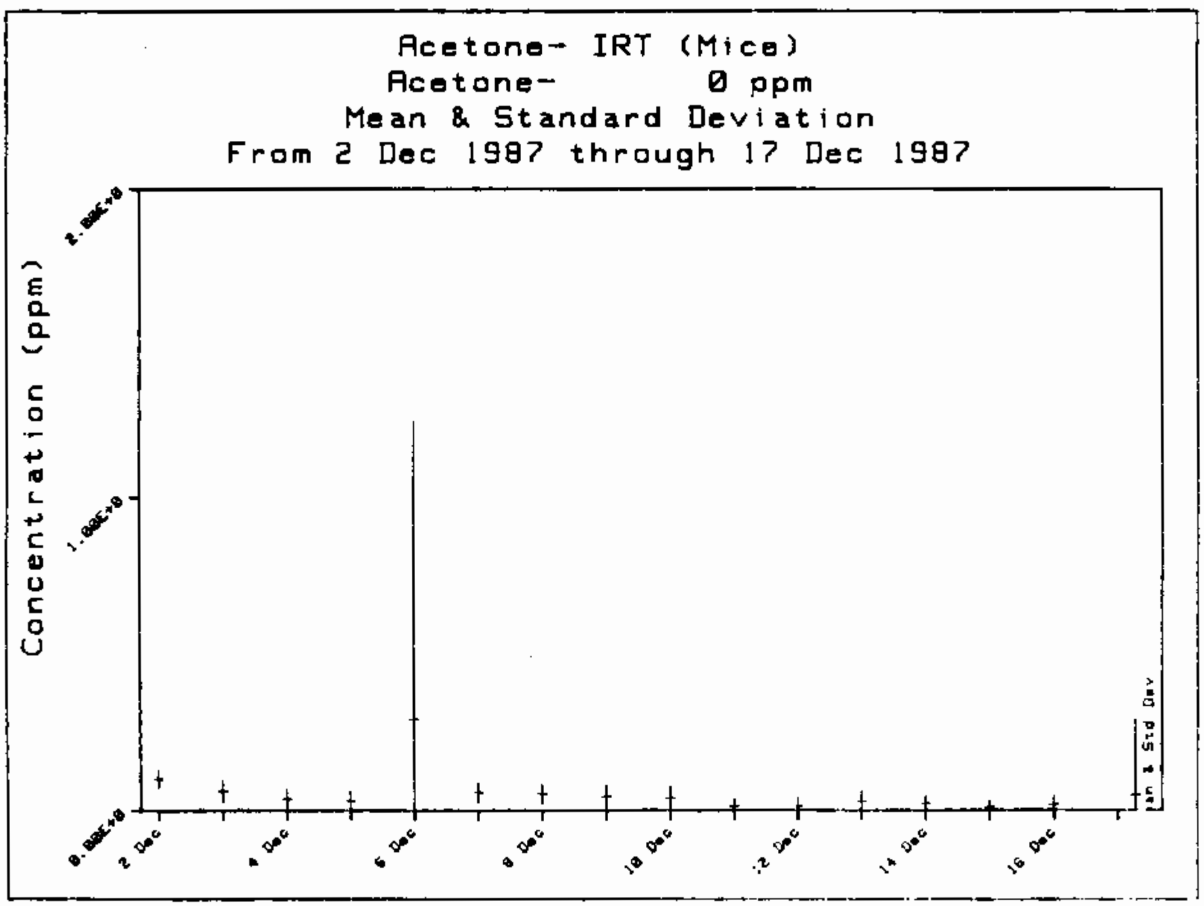
Date	Mean	% Target	Std Dev	% RSD	Maximum	Minimum	N	N in	% N in
2 Dec 1987	2.33E-1	23%	3.145E-2	13%	3.04E-1	1.37E-1	17.	17.	100%
3 Dec 1987	1.80E-1	18%	3.377E-2	19%	2.70E-1	1.06E-1	15.	15.	100%
4 Dec 1987	1.54E-1	15%	2.597E-2	17%	1.86E-1	7.39E-2	17.	17.	100%
5 Dec 1987	1.49E-1	15%	2.135E-2	14%	1.73E-1	8.87E-2	17.	17.	100%
6 Dec 1987	1.25E+0	125%	4.233E+0	338%	1.66E+1	0.00E+0	15.	14.	93%
7 Dec 1987	1.50E-1	15%	2.129E-2	14%	2.24E-1	1.29E-1	15.	15.	100%
8 Dec 1987	1.40E-1	14%	1.074E-2	8%	1.54E-1	1.20E-1	15.	15.	100%
9 Dec 1987	1.51E-1	15%	4.818E-2	32%	1.86E-1	0.00E+0	15.	15.	100%
10 Dec 1987	1.32E-1	13%	3.940E-2	30%	1.67E-1	0.00E+0	15.	15.	100%
11 Dec 1987	1.26E-1	13%	3.605E-2	29%	1.62E-1	0.00E+0	16.	16.	100%
12 Dec 1987	1.28E-1	13%	3.639E-2	29%	1.58E-1	0.00E+0	17.	17.	100%
13 Dec 1987	1.24E-1	12%	3.385E-2	27%	1.48E-1	0.00E+0	17.	17.	100%
14 Dec 1987	1.17E-1	12%	3.263E-2	28%	1.54E-1	0.00E+0	17.	17.	100%
15 Dec 1987	1.27E-1	13%	3.631E-2	29%	1.50E-1	0.00E+0	15.	15.	100%
16 Dec 1987	1.27E-1	13%	3.490E-2	28%	1.50E-1	0.00E+0	17.	17.	100%
17 Dec 1987	9.79E-2	10%	5.017E-2	51%	1.39E-1	0.00E+0	11.	11.	100%
Summary	2.10E-1	21%	1.037E+0	494%	1.66E+1	0.00E+0	251.	250.	100%



Daily Summation For Acetone- IRT (Mice) From 2 Dec 1987 through 17 Dec 1987

Summary Data for: Acetone- 0 ppm/Concentration 0.00E+0 to 2.00E+0

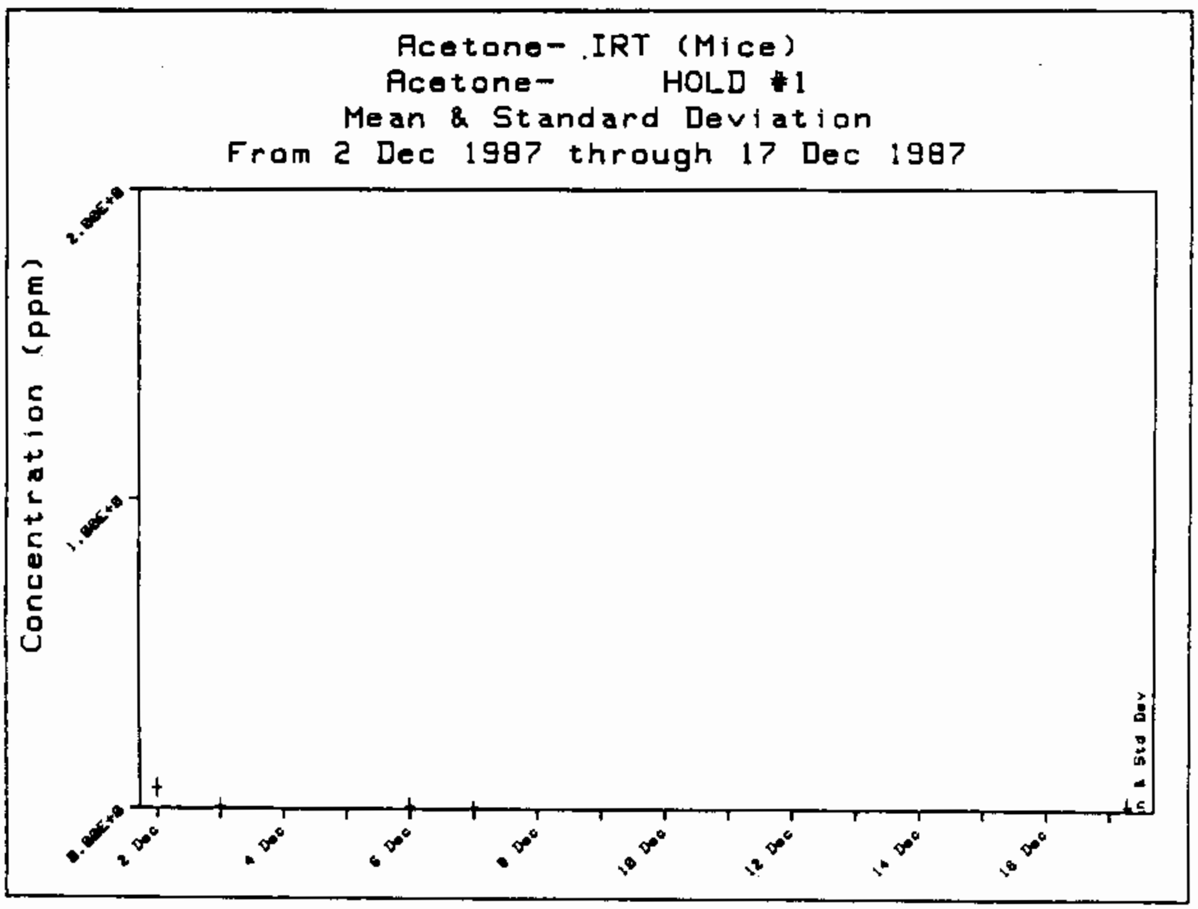
Date	Mean	% Target	Std Dev	% RSD	Maximum	Minimum	N	N in	% N in
2 Dec 1987	9.93E-2	10%	2.677E-2	27%	1.20E-1	0.00E+0	17.	17.	100%
3 Dec 1987	5.98E-2	6%	3.367E-2	56%	1.46E-1	0.00E+0	15.	15.	100%
4 Dec 1987	3.60E-2	4%	3.001E-2	83%	7.60E-2	0.00E+0	17.	17.	100%
5 Dec 1987	3.08E-2	3%	3.179E-2	103%	7.39E-2	0.00E+0	17.	17.	100%
6 Dec 1987	2.90E-1	29%	9.589E-1	330%	3.75E+0	0.00E+0	15.	14.	93%
7 Dec 1987	5.59E-2	6%	3.144E-2	56%	9.50E-2	0.00E+0	15.	15.	100%
8 Dec 1987	5.26E-2	5%	3.195E-2	61%	8.02E-2	0.00E+0	16.	16.	100%
9 Dec 1987	4.46E-2	4%	3.828E-2	86%	8.65E-2	0.00E+0	15.	15.	100%
10 Dec 1987	3.90E-2	4%	3.811E-2	98%	8.23E-2	0.00E+0	15.	15.	100%
11 Dec 1987	1.19E-2	1%	2.589E-2	218%	7.39E-2	0.00E+0	16.	16.	100%
12 Dec 1987	1.27E-2	1%	2.823E-2	223%	7.60E-2	0.00E+0	17.	17.	100%
13 Dec 1987	2.74E-2	3%	3.410E-2	124%	7.60E-2	0.00E+0	17.	17.	100%
14 Dec 1987	1.92E-2	2%	2.778E-2	144%	7.18E-2	0.00E+0	17.	17.	100%
15 Dec 1987	9.01E-3	1%	1.939E-2	215%	6.12E-2	0.00E+0	15.	15.	100%
16 Dec 1987	1.54E-2	2%	2.909E-2	189%	8.02E-2	0.00E+0	17.	17.	100%
17 Dec 1987	0.00E+0	0%	0.000E+0	0%	0.00E+0	0.00E+0	11.	11.	100%
Summary	5.00E-2	5%	2.373E-1	474%	3.75E+0	0.00E+0	252.	251.	100%



Daily Summation For Acetone- IRT (Mice)   From 2 Dec 1987 through 17 Dec 1987

Summary Data for: Acetone-   HDLD #1/Concentration   0.00E+0 to 2.00E+0

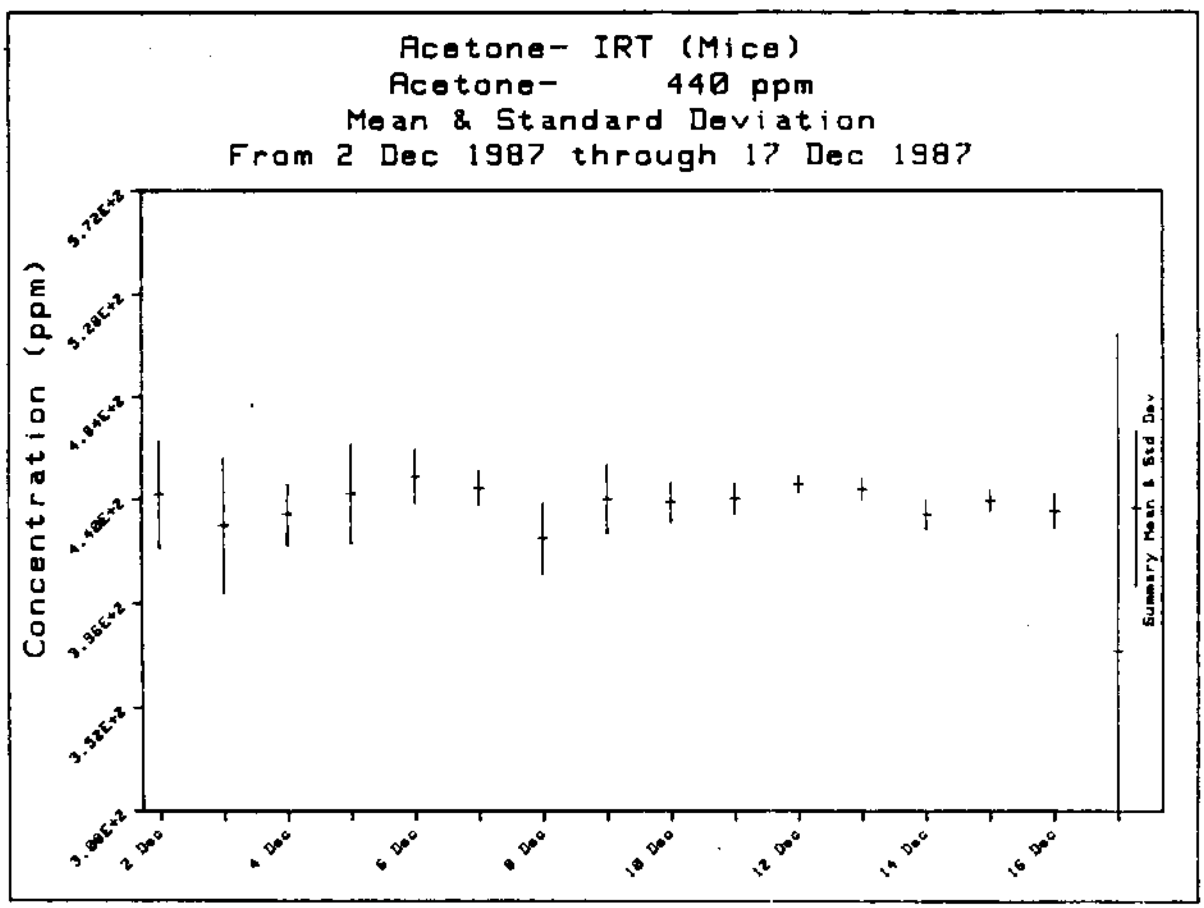
Date	Mean	% Target	Std Dev	% RSD	Maximum	Minimum	N	N in	% N in
2 Dec 1987	6.53E-2	7%	2.839E-2	43%	9.50E-2	0.00E+0	17.	17.	100%
3 Dec 1987	6.89E-3	1%	2.670E-2	387%	1.03E-1	0.00E+0	15.	15.	100%
4 Dec 1987	0.00E+0	0%	0.000E+0	0%	0.00E+0	0.00E+0	17.	17.	100%
5 Dec 1987	0.00E+0	0%	0.000E+0	0%	0.00E+0	0.00E+0	17.	17.	100%
6 Dec 1987	9.99E-3	1%	2.637E-2	264%	7.60E-2	0.00E+0	15.	15.	100%
7 Dec 1987	5.07E-3	1%	1.962E-2	387%	7.60E-2	0.00E+0	15.	15.	100%
8 Dec 1987	0.00E+0	0%	0.000E+0	0%	0.00E+0	0.00E+0	16.	16.	100%
9 Dec 1987									
10 Dec 1987									
11 Dec 1987									
12 Dec 1987									
13 Dec 1987									
14 Dec 1987									
15 Dec 1987									
16 Dec 1987									
17 Dec 1987									
Summary	1.29E-2	1%	2.920E-2	227%	1.03E-1	0.00E+0	112.	112.	100%



Daily Summation For Acetone- IRT (Mice)   From 2 Dec 1987 through 17 Dec 1987

Summary Data for: Acetone-   440 ppm/Concentration   3.96E+2 to 4.84E+2

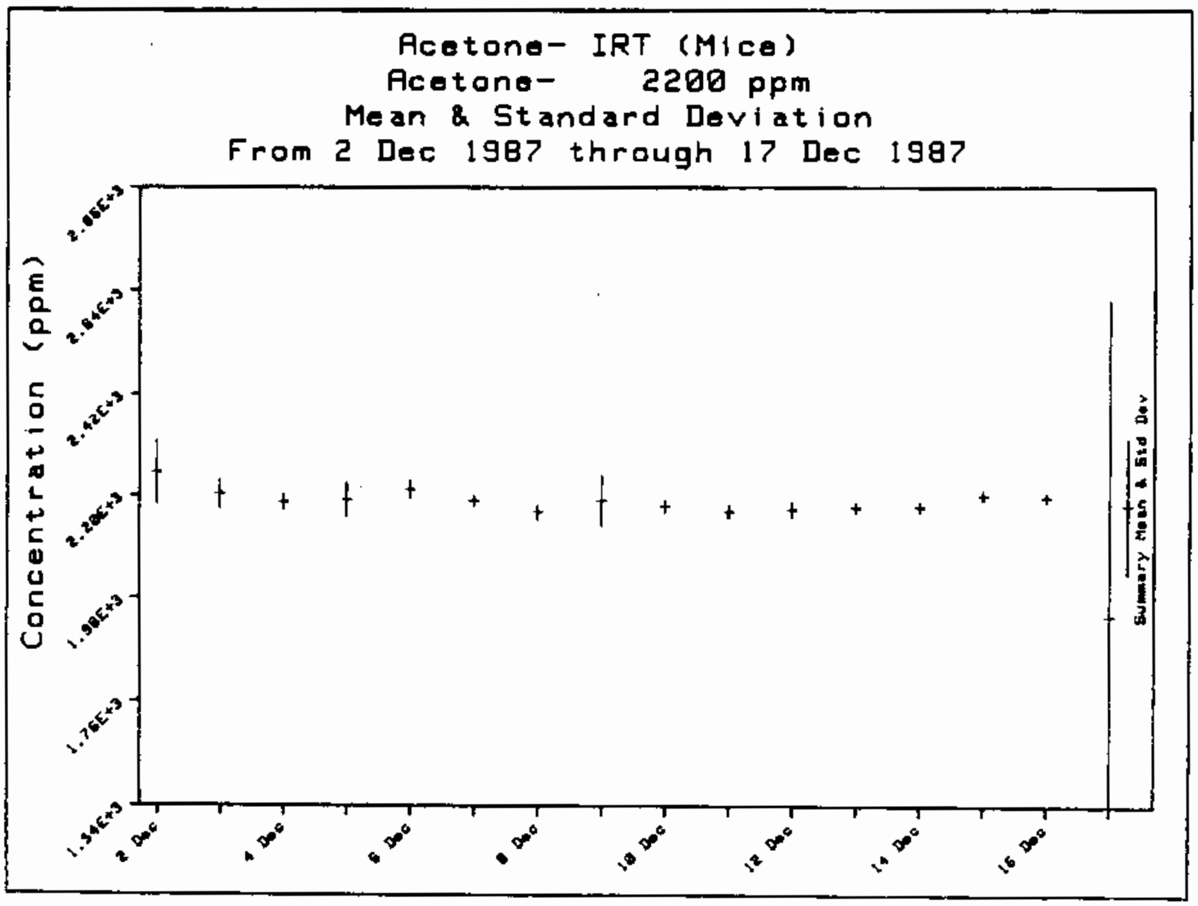
Date	Mean	% Target	Std Dev	% RSD	Maximum	Minimum	N	N in	% N in
2 Dec 1987	4.42E+2	101%	2.281E+1	5%	4.89E+2	4.11E+2	16.	15.	94%
3 Dec 1987	4.29E+2	97%	2.868E+1	7%	4.72E+2	3.97E+2	15.	15.	100%
4 Dec 1987	4.34E+2	99%	1.314E+1	3%	4.57E+2	4.07E+2	16.	16.	100%
5 Dec 1987	4.42E+2	101%	2.118E+1	5%	4.71E+2	3.77E+2	16.	15.	94%
6 Dec 1987	4.50E+2	102%	1.163E+1	3%	4.71E+2	4.27E+2	13.	13.	100%
7 Dec 1987	4.45E+2	101%	7.251E+0	2%	4.51E+2	4.21E+2	15.	15.	100%
8 Dec 1987	4.24E+2	96%	1.489E+1	4%	4.56E+2	4.02E+2	14.	14.	100%
9 Dec 1987	4.40E+2	100%	1.472E+1	3%	4.79E+2	4.21E+2	13.	13.	100%
10 Dec 1987	4.39E+2	100%	8.442E+0	2%	4.52E+2	4.26E+2	15.	15.	100%
11 Dec 1987	4.40E+2	100%	6.719E+0	2%	4.46E+2	4.26E+2	15.	15.	100%
12 Dec 1987	4.46E+2	101%	3.415E+0	1%	4.49E+2	4.34E+2	16.	16.	100%
13 Dec 1987	4.44E+2	101%	4.410E+0	1%	4.48E+2	4.32E+2	16.	16.	100%
14 Dec 1987	4.33E+2	98%	6.137E+0	1%	4.47E+2	4.26E+2	16.	16.	100%
15 Dec 1987	4.39E+2	100%	4.553E+0	1%	4.47E+2	4.27E+2	14.	14.	100%
16 Dec 1987	4.35E+2	99%	7.641E+0	2%	4.45E+2	4.16E+2	16.	16.	100%
17 Dec 1987	3.76E+2	85%	1.355E+2	36%	4.68E+2	7.60E+0	10.	8.	80%
Summary	4.36E+2	99%	3.285E+1	8%	4.89E+2	7.60E+0	236.	232.	98%



Daily Summation For Acetone- IRT (Mice)   From 2 Dec 1987 through 17 Dec 1987

Summary Data for: Acetone- 2200 ppm/Concentration   1.98E+3 to 2.42E+3

Date	Mean	% Target	Std Dev	% RSD	Maximum	Minimum	N	N in	% N in
2 Dec 1987	2.25E+3	102%	6.862E+1	3%	2.45E+3	2.20E+3	16.	15.	94%
3 Dec 1987	2.20E+3	100%	3.171E+1	1%	2.31E+3	2.18E+3	15.	15.	100%
4 Dec 1987	2.19E+3	99%	1.573E+1	1%	2.22E+3	2.16E+3	16.	16.	100%
5 Dec 1987	2.19E+3	100%	3.650E+1	2%	2.24E+3	2.08E+3	16.	16.	100%
6 Dec 1987	2.21E+3	101%	1.845E+1	1%	2.24E+3	2.18E+3	13.	13.	100%
7 Dec 1987	2.19E+3	100%	1.091E+1	0%	2.21E+3	2.17E+3	15.	15.	100%
8 Dec 1987	2.17E+3	98%	1.642E+1	1%	2.19E+3	2.13E+3	15.	15.	100%
9 Dec 1987	2.19E+3	100%	5.362E+1	2%	2.25E+3	2.04E+3	13.	13.	100%
10 Dec 1987	2.18E+3	99%	1.164E+1	1%	2.21E+3	2.17E+3	14.	14.	100%
11 Dec 1987	2.17E+3	98%	1.473E+1	1%	2.19E+3	2.14E+3	15.	15.	100%
12 Dec 1987	2.17E+3	99%	1.567E+1	1%	2.21E+3	2.15E+3	16.	16.	100%
13 Dec 1987	2.18E+3	99%	1.330E+1	1%	2.20E+3	2.16E+3	16.	16.	100%
14 Dec 1987	2.18E+3	99%	1.162E+1	1%	2.19E+3	2.15E+3	16.	16.	100%
15 Dec 1987	2.20E+3	100%	1.162E+1	1%	2.23E+3	2.19E+3	14.	14.	100%
16 Dec 1987	2.20E+3	100%	9.381E+0	0%	2.22E+3	2.18E+3	16.	16.	100%
17 Dec 1987	1.94E+3	88%	6.775E+2	35%	2.20E+3	1.52E+1	10.	9.	90%
Summary	2.18E+3	99%	1.458E+2	7%	2.45E+3	1.52E+1	236.	234.	99%



Daily Summation For Acetone- IRT (Mice)   From 2 Dec 1987 through 2 Dec 1987

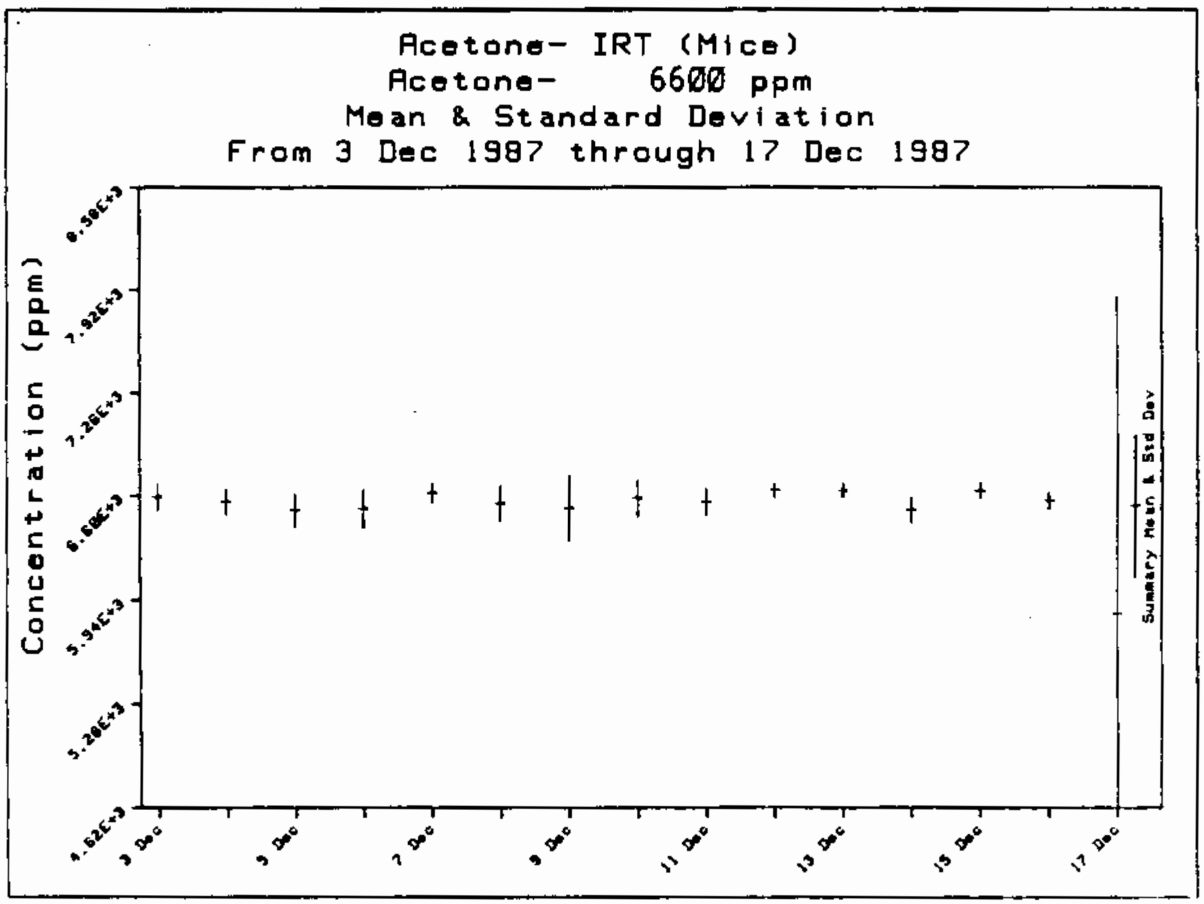
Summary Data for: Acetone- 11000 ppm/Concentration   9.90E+3 to 1.21E+4

Date	Mean	% Target	Std Dev	% RSD	Maximum	Minimum	N	N in	% N in
2 Dec 1987	1.11E+4	101%	3.362E+2	3%	1.17E+4	1.07E+4	16.	16.	100%
Summary	1.11E+4	101%	3.362E+2	3%	1.17E+4	1.07E+4	16.	16.	100%

Daily Summation For Acetone- IRT (Mice)   From 3 Dec 1987 through 17 Dec 1987

Summary Data for: Acetone- 6600 ppm/Concentration   5.94E+3 to 7.26E+3

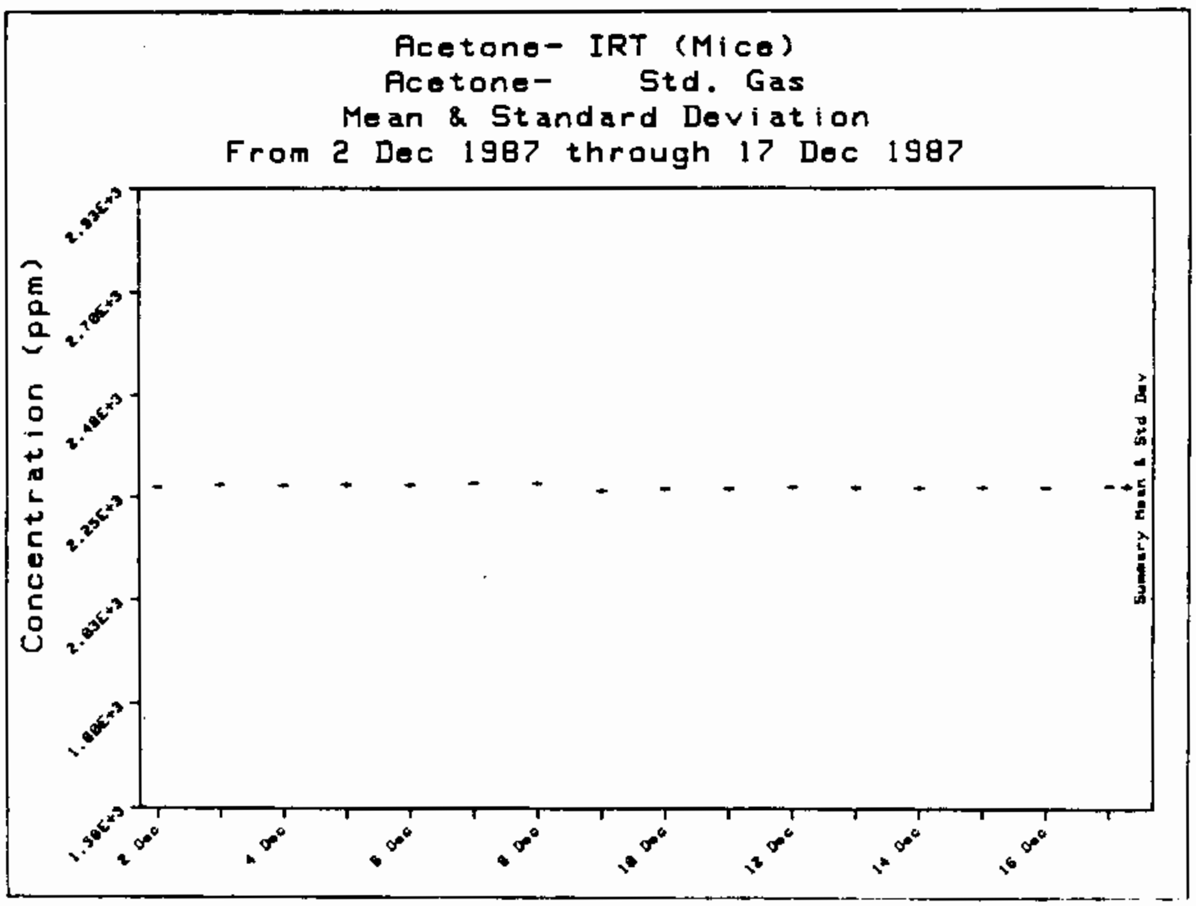
Date	Mean	% Target	Std Dev	% RSD	Maximum	Minimum	N	N in	% N in
3 Dec 1987	6.59E+3	100%	8.264E+1	1%	6.77E+3	6.45E+3	15.	15.	100%
4 Dec 1987	6.56E+3	99%	7.816E+1	1%	6.72E+3	6.44E+3	16.	16.	100%
5 Dec 1987	6.51E+3	99%	9.830E+1	2%	6.73E+3	6.37E+3	16.	16.	100%
6 Dec 1987	6.52E+3	99%	1.202E+2	2%	6.68E+3	6.32E+3	14.	14.	100%
7 Dec 1987	6.61E+3	100%	6.076E+1	1%	6.69E+3	6.52E+3	15.	15.	100%
8 Dec 1987	6.55E+3	99%	1.072E+2	2%	6.73E+3	6.38E+3	14.	14.	100%
9 Dec 1987	6.52E+3	99%	2.011E+2	3%	6.68E+3	5.96E+3	12.	12.	100%
10 Dec 1987	6.58E+3	100%	1.121E+2	2%	6.71E+3	6.29E+3	14.	14.	100%
11 Dec 1987	6.56E+3	99%	8.156E+1	1%	6.76E+3	6.45E+3	15.	15.	100%
12 Dec 1987	6.63E+3	100%	4.266E+1	1%	6.71E+3	6.57E+3	16.	16.	100%
13 Dec 1987	6.63E+3	100%	4.472E+1	1%	6.71E+3	6.56E+3	16.	16.	100%
14 Dec 1987	6.50E+3	99%	7.954E+1	1%	6.62E+3	6.38E+3	16.	16.	100%
15 Dec 1987	6.63E+3	100%	4.712E+1	1%	6.70E+3	6.57E+3	14.	14.	100%
16 Dec 1987	6.56E+3	99%	5.577E+1	1%	6.69E+3	6.50E+3	16.	16.	100%
17 Dec 1987	5.85E+3	89%	2.021E+3	35%	6.77E+3	1.13E+2	10.	9.	90%
Summary	6.54E+3	99%	4.482E+2	7%	6.77E+3	1.13E+2	219.	218.	100%



Daily Summation For Acetone- IRT (Mice)   From 2 Dec 1987 through 17 Dec 1987

Summary Data for: Acetone-   Std. Gas/Concentration   2.03E+3 to 2.48E+3

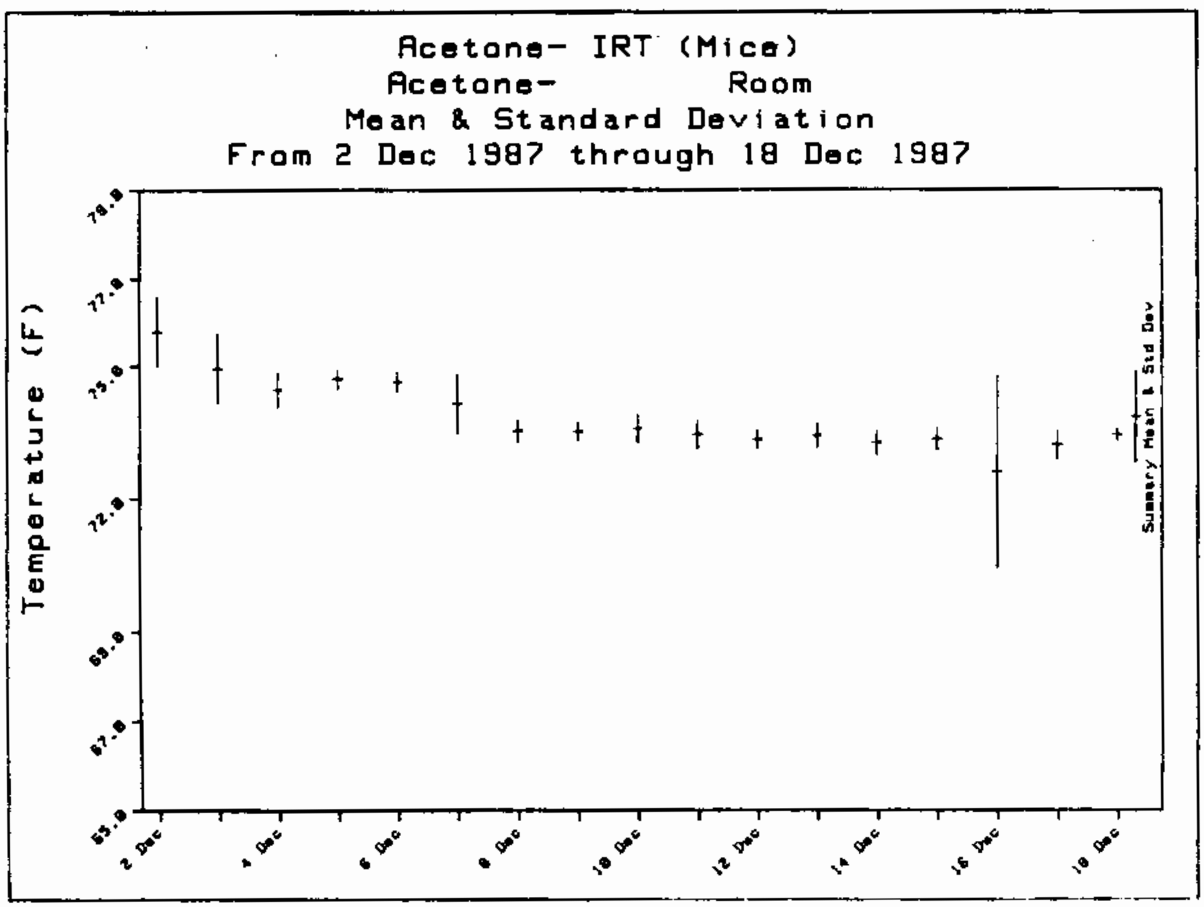
Date	Mean	% Target	Std Dev	% RSD	Maximum	Minimum	N	N in	% N in
2 Dec 1987	2.27E+3	101%	3.516E+0	0%	2.27E+3	2.26E+3	17.	17.	100%
3 Dec 1987	2.28E+3	101%	3.245E+0	0%	2.28E+3	2.27E+3	14.	14.	100%
4 Dec 1987	2.27E+3	101%	3.163E+0	0%	2.28E+3	2.27E+3	17.	17.	100%
5 Dec 1987	2.28E+3	101%	3.474E+0	0%	2.28E+3	2.27E+3	17.	17.	100%
6 Dec 1987	2.28E+3	101%	3.411E+0	0%	2.28E+3	2.27E+3	15.	15.	100%
7 Dec 1987	2.28E+3	101%	1.656E+0	0%	2.28E+3	2.28E+3	15.	15.	100%
8 Dec 1987	2.28E+3	101%	1.952E+0	0%	2.28E+3	2.27E+3	15.	15.	100%
9 Dec 1987	2.26E+3	101%	3.324E+0	0%	2.27E+3	2.26E+3	16.	16.	100%
10 Dec 1987	2.27E+3	101%	2.120E+0	0%	2.27E+3	2.26E+3	15.	15.	100%
11 Dec 1987	2.27E+3	101%	2.875E+0	0%	2.27E+3	2.26E+3	17.	17.	100%
12 Dec 1987	2.27E+3	101%	2.862E+0	0%	2.27E+3	2.26E+3	17.	17.	100%
13 Dec 1987	2.27E+3	101%	3.674E+0	0%	2.27E+3	2.26E+3	17.	17.	100%
14 Dec 1987	2.27E+3	101%	3.678E+0	0%	2.27E+3	2.26E+3	17.	17.	100%
15 Dec 1987	2.27E+3	101%	2.947E+0	0%	2.27E+3	2.26E+3	15.	15.	100%
16 Dec 1987	2.27E+3	101%	2.595E+0	0%	2.27E+3	2.26E+3	17.	17.	100%
17 Dec 1987	2.27E+3	101%	2.236E+0	0%	2.27E+3	2.27E+3	11.	11.	100%
Summary	2.27E+3	101%	5.370E+0	0%	2.28E+3	2.26E+3	252.	252.	100%



Daily Summation For Acetone- IRT (Mice)   From 2 Dec 1987 through 18 Dec 1987

Summary Data for: Acetone-   Room/Temperature   69.0 to 75.0

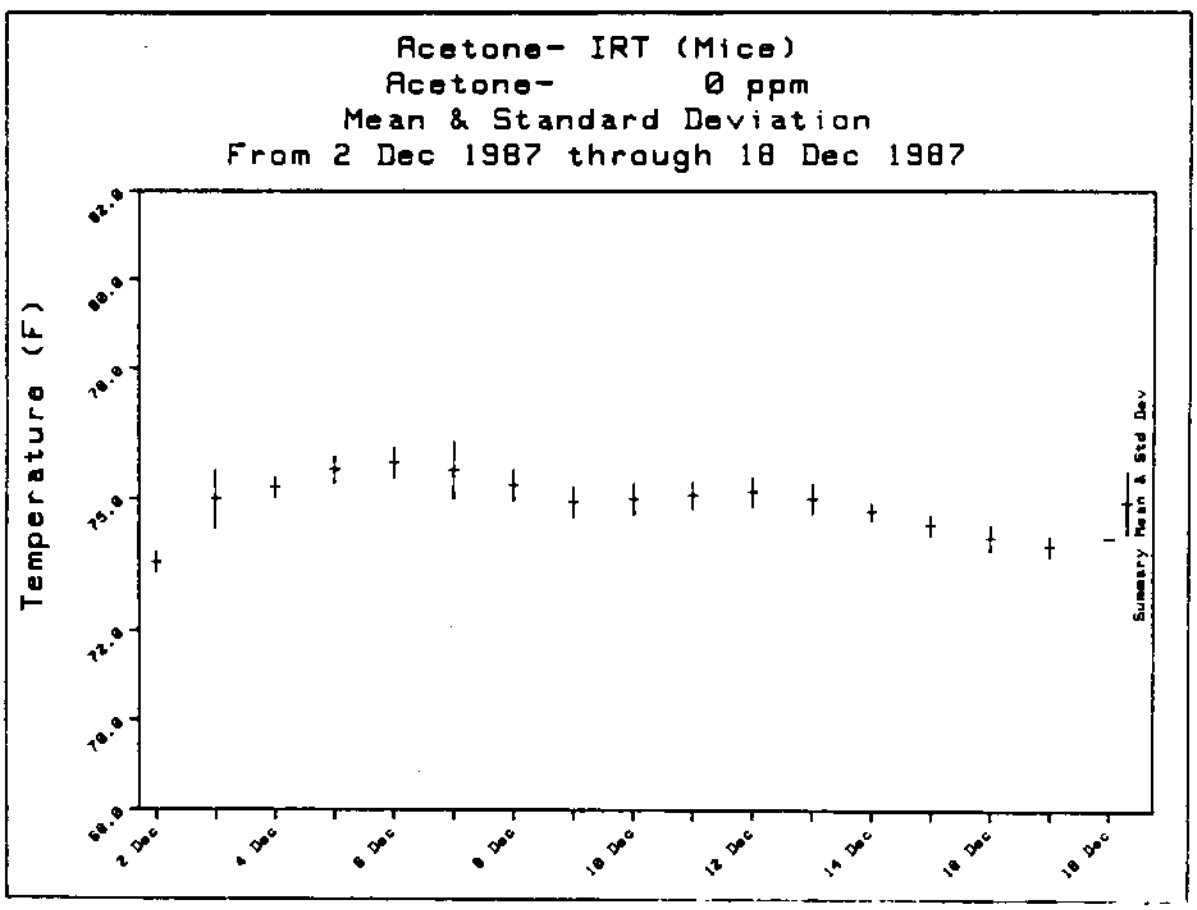
Date	Mean	% Target	Std Dev	% RSD	Maximum	Minimum	N	N in	% N in
2 Dec 1987	75.8	105%	.78	1%	77.1	74.7	7.	1.	14%
3 Dec 1987	75.0	104%	.78	1%	76.0	74.0	8.	5.	63%
4 Dec 1987	74.5	103%	.38	1%	74.9	73.9	8.	8.	100%
5 Dec 1987	74.7	104%	.21	0%	75.0	74.3	8.	8.	100%
6 Dec 1987	74.6	104%	.22	0%	75.1	74.4	8.	7.	88%
7 Dec 1987	74.1	103%	.67	1%	74.9	73.4	8.	8.	100%
8 Dec 1987	73.5	102%	.24	0%	73.8	73.1	8.	8.	100%
9 Dec 1987	73.5	102%	.20	0%	73.7	73.1	8.	8.	100%
10 Dec 1987	73.6	102%	.31	0%	74.1	73.2	8.	8.	100%
11 Dec 1987	73.4	102%	.31	0%	73.8	72.8	8.	8.	100%
12 Dec 1987	73.3	102%	.20	0%	73.7	73.1	8.	8.	100%
13 Dec 1987	73.4	102%	.26	0%	73.8	73.2	8.	8.	100%
14 Dec 1987	73.3	102%	.26	0%	73.6	72.8	8.	8.	100%
15 Dec 1987	73.3	102%	.26	0%	73.8	73.0	8.	8.	100%
16 Dec 1987	72.6	101%	2.16	3%	73.7	66.9	9.	8.	89%
17 Dec 1987	73.2	102%	.32	0%	73.6	72.5	8.	8.	100%
18 Dec 1987	73.4	102%	.13	0%	73.6	73.3	3.	3.	100%
Summary	73.8	103%	1.02	1%	77.1	66.9	131.	120.	92%



Daily Summation For Acetone- IRT (Mice)   From 2 Dec 1987 through 18 Dec 1987

Summary Data for: Acetone-   0 ppm/Temperature   72.0 to 78.0

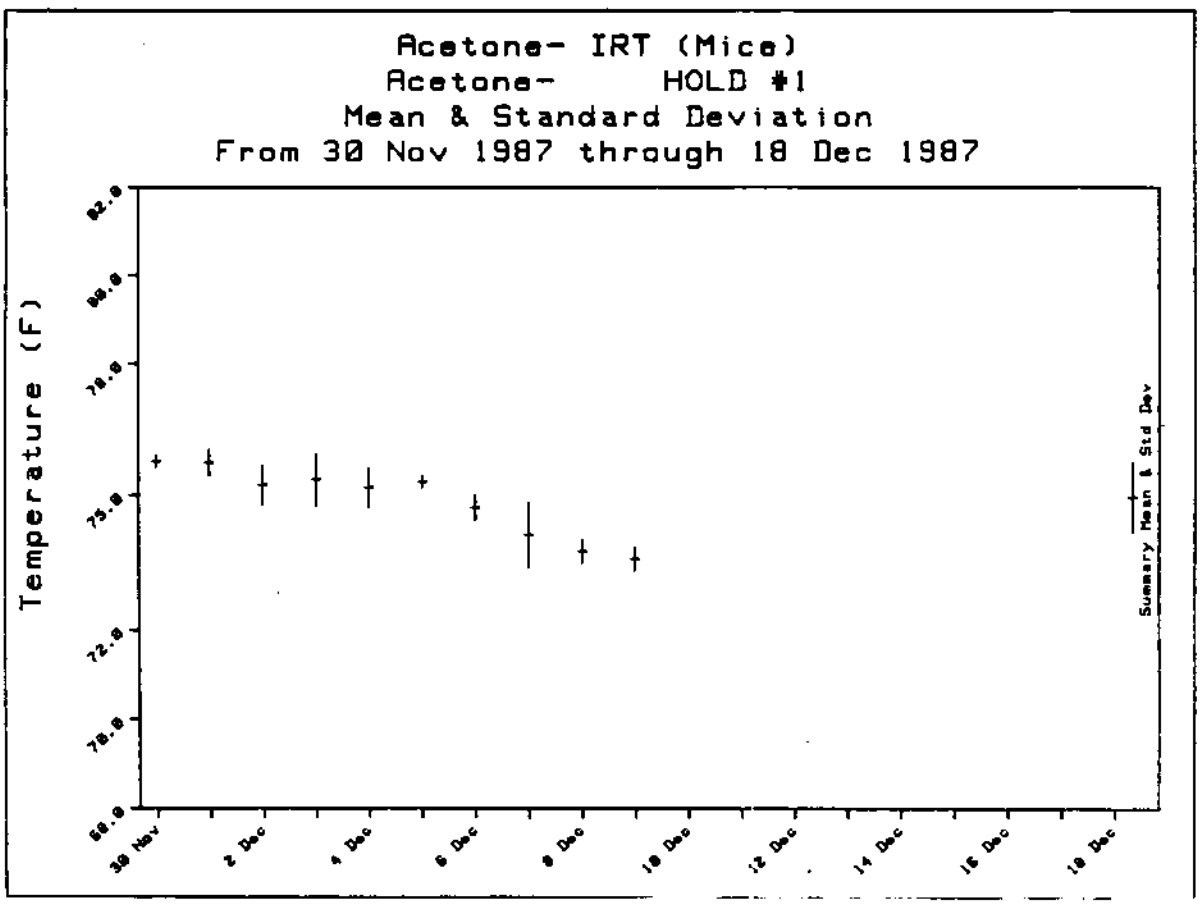
Date	Mean	% Target	Std Dev	% RSD	Maximum	Minimum	N	N in	% N in
2 Dec 1987	73.6	98%	.22	0%	73.9	73.2	7.	7.	100%
3 Dec 1987	75.0	100%	.66	1%	75.6	73.9	8.	8.	100%
4 Dec 1987	75.3	100%	.23	0%	75.6	74.8	8.	8.	100%
5 Dec 1987	75.7	101%	.31	0%	76.2	75.3	8.	8.	100%
6 Dec 1987	75.8	101%	.34	0%	76.4	75.4	8.	8.	100%
7 Dec 1987	75.7	101%	.66	1%	76.6	75.1	8.	8.	100%
8 Dec 1987	75.3	100%	.35	0%	75.9	74.9	8.	8.	100%
9 Dec 1987	75.0	100%	.32	0%	75.4	74.5	8.	8.	100%
10 Dec 1987	75.0	100%	.38	1%	75.7	74.4	8.	8.	100%
11 Dec 1987	75.1	100%	.29	0%	75.8	74.9	8.	8.	100%
12 Dec 1987	75.2	100%	.33	0%	75.7	74.8	8.	8.	100%
13 Dec 1987	75.0	100%	.35	0%	75.5	74.4	8.	8.	100%
14 Dec 1987	74.7	100%	.19	0%	75.0	74.5	8.	8.	100%
15 Dec 1987	74.4	99%	.26	0%	74.9	74.2	8.	8.	100%
16 Dec 1987	74.1	99%	.29	0%	74.5	73.7	8.	8.	100%
17 Dec 1987	73.9	99%	.23	0%	74.3	73.7	8.	8.	100%
18 Dec 1987	74.1	99%	0.00	0%	74.1	74.1	1.	1.	100%
Summary	74.9	100%	.70	1%	76.6	73.2	128.	128.	100%



Daily Summation For Acetone- IRT (Mice)   From 30 Nov 1987 through 18 Dec 1987

Summary Data for: Acetone-   HOLD #1/Temperature   72.0 to 78.0

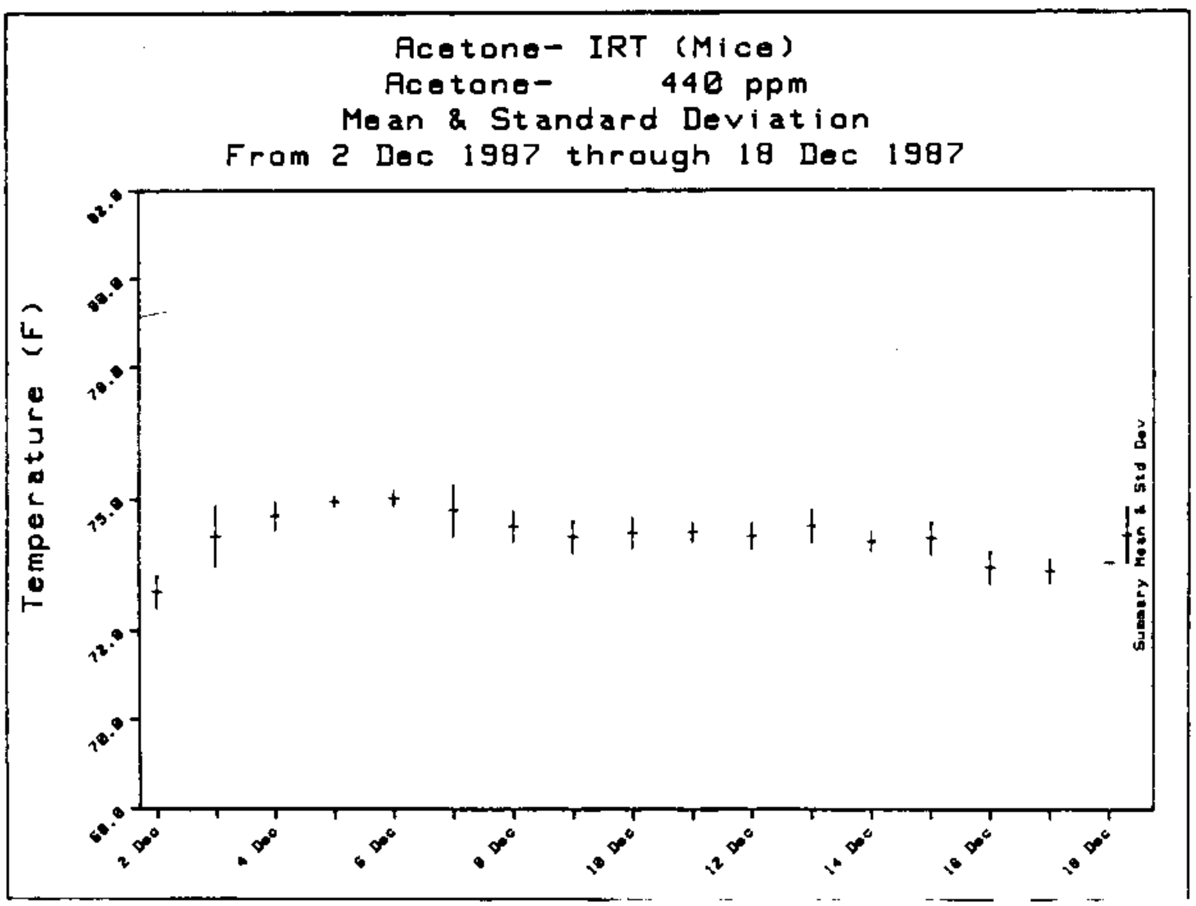
Date	Mean	% Target	Std Dev	% RSD	Maximum	Minimum	N	N in	% N in
30 Nov 1987	75.8	101%	.14	0%	76.0	75.7	5.	5.	100%
1 Dec 1987	75.7	101%	.31	0%	76.2	75.2	8.	8.	100%
2 Dec 1987	75.2	100%	.43	1%	75.8	74.6	8.	8.	100%
3 Dec 1987	75.4	100%	.59	1%	75.9	74.1	8.	8.	100%
4 Dec 1987	75.2	100%	.42	1%	75.8	74.5	8.	8.	100%
5 Dec 1987	75.3	100%	.12	0%	75.5	75.2	8.	8.	100%
6 Dec 1987	74.7	100%	.27	0%	75.2	74.4	8.	8.	100%
7 Dec 1987	74.1	99%	.73	1%	75.0	73.3	8.	8.	100%
8 Dec 1987	73.8	98%	.26	0%	74.2	73.3	8.	8.	100%
9 Dec 1987	73.6	98%	.26	0%	73.8	73.4	2.	2.	100%
10 Dec 1987									
11 Dec 1987									
12 Dec 1987									
13 Dec 1987									
14 Dec 1987									
15 Dec 1987									
16 Dec 1987									
17 Dec 1987									
18 Dec 1987									
Summary	75.0	100%	.79	1%	76.2	73.3	71.	71.	100%



Daily Summation For Acetone- IRT (Mice) From 2 Dec 1987 through 18 Dec 1987

Summary Data for: Acetone- 440 ppm/Temperature 72.0 to 78.0

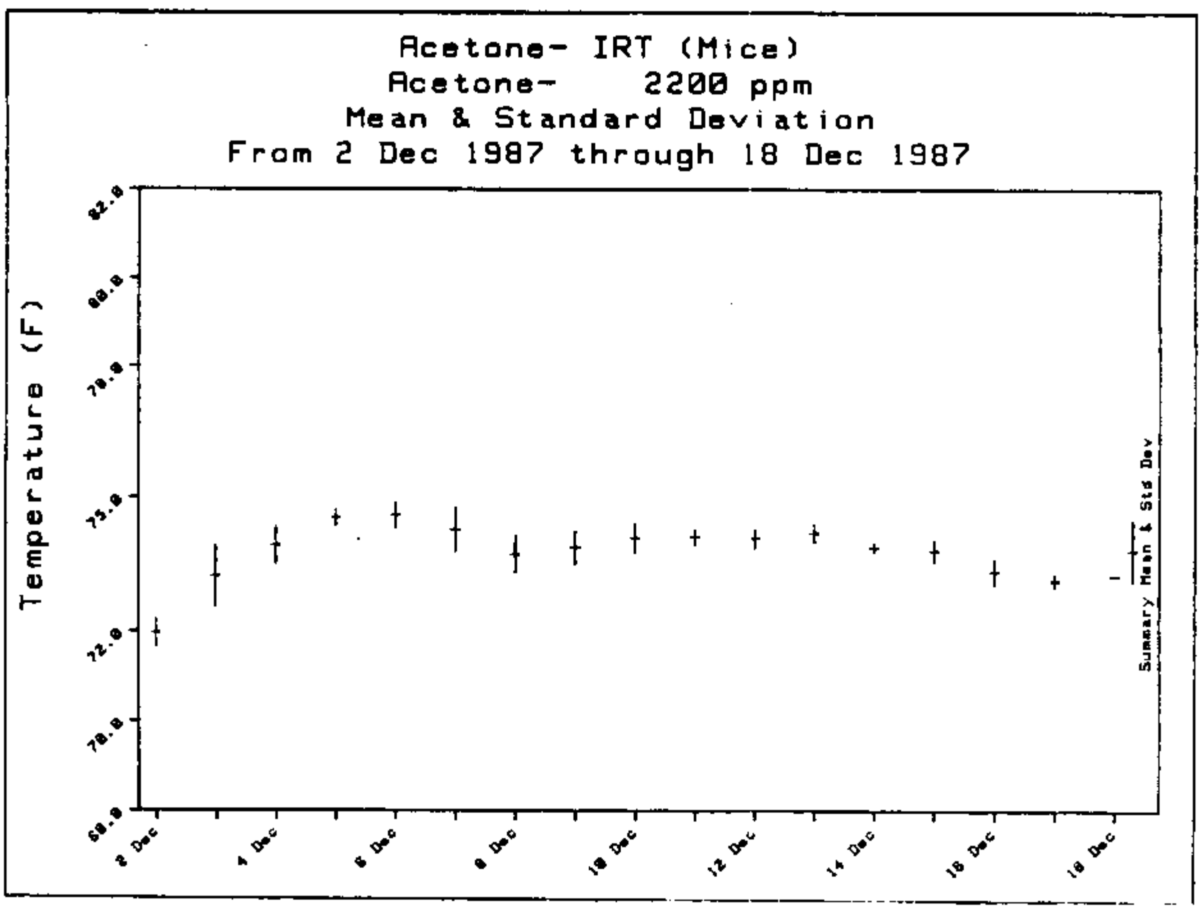
Date	Mean	% Target	Std Dev	% RSD	Maximum	Minimum	N	N in	% N in
2 Dec 1987	72.9	97%	.39	1%	73.4	72.3	7.	7.	100%
3 Dec 1987	74.2	99%	.69	1%	74.8	73.0	8.	8.	100%
4 Dec 1987	74.6	100%	.32	0%	75.1	74.1	8.	8.	100%
5 Dec 1987	75.0	100%	.11	0%	75.1	74.8	8.	8.	100%
6 Dec 1987	75.0	100%	.17	0%	75.4	74.9	8.	8.	100%
7 Dec 1987	74.8	100%	.58	1%	75.4	74.2	8.	8.	100%
8 Dec 1987	74.4	99%	.35	0%	75.0	73.8	8.	8.	100%
9 Dec 1987	74.2	99%	.38	1%	74.7	73.6	8.	8.	100%
10 Dec 1987	74.2	99%	.36	0%	75.0	73.6	8.	8.	100%
11 Dec 1987	74.3	99%	.21	0%	74.8	74.1	8.	8.	100%
12 Dec 1987	74.2	99%	.30	0%	74.7	73.7	8.	8.	100%
13 Dec 1987	74.4	99%	.37	0%	75.0	74.0	8.	8.	100%
14 Dec 1987	74.0	99%	.22	0%	74.4	73.7	8.	8.	100%
15 Dec 1987	74.1	99%	.36	0%	74.5	73.5	8.	8.	100%
16 Dec 1987	73.5	98%	.37	1%	74.3	73.1	8.	8.	100%
17 Dec 1987	73.4	98%	.26	0%	73.6	72.9	8.	8.	100%
18 Dec 1987	73.6	98%	0.00	0%	73.6	73.6	1.	1.	100%
Summary	74.2	99%	.64	1%	75.4	72.3	128.	128.	100%



Daily Summation For Acetone- IRT (Mice)   From 2 Dec 1987 through 18 Dec 1987

Summary Data for: Acetone-   2200 ppm/Temperature   72.0 to 78.0

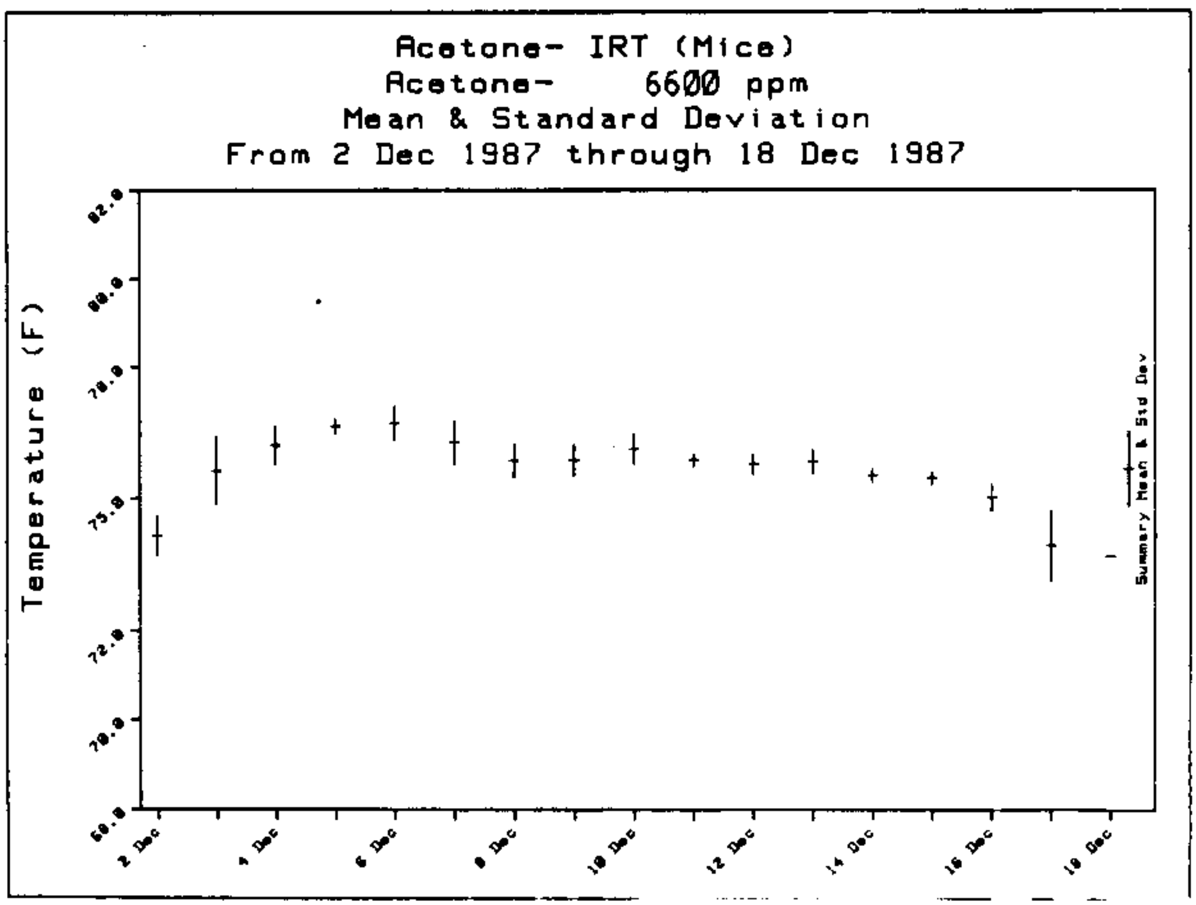
Date	Mean	% Target	Std Dev	% RSD	Maximum	Minimum	N	N in	% N in
2 Dec 1987	72.0	96%	.32	0%	72.4	71.6	7.	4.	57%
3 Dec 1987	73.2	98%	.69	1%	73.9	72.0	8.	8.	100%
4 Dec 1987	73.9	99%	.42	1%	74.5	73.5	8.	8.	100%
5 Dec 1987	74.6	99%	.18	0%	74.9	74.4	8.	8.	100%
6 Dec 1987	74.6	99%	.28	0%	75.0	74.2	8.	8.	100%
7 Dec 1987	74.3	99%	.50	1%	74.9	73.8	8.	8.	100%
8 Dec 1987	73.7	98%	.42	1%	74.3	72.8	8.	8.	100%
9 Dec 1987	73.9	99%	.38	1%	74.4	73.2	8.	8.	100%
10 Dec 1987	74.1	99%	.32	0%	74.4	73.4	8.	8.	100%
11 Dec 1987	74.1	99%	.16	0%	74.3	73.9	8.	8.	100%
12 Dec 1987	74.1	99%	.21	0%	74.4	73.7	8.	8.	100%
13 Dec 1987	74.2	99%	.21	0%	74.5	73.9	8.	8.	100%
14 Dec 1987	73.9	98%	.11	0%	74.0	73.7	8.	8.	100%
15 Dec 1987	73.8	98%	.24	0%	74.0	73.3	8.	8.	100%
16 Dec 1987	73.3	98%	.31	0%	74.0	73.1	8.	8.	100%
17 Dec 1987	73.1	98%	.13	0%	73.3	73.0	8.	8.	100%
18 Dec 1987	73.2	98%	0.00	0%	73.2	73.2	1.	1.	100%
Summary	73.8	98%	.69	1%	75.0	71.6	128.	125.	98%



Daily Summation For Acetone- IRT (Mice) From 2 Dec 1987 through 18 Dec 1987

Summary Data for: Acetone- 6600 ppm/Temperature 72.0 to 78.0

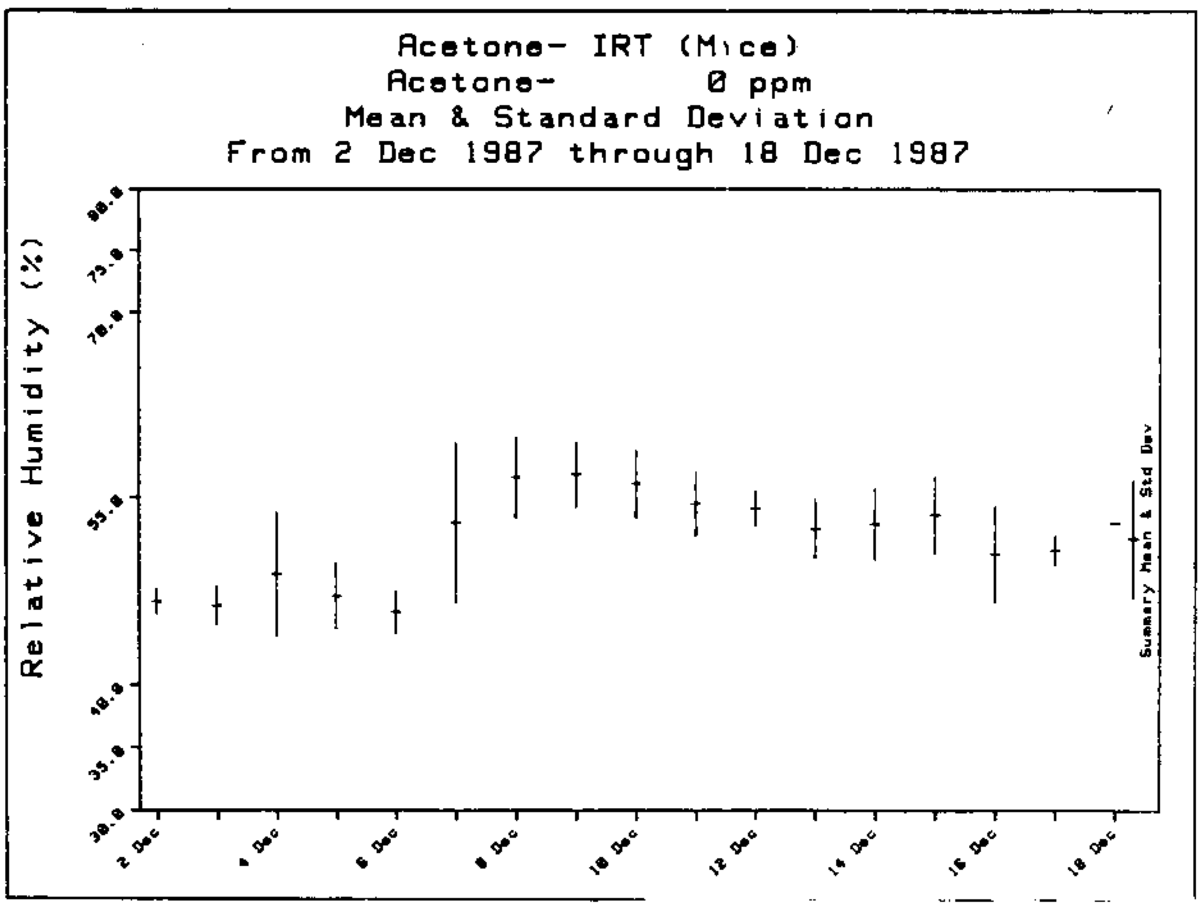
Date	Mean	% Target	Std Dev	% RSD	Maximum	Minimum	N	N in	% N in
2 Dec 1987	74.1	99%	.45	1%	74.7	73.5	7.	7.	100%
3 Dec 1987	75.6	101%	.77	1%	76.3	74.3	8.	8.	100%
4 Dec 1987	76.2	102%	.43	1%	76.9	75.7	8.	8.	100%
5 Dec 1987	76.7	102%	.17	0%	76.9	76.4	8.	8.	100%
6 Dec 1987	76.7	102%	.39	1%	77.3	76.0	8.	8.	100%
7 Dec 1987	76.3	102%	.50	1%	77.0	75.8	8.	8.	100%
8 Dec 1987	75.9	101%	.38	1%	76.4	75.1	8.	8.	100%
9 Dec 1987	75.9	101%	.35	0%	76.3	75.4	8.	8.	100%
10 Dec 1987	76.1	102%	.33	0%	76.5	75.5	8.	8.	100%
11 Dec 1987	75.9	101%	.13	0%	76.1	75.7	8.	8.	100%
12 Dec 1987	75.8	101%	.22	0%	76.2	75.6	8.	8.	100%
13 Dec 1987	75.9	101%	.27	0%	76.3	75.4	8.	8.	100%
14 Dec 1987	75.5	101%	.15	0%	75.8	75.4	8.	8.	100%
15 Dec 1987	75.5	101%	.14	0%	75.6	75.3	8.	8.	100%
16 Dec 1987	75.0	100%	.32	0%	75.6	74.7	8.	8.	100%
17 Dec 1987	73.9	99%	.80	1%	75.0	72.9	8.	8.	100%
18 Dec 1987	73.7	98%	0.00	0%	73.7	73.7	1.	1.	100%
Summary	75.7	101%	.85	1%	77.3	72.9	128.	128.	100%



Daily Summation For Acetone- IRT (Mice) From 2 Dec 1987 through 18 Dec 1987

Summary Data for: Acetone- 0 ppm/Relative Humidity 40.0 to 70.0

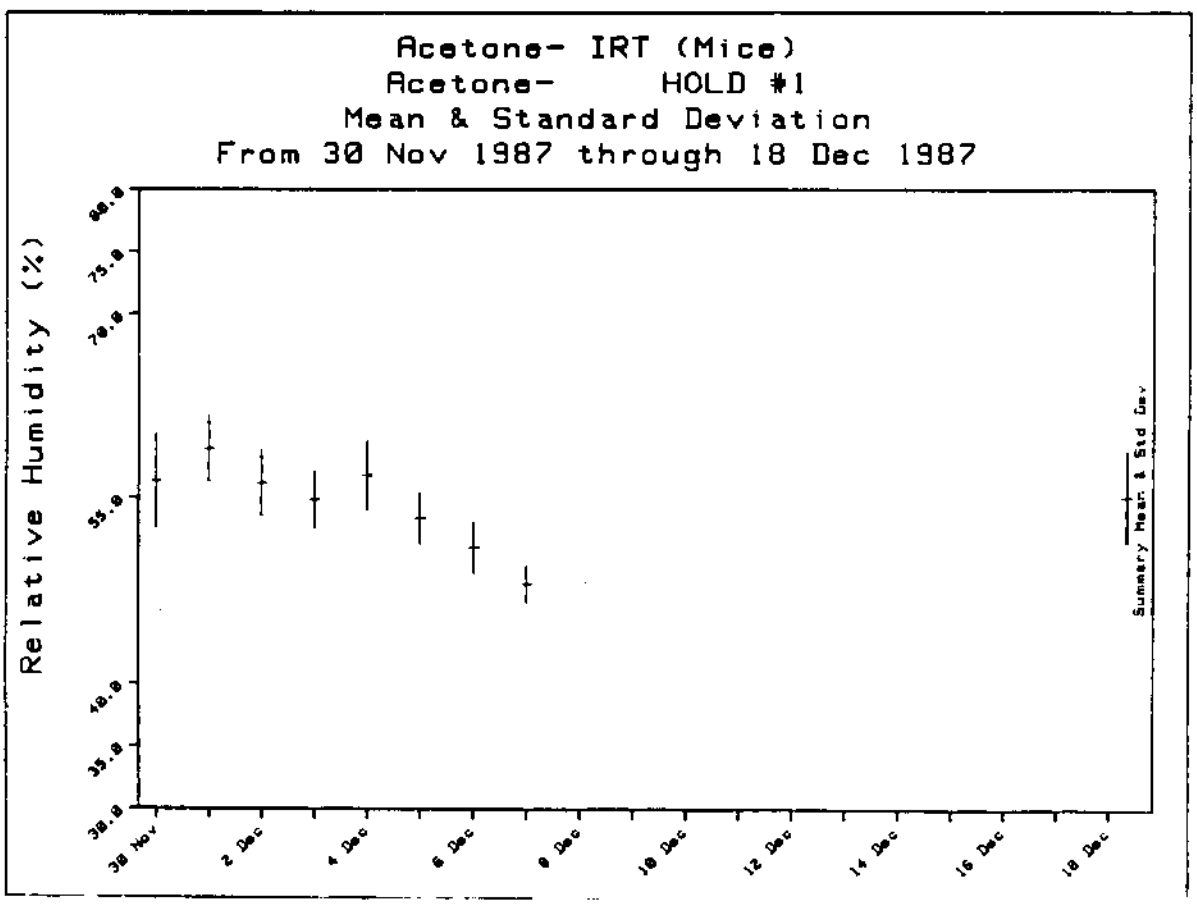
Date	Mean	% Target	Std Dev	% RSD	Maximum	Minimum	N	N in	% N in
2 Dec 1987	46.7	85%	.95	2%	48.0	45.0	7.	7.	100%
3 Dec 1987	46.4	84%	1.51	3%	48.0	44.0	8.	8.	100%
4 Dec 1987	48.9	89%	4.88	10%	55.0	43.0	8.	8.	100%
5 Dec 1987	47.1	86%	2.64	6%	51.0	44.0	8.	8.	100%
6 Dec 1987	45.9	83%	1.73	4%	49.0	43.0	8.	8.	100%
7 Dec 1987	53.0	96%	6.39	12%	61.0	42.0	8.	8.	100%
8 Dec 1987	56.6	103%	3.20	6%	59.0	50.0	8.	8.	100%
9 Dec 1987	56.9	103%	2.59	5%	61.0	54.0	8.	8.	100%
10 Dec 1987	56.1	102%	2.70	5%	59.0	50.0	8.	8.	100%
11 Dec 1987	54.5	99%	2.51	5%	58.0	50.0	8.	8.	100%
12 Dec 1987	54.1	98%	1.36	3%	56.0	52.0	8.	8.	100%
13 Dec 1987	52.5	95%	2.33	4%	55.0	49.0	8.	8.	100%
14 Dec 1987	52.9	96%	2.80	5%	56.0	47.0	8.	8.	100%
15 Dec 1987	53.6	97%	3.07	6%	56.0	47.0	8.	8.	100%
16 Dec 1987	50.5	92%	3.85	8%	54.0	42.0	8.	8.	100%
17 Dec 1987	50.8	92%	1.16	2%	52.0	49.0	8.	8.	100%
18 Dec 1987	53.0	96%	0.00	0%	53.0	53.0	1.	1.	100%
Summary	51.7	94%	4.61	9%	61.0	42.0	128.	128.	100%



Daily Summation For Acetone- IRT (Mice)   From 30 Nov 1987 through 18 Dec 1987

Summary Data for: Acetone-   HOLD #1/Relative Humidity   40.0 to 70.0

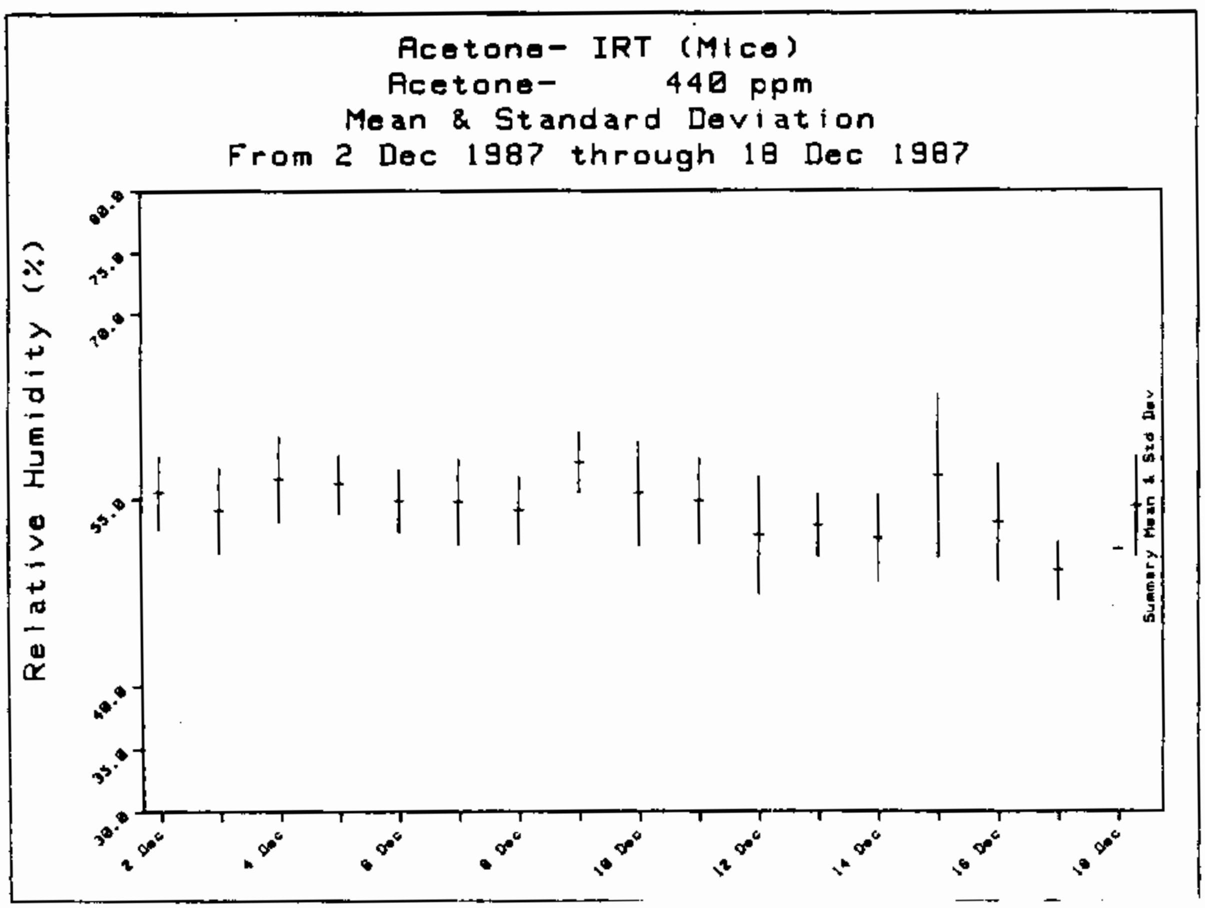
Date	Mean	% Target	Std Dev	% RSD	Maximum	Minimum	N	N in	% N in
30 Nov 1987	56.4	103%	3.82	7%	62.0	51.0	7.	7.	100%
1 Dec 1987	59.0	107%	2.67	5%	62.0	55.0	8.	8.	100%
2 Dec 1987	56.3	102%	2.71	5%	60.0	52.0	8.	8.	100%
3 Dec 1987	54.9	100%	2.30	4%	59.0	52.0	8.	8.	100%
4 Dec 1987	56.9	103%	2.80	5%	61.0	54.0	8.	8.	100%
5 Dec 1987	53.4	97%	2.07	4%	56.0	50.0	8.	8.	100%
6 Dec 1987	51.0	93%	2.00	4%	53.0	47.0	8.	8.	100%
7 Dec 1987	48.0	87%	1.41	3%	49.0	47.0	2.	2.	100%
8 Dec 1987									
9 Dec 1987									
10 Dec 1987									
11 Dec 1987									
12 Dec 1987									
13 Dec 1987									
14 Dec 1987									
15 Dec 1987									
16 Dec 1987									
17 Dec 1987									
18 Dec 1987									
Summary	55.1	100%	3.71	7%	62.0	47.0	57.	57.	100%



Daily Summation For Acetone- IRT (Mice) From 2 Dec 1987 through 18 Dec 1987

Summary Data for: Acetone- 440 ppm/Relative Humidity 40.0 to 70.0

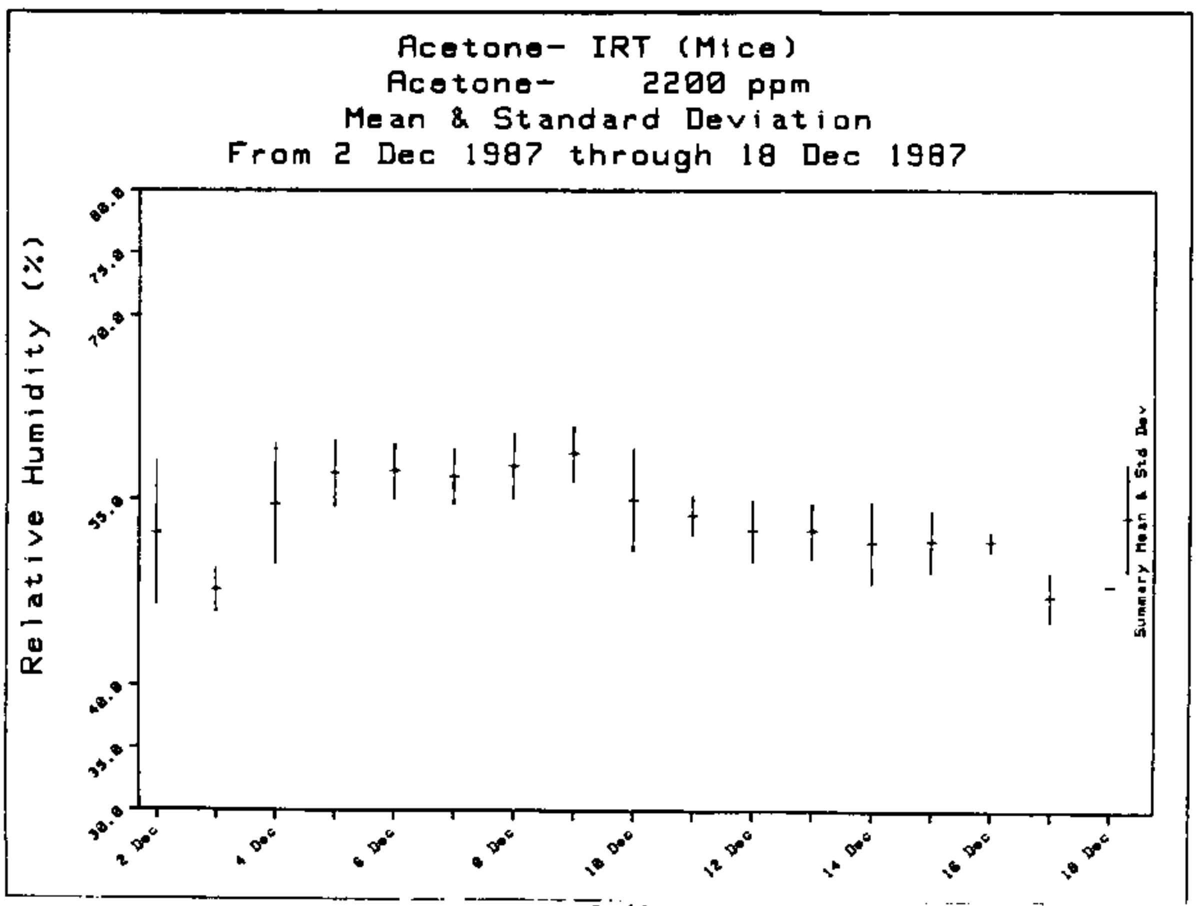
Date	Mean	% Target	Std Dev	% RSD	Maximum	Minimum	N	N in	% N in
2 Dec 1987	55.6	101%	2.94	5%	59.0	51.0	7.	7.	100%
3 Dec 1987	54.1	98%	3.48	6%	59.0	48.0	8.	8.	100%
4 Dec 1987	56.6	103%	3.42	6%	62.0	51.0	8.	8.	100%
5 Dec 1987	56.3	102%	2.31	4%	59.0	53.0	8.	8.	100%
6 Dec 1987	54.9	100%	2.47	5%	57.0	50.0	8.	8.	100%
7 Dec 1987	54.7	100%	3.45	6%	59.0	50.0	8.	8.	100%
8 Dec 1987	54.1	98%	2.70	5%	59.0	50.0	8.	8.	100%
9 Dec 1987	58.0	105%	2.45	4%	60.0	53.0	8.	8.	100%
10 Dec 1987	55.5	101%	4.14	7%	60.0	47.0	8.	8.	100%
11 Dec 1987	54.9	100%	3.40	6%	59.0	49.0	8.	8.	100%
12 Dec 1987	52.1	95%	4.73	9%	57.0	45.0	8.	8.	100%
13 Dec 1987	52.9	96%	2.47	5%	55.0	49.0	8.	8.	100%
14 Dec 1987	51.9	94%	3.44	7%	56.0	45.0	8.	8.	100%
15 Dec 1987	56.9	103%	6.56	12%	62.0	45.0	8.	8.	100%
16 Dec 1987	53.1	97%	4.67	9%	62.0	50.0	8.	8.	100%
17 Dec 1987	49.2	90%	2.31	5%	51.0	45.0	8.	8.	100%
18 Dec 1987	51.0	93%	0.00	0%	51.0	51.0	1.	1.	100%
Summary	54.4	99%	4.01	7%	62.0	45.0	128.	128.	100%



Daily Summation For Acetone- IRT (Mice)   From 2 Dec 1987 through 18 Dec 1987

Summary Data for: Acetone-   2200 ppm/Relative Humidity   40.0 to 70.0

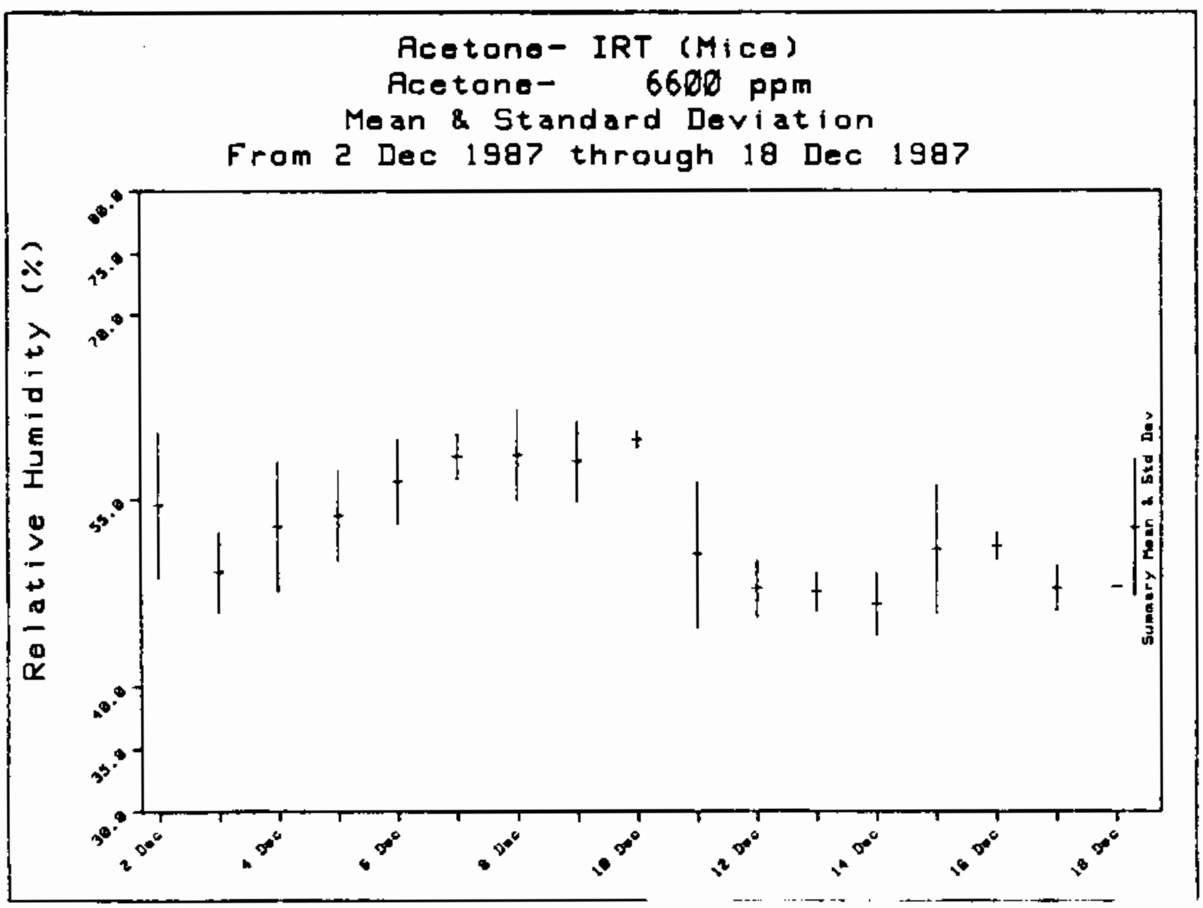
Date	Mean	% Target	Std Dev	% RSD	Maximum	Minimum	N	N in	% N in
2 Dec 1987	52.3	95%	5.82	11%	61.0	47.0	7.	7.	100%
3 Dec 1987	47.6	87%	1.77	4%	50.0	45.0	8.	8.	100%
4 Dec 1987	54.6	99%	4.87	9%	60.0	48.0	8.	8.	100%
5 Dec 1987	57.1	104%	2.70	5%	60.0	53.0	8.	8.	100%
6 Dec 1987	57.4	104%	2.20	4%	61.0	54.0	8.	8.	100%
7 Dec 1987	56.9	103%	2.23	4%	59.0	54.0	8.	8.	100%
8 Dec 1987	57.8	105%	2.66	5%	60.0	52.0	8.	8.	100%
9 Dec 1987	58.8	107%	2.25	4%	61.0	54.0	8.	8.	100%
10 Dec 1987	55.0	100%	4.11	7%	59.0	46.0	8.	8.	100%
11 Dec 1987	53.7	98%	1.58	3%	57.0	52.0	8.	8.	100%
12 Dec 1987	52.5	95%	2.51	5%	56.0	49.0	8.	8.	100%
13 Dec 1987	52.5	95%	2.20	4%	55.0	48.0	8.	8.	100%
14 Dec 1987	51.5	94%	3.34	6%	56.0	45.0	8.	8.	100%
15 Dec 1987	51.6	94%	2.50	5%	54.0	46.0	8.	8.	100%
16 Dec 1987	51.6	94%	.74	1%	52.0	50.0	8.	8.	100%
17 Dec 1987	47.1	86%	1.96	4%	50.0	45.0	8.	8.	100%
18 Dec 1987	48.0	87%	0.00	0%	48.0	48.0	1.	1.	100%
Summary	53.6	97%	4.36	8%	61.0	45.0	128.	128.	100%



Daily Summation For Acetone- IRT (Mice) From 2 Dec 1987 through 18 Dec 1987

Summary Data for: Acetone- 6600 ppm/Relative Humidity 40.0 to 70.0

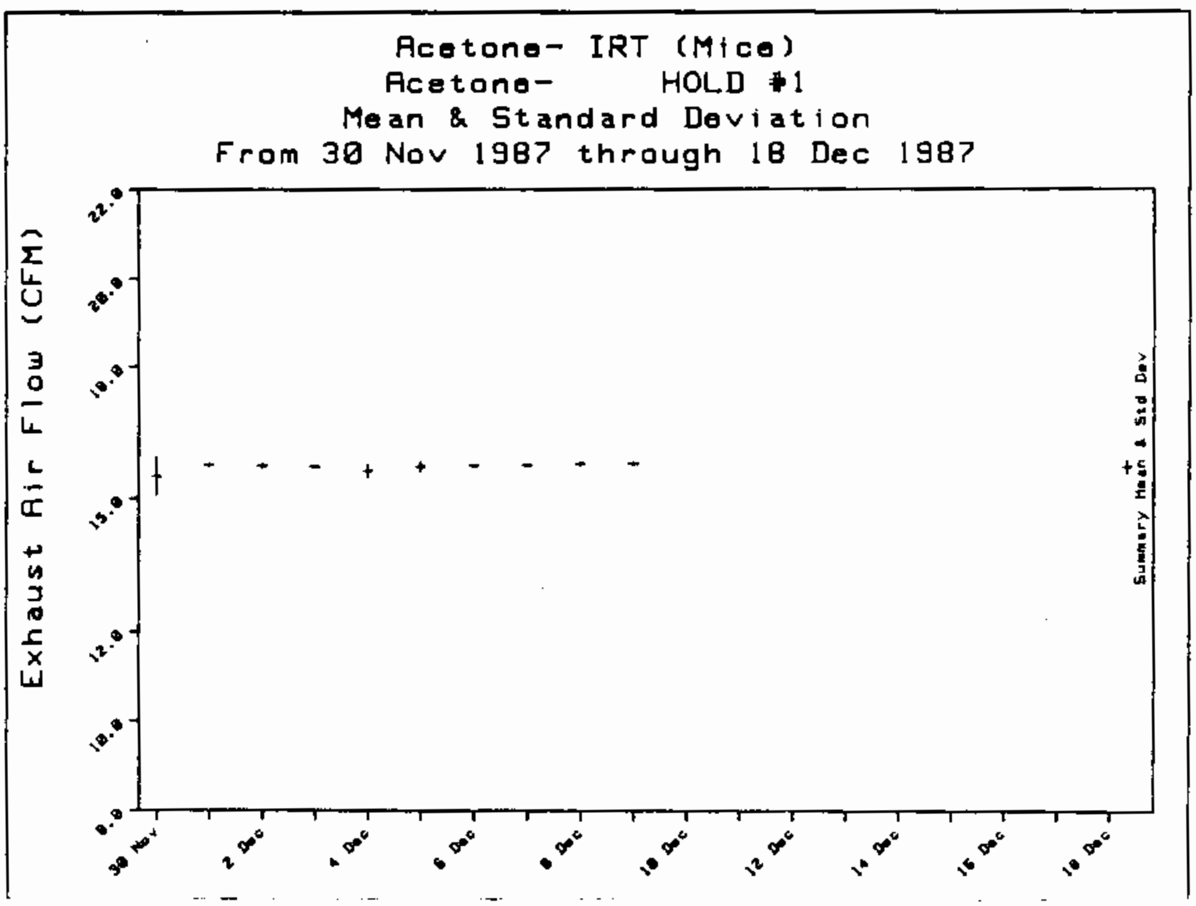
Date	Mean	% Target	Std Dev	% RSD	Maximum	Minimum	N	N in	% N in
2 Dec 1987	54.6	99%	5.88	11%	64.0	49.0	7.	7.	100%
3 Dec 1987	49.2	90%	3.28	7%	52.0	43.0	8.	8.	100%
4 Dec 1987	52.9	96%	5.22	10%	60.0	47.0	8.	8.	100%
5 Dec 1987	53.7	98%	3.62	7%	58.0	47.0	8.	8.	100%
6 Dec 1987	56.5	103%	3.42	6%	60.0	50.0	8.	8.	100%
7 Dec 1987	58.5	106%	1.85	3%	61.0	56.0	8.	8.	100%
8 Dec 1987	58.6	107%	3.62	6%	62.0	51.0	8.	8.	100%
9 Dec 1987	58.1	106%	3.23	6%	63.0	52.0	8.	8.	100%
10 Dec 1987	59.9	109%	.64	1%	61.0	59.0	8.	8.	100%
11 Dec 1987	50.6	92%	5.83	12%	61.0	47.0	8.	8.	100%
12 Dec 1987	47.9	87%	2.23	5%	50.0	43.0	8.	8.	100%
13 Dec 1987	47.6	87%	1.51	3%	50.0	45.0	8.	8.	100%
14 Dec 1987	46.6	85%	2.50	5%	49.0	41.0	8.	8.	100%
15 Dec 1987	51.0	93%	5.15	10%	58.0	40.0	8.	8.	100%
16 Dec 1987	51.2	93%	1.04	2%	52.0	49.0	8.	8.	100%
17 Dec 1987	47.9	87%	1.81	4%	50.0	45.0	8.	8.	100%
18 Dec 1987	48.0	87%	0.00	0%	48.0	48.0	1.	1.	100%
Summary	52.8	96%	5.47	10%	64.0	40.0	128.	128.	100%



Daily Summation For Acetone- IRT (Mice)   From 30 Nov 1987 through 18 Dec 1987

Summary Data for: Acetone-   HOLD #1/Exhaust Air Flow   12.0 to 18.0

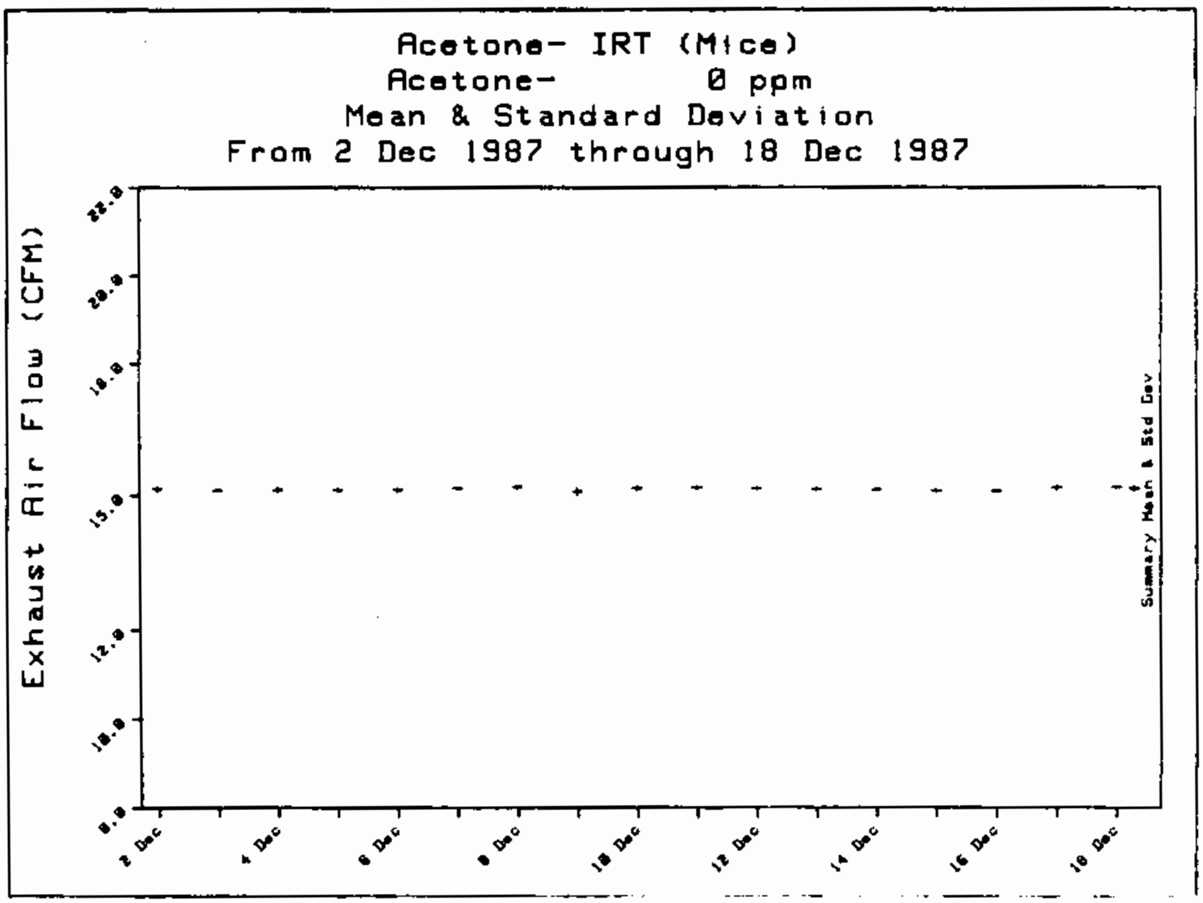
Date	Mean	% Target	Std Dev	% RSD	Maximum	Minimum	N	N in	% N in
30 Nov 1987	15.5	103%	.43	3%	15.8	14.7	7.	7.	100%
1 Dec 1987	15.8	105%	.02	0%	15.8	15.8	8.	8.	100%
2 Dec 1987	15.8	105%	.05	0%	15.9	15.7	8.	8.	100%
3 Dec 1987	15.7	105%	.03	0%	15.8	15.7	8.	8.	100%
4 Dec 1987	15.6	104%	.14	1%	15.8	15.5	8.	8.	100%
5 Dec 1987	15.7	105%	.11	1%	15.9	15.5	8.	8.	100%
6 Dec 1987	15.8	105%	.02	0%	15.8	15.7	8.	8.	100%
7 Dec 1987	15.8	105%	.03	0%	15.8	15.7	8.	8.	100%
8 Dec 1987	15.8	105%	.04	0%	15.9	15.7	8.	8.	100%
9 Dec 1987	15.8	105%	.03	0%	15.8	15.8	2.	2.	100%
10 Dec 1987									
11 Dec 1987									
12 Dec 1987									
13 Dec 1987									
14 Dec 1987									
15 Dec 1987									
16 Dec 1987									
17 Dec 1987									
18 Dec 1987									
Summary	15.7	105%	.16	1%	15.9	14.7	73.	73.	100%



Daily Summation For Acetone- IRT (Mice)   From 2 Dec 1987 through 18 Dec 1987

Summary Data for: Acetone-   0 ppm/Exhaust Air Flow   12.0 to 18.0

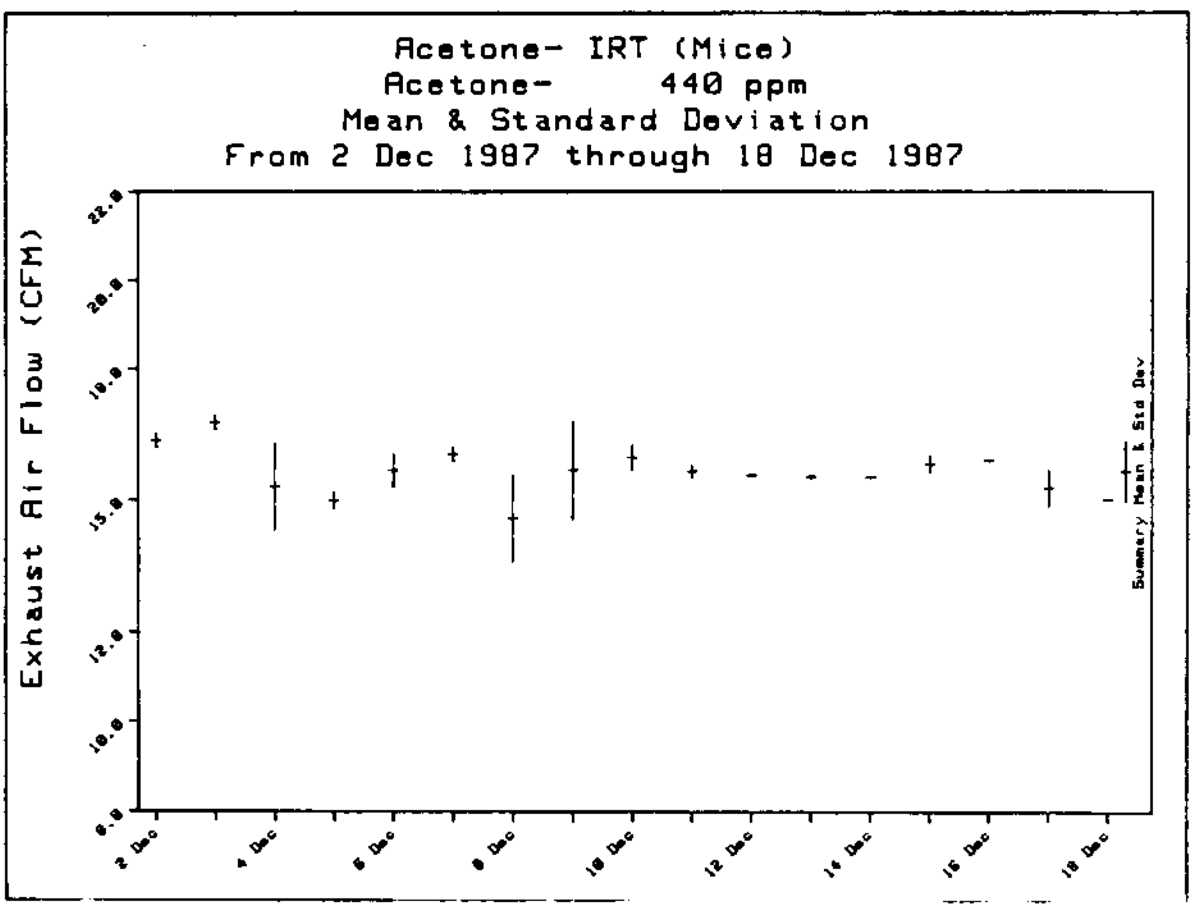
Date	Mean	% Target	Std Dev	% RSD	Maximum	Minimum	N	N in	% N in
2 Dec 1987	15.2	101%	.05	0%	15.3	15.1	7.	7.	100%
3 Dec 1987	15.1	101%	.02	0%	15.1	15.1	8.	8.	100%
4 Dec 1987	15.1	101%	.05	0%	15.2	15.1	8.	8.	100%
5 Dec 1987	15.1	101%	.02	0%	15.2	15.1	8.	8.	100%
6 Dec 1987	15.1	101%	.04	0%	15.2	15.1	8.	8.	100%
7 Dec 1987	15.2	101%	.03	0%	15.2	15.1	8.	8.	100%
8 Dec 1987	15.2	101%	.04	0%	15.2	15.1	8.	8.	100%
9 Dec 1987	15.1	101%	.07	0%	15.2	15.0	8.	8.	100%
10 Dec 1987	15.2	101%	.04	0%	15.2	15.1	8.	8.	100%
11 Dec 1987	15.2	101%	.02	0%	15.2	15.1	8.	8.	100%
12 Dec 1987	15.2	101%	.02	0%	15.2	15.1	8.	8.	100%
13 Dec 1987	15.1	101%	.02	0%	15.2	15.1	8.	8.	100%
14 Dec 1987	15.1	101%	.02	0%	15.2	15.1	8.	8.	100%
15 Dec 1987	15.1	101%	.02	0%	15.1	15.1	8.	8.	100%
16 Dec 1987	15.1	101%	.01	0%	15.1	15.1	8.	8.	100%
17 Dec 1987	15.2	101%	.05	0%	15.2	15.1	8.	8.	100%
18 Dec 1987	15.2	101%	0.00	0%	15.2	15.2	1.	1.	100%
Summary	15.1	101%	.05	0%	15.3	15.0	128.	128.	100%



Daily Summation For Acetone- IRT (Mice)   From 2 Dec 1987 through 18 Dec 1987

Summary Data for: Acetone-   440 ppm/Exhaust Air Flow   12.0 to 18.0

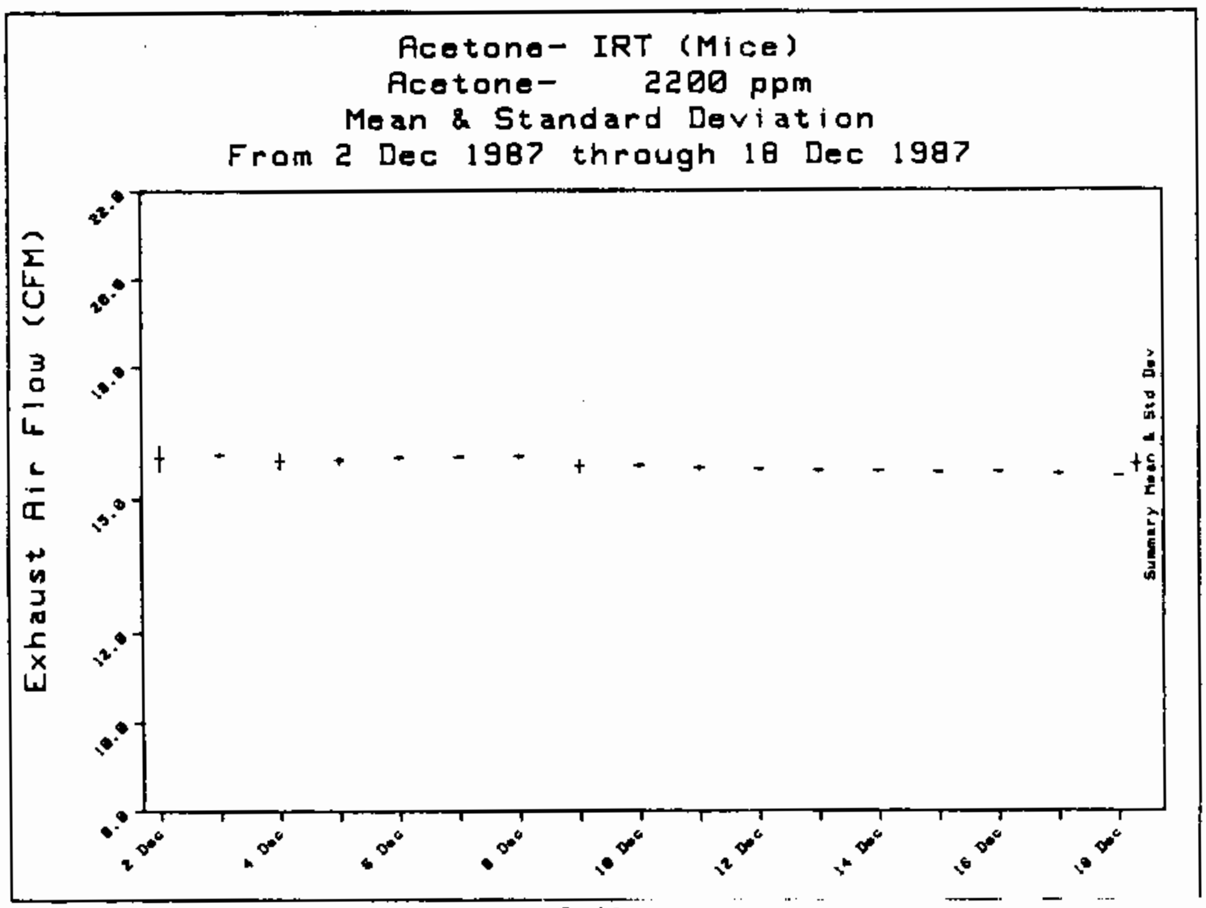
Date	Mean	% Target	Std Dev	% RSD	Maximum	Minimum	N	N in	% N in
2 Dec 1987	16.4	109%	.16	1%	16.6	16.1	7.	7.	100%
3 Dec 1987	16.8	112%	.16	1%	16.9	16.4	8.	8.	100%
4 Dec 1987	15.3	102%	.98	6%	16.9	14.5	8.	8.	100%
5 Dec 1987	15.0	100%	.19	1%	15.1	14.5	8.	8.	100%
6 Dec 1987	15.7	105%	.38	2%	15.9	15.1	8.	8.	100%
7 Dec 1987	16.1	107%	.15	1%	16.2	15.9	8.	8.	100%
8 Dec 1987	14.6	97%	1.01	7%	16.2	13.9	8.	8.	100%
9 Dec 1987	15.7	105%	1.11	7%	16.3	13.9	8.	8.	100%
10 Dec 1987	16.0	106%	.28	2%	16.4	15.5	8.	8.	100%
11 Dec 1987	15.7	104%	.14	1%	15.9	15.5	8.	8.	100%
12 Dec 1987	15.6	104%	.02	0%	15.6	15.5	8.	8.	100%
13 Dec 1987	15.5	104%	.04	0%	15.6	15.5	8.	8.	100%
14 Dec 1987	15.5	104%	.02	0%	15.6	15.5	8.	8.	100%
15 Dec 1987	15.8	105%	.19	1%	16.0	15.5	8.	8.	100%
16 Dec 1987	15.9	106%	.02	0%	16.0	15.9	8.	8.	100%
17 Dec 1987	15.3	102%	.40	3%	16.0	15.0	8.	8.	100%
18 Dec 1987	15.0	100%	0.00	0%	15.0	15.0	1.	1.	100%
Summary	15.7	104%	.68	4%	16.9	13.9	128.	128.	100%



Daily Summation For Acetone- IRT (Mice)   From 2 Dec 1987 through 18 Dec 1987

Summary Data for: Acetone-   2200 ppm/Exhaust Air Flow   12.0 to 18.0

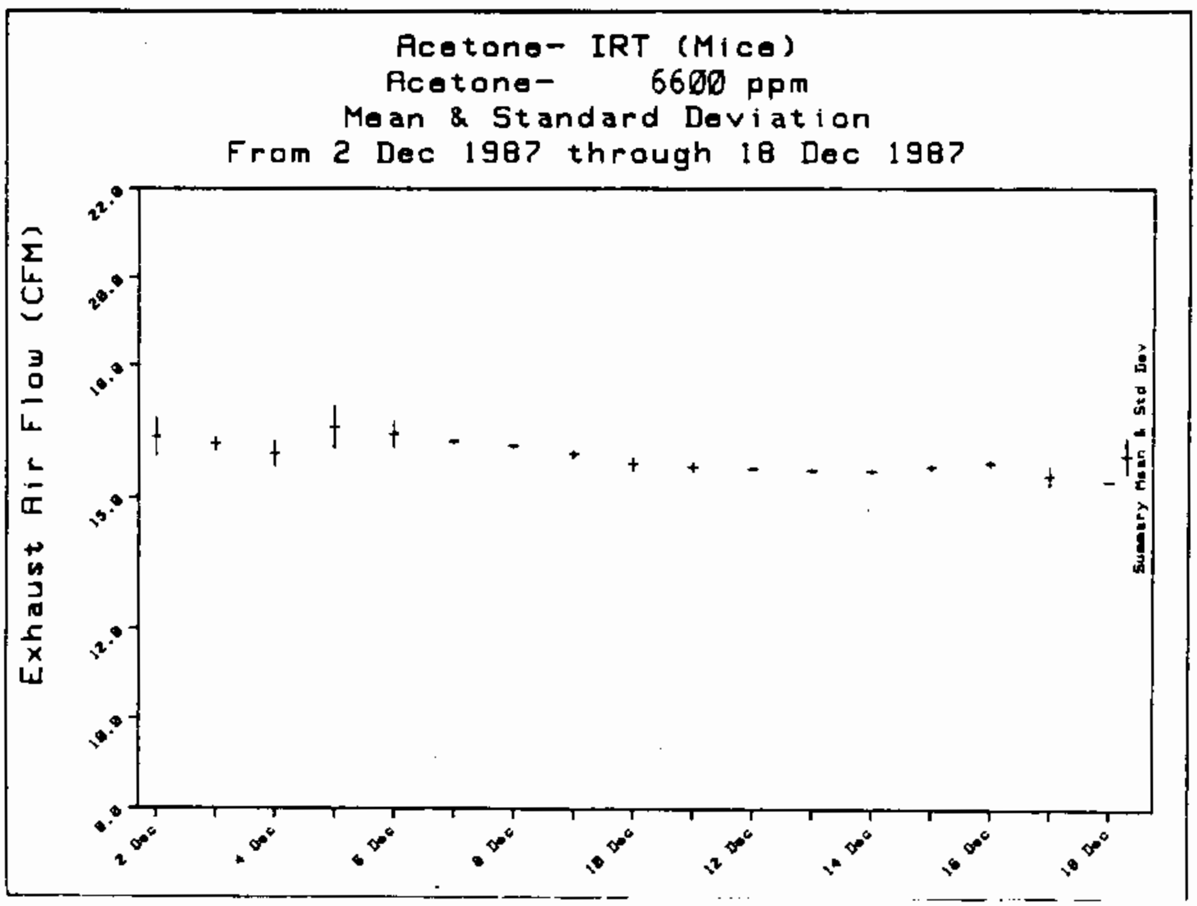
Date	Mean	% Target	Std Dev	% RSD	Maximum	Minimum	N	N in	% N in
2 Dec 1987	15.9	106%	.29	2%	16.3	15.3	7.	7.	100%
3 Dec 1987	16.0	107%	.03	0%	16.0	16.0	8.	8.	100%
4 Dec 1987	15.9	106%	.19	1%	16.1	15.7	8.	8.	100%
5 Dec 1987	15.9	106%	.09	1%	16.0	15.7	8.	8.	100%
6 Dec 1987	15.9	106%	.03	0%	16.0	15.9	8.	8.	100%
7 Dec 1987	15.9	106%	.03	0%	16.0	15.9	8.	8.	100%
8 Dec 1987	16.0	106%	.04	0%	16.0	15.9	8.	8.	100%
9 Dec 1987	15.7	105%	.14	1%	16.0	15.6	8.	8.	100%
10 Dec 1987	15.8	105%	.03	0%	15.8	15.7	8.	8.	100%
11 Dec 1987	15.7	105%	.05	0%	15.8	15.6	8.	8.	100%
12 Dec 1987	15.7	104%	.02	0%	15.7	15.6	8.	8.	100%
13 Dec 1987	15.6	104%	.04	0%	15.7	15.6	8.	8.	100%
14 Dec 1987	15.6	104%	.02	0%	15.6	15.6	8.	8.	100%
15 Dec 1987	15.6	104%	.03	0%	15.6	15.5	8.	8.	100%
16 Dec 1987	15.6	104%	.03	0%	15.6	15.5	8.	8.	100%
17 Dec 1987	15.5	104%	.04	0%	15.6	15.5	8.	8.	100%
18 Dec 1987	15.5	103%	0.00	0%	15.5	15.5	1.	1.	100%
Summary	15.8	105%	.18	1%	16.3	15.3	128.	128.	100%



Daily Summation For Acetone- IRT (Mice) From 2 Dec 1987 through 18 Dec 1987

Summary Data for: Acetone- 6600 ppm/Exhaust Air Flow 12.0 to 18.0

Date	Mean	% Target	Std Dev	% RSD	Maximum	Minimum	N	N in	% N in
2 Dec 1987	16.4	109%	.43	3%	16.6	15.4	7.	7.	100%
3 Dec 1987	16.2	108%	.15	1%	16.6	16.1	8.	8.	100%
4 Dec 1987	16.0	107%	.28	2%	16.5	15.8	8.	8.	100%
5 Dec 1987	16.6	111%	.47	3%	17.0	15.8	8.	8.	100%
6 Dec 1987	16.4	110%	.30	2%	16.9	16.3	8.	8.	100%
7 Dec 1987	16.3	109%	.04	0%	16.4	16.2	8.	8.	100%
8 Dec 1987	16.2	108%	.03	0%	16.2	16.1	8.	8.	100%
9 Dec 1987	16.0	107%	.10	1%	16.2	15.9	8.	8.	100%
10 Dec 1987	15.8	105%	.15	1%	16.0	15.7	8.	8.	100%
11 Dec 1987	15.7	105%	.10	1%	16.0	15.7	8.	8.	100%
12 Dec 1987	15.7	104%	.02	0%	15.7	15.6	8.	8.	100%
13 Dec 1987	15.6	104%	.03	0%	15.7	15.6	8.	8.	100%
14 Dec 1987	15.6	104%	.02	0%	15.7	15.6	8.	8.	100%
15 Dec 1987	15.7	105%	.06	0%	15.8	15.6	8.	8.	100%
16 Dec 1987	15.8	105%	.07	0%	15.9	15.7	8.	8.	100%
17 Dec 1987	15.5	103%	.22	1%	15.9	15.2	8.	8.	100%
18 Dec 1987	15.4	103%	0.00	0%	15.4	15.4	1.	1.	100%
Summary	16.0	106%	.39	2%	17.0	15.2	128.	128.	100%



CHAMBER UNIFORMITY DATA SHEET

COMPOUND: Acetone IRT **EXPOSURE ROOM NUMBER:** 436

TPV MEASUREMENTS

CHAMBER:	#6 / 440 ppm		#7 / 2200 ppm		#8 / 6600 ppm					
DATE:	12/6/87		12/6/87		12/6/87					
SAMPLE PORT	MONITOR READING	% of Mean	MONITOR READING	% of Mean	MONITOR READING	% of Mean	MONITOR READING	% of Mean	MONITOR READING	% of Mean
BACK: 1B	214500.0	100.0%	1055000.0	100.4%	3038000.0	100.5%				
2B										
3B	214000.0	99.8%	1055000.0	100.4%	3031000.0	100.2%				
4B	214700.0	100.1%	1047000.0	99.7%	3029000.0	100.2%				
5B										
6B										
FRONT: 1F										
2F										
3F	214900.0	100.2%	1051000.0	100.0%	2993000.0	99.0%				
4F	214100.0	99.8%	1045000.0	99.5%	3030000.0	100.2%				
5F										
6F										
MEAN:	214440.0	100.0%	1050600.0	100.0%	3024200.0	100.0%				
TPV:	384.71	0.2%	4560.70	0.4%	17796.07	0.6%				
BPV:	//////////////////	≤0 %	//////////////////	≤0 %	//////////////////	≤0 %	//////////////////		//////////////////	

WPV MEASUREMENTS

IN-LINE 1st	214500.0	100.1%	1055000.0	100.5%	3038000.0	99.9%				
2nd	213700.0	99.8%	1047000.0	99.7%	3063000.0	100.8%				
3rd	214400.0	100.1%	1047000.0	99.7%	3018000.0	99.3%				
MEAN:	214200.0	100.0%	1049666.7	100.0%	3039666.7	100.0%				
WPV:	435.89	0.2%	4618.80	0.4%	22546.25	0.7%				

MONITOR TYPE: GC SERIAL # : N809422

MONITOR DATA LOCATION: 2B

COMMENTS: Note change in dose in chamber #8

Study with Mice

ENTERED BY: LL Trent DATE: 12/10/87 REVIEWED BY: RJ Weigel RJW DATE: 3/18/88

EXPOSURE OPERATION DISCUSSION SHEET

INCLUDES DISCUSSIONS AND/OR EXPLANATIONS OF PROBLEMS AFFECTING ANIMAL ENVIRONMENT AND EXPOSURES. EXPLANATIONS ARE INCLUDED FOR DATA IN WHICH THERE WERE EXCURSIONS OF DAILY MEAN OR STANDARD DEVIATION BEYOND ALLOWABLE OPERATING LIMITS OR EXCURSIONS OF INDIVIDUAL DATUM BEYOND CRITICAL LIMITS.

STUDY: IRT Acetone Inhalation Reproductive Teratology Study

REPORTING PERIOD: December 1-30, 1987
NOTE: 24 Hour Data Collection Period extends from ~5:00 a.m. to ~5:00 a.m.

COMPILED BY: R.J. Weigel RJW **DATE:** 12 / 28 / 87

CHAMBER CONCENTRATION

DATE	DISCUSSION OR EXPLANATION
12/3/87	Target concentration for the high chamber was changed from 11000 ppm to 6600 ppm. This level remained the target for the remainder of the study.
12/6/87	Exposure ended at 15:14. At 15:22, concentration in the Room was measured at 16.6 ppm; at 15:25, concentration in the 0 ppm chamber was measured at 3.8 ppm. Readings before and after these showed no unusual levels in either chamber. The reason for these readings are not known. Animal care personnel have been reminded to wait the appropriate period before opening exposure chambers at the end of exposure days.
12/9/87	Exposures were interrupted at 9:12 after 23 minutes (11 minutes after T_{90} was reached) because food had been left in the exposure chambers. Following decay of concentration levels in the chambers, the food was removed and exposures were reinitiated at 10:12. The second exposure period ran for 5: 36 after T_{90} was reached (6 hrs - 23 minutes of prior exposure).
12/17/87	Exposures were terminated early on this last day of testing after 5:09 when the heater element burned out in one of the high chamber generators. Initial shutdown of the exposure occurred at 13:43, causing levels in all three chambers to fall below the critical low limits. At 14:16, the exposure was terminated when the problem was diagnosed and reported to the principal investigator. The readings below the critical levels were:

Time	Chamber	Concentration	% Target(Daily Ave)	%RSD
13:46	440 ppm	316 ppm		
14:08	440 ppm	7.6 ppm	85%	36%
14:06	2200 ppm	15.2 ppm	88%	35%
14:03	11000 ppm	113 ppm	89%	35%

TEMPERATURE & RELATIVE HUMIDITY

DATE	DISCUSSION OR EXPLANATION
12/16/87	Room temperature (66.9°F) exceeded the lower alarm limit (67°F) at 08:16. Animal care personnel were cleaning the floor at this time and may have sprayed the sensor with water. A manual reading at 09:35 showed a room temperature of 73.7°F.

CHAMBER FLOW & VACUUM

DATE	DISCUSSION OR EXPLANATION
	No problems or excursions to report during this period.

APPENDIX C

DEVELOPMENTAL TOXICOLOGY DATA

Acetone Rat Teratology Study: Body Weights and Urine Parameters for Virgin Females

Ø ppm Acetone

Matno	Pre-study Wt(g)	Exposure Day1 (g)	Exposure Day5 (g)	Exposure Day1Ø (g)	Sacrifice Wt(g)	PH
67Ø	28Ø.8	286.3	312.3	305.5	316.Ø	8.Ø
74Ø	272.9	294.3	283.8	294.Ø	299.2	8.Ø
753	285.1	295.Ø	3Ø4.1	3ØØ.8	3Ø7.7	8.Ø
77Ø	285.3	288.4	288.9	292.1	287.1	7.Ø
775	294.9	297.7	312.8	315.6	316.1	8.5
788	278.Ø	282.3	3ØØ.6	3Ø2.6	299.Ø	8.5
835	25Ø.3	265.4	273.8	276.Ø	274.9	8.Ø
851	232.7	243.6	249.7	243.2	247.3	8.5
652	262.5	275.Ø	276.8	288.8	282.9	8.5
658	269.9	272.8	272.3	281.5	271.4	8.Ø

Matno	Protein (mg/dL)	Glucose (mg/dL)	Ketone (mg/dL)	Bilirubin (Ø-3)	Blood (Ø-4)	Urobilinogen (Ehrlich units/dL)
67Ø	3ØØ	Ø	Ø	Ø	Ø	Ø
74Ø	3Ø	Ø	Ø	Ø	1	Ø
753	1ØØ	Ø	5	Ø	Ø	Ø
77Ø	3Ø	Ø	Ø	Ø	Ø	Ø
775	3Ø	Ø	Ø	Ø	Ø	Ø
788	3Ø	Ø	Ø	Ø	1	Ø
835	3Ø	Ø	Ø	Ø	Ø	Ø
851	1ØØ	Ø	Ø	Ø	Ø	Ø
652	1ØØ	Ø	Ø	Ø	Ø	Ø
658	3Ø	Ø	Ø	Ø	3	Ø

Acetone Rat Teratology Study: Body Weights and Urine Parameters for Virgin Females

--- 440 ppm Acetone ---

Matno	Pre-study Wt(g)	Exposure Day1 (g)	Exposure Day5 (g)	Exposure Day10 (g)	Sacrifice Wt(g)	PH	Protein (mg/dL)	Glucose (mg/dL)	Ketone (mg/dL)	Bilirubin (0-3)	Blood (0-4)	Urobilinogen (Ehrlich units/dL)
669	293.6	301.7	309.2	311.7	310.8	8.0	0	0	0	0	0	0
744	276.4	282.8	285.2	304.8	307.5	6.0	0	0	0	0	0	0
790	252.8	278.4	275.2	275.4	279.9	7.5	0	0	0	0	0	0
803	271.4	273.0	277.0	271.3	234.3	6.5	300	0	15	0	1	0
810	282.5	292.2	300.2	304.2	306.8	8.0	30	0	0	0	0	0
837	291.6	301.0	309.2	320.3	327.4	8.5	100	0	0	0	0	0
838	150.7	234.0	252.9	266.4	264.4	6.0	100	0	0	0	0	0
861	259.4	259.2	271.1	288.6	272.2	8.0	30	0	0	0	1	0
882	271.1	274.0	277.6	281.7	270.0	8.5	30	0	0	0	0	0
905	278.3	275.8	275.8	281.6	292.3	8.0	100	0	0	0	0	0

Acetone Rat Teratology Study: Body Weights and Urine Parameters for Virgin Females

--- 2200 ppm Acetone ---

Matno	Pre-study Wt(g)	Exposure Day1 (g)	Exposure Day5 (g)	Exposure Day10 (g)	Sacrifice Wt(g)	PH	Protein (mg/dL)	Glucose (mg/dL)	Ketone (mg/dL)	Bilirubin (0-3)	Blood (0-4)	Urobilinogen (Ehrlich units/dL)
724	260.3	259.9	276.9	282.5	285.4	8.5	30	0	0	0	0	0
737	245.9	259.1	277.3	293.4	273.1	8.5	30	0	0	0	0	0
754	274.0	269.6	286.3	279.6	287.8	8.5	300	0	0	0	0	0
768	284.5	283.1	288.1	292.5	297.5	8.5	30	0	0	0	0	0
796	281.0	299.4	294.8	300.9	317.2	8.0	30	0	0	0	0	0
826	272.2	272.8	278.2	277.7	280.7	8.0	100	0	0	0	0	0
840	305.8	331.3	336.8	340.4	323.1	8.0	100	0	0	0	0	0
841	263.2	274.1	264.3	265.2	276.5	7.5	30	0	0	0	0	0
909	288.8	288.7	294.7	301.8	295.0	6.5	300	0	5	0	0	0
918	169.5	248.6	273.4	292.0	284.1	8.5	100	0	0	0	0	0

Acetone Rat Teratology Study: Body Weights and Urine Parameters for Virgin Females

11000 ppm Acetone

Matno	Pre-study Wt(g)	Exposure Day1 (g)	Exposure Day5 (g)	Exposure Day10 (g)	Sacrifice Wt(g)	PH	Protein (mg/dL)	Glucose (mg/dL)	Ketone (mg/dL)	Bilirubin (0-3)	Blood (0-4)	Urobilinogen (Ehrlich units/dL)
667	283.7	311.4	318.5	316.9	315.4	8.0	0	0	0	0	0	0
692	280.3	276.2	270.4	275.3	270.5	6.5	100	0	0	0	4	0
702	258.5	265.0	257.3	254.5	257.7	8.0	30	0	0	0	1	0
713	294.5	299.4	290.7	289.2	283.3	8.0	30	0	0	0	0	0
733	239.3	256.8	253.7	257.2	257.2	7.5	30	0	0	0	0	0
743	271.8	285.5	290.3	281.4	281.3	8.0	100	0	5	0	0	0
759	263.6	276.2	277.2	283.3	273.0	8.0	15	0	0	0	0	0
762	274.3	295.0	285.5	287.0	291.2	7.0	30	0	40	0	0	0
883	223.5	226.8	225.5	223.9	215.5	8.0	30	0	0	0	0	0
915	292.3	295.6	303.2	298.5	285.7	8.5	30	0	0	0	0	0

Acetone Rat Teratology: Weights (g) and Urine Parameters for Sperm Positive Females

---------- 0 ppm Acetone ----------

Matno	Pregnant	Pre-study Wt(g)	0 dg Wt(g)	6 dg Wt(g)	10 dg Wt(g)	14 dg Wt(g)	17 dg Wt(g)	20 dg Wt(g)	Uter Wt(g)
652	0	249.5	301.2	304.1	314.0	322.0	329.7	323.8	0.14
660	1	243.2	270.9	292.1	298.0	324.3	351.2	385.0	80.75
661	1	253.4	285.4	305.8	321.9	339.3	360.1	372.9	84.76
668	1	245.8	285.9	316.4	328.0	347.8	374.5	404.3	87.61
694	1	227.1	260.9	290.1	304.5	322.6	343.0	372.2	74.72
701	1	238.7	277.1	287.5	309.6	337.3	357.3	393.9	79.31
703	1	228.9	271.8	293.6	320.7	338.7	354.2	394.2	61.85
706	1	230.4	272.8	295.8	309.1	330.3	354.3	437.6	139.24
716	1	246.7	278.9	302.2	318.0	347.6	376.6	407.3	87.09
730	1	237.1	292.3	314.5	328.8	347.5	367.1	403.2	86.90
731	1	234.0	268.5	293.6	316.4	343.9	361.3	403.9	69.81
732	1	236.3	245.7	293.8	311.3	323.7	355.1	401.6	87.37
741	1	232.3	252.2	279.6	283.9	315.8	345.2	369.7	78.41
746	1	236.2	264.7	293.5	309.7	336.3	364.0	389.2	84.73
749	1	227.2	260.3	279.9	300.6	331.8	355.7	408.5	93.00
764	1	228.7	257.2	272.7	288.8	308.3	328.8	331.0	48.14
772	1	253.3	288.7	311.0	324.1	353.6	391.9	460.6	109.85
778	1	232.6	257.7	288.9	304.8	327.3	349.6	405.6	100.19
797	1	246.4	278.8	305.8	313.4	343.9	376.8	409.0	91.44
800	1	248.0	306.3	332.2	345.9	378.7	400.5	441.5	110.06
805	1	254.4	311.7	333.7	355.8	390.3	424.9	474.0	89.66
809	1	233.4	262.1	230.6	298.8	336.2	367.8	399.8	80.50
813	1	247.6	269.4	309.9	319.9	352.2	373.4	412.4	75.81
833	0	216.6	254.2	288.0	301.6	303.1	288.0	268.6	0.72
874	1	222.4	239.1	266.6	286.5	308.3	332.8	374.5	75.29
890	1	232.0	252.8	262.7	273.6	301.5	327.4	372.5	84.95
892	1	242.0	271.8	304.6	322.8	343.1	364.6	400.8	94.47
896	1	256.7	287.5	323.6	335.5	350.8	374.2	405.1	48.39

Acetone Rat Teratology Study: Weights (g) and Urine Parameters for Sperm-positive Females

-- 0 ppm Acetone --

Matno	Liver Wt(g)	Kidney Wt(g)	pH	Protein (mg/dL)	Glucose (mg/dL)	Ketone (mg/dL)	Bilirubin (0-3)	Blood (0-4)	Urobilinogen (Ehrlich units/dL)
652	12.03	2.66	6.0	30	0	0	0	0	0
660	16.93	2.13	8.0	0	0	0	0	2	0
661	14.44	2.36	7.5	100	0	5	0	3	0
668	18.36	2.08	6.5	0	0	0	0	0	0
694	16.45	2.16	6.0	15	0	0	0	0	0
701	16.95	2.50	8.0	15	0	0	0	0	0
703	18.63	2.28	8.5	30	0	0	0	0	0
706	16.35	2.34	6.0	15	0	0	0	3	0
716	17.60	2.42	8.5	30	0	0	0	4	0
730	16.40	2.16	8.0	15	0	0	0	1	0
731	18.96	2.35	8.0	0	0	0	0	0	0
732	17.69	2.23	6.0	15	0	0	0	0	0
741	14.46	2.12	7.5	0	0	0	0	1	0
746	14.98	2.13	6.0	0	0	0	0	0	0
749	15.64	2.24	6.0	0	0	0	0	0	0
764	13.52	2.01	6.0	0	0	0	0	0	0
772	20.34	2.62	6.0	30	0	0	0	4	0
778	16.62	2.14	6.0	15	0	0	0	0	0
797	18.25	2.29	6.0	30	0	5	0	0	0
800	17.53	2.18	7.5	100	0	0	0	4	1
805	19.67	2.36	6.5	15	0	0	0	0	0
809	16.48	2.44	6.0	15	0	0	0	0	0
813	16.08	2.23	6.0	15	0	0	0	0	0
833	11.36	1.96	7.0	100	.	.	.	.	.
874	15.03	1.98	6.5	100	0	0	0	2	0
890	15.97	2.23	6.0	15	0	0	0	0	0
892	15.47	2.10	6.5	30	0	0	0	1	0
898	19.28	2.21	6.5	30	0	0	0	0	0

Acetone Rat Teratology: Weights (g) and Urine Parameters for Sperm Positive Females

---------- 440 ppm Acetone ----------

Matno	Pregnant	Pre-study Wt(g)	0 dg Wt(g)	6 dg Wt(g)	10 dg Wt(g)	14 dg Wt(g)	17 dg Wt(g)	20 dg Wt(g)	Uter Wt(g)
662	1	262.2	296.0	320.4	329.4	356.9	399.4	434.5	96.31
663	1	264.5	292.1	325.0	327.9	352.9	373.5	414.1	71.40
664	1	245.4	266.2	283.5	281.7	310.5	332.5	377.8	76.80
675	1	253.6	283.8	273.2	311.4	344.2	372.3	408.9	93.31
681	0	247.2	261.2	283.1	292.5	282.3	284.9	276.6	0.62
720	1	220.0	236.6	211.7	280.1	276.5	300.5	332.5	65.02
723	1	238.2	283.5	318.6	335.7	354.3	382.1	410.2	70.47
726	0	224.9	272.0	294.4	293.9	292.5	292.7	283.0	0.37
728	1	235.0	257.5	234.1	300.3	322.5	345.8	372.0	79.65
747	1	239.7	276.4	241.3	307.3	320.0	360.5	364.3	76.19
748	1	239.4	268.9	285.7	294.5	316.1	345.6	387.3	79.96
756	1	261.4	266.7	328.2	336.6	363.5	399.3	418.4	57.33
761	1	232.6	244.3	275.4	265.9	305.9	333.3	355.1	67.87
763	1	252.8	286.9	307.4	337.0	365.4	381.9	430.5	82.27
801	1	258.8	294.6	300.8	313.5	336.6	365.9	413.7	89.82
804	1	241.4	269.9	308.0	309.6	339.1	370.7	395.2	86.74
814	1	243.0	282.2	313.4	339.9	360.3	390.1	442.4	91.10
819	1	234.4	250.5	261.3	267.3	309.5	339.4	385.7	95.88
829	1	245.1	276.3	307.2	335.7	382.4	393.8	431.4	95.44
832	1	216.9	252.8	285.7	297.3	307.7	324.2	340.1	38.44
848	1	244.8	272.2	278.4	303.9	336.5	367.2	409.8	89.38
849	1	231.4	258.2	272.8	293.0	314.8	340.2	383.5	92.83
855	1	241.4	272.0	293.0	310.6	330.6	358.6	393.9	72.67
864	1	246.4	293.7	318.5	332.9	341.6	370.5	400.1	52.67
870	1	237.2	268.7	298.9	313.4	339.2	358.7	400.9	65.83
877	1	247.7	272.8	286.7	302.5	324.3	352.7	410.3	87.91
881	1	232.7	274.5	301.5	315.3	338.0	371.2	406.8	81.97
912	1	244.6	286.9	305.3	316.9	331.4	368.4	419.2	89.83
913	1	239.9	282.0	308.1	322.1	350.0	378.8	420.7	84.78

Acetone Rat Teratology Study: Weights (g) and Urine Parameters for Sperm-positive Females

--- 440 ppm Acetone ---

Matno	Liver Wt(g)	Kidney Wt(g)	pH	Protein (mg/dL)	Glucose (mg/dL)	Ketone (mg/dL)	Bilirubin (0-3)	Blood (0-4)	Urobilinogen (Ehrlich units/dL)
662	19.16	2.31	8.0	0	0	0	0	0	0
663	18.95	2.35	8.0	30	0	0	0	1	0
664	15.58	2.00	8.5	300	0	0	0	2	0
675	17.09	2.51	8.5	15	0	0	0	4	0
681	9.78	2.02	8.5	15	0	0	0	1	0
720	13.55	1.83	8.0	0	250	0	0	0	0
723	19.35	2.62	8.5	0	100	0	0	0	0
726	12.13	1.97	8.0	30	0	5	0	2	0
728	14.81	1.82	8.5	0	0	0	0	3	0
747	15.95	2.32	8.5	100	0	0	0	0	0
748	15.28	2.02	8.5	0	0	0	0	0	0
758	18.93	2.69	8.0	0	0	0	0	0	0
761	14.78	2.22	8.0	0	0	0	0	0	0
763	17.57	2.43	8.0	30	0	0	0	0	0
801	19.57	2.31	8.0	0	0	0	0	1	0
804	15.98	2.33	7.5	0	0	0	0	0	0
814	20.22	2.31	8.0	15	0	0	0	0	0
819	15.87	2.32	8.0	15	0	0	0	0	0
829	17.88	2.53	7.5	0	0	0	0	0	0
832	16.49	2.34	8.0	15	0	0	0	0	0
846	16.56	2.30	8.0	30	0	5	0	0	0
849	15.98	2.29	8.0	15	0	0	0	1	0
856	17.05	2.26	8.0	15	0	0	0	1	0
864	18.17	2.54	8.0	100	0	0	0	2	0
870	17.30	2.23	8.0	15	0	0	0	0	0
877	18.70	2.06	8.5	30	0	0	0	0	0
881	14.81	2.28	8.0	100	0	0	0	0	0
912	19.14	2.23	8.0	30	0	0	0	0	0
913	17.82	2.24	8.0	15	0	0	0	0	0

Acetone Rat Teratology: Weights (g) and Urine Parameters for Sperm Positive Females

-- 2200 ppm Acetone --

Matno	Pregnant	Pre-study Wt(g)	0 dg Wt(g)	6 dg Wt(g)	10 dg Wt(g)	14 dg Wt(g)	17 dg Wt(g)	20 dg Wt(g)	Uter Wt(g)
651	1	261.8	300.6	324.9	334.1	348.2	359.1	401.7	84.39
665	1	243.2	267.8	296.6	308.7	332.3	356.0	380.8	78.67
666	1	270.8	321.0	342.9	366.5	388.5	417.1	454.4	68.60
679	1	236.5	273.9	290.8	309.2	327.1	350.9	383.6	73.93
704	1	222.4	246.4	260.2	282.2	303.1	323.2	354.2	70.83
705	1	241.5	263.2	295.1	313.9	342.7	369.2	395.6	88.23
712	1	238.6	249.1	294.4	305.0	327.7	344.4	387.1	56.11
719	1	229.5	242.9	270.0	280.9	304.7	323.9	343.4	67.24
727	1	236.0	275.9	307.7	331.8	354.4	388.0	422.7	107.66
734	1	268.9	306.6	329.5	351.6	372.4	383.4	415.3	30.57
735	1	248.8	283.7	294.8	324.1	361.6	384.9	416.1	84.05
736	1	221.7	257.0	267.6	282.1	305.3	317.8	341.5	52.16
745	1	248.1	292.0	312.5	328.0	345.6	372.7	403.1	81.54
769	1	240.1	259.7	295.1	314.6	336.1	357.7	380.7	74.41
780	1	240.7	268.7	297.1	311.6	325.3	353.3	401.4	88.28
791	1	234.8	280.3	279.7	290.1	311.7	334.9	363.0	81.63
799	1	232.6	269.1	300.9	316.9	339.3	365.8	388.4	45.52
822	1	243.0	275.9	315.0	320.6	348.5	373.3	395.8	81.31
823	0	241.3	291.0	296.1	315.8	317.5	316.2	310.9	0.73
834	1	250.2	287.7	307.1	318.2	334.1	362.8	390.8	62.46
863	1	226.3	284.1	297.8	306.0	320.2	352.5	396.9	82.26
865	1	248.7	288.0	317.6	329.4	339.2	370.0	391.0	87.97
867	1	248.1	296.1	324.6	343.2	352.7	382.7	416.9	71.68
868	1	238.1	273.1	296.8	323.9	354.3	388.7	431.7	98.14
873	1	228.3	253.6	285.1	307.9	326.7	364.1	395.7	83.80
879	1	233.2	274.6	298.9	303.2	321.7	369.0	391.4	78.32
888	1	230.5	257.8	291.4	314.2	335.4	368.1	389.7	81.38
889	0	248.0	294.9	321.5	324.3	327.6	317.7	315.8	0.66
891	1	229.9	254.1	271.8	274.4	283.3	303.1	327.2	53.82
908	1	231.2	273.9	308.6	332.0	358.6	383.7	421.0	86.41
910	1	235.3	263.8	281.4	303.1	318.1	342.8	372.3	71.71

Acetone Rat Teratology Study: Weights (g) and Urine Parameters for Sperm-positive Females

---------- 2200 ppm Acetone ----------

Matno	Liver Wt(g)	Kidney Wt(g)	pH	Protein (mg/dL)	Glucose (mg/dL)	Ketone (mg/dL)	Bilirubin (0-3)	Blood (0-4)	Urobilinogen (Ehrlich units/dL)
651	16.54	2.16	8.0	15	0	0	0	0	0
655	15.93	2.56	8.0	0	0	0	0	0	0
666	18.38	2.30	.	.	.	.	.	.	.
679	17.49	2.70	8.0	0	0	0	0	2	0
704	14.55	1.97	8.0	0	0	0	0	0	0
705	15.09	2.07	8.5	30	0	0	0	4	0
712	15.78	2.32	7.5	0	0	0	0	0	0
719	14.67	1.91	8.0	15	0	0	0	0	0
727	16.89	2.16	7.0	30	0	0	0	0	0
734	18.71	2.28	8.0	0	0	0	0	0	0
736	16.27	2.42	8.5	30	0	0	0	0	0
738	15.81	2.09	8.0	0	0	0	0	0	0
745	16.25	2.22	7.5	0	0	0	0	0	0
769	14.78	2.28	8.0	15	0	10	1	0	0
780	16.81	2.39	8.0	15	0	0	0	0	0
791	14.76	2.16	8.5	100	0	0	0	0	0
799	18.53	2.40	8.0	30	0	0	0	2	0
822	16.18	2.21	8.5	30	0	0	0	0	0
823	13.98	2.27	8.5	30	0	0	0	0	0
834	18.02	2.03	8.0	15	0	0	0	0	0
863	18.38	2.47	8.5	30	0	0	0	1	0
865	16.90	2.28	8.0	15	0	0	0	0	0
867	18.74	2.20	8.0	15	0	0	0	0	0
868	20.15	2.50	8.0	15	0	0	0	0	0
873	18.00	2.13	8.0	15	0	0	0	0	0
879	15.35	2.03	8.5	0	0	0	0	0	0
888	16.52	2.20	7.5	0	0	0	0	0	0
889	13.76	2.46	8.0	0	0	0	0	0	0
891	14.38	2.07	8.0	0	0	0	0	0	0
908	17.72	2.09	8.5	30	0	0	0	0	0
910	13.73	2.10	8.5	30	0	0	0	0	0

Acetone Rat Teratology: Weights (g) and Urine Parameters for Sperm Positive Females

----- 11000 ppm Acetone -----

Matno	Pregnant	Pre-study Wt(g)	0 dg Wt(g)	6 dg Wt(g)	10 dg Wt(g)	14 dg Wt(g)	17 dg Wt(g)	20 dg Wt(g)	Uter Wt(g)
654	1	239.7	271.4	291.6	310.0	330.1	360.2	391.0	75.18
657	1	242.6	269.5	287.8	299.2	317.1	336.5	348.9	52.25
678	1	259.6	294.0	303.0	324.2	346.6	366.6	395.6	82.85
693	1	245.3	292.2	315.3	323.9	348.8	373.8	406.8	75.03
697	1	253.3	296.4	332.6	330.0	351.7	379.5	398.6	66.23
698	1	243.5	281.2	309.3	305.2	335.0	358.3	393.3	88.71
711	1	214.3	240.1	268.5	263.5	290.6	317.2	336.1	62.27
738	1	244.0	264.8	266.3	256.9	226.2	294.6	328.1	62.45
742	1	231.8	258.1	281.5	294.3	305.6	334.1	365.6	69.44
765	1	248.8	289.6	336.2	341.8	367.0	398.4	410.9	67.21
771	1	239.2	264.0	294.0	292.7	316.2	346.2	349.1	65.11
776	1	218.7	246.8	264.0	259.2	285.6	289.4	298.5	29.07
781	1	233.7	265.3	297.3	302.7	328.2	359.0	377.5	77.18
782	1	246.2	292.7	313.0	330.6	344.8	359.9	383.9	52.71
817	1	239.2	278.1	297.0	306.9	326.6	347.5	360.4	71.02
818	1	232.4	252.0	260.1	280.6	309.1	334.8	367.5	78.87
820	1	258.8	286.0	316.0	296.5	318.3	354.4	364.4	74.49
828	1	239.6	279.4	310.6	316.1	331.6	363.2	389.8	76.01
831	1	283.9	316.2	350.5	358.8	373.7	397.5	417.5	77.85
842	0	245.1	267.5	282.5	285.0	288.6	290.4	288.7	0.60
860	1	233.4	272.4	286.9	309.5	320.3	353.4	383.0	63.57
869	1	266.3	316.0	338.7	338.8	346.7	367.7	410.0	78.29
876	1	233.5	261.0	294.3	308.9	322.9	342.5	352.4	36.46
884	1	238.1	276.4	314.2	290.4	310.4	328.4	351.0	53.47
904	1	233.2	264.3	282.7	290.0	304.8	327.4	342.6	62.17
906	1	215.3	248.6	277.1	287.2	303.1	325.1	354.3	62.77
911	1	232.1	256.8	286.7	297.1	311.5	352.7	379.9	83.90

Acetone Rat Teratology Study: Weights (g) and Urine Parameters for Sperm-positive Females

--- 11000 ppm Acetone ---

Matno	Liver Wt(g)	Kidney Wt(g)	pH	Protein (mg/dL)	Glucose (mg/dL)	Ketone (mg/dL)	Bilirubin (0-3)	Blood (0-4)	Urobilinogen (Ehrlich units/dL)
654	16.74	2.31	8.0	0	0	0	0	0	0
657	15.22	2.18	6.0	15	0	0	0	0	0
678	19.69	2.68	8.5	30	0	5	0	0	0
693	21.18	2.66	8.0	30	0	0	0	0	0
697	17.90	2.51	8.0	15	0	0	0	1	0
698	20.83	3.01	8.0	0	0	0	0	0	0
711	14.68	2.05	.	.	.	.	.	.	.
738	14.81	2.19	8.0	0	0	0	0	0	0
742	17.81	2.34	8.0	15	0	0	0	1	0
765	16.90	2.41	6.0	0	0	0	0	0	0
771	13.92	2.11	8.0	15	0	0	0	0	0
776	13.00	2.01	8.0	30	0	5	0	0	0
781	18.06	2.45	8.5	30	0	0	0	0	0
782	18.48	2.74	6.0	0	0	0	0	0	0
817	14.10	2.16	6.0	0	0	0	0	1	0
818	18.60	2.43	8.0	30	0	0	0	2	0
820	16.29	2.26	8.0	0	0	0	0	0	0
828	17.91	2.39	8.0	0	0	0	0	3	0
831	17.63	2.62	8.0	0	0	0	0	0	0
842	8.53	3.52	8.0	0	0	0	0	0	0
860	18.76	2.18	8.0	0	0	0	0	0	0
869	18.80	2.42	8.0	15	0	0	0	0	0
878	18.41	2.49	8.5	0	0	0	0	1	0
884	15.86	2.44	8.0	15	0	0	0	0	0
904	14.67	2.16	8.5	30	0	0	0	0	0
908	18.83	2.49	8.5	100	0	0	0	0	0
911	14.74	2.28	8.5	15	0	0	0	1	0

C.12

Acetone Rat Ketone Teratology Study: Body Weights (g) for Sperm-positive Females

0 ppm Acetone

Matno	Pregnant	Pre-study Wt (g)	0 dg Wt (g)	6 dg Wt (g)	10 dg Wt (g)	14 dg Wt (g)	17 dg Wt (g)	20 dg Wt (g)	Uter Wt (g)
658	1	272.3	305.6	327.0	332.3	339.3	370.9	402.82	75.32
684	1	230.8	284.6	297.7	288.1	331.7	359.2	402.26	92.93
699	1	254.6	279.3	314.0	325.6	355.4	381.5	422.34	82.22
739	1	242.8	287.9	296.0	302.9	328.5	359.6	389.32	100.24
773	1	234.8	258.4	270.3	266.8	298.6	316.6	355.03	82.75
806	1	224.8	250.7	289.3	297.4	314.1	321.8	334.93	33.90
824	1	251.1	299.0	337.1	348.2	366.2	393.9	448.77	105.92

Liver Wt(g)	Kidney Wt(g)	pH	Protein (mg/dL)	Glucose (mg/dL)	Ketone (mg/dL)	Bilirubin (0-3)	Blood (0-4)	Urobilinogen (Ehrlich units/dL)
14.00	2.04	7.5	0	0	0	0	1	0
15.14	2.29	7.5	30	0	10	0	0	0
13.73	2.12	7.0	0	0	0	0	0	0
12.34	1.71	7.0	30	0	10	1	1	0
12.41	1.95	7.0	100	0	5	0	0	0
13.09	2.08	6.5	15	0	0	0	2	0
15.38	2.35	8.0	15	0	10	0	1	0

440 ppm Acetone

Matno	Pregnant	Pre-study Wt (g)	0 dg Wt (g)	6 dg Wt (g)	10 dg Wt (g)	14 dg Wt (g)	17 dg Wt (g)	20 dg Wt (g)	Uter Wt (g)
710	0	239.8	272.9	269.6	266.5	279.7	271.2	279.25	0.56
725	0	270.2	308.6	308.1	306.1	311.6	310.9	300.44	0.50
769	1	238.0	273.3	292.4	306.1	338.5	359.0	392.03	79.44
794	1	234.3	282.8	285.5	301.5	316.9	335.0	353.11	40.50
839	0	230.6	268.0	293.5	312.7	327.1	314.5	317.36	0.44
876	1	256.8	298.2	319.3	333.2	355.6	372.0	398.30	75.47

Liver Wt(g)	Kidney Wt(g)	pH	Protein (mg/dL)	Glucose (mg/dL)	Ketone (mg/dL)	Bilirubin (0-3)	Blood (0-4)	Urobilinogen (Ehrlich units/dL)
12.57	2.26	6.5	300	0	0	0	1	0
12.89	2.35	6.5	300	0	0	0	0	0
15.96	2.45	8.0	100	0	0	0	0	0
15.45	2.24	8.0	300	0	0	0	0	0
15.13	2.34	6.5	300	0	0	0	0	0
16.58	2.49	8.0	100	0	0	0	1	0

Acetone Rat Ketone Teratology Study: Body Weights (g) for Sperm-positive Females

2200 ppm Acetone

Matno	Pregnant	Pre-study Wt (g)	0 dg Wt (g)	6 dg Wt (g)	10 dg Wt (g)	14 dg Wt (g)	17 dg Wt (g)	20 dg Wt (g)	Uter Wt (g)
677	1	246.8	291.3	313.9	332.8	359.2	381.7	422.25	86.50
718	1	254.4	285.7	306.8	325.8	342.6	352.9	375.04	65.54
783	1	237.9	262.7	283.2	309.7	334.8	347.9	383.76	61.80
871	1	236.0	260.6	302.0	326.8	340.9	374.3	417.75	86.96
872	1	244.0	267.3	308.7	318.5	338.9	363.2	403.05	80.81
887	1	237.9	296.1	276.4	287.2	312.0	334.8	356.21	72.26
900	1	237.2	264.9	299.3	318.3	347.1	372.8	413.90	82.11

Liver Wt(g)	Kidney Wt(g)	pH	Protein (mg/dL)	Glucose (mg/dL)	Ketone (mg/dL)	Bilirubin (0-3)	Blood (0-4)	Urobilinogen (Ehrlich units/dL)
16.16	2.23	6.0	100	0	5	0	1	0
13.16	1.89	7.5	15	0	0	0	1	0
17.16	2.14	7.5	300	0	0	0	0	0
16.04	2.26	7.0	100	0	0	0	0	0
16.03	2.11	7.0	300	0	0	0	0	0
17.88	2.23	8.5	100	0	0	0	0	0
17.74	2.30	7.0	100	0	5	0	0	0

C-14

11000 ppm Acetone

Matno	Pregnant	Pre-study Wt (g)	0 dg Wt (g)	6 dg Wt (g)	10 dg Wt (g)	14 dg Wt (g)	17 dg Wt (g)	20 dg Wt (g)	Uter Wt (g)
656	1	261.7	301.0	317.1	323.8	346.6	364.7	387.99	81.74
696	1	259.1	298.9	310.2	321.8	357.2	383.9	413.05	80.26
714	1	224.8	246.3	261.7	275.7	298.1	318.3	345.99	74.04
717	1	256.4	285.1	318.1	330.7	345.9	367.7	391.98	69.06
858	1	252.0	284.0	321.3	288.4	303.4	307.4	317.49	69.26
859	1	244.4	276.3	287.5	299.7	313.5	328.4	338.53	55.98
897	1	251.0	270.4	300.0	299.2	323.2	344.8	387.53	68.02

Liver Wt(g)	Kidney Wt(g)	pH	Protein (mg/dL)	Glucose (mg/dL)	Ketone (mg/dL)	Bilirubin (0-3)	Blood (0-4)	Urobilinogen (Ehrlich units/dL)
15.54	2.51	8.0	100	0	0	0	1	0
19.32	2.51	8.5	0	0	0	0	1	0
16.01	2.43	8.0	100	0	5	0	0	0
16.82	2.43	8.0	30	0	0	0	1	0
14.93	2.65	5.0	30	0	0	0	1	0
13.96	2.17	7.5	15	0	0	0	4	0
15.74	2.18	8.5	30	0	0	0	1	0

Acetone Rat Teratology Study: Raw Fetal Data

-- Ø ppm Acetone --

Matno	Site	Status	Fetal Wt(g)	Sex	Head or Visceral	ABN1	ABN2	ABN3	ABN4	ABN5	ABN6	ABN7
66Ø	1	1	3.52	2	H							
66Ø	2	1	3.67	2	V							
66Ø	3	1	3.56	2	H							
66Ø	4	1	3.62	2	V							
66Ø	5	1	3.99	1	H							
66Ø	6	1	3.57	2	V							
66Ø	7	1	3.66	1	H							
66Ø	8	1	3.18	2	V	ROST						
66Ø	9	1	3.43	2	H							
66Ø	1Ø	1	3.52	2	V							
66Ø	11	1	3.75	1	H							
66Ø	12	1	3.71	1	V							
66Ø	13	1	3.85	2	H							
66Ø	14	1	4.Ø1	1	V							
66Ø	15	1	3.61	2	H							
66Ø	16	2	.	.								
661	1	1	2.73	2	H							
661	2	1	3.29	1	V							
661	3	1	3.Ø3	1	H							
661	4	1	3.Ø1	2	V							
661	5	1	2.78	2	H							
661	6	1	3.24	2	V	ROVE						
661	7	1	2.98	1	H							
661	8	1	3.16	2	V							
661	9	1	3.Ø3	1	H							
661	1Ø	1	2.78	1	V							
661	11	1	2.88	1	H							
661	12	1	2.86	1	V							
661	13	1	2.88	2	H							
661	14	1	?.83	1	V							
661	15	1	3.Ø2	1	H							
661	16	1	3.19	1	V							
661	17	1	3.2Ø	2	H							
661	18	1	2.83	2	V							
661	19	1	3.42	2	H							
668	1	1	3.42	1	V							
668	2	2	.	.								
668	3	1	3.98	1	H	COST						
668	4	1	3.82	1	V	COST						
668	5	1	3.92	2	H							
668	6	1	3.7Ø	2	V							
668	7	1	4.13	1	H							
668	8	1	3.8Ø	1	V	ROST						
668	9	1	3.62	2	H							
668	1Ø	1	3.73	2	V							
668	11	1	3.74	1	H							
668	12	2	.	.								

Status: 1 = Live; 2 = Early Resorption; 4 = Late Resorption
Sex: Male = 1; Female = 2; See Code Sheet 39 for Identification of abnormalities [ABNn]

Acetone Rat Teratology Study: Raw Fetal Data

0 ppm Acetone

Matno	Site	Status	Fetal Wt(g)	Sex	Head or Visceral	ABN1	ABN2	ABN3	ABN4	ABN5	ABN6	ABN7
668	13	1	3.79	1	V							
668	14	1	3.95	1	H							
668	15	2	.	.								
694	1	1	3.17	2	V							
694	2	1	3.11	2	H							
694	3	1	3.16	1	V							
694	4	1	3.30	1	H							
694	5	1	3.47	1	V							
694	6	1	3.39	1	H	SURB						
694	7	1	3.40	1	V							
694	8	1	3.28	2	H							
694	9	1	2.71	1	V	DIUR	SURB					
694	10	1	3.06	1	H							
694	11	1	2.73	2	V							
694	12	1	3.28	1	H							
694	13	1	3.44	1	V							
694	14	1	3.28	1	H	ROST						
694	15	1	3.52	1	V							
701	1	1	3.56	2	H							
701	2	1	3.89	1	V							
701	3	1	3.40	2	H	SURB						
701	4	1	3.56	2	V							
701	5	1	3.58	1	H							
701	6	1	3.21	1	V							
701	7	1	3.28	2	H							
701	8	1	3.13	2	V	SURB						
701	9	1	3.46	1	H							
701	10	1	3.57	1	V							
701	11	1	3.82	1	H							
701	12	1	3.80	2	V							
701	13	1	4.02	1	H							
701	14	1	3.83	2	V							
701	15	2	.	.								
701	16	1	3.71	2	H							
701	17	2	.	.								
703	1	1	3.14	2	V							
703	2	1	3.89	1	H							
703	3	1	3.49	1	V	DIUR						
703	4	1	3.32	2	H							
703	5	1	3.38	2	V							
703	6	1	3.31	1	H							
703	7	1	3.48	1	V							
703	8	1	3.47	1	H							
703	9	1	3.37	2	V							
703	10	1	2.89	2	H							
703	11	1	3.40	2	V	DIUR						
703	12	1	3.46	2	H							

Status: 1 = Live; 2 = Early Resorption; 4 = Late Resorption
Sex: Male = 1; Female = 2; See Code Sheet 39 for Identification of abnormalities [ABNn]

Acetone Rat Teratology Study: Raw Fetal Data

---- 0 ppm Acetone ----

Matno	Site	Status	Fetal Wt(g)	Sex	Head or Visceral	ABN1	ABN2	ABN3	ABN4	ABN5	ABN6	ABN7
706	1	1	3.25	2	H							
706	2	1	3.84	1	V							
706	3	1	3.89	1	H							
706	4	1	3.49	2	V							
706	5	1	3.79	1	H	SURB						
706	6	1	3.80	1	V	SURB						
706	7	1	3.61	1	H	SURB						
706	8	1	3.95	1	V							
706	9	1	3.37	2	H							
706	10	1	3.88	2	V							
706	11	1	3.44	2	H							
706	12	1	3.33	2	V							
706	13	1	3.65	2	H							
706	14	1	3.95	1	V							
706	15	1	3.89	2	H							
706	16	1	3.93	1	V							
706	17	1	3.85	1	H							
716	1	1	3.60	2	V	ROVE	SURB					
716	2	1	3.48	2	H							
716	3	1	3.53	2	V							
716	4	1	3.42	2	H							
716	5	1	3.95	2	V							
716	6	1	3.87	2	H							
716	7	1	3.61	1	V	SURB						
716	8	1	3.85	1	H	SURB						
716	9	1	3.57	1	V	ROST	SURB					
716	10	1	3.71	1	H	SURB						
716	11	1	3.75	1	V	SURB						
716	12	1	3.81	2	H							
716	13	1	3.98	1	V	SURB						
716	14	1	3.84	1	H	SURB	COST					
716	15	1	3.38	2	V							
716	16	1	3.50	2	H	SURB						
730	1	2	.	.								
730	2	1	3.10	1	V							
730	3	2	.	.								
730	4	1	3.24	2	H	ROST	ROVE					
730	5	1	3.03	1	V	DIUR	ROST					
730	6	1	2.02	1	H	ROST	ROPB	ROPH				
730	7	2	.	.								
730	8	1	2.48	1	V	ROST	ROPB	ROPH				
730	9	1	3.36	2	H							
730	10	1	3.30	1	V							
730	11	1	3.35	1	H	ROST						
730	12	1	3.57	1	V							
730	13	1	3.35	2	H							
730	14	1	3.41	2	V	ROST						

Status: 1 = Live; 2 = Early Resorption; 4 = Late Resorption
Sex: Male = 1; Female = 2; See Code Sheet 39 for Identification of abnormalities [ABNn]

Acetone Rat Teratology Study: Raw Fetal Data

---------- 0 ppm Acetone ----------

Matno	Site	Status	Fetal Wt(g)	Sex	Head or Visceral	ABN1	ABN2	ABN3	ABN4	ABN5	ABN6	ABN7
730	15	1	3.26	2	H							
730	16	1	3.38	2	V							
731	1	1	1.72	2	HV	EXCE	AOPT	RACH	FURB			
731	2	4	.	.								
731	3	1	3.63	2	V							
731	4	4	.	.								
731	5	1	3.81	1	H							
731	6	1	2.71	1	V	ROST	ROPB					
731	7	1	3.37	1	H	ROST						
731	8	1	3.41	2	V							
731	9	1	3.54	2	H							
731	10	1	3.68	1	V							
731	11	4	.	.								
731	12	1	3.29	2	H							
731	13	1	3.64	1	V	ROST	MAST					
731	14	1	3.06	2	H							
731	15	1	3.01	1	V	ROST						
731	16	1	3.48	2	H							
732	1	1	2.63	2	H							
732	2	1	3.84	1	V							
732	3	1	3.61	2	H							
732	4	1	3.60	1	V	COST						
732	5	1	3.52	1	H							
732	6	1	3.08	2	V							
732	7	1	3.26	2	H							
732	8	1	3.31	2	V							
732	9	1	3.28	1	H							
732	10	1	3.72	1	V							
732	11	1	3.78	1	H							
732	12	1	3.54	1	V	COST						
732	13	1	3.80	2	H							
732	14	1	3.99	2	V							
732	15	1	3.42	2	H	SURB						
732	16	1	3.90	1	V							
741	1	1	3.39	1	H							
741	2	1	4.05	1	V							
741	3	1	4.03	1	H							
741	4	1	3.95	1	V							
741	5	1	3.52	2	H							
741	6	1	3.81	2	V							
741	7	1	3.63	2	H	ROST						
741	8	1	3.54	2	V							
741	9	1	3.68	1	H							
741	10	1	4.08	1	V							
741	11	1	3.91	2	H							
741	12	1	3.86	2	V							
741	13	1	3.98	2	H							

Status: 1 = Live; 2 = Early Resorption; 4 = Late Resorption
Sex: Male = 1; Female = 2; See Code Sheet 39 for Identification of abnormalities [ABNn]

Acetone Rat Teratology Study: Raw Fetal Data

0 ppm Acetone

Matno	Site	Status	Fetal Wt(g)	Sex	Head or Visceral	ABN1	ABN2	ABN3	ABN4	ABN5	ABN6	ABN7
741	14	1	3.74	2	V							
746	1	1	3.73	1	H							
746	2	1	3.92	1	V							
746	3	1	4.08	1	H							
746	4	1	3.94	1	V							
746	5	1	3.91	2	H							
746	6	1	3.96	1	V	MIIN						
746	7	1	3.98	2	H							
746	8	1	4.05	1	V							
746	9	4	.	.								
746	10	1	3.92	1	V							
746	11	1	3.86	1	H							
746	12	1	3.98	2	V							
746	13	1	3.77	2	H							
746	14	1	3.60	2	V							
746	15	1	3.30	1	H							
746	16	1	3.83	1	V							
749	1	1	3.60	1	V							
749	2	1	3.65	2	H							
749	3	1	3.82	2	V							
749	4	1	3.63	2	H							
749	5	1	3.73	1	V							
749	6	1	3.64	2	H							
749	7	1	3.83	1	V							
749	8	1	3.57	2	H							
749	9	1	4.04	2	V							
749	10	1	4.16	1	H							
749	11	1	3.96	1	V							
749	12	1	4.23	1	H							
749	13	1	4.00	1	V							
749	14	1	3.76	2	H							
749	15	1	3.76	2	V							
749	16	1	3.99	1	H							
764	1	1	3.44	2	H							
764	2	4	.	.								
764	3	1	2.65	1	V							
764	4	1	3.17	2	H							
764	5	2	.	.								
764	6	2	.	.								
764	7	1	1.51	2	V	ROSK	ROST	ROPB	ROPH			
764	8	1	2.15	2	H	ROST	ROPB	ROPH				
764	9	1	3.17	2	V							
764	10	1	3.38	1	H	SURB						
764	11	2	.	.								
764	12	1	3.71	2	V							
764	13	1	3.33	2	H							
772	1	1	4.22	1	V							

Status: 1 = Live; 2 = Early Resorption; 4 = Late Resorption
Sex: Male = 1; Female = 2; See Code Sheet 39 for Identification of abnormalities [ABNn]

Acetone Rat Teratology Study: Raw Fetal Data

Ø ppm Acetone

Matno	Site	Status	Fetal Wt(g)	Sex	Head or Visceral	ABN1	ABN2	ABN3	ABN4	ABN5	ABN6	ABN7
772	2	1	3.74	2	H							
772	3	1	3.75	2	V	COST						
772	4	1	4.47	1	H	COST						
772	5	1	4.06	1	V							
772	6	1	4.34	1	H	COST						
772	7	1	4.10	2	V	COST						
772	8	1	3.72	2	H							
772	9	1	3.98	1	V							
772	10	1	3.95	2	H							
772	11	1	3.94	2	V							
772	12	1	4.15	1	H							
772	13	1	4.51	1	V							
772	14	1	3.89	1	H	SURB						
772	15	1	3.95	2	V							
772	16	1	4.09	1	H							
772	17	1	3.93	2	V							
772	18	1	4.19	1	H							
772	19	1	3.12	2	V							
778	1	1	3.70	1	H							
778	2	1	3.93	2	V							
778	3	1	4.28	1	H							
778	4	1	4.11	2	V							
778	5	1	3.89	2	H							
778	6	1	3.95	2	V							
778	7	1	3.92	2	H							
778	8	1	3.67	2	V							
778	9	1	4.02	1	H							
778	10	1	3.55	1	V							
778	11	1	3.73	1	H							
778	12	2	.	.								
778	13	1	4.14	1	V							
778	14	1	4.13	2	H							
778	15	1	4.35	1	V	ROVE						
778	16	1	4.08	1	H							
778	17	1	4.19	1	V							
778	18	1	4.13	1	H							
797	1	1	4.08	1	H							
797	2	2	.	.								
797	3	1	4.28	2	V							
797	4	1	4.34	2	H							
797	5	1	4.38	2	V							
797	6	1	4.02	2	H							
797	7	1	4.16	1	V							
797	8	1	4.15	2	H							
797	9	1	3.93	2	V							
797	10	1	3.96	2	H							
797	11	1	3.95	1	V							

Status: 1 = Live; 2 = Early Resorption; 4 = Late Resorption
Sex: Male = 1; Female = 2; See Code Sheet 39 for Identification of abnormalities [ABNn]

Acetone Rat Teratology Study: Raw Fetal Data

Ø ppm Acetone

Matno	Site	Status	Fetal Wt(g)	Sex	Head or Visceral	ABN1	ABN2	ABN3	ABN4	ABN5	ABN6	ABN7
797	12	1	3.87	1	H							
797	13	1	4.41	1	V	DIUR						
797	14	1	4.64	1	H							
797	15	1	3.96	2	V							
797	16	2	.	.								
797	17	1	4.14	1	H							
800	1	1	3.80	2	V							
800	2	1	4.38	1	H							
800	3	1	4.23	1	V	SURB						
800	4	1	3.98	2	H							
800	5	1	4.21	1	V							
800	6	1	3.79	2	H							
800	7	1	4.17	1	V							
800	8	1	4.45	1	H							
800	9	1	4.25	1	V							
800	10	1	4.53	1	H							
800	11	1	4.21	1	V							
800	12	1	3.92	2	H							
800	13	1	4.09	2	V							
800	14	1	4.39	1	H							
800	15	1	3.79	1	V							
800	16	2	.	.								
800	17	1	4.06	2	H							
800	18	1	4.20	1	V	SURB						
800	19	1	4.20	1	H	SURB						
805	1	1	3.78	1	H							
805	2	1	3.79	1	V							
805	3	1	3.78	2	H							
805	4	2	.	.								
805	5	2	.	.								
805	6	1	3.95	1	V							
805	7	1	3.82	1	H							
805	8	1	3.85	1	V							
805	9	1	4.13	1	H							
805	10	1	3.50	1	V							
805	11	1	3.57	1	H							
805	12	1	3.93	1	V							
805	13	1	3.50	1	H							
805	14	1	3.36	1	V							
805	15	2	.	.								
805	16	1	3.94	1	H							
805	17	1	3.89	1	V							
805	18	1	3.77	2	H							
805	19	1	3.84	1	V	ROVE						
809	1	1	3.97	2	V	COST						
809	2	1	3.97	2	H							
809	3	1	4.13	2	V							

Status: 1 = Live; 2 = Early Resorption; 4 = Late Resorption
Sex: Male = 1; Female = 2; See Code Sheet 39 for Identification of abnormalities [ABNn]

Acetone Rat Teratology Study: Raw Fetal Data

0 ppm Acetone

Matno	Site	Status	Fetal Wt(g)	Sex	Head or Visceral	ABN1	ABN2	ABN3	ABN4	ABN5	ABN6	ABN7
809	4	1	4.18	2	H							
809	5	2	.	.								
809	6	1	4.22	2	V							
809	7	1	4.38	1	H	ROVE						
809	8	1	3.84	2	V	ROVE						
809	9	1	4.19	2	H							
809	10	1	4.24	1	V							
809	11	1	4.38	1	H							
809	12	4	.	.								
809	13	1	4.26	2	V	COST						
809	14	1	4.18	2	H							
809	15	1	4.53	1	V							
813	1	1	3.18	2	V							
813	2	1	3.66	1	H							
813	3	1	3.68	1	V							
813	4	1	3.43	1	H							
813	5	1	3.60	2	V							
813	6	1	3.17	1	H							
813	7	1	3.16	2	V							
813	8	1	2.42	1	H	ROST						
813	9	1	3.03	2	V							
813	10	1	3.47	2	H							
813	11	1	2.95	2	V	ROST						
813	12	1	3.47	1	H							
813	13	2	.	.								
813	14	1	3.14	1	V							
813	15	1	3.52	1	H							
813	16	1	3.71	1	V							
874	1	1	3.36	2	V							
874	2	1	3.71	2	H							
874	3	1	3.70	2	V							
874	4	1	3.41	2	H							
874	5	1	3.66	1	V	MAST						
874	6	1	3.96	1	H							
874	7	1	3.91	1	V							
874	8	1	3.47	2	H							
874	9	1	3.73	2	V							
874	10	1	3.37	2	H							
874	11	1	3.65	1	V							
874	12	1	3.84	1	H							
874	13	1	3.71	2	V							
874	14	1	3.64	1	H							
890	1	1	3.67	1	H	SURB						
890	2	1	3.65	2	V							
890	3	1	3.76	2	H							
890	4	1	3.47	2	V							
890	5	1	3.87	1	H							

Status: 1 = Live; 2 = Early Resorption; 4 = Late Resorption
Sex: Male = 1; Female = 2; See Code Sheet 39 for Identification of abnormalities [ABNn]

Acetone Rat Teratology Study: Raw Fetal Data

---------- Ø ppm Acetone ----------

Matno	Site	Status	Fetal Wt(g)	Sex	Head or Visceral	ABN1	ABN2	ABN3	ABN4	ABN5	ABN6	ABN7
890	6	1	4.03	1	V	ROST	SURB					
890	7	1	3.74	2	H							
890	8	1	3.41	2	V							
890	9	1	3.71	1	H	SURB						
890	10	1	3.73	1	V							
890	11	1	3.60	1	H							
890	12	1	3.62	1	V	SURB						
890	13	1	4.01	1	H							
890	14	1	3.73	2	V							
890	15	1	3.78	2	H							
890	16	1	3.67	1	V	SURB						
892	1	1	3.53	1	H	ROST						
892	2	1	3.51	1	V							
892	3	1	3.44	2	H							
892	4	1	3.51	2	V							
892	5	1	3.68	2	H							
892	6	1	3.98	1	V	ROVE						
892	7	1	3.76	1	H							
892	8	1	4.32	1	V							
892	9	1	3.62	2	H							
892	10	1	3.85	1	V							
892	11	1	3.96	1	H							
892	12	1	3.32	2	V							
892	13	1	3.64	2	H							
892	14	1	3.97	1	V							
892	15	1	3.87	1	H	ROVE						
892	16	1	3.85	2	V							
892	17	1	3.97	2	H							
896	1	1	2.87	2	H							
896	2	1	3.31	1	V							
896	3	1	3.27	1	H							
896	4	1	3.11	2	V							
896	5	1	2.92	2	H							
896	6	1	3.13	2	V							
896	7	1	3.13	1	H							
896	8	1	3.23	2	V							
896	9	1	3.44	1	H							

Status: 1 = Live; 2 = Early Resorption; 4 = Late Resorption
Sex: Male = 1; Female = 2; See Code Sheet 39 for Identification of abnormalities [ABNn]

Acetone Rat Teratology Study: Raw Fetal Data

--- 440 ppm Acetone ---

Matno	Site	Status	Fetal Wt(g)	Sex	Head or Visceral	ABN1	ABN2	ABN3	ABN4	ABN5	ABN6	ABN7
662	1	2	.	.								
662	2	1	3.69	1	V							
662	3	1	3.55	1	H	ROST	SURB					
662	4	1	3.54	1	V							
662	5	1	3.68	2	H							
662	6	1	3.74	2	V	SURB						
662	7	1	4.07	2	H							
662	8	1	3.83	1	V	ROST						
662	9	1	3.68	2	H	SURB						
662	10	1	3.62	1	V	ROST						
662	11	1	3.58	1	H							
662	12	1	3.55	2	V	ROST	SURB					
662	13	1	3.51	2	H							
662	14	1	3.69	2	V							
662	15	1	3.71	1	H							
662	16	1	4.01	2	V							
662	17	1	3.79	2	H							
662	16	1	3.94	2	V							
663	1	1	3.11	2	V	MAST						
663	2	2	.	.								
663	3	1	3.56	1	H							
663	4	1	3.63	1	V							
663	5	1	3.37	2	H							
663	6	1	3.29	2	V							
663	7	1	3.37	2	H							
663	8	1	3.15	2	V							
663	9	1	3.06	2	H							
663	10	1	3.28	1	V							
663	11	1	3.64	1	H							
663	12	1	3.27	1	V							
663	13	1	3.63	1	H	ROST						
663	14	1	3.44	2	V							
663	15	1	3.66	1	H							
663	16	2	.	.								
664	1	2	.	.								
664	2	1	3.40	2	H							
664	3	1	3.36	2	V							
664	4	1	3.59	1	H							
664	5	1	3.57	2	V	SURB						
664	6	1	2.80	2	H							
664	7	1	3.82	1	V	DIUR						
664	8	1	3.42	2	H	SURB						
664	9	1	3.38	2	V							
664	10	1	3.42	1	H	ROST	SURB					
664	11	1	3.35	2	V	DIUR						
664	12	1	3.52	1	H	SURB						
664	13	1	3.53	2	V	DIUR						

Status: 1 = Live; 2 = Early Resorption; 4 = Late Resorption
Sex: Male = 1; Female = 2; See Code Sheet 39 for Identification of abnormalities [ABNn]

Acetone Rat Teratology Study: Raw Fetal Data

440 ppm Acetone

Matno	Site	Status	Fetal Wt(g)	Sex	Head or Visceral	ABN1	ABN2	ABN3	ABN4	ABN5	ABN6	ABN7
664	14	1	3.42	2	H							
664	15	1	3.48	2	V							
664	16	1	3.75	1	H	SURB						
675	1	1	3.70	1	V							
675	2	1	4.08	1	H							
675	3	1	4.04	1	V							
675	4	1	4.17	1	H							
675	5	1	4.02	2	V	ROVE						
675	6	1	3.87	1	H							
675	7	1	3.95	2	V							
675	8	1	3.05	1	H							
675	9	1	3.42	2	V							
675	10	1	3.73	2	H	ROVE						
675	11	1	3.99	1	V							
675	12	1	4.26	1	H							
675	13	1	4.02	1	V							
675	14	1	3.82	2	H							
675	15	1	4.15	1	V							
675	16	1	3.98	1	H							
675	17	1	4.01	2	V							
720	1	1	3.51	1	H							
720	2	1	3.78	1	V							
720	3	1	3.61	2	H							
720	4	2	.	.								
720	5	1	4.07	1	V							
720	6	1	3.93	1	H							
720	7	1	3.87	1	V							
720	8	2	.	.								
720	9	1	3.54	2	H	COST						
720	10	1	3.72	1	V							
720	11	1	3.83	1	H	COST						
720	12	1	3.55	1	V							
720	13	1	3.95	1	H							
720	14	2	.	.								
720	15	1	3.17	2	V							
720	16	2	.	.								
723	1	1	3.74	2	V							
723	2	1	3.86	2	H							
723	3	1	4.09	1	V							
723	4	2	.	.								
723	5	2	.	.								
723	6	1	3.87	1	H							
723	7	1	4.22	1	V							
723	8	1	3.94	2	H							
723	9	1	4.30	1	V							
723	10	1	3.90	2	H							
723	11	1	3.98	1	V							

Status: 1 = Live; 2 = Early Resorption; 4 = Late Resorption
Sex: Male = 1; Female = 2; See Code Sheet 39 for Identification of abnormalities [ABNn]

Acetone Rat Teratology Study: Raw Fetal Data

440 ppm Acetone

Matno	Site	Status	Fetal Wt(g)	Sex	Head or Visceral	ABN1	ABN2	ABN3	ABN4	ABN5	ABN6	ABN7
723	12	1	3.76	2	H							
723	13	1	4.02	1	V							
723	14	1	3.73	2	H							
723	15	2	.	.								
723	16	1	3.99	1	V							
728	1	1	4.20	1	V							
728	2	1	4.48	1	H							
728	3	1	4.64	1	V							
728	4	1	4.28	2	H							
728	5	1	4.75	1	V							
728	6	1	4.78	1	H							
728	7	1	4.16	2	V							
728	8	1	4.20	2	H							
728	9	1	4.47	1	V							
728	10	1	4.47	1	H							
728	11	1	4.37	2	V							
728	12	1	4.11	2	H							
728	13	1	4.14	2	V							
747	1	1	3.27	2	V							
747	2	1	3.80	1	H							
747	3	1	3.19	1	V							
747	4	1	3.53	2	H							
747	5	1	3.05	2	V							
747	6	1	3.47	1	H							
747	7	1	3.55	1	V							
747	8	1	3.98	1	H							
747	9	1	3.25	2	V							
747	10	1	3.52	2	H							
747	11	1	2.76	2	V							
747	12	1	3.21	2	H							
747	13	1	3.59	1	V							
747	14	1	3.57	1	H							
747	15	2	.	.								
747	16	1	3.57	1	V							
748	1	1	2.88	1	H							
748	2	1	3.50	2	V							
748	3	1	3.20	2	H							
748	4	1	3.39	1	V							
748	5	1	3.41	1	H							
748	6	1	3.36	1	V							
748	7	1	3.37	1	H							
748	8	1	3.64	1	V							
748	9	1	3.49	1	H							
748	10	1	3.52	1	V							
748	11	1	3.72	1	H							
748	12	1	3.63	1	V							
748	13	1	3.55	2	H							

Status: 1 = Live; 2 = Early Resorption; 4 = Late Resorption
Sex: Male = 1; Female = 2; See Code Sheet 39 for Identification of abnormalities [ABNn]

Acetone Rat Teratology Study: Raw Fetal Data

-- 440 ppm Acetone --

Matno	Site	Status	Fetal Wt(g)	Sex	Head or Visceral	ABN1	ABN2	ABN3	ABN4	ABN5	ABN6	ABN7
748	14	1	3.71	1	V							
748	16	1	3.67	1	H							
748	18	1	3.30	2	V							
756	1	1	3.42	2	H							
756	2	4	.	.								
756	3	2	.	.								
756	4	1	3.14	2	V	SURB						
756	5	2	.	.								
756	6	1	3.50	2	H							
756	7	1	3.59	1	V							
756	8	1	2.96	2	H	SURB						
756	9	1	3.93	1	V	SURB						
756	10	1	3.31	2	H							
756	11	4	.	.								
756	12	2	.	.								
756	13	4	.	.								
756	14	1	2.78	2	V	ROST						
756	15	4	.	.								
756	16	1	3.45	2	H	SURB						
756	17	1	3.98	1	V	COST	SURB					
761	1	4	.	.								
761	2	1	3.68	2	V							
761	3	1	3.95	1	H							
761	4	1	3.65	2	V							
761	5	1	3.91	1	H							
761	6	1	3.64	2	V							
761	7	1	3.92	1	H							
761	8	1	3.69	2	V	SURB						
761	9	1	3.33	1	H	ROST						
761	10	1	4.00	1	V							
761	11	1	3.80	1	H							
761	12	1	4.14	2	V	SURB						
761	13	1	3.99	1	H							
763	1	1	3.48	2	H							
763	2	1	3.45	2	V							
763	3	1	3.68	2	H							
763	4	1	3.58	2	V							
763	5	1	3.61	1	H							
763	6	1	3.68	2	V							
763	7	1	3.93	1	H							
763	8	1	3.98	1	V							
763	9	1	3.68	1	H	ROST						
763	10	1	3.14	1	V							
763	11	2	.	.								
763	12	1	3.57	1	H							
763	13	1	3.51	1	V							
763	14	1	3.05	2	H							

Status: 1 = Live; 2 = Early Resorption; 4 = Late Resorption
Sex: Male = 1; Female = 2; See Code Sheet 39 for Identification of abnormalities [ABNn]

Acetone Rat Teratology Study: Raw Fetal Data

440 ppm Acetone

Matno	Site	Status	Fetal Wt(g)	Sex	Head or Visceral	ABN1	ABN2	ABN3	ABN4	ABN5	ABN6	ABN7
763	15	1	3.48	2	V							
763	16	2	.	.								
763	17	1	3.98	1	H							
763	18	2	.	.								
801	1	1	3.92	1	V							
801	2	1	3.72	1	H							
801	3	1	3.68	2	V							
801	4	1	3.39	1	H							
801	5	1	3.70	1	V							
801	6	1	3.86	1	H							
801	7	1	3.38	2	V							
801	8	1	3.61	1	H							
801	9	1	3.67	2	V							
801	10	1	3.77	1	H							
801	11	1	3.70	2	V							
801	12	1	2.98	1	H							
801	13	1	2.98	2	V	ROST						
801	14	1	3.12	1	H	ROST	MAST	SURB	ROVE	MIRB		
801	15	1	3.43	2	V							
801	16	1	3.82	1	H							
801	17	1	3.83	1	V							
804	1	1	3.97	1	V							
804	2	1	3.24	2	H							
804	3	1	4.00	1	V							
804	4	1	4.27	1	H							
804	5	1	3.98	2	V							
804	6	1	4.09	1	H							
804	7	1	3.92	2	V							
804	8	1	3.71	2	H							
804	9	1	3.82	2	V							
804	10	1	3.92	1	H							
804	11	1	3.22	1	V							
804	12	1	3.94	2	H							
804	13	1	3.50	2	V	ROST						
804	14	1	3.54	2	H							
804	15	4	.	.								
804	16	1	4.37	1	V							
804	17	1	3.93	2	H							
814	1	1	3.28	2	H							
814	2	1	3.53	2	V							
814	3	1	3.38	2	H							
814	4	1	3.82	1	V							
814	5	1	3.68	1	H							
814	6	1	3.86	2	V							
814	7	1	4.11	1	H							
814	8	1	4.04	2	V							
814	9	1	4.06	2	H							

Status: 1 = Live; 2 = Early Resorption; 4 = Late Resorption
Sex: Male = 1; Female = 2; See Code Sheet 39 for Identification of abnormalities [ABNn]

Acetone Rat Teratology Study: Raw Fetal Data

----- 440 ppm Acetone -----

Matno	Site	Status	Fetal Wt(g)	Sex	Head or Visceral	ABN1	ABN2	ABN3	ABN4	ABN5	ABN6	ABN7
814	10	1	3.99	2	V							
814	11	1	4.09	2	H							
814	12	1	3.68	2	V							
814	13	1	3.98	1	H							
814	14	1	4.13	1	V							
814	15	1	4.11	1	H							
814	16	1	4.15	1	V							
819	1	1	3.35	2	H							
819	2	1	3.67	1	V							
819	3	1	3.42	2	H							
819	4	1	4.02	1	V							
819	5	1	3.59	2	H							
819	6	1	3.70	2	V							
819	7	1	3.92	1	H							
819	8	1	3.59	2	V							
819	9	1	3.49	1	H							
819	10	1	3.52	2	V							
819	11	1	3.81	2	H							
819	12	1	3.93	1	V							
819	13	1	4.04	1	H							
819	14	1	3.44	2	V							
819	15	1	3.77	2	H							
819	16	1	3.59	2	V							
819	17	1	3.75	2	H							
829	1	1	3.64	2	V							
829	2	1	3.51	2	H							
829	3	1	3.77	1	V							
829	4	1	3.65	1	H							
829	5	1	3.61	1	V							
829	6	1	3.56	2	H							
829	7	1	4.03	1	V							
829	8	1	4.01	1	H							
829	9	1	3.56	1	V							
829	10	1	3.46	1	H							
829	11	1	3.58	2	V							
829	12	1	3.42	2	H							
829	13	1	3.78	2	V							
829	14	1	3.71	1	H							
829	15	1	3.63	2	V							
829	16	1	3.52	2	H							
829	17	1	3.56	2	V							
829	18	1	3.72	2	H							
832	1	1	3.63	1	V							
832	2	1	3.82	1	H							
832	3	1	3.91	2	V							
832	4	1	3.55	2	H							
832	5	2	.	.								

Status: 1 = Live; 2 = Early Resorption; 4 = Late Resorption
Sex: Male = 1; Female = 2; See Code Sheet 39 for Identification of abnormalities [ABNn]

Acetone Rat Teratology Study: Raw Fetal Data

440 ppm Acetone

Matno	Site	Status	Fetal Wt(g)	Sex	Head or Visceral	ABN1	ABN2	ABN3	ABN4	ABN5	ABN6	ABN7
832	6	1	3.88	2	V							
832	7	1	3.96	2	H							
846	1	1	3.98	1	H							
846	2	1	4.10	1	V							
846	3	1	3.86	1	H							
846	4	1	3.87	1	V							
846	5	1	3.58	2	H							
846	6	1	3.79	1	V							
846	7	1	3.91	1	H							
846	8	1	3.86	2	V							
846	9	1	3.48	2	H							
846	10	1	3.21	1	V							
846	11	1	4.08	1	H							
846	12	1	3.76	2	V							
846	13	1	4.05	1	H							
846	14	1	3.67	2	V							
846	15	1	4.08	1	H							
846	16	1	4.01	1	V							
849	1	1	3.77	1	H							
849	2	1	4.00	1	V							
849	3	1	3.61	2	H							
849	4	1	4.09	2	V							
849	5	1	3.88	2	H							
849	6	2	.	.								
849	7	1	3.79	2	V							
849	8	1	3.83	2	H							
849	9	1	3.64	2	V							
849	10	1	3.76	1	H							
849	11	1	3.97	1	V							
849	12	1	3.44	2	H							
849	13	1	3.61	1	V							
849	14	1	3.51	2	H							
849	15	1	3.67	2	V							
849	16	1	3.65	1	H							
849	17	1	3.83	1	V							
849	18	1	3.74	1	H							
855	1	1	3.19	2	H	ROST						
855	2	1	3.57	2	V							
855	3	1	3.54	2	H							
855	4	1	3.83	1	V							
855	5	1	3.40	2	H							
855	6	1	3.73	2	V							
855	7	1	3.72	2	H							
855	8	1	3.80	1	V							
855	9	1	3.49	2	H							
855	10	1	3.39	1	V							
855	11	1	3.80	2	H							

Status: 1 = Live; 2 = Early Resorption; 4 = Late Resorption
Sex: Male = 1; Female = 2; See Code Sheet 39 for Identification of abnormalities [ABNn]

Acetone Rat Teratology Study: Raw Fetal Data

440 ppm Acetone

Matno	Site	Status	Fetal Wt(g)	Sex	Head or Visceral	ABN1	ABN2	ABN3	ABN4	ABN5	ABN6	ABN7
855	12	2	.	.								
855	13	1	3.51	2	V							
855	14	2	.	.								
855	15	1	3.00	2	H							
855	16	1	3.74	1	V							
864	1	1	3.49	1	H							
864	2	1	3.59	2	V							
864	3	1	3.65	1	H							
864	4	1	3.87	1	V							
864	5	1	3.95	2	H							
864	6	1	4.28	1	V							
864	7	1	4.06	1	H							
864	8	1	3.88	1	V	ROST	ROPB					
864	9	1	3.88	1	H							
870	1	1	3.85	1	H	ROVE						
870	2	1	3.59	1	V							
870	3	1	3.74	2	H							
870	4	1	4.14	1	V							
870	5	1	4.09	1	H							
870	6	1	3.87	2	V							
870	7	1	3.71	2	H							
870	8	1	3.85	1	V	ROVE						
870	9	1	3.69	2	H							
870	10	1	3.88	1	V							
870	11	1	3.85	1	H							
870	12	1	4.13	1	V							
870	13	1	3.97	1	H							
870	14	1	3.84	2	V							
870	15	1	3.97	2	H							
877	1	1	3.28	2	H							
877	2	1	3.48	1	V							
877	3	1	3.55	1	H							
877	4	1	3.68	1	V							
877	5	1	3.49	2	H							
877	6	1	3.61	2	V	ROST						
877	7	1	3.84	1	H							
877	8	1	3.61	2	V	DIUR						
877	9	1	3.48	2	H							
877	10	1	3.79	1	V							
877	11	1	3.63	1	H							
877	12	1	3.55	2	V	DIUR						
877	13	1	3.64	2	H							
877	14	1	3.54	2	V							
877	15	1	3.53	2	H							
877	16	1	3.28	1	V	DIUR	ROST					
877	17	1	3.42	2	H							
881	1	1	3.73	2	V							

Status: 1 = Live; 2 = Early Resorption; 4 = Late Resorption
Sex: Male = 1; Female = 2; See Code Sheet 39 for Identification of abnormalities [ABNn]

Acetone Rat Teratology Study: Raw Fetal Data

440 ppm Acetone

Matno	Site	Status	Fetal Wt(g)	Sex	Head or Visceral	ABN1	ABN2	ABN3	ABN4	ABN5	ABN6	ABN7
855	12	2	.	.								
855	13	1	3.51	2	V							
855	14	2	.	.								
855	15	1	3.00	2	H							
855	16	1	3.74	1	V							
864	1	1	3.49	1	H							
864	2	1	3.59	2	V							
864	3	1	3.65	1	H							
864	4	1	3.87	1	V							
864	5	1	3.95	2	H							
864	6	1	4.28	1	V							
864	7	1	4.06	1	H							
864	8	1	3.66	1	V	ROST	ROPB					
864	9	1	3.88	1	H							
870	1	1	3.85	1	H	ROVE						
870	2	1	3.59	1	V							
870	3	1	3.74	2	H							
870	4	1	4.14	1	V							
870	5	1	4.09	1	H							
870	6	1	3.87	2	V							
870	7	1	3.71	2	H							
870	8	1	3.85	1	V	ROVE						
870	9	1	3.69	2	H							
870	10	1	3.88	1	V							
870	11	1	3.85	1	H							
870	12	1	4.13	1	V							
870	13	1	3.97	1	H							
870	14	1	3.64	2	V							
870	15	1	3.97	2	H							
877	1	1	3.28	2	H							
877	2	1	3.48	1	V							
877	3	1	3.56	1	H							
877	4	1	3.66	1	V							
877	5	1	3.49	2	H							
877	6	1	3.61	2	V	ROST						
877	7	1	3.84	1	H							
877	8	1	3.81	2	V	DIUR						
877	9	1	3.48	2	H							
877	10	1	3.79	1	V							
877	11	1	3.63	1	H							
877	12	1	3.55	2	V	DIUR						
877	13	1	3.64	2	H							
877	14	1	3.54	2	V							
877	15	1	3.53	2	H							
877	16	1	3.28	1	V	DIUR	ROST					
877	17	1	3.42	2	H							
881	1	1	3.73	2	V							

Status: 1 = Live; 2 = Early Resorption; 4 = Late Resorption
Sex: Male = 1; Female = 2; See Code Sheet 39 for Identification of abnormalities [ABNn]

Acetone Rat Teratology Study: Raw Fetal Data

-- 440 ppm Acetone --

Matno	Site	Status	Fetal Wt(g)	Sex	Head or Visceral	ABN1	ABN2	ABN3	ABN4	ABN5	ABN6	ABN7
881	2	1	3.63	1	H							
881	3	1	3.55	2	V							
881	4	1	3.65	2	H							
881	5	1	3.74	1	V							
881	6	1	3.70	2	H							
881	7	1	3.53	2	V							
881	8	1	3.76	1	H	COST						
881	9	1	3.45	1	V							
881	10	1	3.43	2	H	MAST	ROST					
881	11	1	3.70	2	V							
881	12	1	3.85	1	H							
881	13	1	3.30	2	V							
881	14	1	3.64	2	H							
881	15	1	3.77	2	V							
881	16	2	.	.								
912	1	1	3.66	2	V							
912	2	1	3.96	1	H							
912	3	1	3.81	1	V							
912	4	1	3.77	2	H							
912	5	1	3.84	2	V							
912	6	1	3.54	2	H							
912	7	1	3.80	1	V	DIUR						
912	8	1	3.96	1	H							
912	9	1	3.58	2	V							
912	10	1	3.65	2	H							
912	11	2	.	.								
912	12	1	3.60	2	V							
912	13	1	3.48	2	H							
912	14	1	3.82	2	V							
912	15	1	4.20	1	H							
912	16	1	3.04	2	V							
912	17	1	3.69	1	H							
913	1	1	3.82	1	H							
913	2	1	3.51	2	V							
913	3	1	3.77	1	H							
913	4	1	3.88	1	V							
913	5	1	3.63	2	H							
913	6	1	3.52	2	V							
913	7	1	3.95	1	H							
913	8	1	3.58	2	V	MIIN						
913	9	1	3.48	2	H							
913	10	1	3.88	2	V							
913	11	1	3.94	1	H							
913	12	2	.	.								
913	13	1	4.10	1	V							
913	14	1	3.78	2	H							
913	15	1	4.21	1	V	ROST						

Status: 1 = Live; 2 = Early Resorption; 4 = Late Resorption
Sex: Male = 1; Female = 2; See Code Sheet 39 for Identification of abnormalities [ABNn]

SAS

Acetone Rat Teratology Study: Raw Fetal Data

-- 440 ppm Acetone --

Matno	Site	Status	Fetal Wt(g)	Sex	Head or Visceral	ABN1	ABN2	ABN3	ABN4	ABN5	ABN6	ABN7
913	16	1	4.04	2	H							

Status: 1 = Live; 2 = Early Resorption; 4 = Late Resorption
Sex: Male = 1; Female = 2; See Code Sheet 39 for Identification of abnormalities [ABNn]

Acetone Rat Teratology Study: Raw Fetal Data

2200 ppm Acetone

Matno	Site	Status	Fetal Wt(g)	Sex	Head or Visceral	ABN1	ABN2	ABN3	ABN4	ABN5	ABN6	ABN7
651	1	1	2.79	2	H	SURB						
651	2	1	3.02	2	V							
651	3	1	2.70	2	H							
651	4	1	3.00	2	V							
651	5	1	3.34	1	H	ROST						
651	6	1	3.27	1	V							
651	7	1	3.02	2	H	SURB						
651	8	1	3.37	1	V							
651	9	1	3.21	2	H	SURB						
651	10	1	3.08	1	V							
651	11	1	3.30	1	H	SURB						
651	12	1	3.02	2	V							
651	13	1	3.10	1	H	SURB						
651	14	1	3.24	1	V							
651	15	1	3.32	2	H							
651	16	1	3.06	2	V	SURB						
651	17	1	2.92	2	H							
651	18	1	3.07	2	V	SURB						
655	1	1	3.52	1	H							
655	2	1	3.08	1	V	ROSK	ROST					
655	3	1	2.97	2	H	ROST						
655	4	1	3.31	1	V							
655	5	1	3.38	1	H							
655	6	1	3.65	2	V	ROST						
655	7	1	3.64	1	H							
655	8	1	3.16	1	V							
655	9	1	3.25	1	H							
655	10	2	.	.								
655	11	1	3.37	2	V							
655	12	1	3.23	1	H							
655	13	1	3.50	1	V							
655	14	1	3.19	2	H							
655	15	1	3.14	2	V							
655	16	1	3.52	1	H	ROST						
655	17	1	3.43	2	V							
666	1	1	2.59	1	H	ROST	ROPB	ROPH				
666	2	1	2.99	1	V							
666	3	1	3.30	2	H							
666	4	1	3.11	2	V							
666	5	1	3.37	1	H							
666	6	1	3.15	1	V							
666	7	1	3.43	1	H							
666	8	1	3.16	2	V							
666	9	1	3.48	1	H							
666	10	1	3.00	2	V							
666	11	1	3.20	2	H							
666	12	1	3.45	1	V							

Status: 1 = Live; 2 = Early Resorption; 4 = Late Resorption
Sex: Male = 1; Female = 2; See Code Sheet 39 for Identification of abnormalities [ABNn]

Acetone Rat Teratology Study: Raw Fetal Data

2200 ppm Acetone

Matno	Site	Status	Fetal Wt(g)	Sex	Head or Visceral	ABN1	ABN2	ABN3	ABN4	ABN5	ABN6	ABN7
666	13	1	3.19	1	H							
666	14	1	3.18	2	V	SURB						
666	15	1	3.60	1	H							
666	16	1	3.08	2	V							
666	17	1	3.38	2	H							
666	18	1	3.08	2	V							
679	1	1	3.14	1	V							
679	2	1	3.58	2	H							
679	3	1	3.15	2	V							
679	4	2	.	.								
679	5	1	3.59	2	H							
679	6	1	3.89	1	V							
679	7	1	3.76	1	H							
679	8	1	3.41	1	V							
679	9	1	3.46	2	H							
679	10	1	3.70	1	V							
679	11	1	3.09	1	H							
679	12	1	3.62	2	V							
679	13	1	3.80	1	H	ROST						
679	14	1	3.91	1	V	ROST	MAST					
679	15	1	3.62	2	H							
704	1	1	3.04	2	V							
704	2	2	.	.								
704	3	1	3.64	1	H							
704	4	1	3.39	2	V	ROPB						
704	5	2	.	.								
704	6	2	.	.								
704	7	1	3.64	1	H							
704	8	1	3.49	1	V	ROPB						
704	9	1	3.31	2	H							
704	10	1	3.41	1	V							
704	11	1	3.31	2	H							
704	12	1	3.34	2	V							
704	13	1	3.14	2	H							
704	14	1	3.26	2	V	ROSK						
704	15	1	3.54	1	H							
704	16	1	3.46	2	V							
704	17	1	2.44	2	H	ROST	ROPB					
705	1	1	3.74	1	H							
705	2	1	3.86	1	V							
705	3	1	3.75	1	H							
705	4	1	4.04	1	V							
705	5	1	3.54	1	H							
705	6	2	.	.								
705	7	1	3.40	2	V							
705	8	1	3.91	1	H							
705	9	1	4.06	1	V							

Status: 1 = Live; 2 = Early Resorption; 4 = Late Resorption
Sex: Male = 1; Female = 2; See Code Sheet 39 for Identification of abnormalities [ABNn]

j

Acetone Rat Teratology Study: Raw Fetal Data

-- 2200 ppm Acetone --

Matno	Site	Status	Fetal Wt(g)	Sex	Head or Visceral	ABN1	ABN2	ABN3	ABN4	ABN5	ABN6	ABN7
705	10	1	3.62	2	H							
705	11	1	4.14	1	V							
705	12	1	4.02	1	H	SURB						
705	13	1	4.22	1	V							
705	14	1	4.35	1	H							
705	15	1	3.86	1	V							
705	16	1	4.10	2	H							
705	17	2	.	.								
712	1	1	3.77	2	H							
712	2	1	3.09	2	V							
712	3	1	3.90	2	H							
712	4	2	.	.								
712	5	1	3.68	2	V							
712	6	1	3.89	1	H	COST						
712	7	1	3.01	2	V							
712	8	1	3.62	2	H							
712	9	1	4.12	1	V							
712	10	1	3.68	2	H							
712	11	2	.	.								
712	12	1	3.71	2	V							
719	1	1	2.99	1	V							
719	2	1	3.58	1	H							
719	3	1	3.47	1	V							
719	4	1	3.66	2	H							
719	5	1	3.17	1	V							
719	6	1	3.45	1	H							
719	7	1	2.77	2	V							
719	8	2	.	.								
719	9	2	.	.								
719	10	1	3.49	2	H							
719	11	1	3.18	1	V							
719	12	1	3.44	2	H							
719	13	1	2.90	2	V							
719	14	1	3.14	2	H							
719	15	2	.	.								
727	1	1	3.59	1	H							
727	2	1	3.58	2	V							
727	3	1	3.71	2	H							
727	4	1	3.94	1	V							
727	5	1	3.98	1	H							
727	6	1	3.70	2	V							
727	7	1	3.37	2	H							
727	8	1	3.95	2	V							
727	9	1	3.95	1	H							
727	10	1	3.71	2	V							
727	11	1	3.71	2	H							
727	12	1	3.80	2	V							

Status: 1 = Live; 2 = Early Resorption; 4 = Late Resorption
Sex: Male = 1; Female = 2; See Code Sheet 39 for Identification of abnormalities [ABNn]

Acetone Rat Teratology Study: Raw Fetal Data

------- 2200 ppm Acetone -------

Matno	Site	Status	Fetal Wt(g)	Sex	Head or Visceral	ABN1	ABN2	ABN3	ABN4	ABN5	ABN6	ABN7
727	13	1	3.71	2	H							
727	14	1	3.90	1	V							
727	15	1	3.74	2	H							
727	16	1	3.99	1	V							
727	17	1	4.10	1	H							
727	18	1	4.09	2	V							
727	19	1	4.30	1	H							
727	20	2	.	.								
734	1	2	.	.								
734	2	2	.	.								
734	3	2	.	.								
734	4	1	4.03	1	H	SURB						
734	5	2	.	.								
734	6	2	.	.								
734	7	1	2.82	2	V	ROST						
734	8	1	3.74	1	H	SURB						
734	9	1	2.72	1	V	ROST	ROPB					
734	10	2	.	.								
734	11	2	.	.								
734	12	2	.	.								
734	13	1	3.68	1	H							
734	14	2	.	.								
735	1	1	3.31	1	V							
735	2	1	2.63	1	H	ROST						
735	3	1	3.51	2	V							
735	4	1	3.43	2	H	RORB						
735	5	1	3.77	1	V	COST						
735	6	1	3.91	1	H							
735	7	1	3.52	2	V							
735	8	1	3.44	1	H							
735	9	1	3.06	2	V							
735	10	1	3.38	1	H							
735	11	1	3.18	2	V							
735	12	1	3.60	2	H							
735	13	1	3.25	1	V							
735	14	1	3.50	1	H							
735	15	1	3.62	2	V							
735	16	1	3.14	2	H							
735	17	1	3.54	1	V							
736	1	1	3.06	2	H							
736	2	1	3.70	1	V							
736	3	1	3.63	1	H	SURB						
736	4	1	3.52	2	V							
736	5	1	3.55	1	H							
736	6	1	3.82	1	V							
736	7	1	3.19	2	H							
736	8	1	3.29	1	V	SURB						

Status: 1 = Live; 2 = Early Resorption; 4 = Late Resorption
Sex: Male = 1; Female = 2; See Code Sheet 39 for Identification of abnormalities [ABNn]

Acetone Rat Teratology Study: Raw Fetal Data

--- 2200 ppm Acetone ---

Matno	Site	Status	Fetal Wt(g)	Sex	Head or Visceral	ABN1	ABN2	ABN3	ABN4	ABN5	ABN6	ABN7
738	9	1	3.78	1	H	SURB						
738	10	1	3.64	2	V	SURB						
745	1	1	2.95	2	V							
745	2	1	3.25	2	H							
745	3	1	3.19	2	V							
745	4	1	3.53	1	H							
745	5	1	3.80	1	V							
745	6	1	2.88	1	H							
745	7	1	3.52	1	V							
745	8	1	3.15	1	H							
745	9	1	3.29	1	V							
745	10	1	3.35	1	H							
745	11	1	2.95	2	V							
745	12	1	3.44	1	H							
745	13	1	3.79	1	V							
745	14	1	3.30	2	H							
745	15	2	.	.								
745	16	2	.	.								
745	17	1	3.49	2	V							
745	18	1	3.77	2	H							
769	1	4	.	.								
769	2	1	3.93	2	V							
769	3	1	3.95	1	H							
769	4	1	4.33	1	V							
769	5	1	4.28	1	H							
769	6	1	4.16	1	V							
769	7	1	4.02	2	H							
769	8	1	4.14	1	V							
769	9	2	.	.								
769	10	1	4.72	1	V							
769	11	1	4.09	1	H							
769	12	1	4.14	1	V							
769	13	1	4.33	1	H							
769	14	1	3.81	2	V	ROVE						
769	15	1	4.10	1	H							
780	1	1	3.75	1	H							
780	2	1	3.64	2	V							
780	3	1	3.66	1	H							
780	4	1	3.74	2	V							
780	5	1	3.49	2	H							
780	6	1	3.46	2	V							
780	7	2	.	.								
780	8	1	3.61	2	H							
780	9	1	3.55	1	V							
780	10	1	4.12	1	H	COST						
780	11	1	3.42	2	V							
780	12	1	3.56	2	H	ROVE						

Status: 1 = Live; 2 = Early Resorption; 4 = Late Resorption
Sex: Male = 1; Female = 2; See Code Sheet 39 for Identification of abnormalities [ABNn]

SAS

Acetone Rat Teratology Study: Raw Fetal Data

---------- 2200 ppm Acetone ----------

Matno	Site	Status	Fetal Wt(g)	Sex	Head or Visceral	ABN1	ABN2	ABN3	ABN4	ABN5	ABN6	ABN7
780	13	1	3.47	1	V							
780	14	1	3.72	1	H							
780	15	1	3.27	2	V							
780	16	1	3.60	1	H							
780	17	1	3.65	2	V							
780	18	1	3.82	1	H							
791	1	1	2.73	2	V	ROST						
791	2	1	3.94	1	H							
791	3	1	4.29	1	V							
791	4	1	3.99	2	H							
791	5	1	4.12	2	V							
791	6	1	4.11	1	H							
791	7	1	4.31	1	V							
791	8	2	.	.								
791	9	1	3.66	2	H							
791	10	1	3.84	1	V	COST						
791	11	1	3.86	1	H	COST						
791	12	1	4.17	1	V							
791	13	1	3.84	2	H							
791	14	1	3.90	1	V	COST						
791	15	1	3.97	2	H							
791	16	1	3.81	1	V							
799	1	1	3.47	2	V							
799	2	1	3.86	1	H							
799	3	4	.	.								
799	4	1	2.86	1	V							
799	5	1	3.27	2	H							
799	6	4	.	.								
799	7	1	2.99	2	V							
799	8	4	.	.								
799	9	4	.	.								
799	10	1	3.13	2	H							
799	11	2	.	.								
799	12	1	3.83	1	V							
799	13	4	.	.								
799	14	1	3.55	1	H							
799	15	2	.	.								
822	1	1	3.76	1	V							
822	2	1	3.63	1	H							
822	3	1	3.96	1	V							
822	4	1	3.42	2	H							
822	5	1	3.68	1	V							
822	6	1	3.94	1	H							
822	7	1	3.69	2	V							
822	8	1	3.73	1	H							
822	9	1	3.66	1	V							
822	10	2	.	.								

Status: 1 = Live; 2 = Early Resorption; 4 = Late Resorption
Sex: Male = 1; Female = 2; See Code Sheet 39 for Identification of abnormalities [ABNn]

Acetone Rat Teratology Study: Raw Fetal Data

--- 2200 ppm Acetone ---

Matno	Site	Status	Fetal Wt(g)	Sex	Head or Visceral	ABN1	ABN2	ABN3	ABN4	ABN5	ABN6	ABN7
822	11	1	3.70	1	H							
822	12	1	3.71	2	V							
822	13	1	3.92	1	H							
822	14	1	3.87	1	V							
822	15	1	3.62	2	H							
822	16	1	3.86	2	V							
834	1	1	3.67	1	V							
834	2	1	3.31	2	H							
834	3	1	3.63	1	V							
834	4	1	3.19	1	H							
834	5	1	3.54	1	V							
834	6	1	3.64	2	H							
834	7	1	3.48	1	V	DIUR	ROST	MAST				
834	8	1	3.95	1	H							
834	9	1	3.74	1	V							
834	10	1	3.61	2	H							
834	11	1	2.90	2	V							
834	12	1	3.40	2	H	ROVE						
834	13	2	.	.								
863	1	1	.	1	H							
863	2	2	.	.								
863	3	1	.	1	V	DIUR						
863	4	1	.	1	H							
863	5	1	.	2	V	ROST						
863	6	1	.	1	H							
863	7	1	.	1	V							
863	8	1	.	1	H							
863	9	1	.	1	V							
863	10	1	.	2	H							
863	11	1	.	1	V							
863	12	1	.	2	H							
863	13	1	.	2	V							
863	14	1	.	1	H							
863	15	1	.	1	V							
863	16	1	.	2	H							
863	17	1	.	1	V							
863	18	1	.	1	H							
865	1	1	3.11	1	H	ROPB						
865	2	1	3.34	1	V	ROST						
865	3	2	.	.								
865	4	1	3.10	2	H							
865	5	1	3.16	2	V							
865	6	1	3.07	2	H							
865	7	1	3.15	2	V							
865	8	4	.	.								
865	9	4	.	.								
865	10	4	.	.								

Status: 1 = Live; 2 = Early Resorption; 4 = Late Resorption
Sex: Male = 1; Female = 2; See Code Sheet 39 for Identification of abnormalities [ABNn]

Acetone Rat Teratology Study: Raw Fetal Date

2200 ppm Acetone

Matno	Site	Status	Fetal Wt(g)	Sex	Head or Visceral	ABN1	ABN2	ABN3	ABN4	ABN5	ABN6	ABN7
865	11	1	3.23	1	H							
865	12	1	3.38	2	V							
865	13	1	3.14	1	H							
865	14	1	3.56	1	V							
867	1	2	.	.								
867	2	1	3.66	1	H	ROVE						
867	3	1	3.76	1	V							
867	4	1	3.60	2	H							
867	5	1	3.45	2	V	DIUR	ROVE					
867	6	1	3.83	1	H							
867	7	1	3.42	2	V							
867	8	1	3.70	2	H							
867	9	1	3.73	2	V							
867	10	1	3.52	1	H							
867	11	2	.	.								
867	12	1	3.44	2	V							
867	13	1	3.74	2	H							
867	14	1	4.17	1	V	ROSK						
867	15	2	.	.								
867	16	1	4.02	2	H							
868	1	1	3.77	1	H							
868	2	1	4.03	1	V							
868	3	1	3.91	2	H							
868	4	1	4.30	1	V							
868	5	1	4.02	1	H							
868	6	1	4.22	1	V							
868	7	1	3.77	2	H							
868	8	1	3.73	2	V							
868	9	1	4.00	2	H							
868	10	1	3.84	2	V							
868	11	1	4.04	1	H							
868	12	1	3.71	2	V							
868	13	1	3.64	2	H							
868	14	1	3.72	2	V							
868	15	1	3.74	2	H							
868	16	1	3.91	2	V							
868	17	1	4.06	1	H							
873	1	1	3.63	2	V							
873	2	1	4.10	1	H							
873	3	1	3.70	2	V	ROVE						
873	4	1	3.87	2	H							
873	5	1	4.53	1	V	DIUR	RPCA					
873	6	1	3.72	2	H							
873	7	1	2.42	1	V	ROST	SURB	ROPB	ROSK			
873	8	1	3.24	2	H							
873	9	1	4.24	1	V							
873	10	1	4.03	1	H							

Status: 1 = Live; 2 = Early Resorption; 4 = Late Resorption
Sex: Male = 1; Female = 2; See Code Sheet 39 for Identification of abnormalities [ABNn]

SAS

Acetone Rat Teratology Study: Raw Fetal Data

---------- 2200 ppm Acetone ----------

Matno	Site	Status	Fetal Wt(g)	Sex	Head or Visceral	ABN1	ABN2	ABN3	ABN4	ABN5	ABN6	ABN7
873	11	1	4.22	2	V							
873	12	1	4.07	2	H							
873	13	1	4.07	1	V	DIUR						
873	14	1	3.73	2	H							
873	15	1	4.01	1	V							
879	1	1	3.48	1	H	ROST						
879	2	1	3.91	1	V							
879	3	1	3.48	2	H							
879	4	1	3.77	1	V							
879	5	1	3.59	2	H							
879	6	1	3.58	2	V							
879	7	1	3.52	2	H							
879	8	1	3.60	2	V							
879	9	1	3.72	1	H							
879	10	1	3.32	2	V							
879	11	1	2.97	2	H							
879	12	1	3.75	2	V							
879	13	1	3.50	2	H							
879	14	1	3.30	2	V							
879	15	1	3.94	1	H							
888	1	1	3.51	1	V	ROVE						
888	2	1	3.58	1	H							
888	3	1	3.77	1	V							
888	4	1	3.41	1	H							
888	5	1	3.82	1	V							
888	6	2	.	.								
888	7	1	3.39	2	H							
888	8	1	3.58	1	V							
888	9	1	3.68	1	H							
888	10	1	3.87	1	V							
888	11	1	3.55	2	H							
888	12	1	3.72	1	V							
888	13	1	3.30	1	H							
888	14	1	3.51	2	V							
888	15	1	3.64	2	H							
888	16	1	3.53	1	V							
891	1	1	3.14	2	V							
891	2	1	3.25	2	H							
891	3	1	3.15	1	V							
891	4	1	3.25	2	H							
891	5	1	3.18	2	V							
891	6	1	3.48	2	H							
891	7	1	3.50	1	V							
891	8	1	3.54	2	H							
891	9	1	3.30	2	V	ROST						
891	10	1	3.39	2	H							
891	11	1	3.55	1	V							

Status: 1 = Live; 2 = Early Resorption; 4 = Late Resorption
Sex: Male = 1; Female = 2; See Code Sheet 39 for Identification of abnormalities [ABNn]

Acetone Rat Teratology Study: Raw Fetal Data

2200 ppm Acetone

Matno	Site	Status	Fetal Wt(g)	Sex	Head or Visceral	ABN1	ABN2	ABN3	ABN4	ABN5	ABN6	ABN7
908	1	1	3.37	2	H	ROST						
908	2	1	3.38	2	V							
908	3	1	3.40	2	H							
908	4	1	3.50	1	V							
908	5	1	3.54	1	H							
908	6	1	3.75	1	V							
908	7	1	3.38	1	H							
908	8	1	3.09	2	V							
908	9	1	3.52	1	H							
908	10	1	3.68	2	V							
908	11	1	3.98	1	H							
908	12	1	3.46	2	V							
908	13	1	3.09	2	H	ROST						
908	14	1	2.97	1	V	ROSK	SURB	ROST				
908	15	1	3.26	2	H							
908	16	1	3.24	2	V							
910	1	1	3.32	2	H	RORB						
910	2	1	2.90	2	V							
910	3	2	.	.								
910	4	1	3.62	1	H							
910	5	1	3.46	1	V							
910	6	1	3.65	1	H							
910	7	1	3.41	2	V							
910	8	1	3.49	2	H							
910	9	1	3.17	1	V							
910	10	1	2.88	2	H	ROST						
910	11	1	3.29	2	V							
910	12	1	3.94	1	H							
910	13	1	3.39	2	V							
910	14	1	3.32	2	H							
910	15	1	3.66	2	V							

Status: 1 = Live; 2 = Early Resorption; 4 = Late Resorption
Sex: Male = 1; Female = 2; See Code Sheet 39 for Identification of abnormalities [ABNn]

SAS

Acetone Rat Teratology Study: Raw Fetal Data

-- 11000 ppm Acetone --

Matno	Site	Status	Fetal Wt(g)	Sex	Head or Visceral	ABN1	ABN2	ABN3	ABN4	ABN5	ABN6	ABN7
654	1	1	2.92	2	H							
654	2	1	3.43	1	V							
654	3	1	3.44	1	H							
654	4	2	.	.								
654	5	1	3.30	2	V							
654	6	1	3.19	1	H							
654	7	1	3.16	1	V							
654	8	1	3.34	2	H							
654	9	1	3.28	2	V							
654	10	1	3.00	1	H							
654	11	1	3.13	2	V							
654	12	1	3.16	1	H							
654	13	1	3.01	2	V	ROST						
654	14	1	3.13	2	H							
654	15	1	2.91	1	V							
654	16	1	3.08	2	H							
657	1	1	3.38	1	H							
657	2	1	3.24	1	V							
657	3	1	3.02	2	H							
657	4	1	3.27	1	V							
657	5	1	1.97	1	H	ROST	SURB	ROPB	ROPH			
657	6	1	3.04	2	V							
657	7	1	3.12	2	H							
657	8	1	1.86	2	V	ROSK	ROST	ROVE	ROPB	ROPH		
657	9	1	3.18	2	H							
657	10	2	.	.								
667	11	1	3.10	1	V							
657	12	1	3.22	2	H							
678	1	1	3.05	1	H							
678	2	1	3.60	1	V							
678	3	1	3.39	1	H							
678	4	1	3.33	2	V							
678	6	1	3.17	2	H							
678	8	1	3.52	1	V							
678	7	1	3.32	2	H							
678	8	1	3.21	2	V	DIUR						
678	9	1	3.26	2	H							
678	10	1	3.31	2	V	DIUR	RORB					
678	11	1	3.10	1	H							
678	12	1	3.23	2	V	ROVE						
678	13	1	3.24	2	H							
678	14	1	3.09	2	V							
678	16	1	3.61	1	H							
678	18	1	3.43	2	V							
693	1	1	2.85	2	H							
693	2	1	2.91	2	V	ROSK						
693	3	1	2.77	2	H							

Status: 1 = Live; 2 = Early Resorption; 4 = Late Resorption
Sex: Male = 1; Female = 2; See Code Sheet 39 for Identification of abnormalities [ABNn]

Acetone Rat Teratology Study: Raw Fetal Data

-- 11000 ppm Acetone --

Matno	Site	Status	Fetal Wt(g)	Sex	Head or Visceral	ABN1	ABN2	ABN3	ABN4	ABN5	ABN6	ABN7
693	4	1	2.43	2	V	ROST						
693	5	1	3.08	1	H							
693	6	1	3.06	1	V							
693	7	2	.	.								
693	8	1	2.84	2	H							
693	9	1	2.73	2	V							
693	10	1	2.97	1	H							
693	11	1	3.30	1	V							
693	12	1	2.87	2	H							
693	13	1	2.53	2	V	ROST						
693	14	1	3.23	1	H							
693	15	1	3.18	1	V							
693	16	1	3.17	1	H							
693	17	1	3.43	1	V							
697	1	1	2.75	1	V							
697	2	1	2.83	1	H							
697	3	1	2.60	2	V							
697	4	1	2.83	1	H							
697	5	1	2.94	1	V							
697	6	1	3.01	1	H							
697	7	1	2.56	2	V							
697	8	1	2.43	1	H							
697	9	1	2.26	2	V							
697	10	1	2.91	1	H							
697	11	1	2.88	1	V							
697	12	1	2.42	2	H							
697	13	1	2.66	2	V							
697	14	1	2.59	2	H							
697	15	1	2.88	2	V							
698	1	1	3.09	1	V	ROST						
698	2	1	3.07	2	H							
698	3	1	2.93	1	V							
698	4	1	3.12	1	H							
698	5	1	2.92	2	V							
698	6	1	2.99	1	H							
698	7	1	3.26	1	V							
698	8	1	2.97	2	H							
698	9	1	3.15	1	V							
698	10	1	3.10	1	H	ROST						
698	11	1	1.59	1	V	CLST	ECHT	MAVM	ROSK	ROVE	ROPH	EDEM
698	12	1	2.79	2	H							
698	13	1	2.92	1	V							
698	14	1	3.28	1	H							
698	15	1	2.97	1	V							
698	16	1	3.04	1	H	SURB						
698	17	1	2.99	2	V							
698	18	1	2.86	2	H							

Status: 1 = Live; 2 = Early Resorption; 4 = Late Resorption
Sex: Male = 1; Female = 2; See Code Sheet 39 for Identification of abnormalities [ABNn]

Acetone Rat Teratology Study: Raw Fetal Data

-- 11000 ppm Acetone --

Matno	Site	Status	Fetal Wt(g)	Sex	Head or Visceral	ABN1	ABN2	ABN3	ABN4	ABN5	ABN6	ABN7
698	19	1	3.07	1	V							
711	1	1	2.54	1	V							
711	2	1	2.84	2	H							
711	3	1	3.06	1	V	ROST						
711	4	1	2.88	2	H							
711	5	1	3.12	1	V							
711	6	1	2.79	2	H	ROST						
711	7	1	2.55	1	V	ROST						
711	8	1	2.68	2	H	ROST	MAST					
711	9	2	.	.								
711	10	1	2.95	2	V	ROST						
711	11	1	3.16	1	H	ROST						
711	12	1	3.12	2	V							
711	13	1	3.29	2	H							
711	14	1	3.11	2	V	ROST	MAST					
711	15	1	2.98	2	H							
738	1	1	2.86	1	V							
738	2	1	2.95	1	H							
738	3	1	3.17	1	V	DIUR						
738	4	1	3.38	1	H							
738	5	1	3.23	2	V							
738	6	1	3.18	1	H							
738	7	1	2.83	2	V							
738	8	1	3.05	1	H							
738	9	1	2.91	2	V							
738	10	1	3.04	1	H							
738	11	1	3.31	1	V							
738	12	1	3.18	2	H							
738	13	1	3.06	1	V							
738	14	2	.	.								
738	15	2	.	.								
742	1	1	2.63	1	H	ROPH						
742	2	2	.	.								
742	3	1	3.17	1	V							
742	4	1	3.29	1	H							
742	5	1	3.01	2	V							
742	6	1	2.98	1	H							
742	7	1	2.70	2	V							
742	8	1	2.83	1	H							
742	9	1	2.88	1	V							
742	10	1	3.00	1	H							
742	11	1	3.01	1	V	ROSK						
742	12	1	3.03	1	H							
742	13	1	2.77	2	V							
742	14	1	2.77	2	H							
742	15	1	2.99	1	V							
742	16	1	2.89	1	H							

Status: 1 = Live; 2 = Early Resorption; 4 = Late Resorption
Sex: Male = 1; Female = 2; See Code Sheet 39 for Identification of abnormalities [ABNn]

Acetone Rat Teratology Study: Raw Fetal Data

--- 11000 ppm Acetone ---

Matno	Site	Status	Fetal Wt(g)	Sex	Head or Visceral	ABN1	ABN2	ABN3	ABN4	ABN5	ABN6	ABN7
765	1	1	3.51	2	H							
765	2	1	3.53	2	V							
765	3	2	.	.								
765	4	1	3.54	2	H	ROST	SURB					
765	5	1	3.97	1	V							
765	6	1	3.86	1	H							
765	7	1	3.55	2	V							
765	8	1	3.46	2	H	SURB						
765	9	1	3.45	2	V							
765	10	1	3.71	2	H	SURB						
765	11	1	3.36	1	V	DIUR						
765	12	1	3.03	2	H							
765	13	4	.	.								
765	14	1	3.70	1	V	SURB						
765	15	1	3.96	1	H							
765	16	4	.	.								
771	1	1	3.23	1	H							
771	2	1	2.58	2	V							
771	3	1	3.04	2	H							
771	4	1	2.98	1	V							
771	5	1	3.25	1	H							
771	6	1	2.97	2	V							
771	7	1	3.11	2	H							
771	8	2	.	.								
771	9	1	2.84	2	V							
771	10	1	2.76	2	H							
771	11	1	2.86	1	V							
771	12	1	2.80	1	H							
771	13	1	3.03	2	V							
771	14	1	2.82	1	H							
771	15	1	3.06	2	V							
771	16	1	2.92	1	H							
776	1	1	3.24	2	H							
776	2	1	3.18	1	V							
776	3	1	3.03	2	H							
776	4	1	2.56	2	V							
776	5	1	3.27	1	H							
776	6	1	2.84	2	V							
781	1	1	3.33	2	V							
781	2	1	3.46	1	H							
781	3	1	3.48	2	V							
781	4	1	3.53	1	H							
781	5	1	3.37	2	V							
781	6	1	3.10	2	H							
781	7	1	3.16	2	V							
781	8	1	3.43	2	H							
781	9	1	3.57	1	V							

Status: 1 = Live; 2 = Early Resorption; 4 = Late Resorption
Sex: Male = 1; Female = 2; See Code Sheet 39 for Identification of abnormalities [ABNn]

SAS

Acetone Rat Teratology Study: Raw Fetal Data

11000 ppm Acetone

Matno	Site	Status	Fetal Wt(g)	Sex	Head or Visceral	ABN1	ABN2	ABN3	ABN4	ABN5	ABN6	ABN7
781	10	1	3.48	2	H							
781	11	1	3.38	1	V	DIUR	SURB					
781	12	1	3.17	2	H							
781	13	1	3.34	2	V							
781	14	1	3.67	1	H							
781	15	1	3.48	2	V							
781	16	2	.	.								
782	1	2	.	.								
782	2	4	.	.								
782	3	1	3.00	2	V	ANUR						
782	4	1	2.60	2	H							
782	5	1	2.61	2	V	ANUR	ROVE	MIVE	SURB			
782	6	1	3.22	1	H							
782	7	1	3.05	1	V							
782	8	2	.	.								
782	9	2	.	.								
782	10	1	2.97	1	H							
782	11	2	.	.								
782	12	1	2.82	2	V							
782	13	1	3.01	2	H							
782	14	1	3.15	2	V							
782	15	1	3.32	1	H							
782	16	1	3.01	1	V							
782	17	2	.	.								
817	1	1	3.19	2	H							
817	2	1	3.09	1	V							
817	3	1	3.22	2	H							
817	4	2	.	.								
817	5	1	3.40	1	V							
817	6	1	2.94	1	H							
817	7	1	3.32	1	V							
817	8	1	2.90	1	H							
817	9	1	3.23	1	V							
817	10	1	3.32	1	H							
817	11	1	3.05	1	V							
817	12	1	2.89	2	H							
817	13	1	3.12	1	V							
817	14	1	3.34	1	H							
817	15	1	3.38	2	V							
817	16	1	3.49	1	H							
818	1	1	3.35	1	H	ROST						
818	2	1	3.09	1	V							
818	3	1	3.41	1	H	SURB						
818	4	1	3.20	2	V							
818	5	1	2.81	2	H							
818	6	1	3.28	1	V	ROSK						
818	7	1	3.03	2	H	ROST						

Status: 1 = Live; 2 = Early Resorption; 4 = Late Resorption
Sex: Male = 1; Female = 2; See Code Sheet 39 for Identification of abnormalities [ABNn]

Acetone Rat Teratology Study: Raw Fetal Data

-- 11000 ppm Acetone --

Matno	Site	Status	Fetal Wt(g)	Sex	Head or Visceral	ABN1	ABN2	ABN3	ABN4	ABN5	ABN6	ABN7
818	8	1	3.16	1	V	ROST						
818	9	1	3.06	1	H							
818	10	1	3.09	1	V							
818	11	1	3.25	2	H							
818	12	1	3.32	1	V	ROST						
818	13	1	2.82	2	H	ROST						
818	14	1	3.08	1	V							
818	15	1	2.98	1	H							
818	16	1	3.10	1	V							
820	1	1	3.80	1	H							
820	2	1	3.59	1	V							
820	3	1	3.70	1	H	MAST	SURB					
820	4	1	3.90	1	V							
820	5	1	3.81	2	H							
820	6	1	3.61	1	V							
820	7	1	3.52	2	H							
820	8	1	3.49	1	V							
820	9	2	.	.								
820	10	1	3.80	1	H							
820	11	1	3.61	2	V							
820	12	1	3.75	1	H							
820	13	2	.	.								
820	14	1	3.50	2	V							
820	15	1	3.58	1	H							
820	16	1	3.68	2	V							
828	1	1	3.47	2	H							
828	2	1	3.23	2	V							
828	3	1	3.17	1	H							
828	4	2	.	.								
828	5	1	3.08	1	V							
828	6	1	3.45	2	H							
828	7	1	3.38	2	V							
828	8	1	3.32	2	H							
828	9	1	3.22	1	V	ROSK						
828	10	1	3.58	2	H							
828	11	1	3.20	1	V	ROSK						
828	12	1	3.47	2	H							
828	13	1	3.24	1	V	ROSK						
828	14	1	3.35	1	H							
828	15	1	2.87	2	V							
828	16	1	3.11	2	H	ROST	MAST	SURB				
831	1	1	2.90	2	H							
831	2	1	2.87	2	V							
831	3	1	2.96	1	H							
831	4	1	2.68	1	V	ROST	MAST					
831	5	1	2.85	1	H	ROST						
831	6	1	3.09	1	V							

Status: 1 = Live; 2 = Early Resorption; 4 = Late Resorption
Sex: Male = 1; Female = 2; See Code Sheet 39 for Identification of abnormalities [ABNn]

Acetone Rat Teratology Study: Raw Fetal Data

---------- 11000 ppm Acetone ----------

Matno	Site	Status	Fetal Wt(g)	Sex	Head or Visceral	ABN1	ABN2	ABN3	ABN4	ABN5	ABN6	ABN7
831	7	1	3.12	1	H							
831	8	2	.	.								
831	9	1	2.99	1	V							
831	10	1	2.80	2	H							
831	11	1	2.48	2	V							
831	12	1	2.78	2	H							
831	13	4	.	.								
831	14	1	2.82	2	V							
831	15	1	3.06	2	H							
831	16	1	2.79	2	V							
831	17	1	3.12	1	H							
831	18	1	2.69	2	V	ROST						
831	19	1	2.89	2	H							
860	1	1	2.56	1	V	RORB						
860	2	2	.	.								
860	3	1	2.69	2	H	ROST						
860	4	1	2.60	2	V	ROST						
860	5	1	2.65	2	H	ROST						
860	6	1	2.46	1	V	ROST						
860	7	1	2.59	1	H							
860	8	1	2.06	1	V	ROST						
860	9	1	2.65	1	H							
860	10	1	2.96	1	V							
860	11	1	2.76	1	H							
860	12	1	2.62	2	V	ROST	MAST					
860	13	1	2.84	1	H							
860	14	1	2.66	2	V	ROST						
860	15	1	2.76	1	H							
860	16	1	2.67	1	V							
869	1	1	2.77	2	H							
869	2	1	3.07	1	V							
869	3	1	3.13	1	H							
869	4	1	2.52	1	V	ROST						
869	5	1	2.85	2	H	ROST						
869	6	1	3.01	2	V							
869	7	1	3.06	1	H							
869	8	1	2.63	2	V							
869	9	1	2.85	1	H							
869	10	1	2.78	2	V							
869	11	1	2.89	2	H							
869	12	1	2.98	1	V							
869	13	1	2.98	2	H							
869	14	1	2.68	2	V							
869	15	2	.	.								
869	16	1	3.21	1	H	ROST						
869	17	1	2.89	2	V							
869	18	1	3.12	1	H							

Status: 1 = Live; 2 = Early Resorption; 4 = Late Resorption
Sex: Male = 1; Female = 2; See Code Sheet 39 for Identification of abnormalities [ABNn]

SAS

Acetone Rat Teratology Study: Raw Fetal Data

------------------------------ 11000 ppm Acetone ------------------------------

Matno	Site	Status	Fetal Wt(g)	Sex	Head or Visceral	ABN1	ABN2	ABN3	ABN4	ABN5	ABN6	ABN7
876	1	1	3.05	2	H							
876	2	1	3.42	1	V							
876	3	1	3.27	1	H							
876	4	1	3.04	2	V							
876	5	1	3.26	2	H							
876	6	1	3.30	1	V							
876	7	1	3.04	2	H							
884	1	4	.	.								
884	2	1	2.82	1	H							
884	3	1	2.73	1	V							
884	4	1	2.56	2	H							
884	5	1	2.61	2	V							
884	6	1	2.42	2	H							
884	7	1	2.46	1	V	DIUR						
884	8	1	2.38	1	H							
884	9	1	2.48	1	V							
884	10	1	2.37	2	H							
884	11	1	2.01	2	V	ROST						
884	12	1	2.51	2	H	ROST	ROVE					
884	13	2	.	.								
884	14	1	2.94	1	V							
884	15	4	.	.								
884	16	1	2.46	2	H	ROST						
904	1	1	2.83	1	V							
904	2	1	3.21	1	H							
904	3	1	2.82	2	V							
904	4	2	.	.								
904	5	1	3.04	2	H							
904	6	1	3.20	2	V							
904	7	1	3.09	1	H							
904	8	1	2.93	2	V							
904	9	1	2.98	2	H	ROST						
904	10	1	3.04	1	V							
904	11	1	2.63	2	H	ROST	UARH	MIST				
904	12	1	3.57	1	V							
904	13	1	2.92	2	H							
904	14	1	3.25	2	V							
906	1	1	2.26	2	H	ROST						
906	2	1	2.24	2	V	ROST						
906	3	1	2.99	1	H							
906	4	1	2.74	2	V							
906	5	2	.	.								
906	6	1	2.35	1	H	ROST	MAST					
906	7	1	3.13	1	V							
906	8	1	2.72	1	H							
906	9	1	2.89	2	V							
906	10	2	.	.								

Status: 1 = Live; 2 = Early Resorption; 4 = Late Resorption
Sex: Male = 1; Female = 2; See Code Sheet 39 for Identification of abnormalities [ABNn]

Acetone Rat Teratology Study: Raw Fetal Data

-- 11000 ppm Acetone --

Matno	Site	Status	Fetal Wt(g)	Sex	Head or Visceral	ABN1	ABN2	ABN3	ABN4	ABN5	ABN6	ABN7
906	11	1	3.19	1	H							
906	12	1	2.91	2	V							
906	13	1	3.00	1	H							
906	14	1	2.91	2	V							
906	15	1	2.82	2	H							
906	16	1	2.82	2	V	WIIN						
911	1	1	3.67	1	V	ROST	MAST					
911	2	1	3.44	2	H							
911	3	1	3.56	2	V							
911	4	1	3.57	2	H							
911	5	1	3.43	2	V	DIUR						
911	6	1	3.63	1	H							
911	7	1	3.41	1	V							
911	8	1	3.33	2	H							
911	9	1	3.49	1	V							
911	10	1	3.67	1	H							
911	11	1	3.64	1	V	SURB						
911	12	1	3.29	2	H							
911	13	1	2.90	2	V							
911	14	1	2.44	2	H	ROST						
911	15	1	3.41	2	V							
911	16	4	.	.								
911	17	1	3.40	2	H							

Status: 1 = Live; 2 = Early Resorption; 4 = Late Resorption
Sex: Male = 1; Female = 2; See Code Sheet 39 for Identification of abnormalities [ABNn]

Acetone Rat Teratology Study: Raw Fetal Data

Code Sheet for Identification of Fetal Abnormalities

ANUR	Anurous
AOPT	Anophthalmia
CLST	Cleft Sternum
COST	Completely Ossified Sternebra 1-6
DIUR	Dilated Ureter
ECHT	Ectopic Heart
EDEM	Edema
EXCE	Exencephaly
MAST	Misaligned Sternebra
MAVM	Major Vessel Malformation
MIIN	Missing Innominate
MIRB	Missing Rib (agenesis)
MIST	Microstomia
MIVE	Missing Vertebrae (agenesis)
RACH	Rachischisis
ROPB	Reduced Ossification Pelvis
ROPH	Reduced Ossification Phalanges
RORB	Reduced Ossification Rib
ROSK	Reduced Ossification Skull
ROST	Reduced Ossification Sternebra
ROVE	Reduced Ossification Vertebra
RPCA	Renal Pelvic Cavitation
SURB	Supernumerary Rib
UARH	Unilateral Arhinia

Acetone Rat Teratology Study: Calendar of Events

Exposure levels; Treatments 1-4	0, 440, 2200, 11000 ppm
Ordered rats	8-12-87
Received male rats (ARS# 870074)	9/22/87
Received female rats (ARS# 870075)	9/22/87
Eartagged and weighed females pre-study	10/5/87
Weighed and randomized virgins	10-22-87
Initial health screen; 5 males, 5 females	10-12-87
Virgins placed into individual caging	10-12-87
Additional health screen; 5 males, 5 females	10-26-87
Rats released for study	10-16-87
Detection of copulation (0dg) (Teratology/Ketone) weighed, randomized, individually caged	(A) 10-20-87 (43/7) (B) 10-21-87 (9/7) (C) 10-22-87 (13/7) (D) 10-23-87 (40/7) (E) 10-24-87 (17/0)
Study rats sent to exposure room; grp A-C & virgins	10-23-87
grp D and E	10-26-87
Exposure (6 hours/day; 6-19 dg)	(A) 10-26 to 11-8-87 (B) 10-27 to 11-9-87 (C) 10-28 to 11-10-87 (D) 10-29 to 11-11-87 (E) 10-30 to 11-12-87
Weighed (6dg) started exposure	(A-E) 10-26 to 10-31-87
Weighed (10dg)	(A-E) 10-30 to 11-3-87
Weighed (14dg)	(A-E) 11-3 to 11-7-87
Weighed (17dg)	(A-E) 11-6 to 11-10-87
Sacrifice (20dg)	(A) 11-9-87 (B) 11-10-87 (C) 11-11-87 terminal serology (D) 11-12-87 terminal serology (E) 11-13-87
Ketone rats bled; dg7 pm/ dg8 am	(A-D) 10-27 to 10-31-87
dg14 pm/ dg15 am	(A-D) 11-3 to 11-7-87
dg19 pm/ dg20 am	(A-D) 11-8 to 11-12-87
Virgins - exposed for 14 days concurrent with grp C	
Weighed exposure day 1	10-28-87
Weighed exposure day 5	11-1-87
Weighed exposure day 10	11-6-87
Sacrifice, one day post-exposure	11-11-87
Fetal exams completed	1/18/88

ACETONE RAT TERATOLOGY STUDY DISPOSITION

Exposure Group	Treatment	Virgins	Sperm-Positive Teratology Rats			
			On Study(a)	Removed From Study	Sacrifice	Litters Examined
Control (0 ppm)	1	10	30	2(b)	28	26
440 ppm	2	10	31	2(c)	29	27
2200 ppm	3	10	31	0	31	29
11000 ppm	4	10	30	3(d)	27	26

(a) The study protocol required a minimum of 30 sperm-positive females (to obtain 20 pregnant females).

(b) 1 dam - umbilical hernia
1 litter ≤2 implants

(c) 1 dam - weight loss, moribund due to dental problem
1 litter ≤ 2 implants

(d) 1 dam - dental problems
2 litters ≤ 2 implants

ACETONE RAT TERATOLOGY (KETONE) STUDY DISPOSITION

Exposure Group	Treatment	Sperm-Positive Ketone Teratology Rats			
		On Study	Removed From Study	Sacrifice	Litters Examined
Control (0 ppm)	1	7	0	7	7
440 ppm	2	7	0	7	4
2200 ppm	3	7	0	7	7
11000 ppm	4	7	0	7	7

Acetone Mouse Teratology Study: Body Weights (g) for Virgin Females

0 ppm Acetone

MATNO	Pre-study Wt	Exposure Day1	Exposure Day5	Exposure Day10	Sacrifice Wt
1057	31.2	30.5	30.8	32.4	31.8
1121	27.1	25.1	26.3	26.8	28.4
1157	25.0	24.0	25.8	26.8	25.5
1198	21.9	23.1	23.1	24.2	24.1
1231	30.6	27.0	27.8	28.3	28.1
1288	28.1	26.8	28.4	28.8	29.5
1295	25.9	25.5	25.6	27.5	26.7
1319	27.5	27.9	28.2	28.9	30.4
1323	31.0	30.0	29.4	31.3	31.2
1325	25.5	25.9	26.8	26.5	28.9

Acetone Mouse Teratology Study: Body Weights (g) for Virgin Females

---------- 440 ppm Acetone ----------

MATNO	Pre-study Wt	Exposure Day1	Exposure Day5	Exposure Day10	Sacrifice Wt
1071	23.2	24.2	23.9	24.6	25.4
1103	22.8	22.6	23.0	24.4	25.1
1107	26.6	27.9	28.1	28.7	29.1
1151	27.9	26.2	26.2	26.4	27.4
1183	25.7	25.1	24.7	25.3	27.2
1219	28.0	26.6	29.0	27.4	29.1
1222	26.1	25.8	26.0	27.0	27.1
1234	33.1	32.1	33.4	32.1	32.2
1301	32.3	29.2	31.4	30.2	30.6
1324	26.7	28.0	28.0	28.2	27.4

Acetone Mouse Teratology Study: Body Weights (g) for Virgin Females

-- 2200 ppm Acetone --

MATNO	Pre-study Wt	Exposure Day1	Exposure Day5	Exposure Day10	Sacrifice Wt
1041	29.7	29.0	30.5	30.0	30.6
1062	27.2	28.2	27.6	26.9	28.9
1072	34.2	34.5	34.5	35.4	36.1
1095	23.4	21.8	22.2	23.1	22.9
1124	27.1	25.8	26.9	27.5	28.6
1148	23.3	24.9	25.9	25.1	25.6
1168	23.5	24.5	24.7	24.4	26.6
1210	25.9	28.1	27.4	26.9	28.1
1266	24.9	27.7	27.8	27.5	27.6
1276	27.8	26.4	28.8	26.7	27.7

Acetone Mouse Teratology Study: Body Weights (g) for Virgin Females

6600 ppm Acetone

MATNO	Pre-study Wt	Exposure Day1	Exposure Day5	Exposure Day10	Sacrifice Wt
1031	29.8	27.8	26.8	28.4	29.5
1070	29.0	28.4	29.7	32.0	34.1
1154	26.1	26.3	26.4	27.5	27.6
1186	30.6	27.9	29.7	30.4	30.3
1189	26.0	26.2	27.2	28.0	29.3
1192	25.1	25.3	26.0	27.2	28.2
1207	23.7	24.2	24.8	26.3	26.4
1264	24.8	22.9	24.1	25.6	25.8
1314	26.2	25.5	26.6	28.9	29.3
1322	33.4	31.4	30.1	31.9	31.9

C.61

SAS

Acetone Mouse Teratology Study: Body Weights (g) for Plug-positive Females

------------------------------ 0 ppm Acetone ------------------------------

MATNO	Pregnant	Pre-study Wt (g)	0 dg Wt (g)	6 dg Wt (g)	9 dg Wt (g)	12 dg Wt (g)	15 dg Wt (g)	18 dg Wt (g)	Uter Wt (g)	Liver (g)	Kidney (g)
1006	1	27.5	28.3	29.1	30.8	35.3	39.4	44.47	11.376	0.472	0.472
1010	1	27.9	25.4	27.4	28.6	33.9	41.4	49.17	18.579	2.643	0.370
1015	1	29.1	29.6	31.3	31.6	37.2	44.0	52.01	17.688	2.989	0.452
1036	0	29.2	28.8	30.4	32.3	31.1	31.3	30.59	0.187	2.085	0.510
1045	1	25.4	25.0	27.6	28.7	34.0	40.8	47.92	16.871	2.833	0.459
1062	1	32.9	32.5	34.5	35.3	41.8	50.2	60.59	22.107	3.120	0.589
1064	1	30.6	30.4	32.6	34.2	41.3	48.0	58.80	20.199	3.343	0.574
1078	1	28.5	26.2	28.7	31.0	37.0	45.4	54.12	19.832	3.146	0.488
1079	0	29.1	27.5	30.3	27.9	29.0	29.2	27.23	0.127	1.718	0.448
1080	1	25.7	24.9	28.2	28.2	33.0	40.3	48.26	18.473	2.441	0.444
1123	1	25.7	25.0	27.6	29.5	33.6	38.9	45.31	14.365	2.592	0.433
1126	1	30.7	31.0	33.3	37.4	41.5	49.8	58.32	20.224	3.121	0.599
1131	1	22.6	22.0	25.0	26.2	32.4	37.9	44.21	13.652	2.863	0.439
1164	1	26.0	26.8	28.9	31.4	38.1	44.8	51.76	19.113	2.812	0.484
1166	0	22.9	23.4	25.8	28.0	26.5	28.2	25.94	0.110	1.812	0.447
1176	1	25.5	25.7	27.5	29.1	34.2	41.3	47.06	18.126	2.391	0.418
1179	0	22.1	23.5	23.1	24.4	24.3	24.8	24.16	0.084	1.518	0.376
1185	1	26.6	28.0	30.8	32.4	38.7	48.1	57.40	23.683	3.116	0.501
1193	1	27.3	27.4	28.4	30.1	33.8	41.2	47.97	15.716	2.839	0.547
1202	1	24.4	24.4	26.5	28.9	33.6	42.1	60.22	19.678	2.464	0.446
1209	1	28.3	28.9	31.1	33.2	38.7	45.3	53.84	18.899	2.893	0.607
1212	1	34.4	31.3	33.7	35.9	41.1	49.0	57.35	20.115	3.761	0.661
1213	1	28.4	28.9	31.5	32.4	39.0	46.7	54.98	22.397	2.549	0.378
1225	1	27.2	25.8	28.6	28.6	34.0	40.6	47.46	15.662	3.046	0.444
1239	1	27.0	27.8	30.3	30.7	36.7	45.4	54.31	22.941	2.792	0.492
1249	1	30.6	30.1	32.4	33.3	38.7	46.3	53.38	10.960	3.403	0.561
1254	1	24.6	25.1	28.8	30.4	37.0	45.7	54.95	21.843	2.758	0.477
1272	0	26.7	27.5	29.2	27.3	28.3	29.1	17.59	0.105	1.799	0.421
1289	1	30.0	30.3	32.9	34.4	41.5	50.6	61.46	22.684	3.537	0.553
1293	1	30.9	27.7	31.8	33.8	41.2	51.0	57.90	20.753	3.295	0.503
1306	1	31.1	31.1	32.2	33.2	38.5	46.6	54.25	19.663	2.587	0.465

Acetone Mouse Teratology Study: Body Weights (g) for Plug-positive Females

440 ppm Acetone

MATNO	Pregnant	Pre-study Wt (g)	0 dg Wt (g)	6 dg Wt (g)	9 dg Wt (g)	12 dg Wt (g)	15 dg Wt (g)	18 dg Wt (g)	Uter Wt (g)	Liver (g)	Kidney (g)
1001	1	21.7	23.5	25.3	28.8	32.6	37.1	43.14	11.199	2.917	0.453
1002	1	26.4	26.2	30.1	33.9	38.9	47.2	55.63	19.940	2.823	0.460
1029	1	27.7	27.5	29.8	32.1	37.7	44.9	54.57	18.197	3.103	0.458
1032	1	29.5	29.2	28.1	31.7	36.2	42.8	49.92	16.998	3.104	0.466
1033	1	31.2	29.3	34.7	35.9	42.6	52.5	63.24	22.300	3.420	0.557
1034	1	28.6	28.7	31.1	33.9	38.4	46.9	56.01	19.004	0.614	3.134
1042	0	26.7	27.5	28.2	29.7	28.2	29.0	29.09	0.600	2.009	0.482
1066	1	27.1	27.7	31.0	33.9	39.2	47.6	59.09	22.717	3.280	0.476
1069	1	25.7	26.4	26.5	29.5	34.7	42.4	50.29	16.455	3.274	0.446
1093	0	23.2	23.5	23.9	23.9	23.7	24.6	23.87	0.087	1.711	0.405
1104	1	24.4	24.8	27.3	28.6	35.2	41.2	48.66	16.938	3.157	0.500
1128	1	22.5	22.0	25.7	27.1	32.8	37.8	43.70	12.825	2.669	0.428
1132	1	30.0	29.1	28.8	30.3	34.9	39.7	47.35	16.574	2.078	0.427
1147	1	31.9	30.5	33.2	35.2	39.8	48.0	56.92	19.604	3.163	0.500
1149	0	26.7	27.9	27.5	29.9	29.0	29.7	29.43	0.110	1.888	0.401
1156	1	24.4	25.6	29.3	31.3	37.2	46.0	54.26	20.223	2.987	0.426
1161	1	30.5	29.4	30.5	32.9	39.2	48.9	57.00	21.168	3.231	0.560
1171	1	24.4	24.6	27.5	28.6	34.7	43.2	51.90	18.929	2.640	0.419
1182	1	32.1	32.8	33.5	34.6	39.3	45.9	52.45	15.404	2.993	0.522
1199	1	24.3	24.5	27.9	31.1	34.3	41.0	47.89	16.830	2.771	0.393
1215	0	28.6	27.6	29.9	28.0	28.9	30.1	29.82	0.107	2.320	0.463
1238	1	29.0	30.3	33.2	33.8	39.4	47.6	57.90	21.437	3.587	0.547
1251	1	24.9	26.4	28.7	31.3	34.4	41.0	46.40	15.149	2.357	0.446
1261	1	26.9	28.4	30.5	31.8	37.5	44.5	53.20	17.594	2.801	0.502
1270	1	23.1	23.8	26.2	27.3	32.0	40.4	45.12	14.760	1.936	0.395
1271	1	31.3	30.6	34.6	36.5	44.0	53.3	66.05	26.106	3.753	0.598
1274	1	30.2	31.9	32.4	34.0	38.8	45.4	53.23	19.020	2.821	0.526
1279	1	27.9	27.2	30.4	32.8	37.9	45.6	54.26	19.650	2.819	0.506
1287	1	28.7	29.1	31.7	34.3	41.2	51.9	63.47	25.646	3.059	0.561
1294	1	26.0	25.1	28.4	29.9	35.8	44.7	55.04	22.866	2.481	0.485
1308	1	24.0	23.5	25.6	27.4	32.3	39.6	45.81	17.661	2.302	0.405
1317	1	26.5	26.9	29.2	31.7	36.8	44.2	51.45	8.917	2.582	0.498
1321	0	32.4	30.2	32.1	32.7	31.5	31.7	31.14	0.295	2.187	0.551

Acetone Mouse Teratology Study: Body Weights (g) for Plug-positive Females

2200 ppm Acetone

MATNO	Pregnant	Pre-study Wt (g)	0 dg Wt (g)	6 dg Wt (g)	9 dg Wt (g)	12 dg Wt (g)	15 dg Wt (g)	18 dg Wt (g)	Uter Wt (g)	Liver (g)	Kidney (g)
1017	1	34.6	34.8	38.0	39.6	44.7	51.9	61.29	19.770	3.304	0.589
1035	0	30.0	28.8	31.5	32.2	31.3	31.9	31.78	0.242	2.067	0.474
1037	1	29.6	29.7	31.7	32.2	37.2	45.8	53.04	17.061	2.894	0.502
1049	1	26.4	28.0	30.0	32.7	38.6	47.0	56.25	19.887	3.039	0.459
1050	1	27.1	25.9	29.4	32.8	37.9	46.2	55.15	18.616	2.628	0.476
1063	1	28.0	27.2	31.2	33.0	38.6	46.8	54.23	19.524	2.975	0.533
1066	1	31.7	31.0	33.2	36.0	41.4	50.4	61.01	23.070	3.380	0.538
1068	1	34.8	34.6	36.2	37.7	43.2	50.3	59.55	21.053	3.422	0.567
1094	1	27.7	27.5	30.5	32.7	37.4	45.3	53.02	16.462	2.993	0.469
1119	1	26.3	27.6	29.7	32.3	36.6	43.4	50.44	16.390	3.091	0.529
1136	1	23.2	22.8	26.4	28.3	34.3	41.7	49.73	19.052	3.128	0.465
1137	0	22.8	22.6	23.4	24.2	24.3	24.7	23.99	0.149	1.801	0.390
1138	1	23.4	22.4	24.9	27.1	29.3	33.1	37.47	8.810	2.566	0.411
1150	1	24.4	25.2	25.9	29.2	32.8	38.9	44.25	13.773	2.800	0.457
1155	1	30.5	29.8	32.4	33.8	39.0	45.6	50.62	18.826	2.966	0.546
1165	1	23.6	25.0	27.2	29.8	35.4	43.0	52.31	19.423	2.885	0.518
1167	0	29.4	31.2	29.0	29.5	31.1	30.2	29.26	0.427	2.207	0.507
1169	0	26.1	27.0	26.4	26.8	26.7	27.7	26.67	1.913	0.509	0.006
1178	1	34.0	32.4	37.1	39.2	45.2	53.1	61.87	20.370	3.436	0.566
1181	1	30.6	28.8	31.3	33.7	39.2	47.3	55.26	20.041	2.710	0.495
1187	1	26.2	27.5	28.1	32.2	36.8	42.9	49.01	15.801	3.263	0.484
1201	1	24.6	24.2	24.9	27.3	31.8	37.2	44.52	14.202	2.616	0.420
1208	1	25.6	26.3	25.9	27.7	31.5	36.0	43.36	14.477	2.348	0.456
1220	1	27.0	27.7	26.1	30.1	35.4	43.8	50.55	14.792	3.366	0.519
1233	1	23.6	24.7	27.4	29.4	36.0	43.5	50.99	19.441	2.566	0.398
1244	1	29.0	29.2	33.2	35.9	42.8	52.0	62.55	22.508	3.593	0.575
1260	1	27.4	27.8	29.1	30.4	36.8	43.3	50.46	19.118	2.466	0.480
1283	1	28.4	26.9	31.2	32.8	39.5	48.3	57.78	17.724	3.363	0.578
1284	1	24.4	24.5	27.7	29.5	34.9	43.5	51.21	10.742	2.847	0.419
1291	1	34.4	32.3	35.1	37.7	44.6	54.4	65.45	24.803	3.215	0.612
1296	1	26.0	27.1	30.1	32.6	38.6	48.0	58.01	20.133	2.798	0.504
1312	1	21.6	22.3	26.2	28.2	32.2	39.1	23.16	14.938	2.659	0.451
1328	1	26.4	25.2	29.2	29.9	36.6	43.7	51.28	16.088	2.946	0.481

Acetone Mouse Teratology Study: Body Weights (g) for Plug-positive Females

-- 6600 ppm Acetone --

MATNO	Pregnant	Pre-study Wt (g)	0 dg Wt (g)	6 dg Wt (g)	9 dg Wt (g)	12 dg Wt (g)	15 dg Wt (g)	18 dg Wt (g)	Uter Wt (g)	Liver (g)	Kidney (g)
1009	1	31.7	32.3	33.5	35.0	41.6	50.6	61.42	19.556	4.061	0.702
1011	1	25.7	26.7	29.6	32.1	37.7	45.1	54.60	18.670	3.780	0.572
1014	1	29.0	29.3	30.9	32.7	37.0	43.5	51.44	14.259	3.228	0.434
1019	1	31.3	31.8	33.4	36.7	43.0	53.0	64.65	23.031	4.630	0.606
1022	1	29.1	29.1	31.6	33.5	39.8	48.6	57.19	20.568	3.636	0.554
1023	1	28.3	27.9	32.2	34.0	37.9	47.1	54.89	19.350	4.029	0.528
1024	1	28.6	26.9	29.9	32.8	38.3	45.0	53.45	18.316	3.287	0.470
1025	1	29.9	29.2	31.2	35.6	39.1	47.3	55.72	19.399	3.585	0.472
1026	1	34.0	33.1	35.8	36.5	41.8	50.1	58.95	18.322	3.878	0.569
1030	0	32.0	31.5	32.3	33.1	34.2	33.8	35.10	0.226	2.587	0.500
1048	1	25.2	26.0	27.0	29.6	34.2	42.8	49.01	16.144	3.260	0.548
1060	1	30.9	30.3	34.1	36.2	43.8	50.7	61.18	20.224	3.989	0.618
1061	1	28.5	26.9	29.3	32.4	37.7	47.6	56.64	18.614	3.804	0.519
1073	1	28.9	27.2	32.5	33.5	40.2	47.3	55.57	17.831	4.172	0.555
1099	1	28.3	27.2	30.2	33.5	39.1	46.0	53.51	18.057	3.510	0.501
1118	1	26.7	28.4	31.5	33.2	34.3	45.4	53.64	17.399	3.531	0.501
1142	1	25.1	25.6	27.4	29.7	35.7	41.7	48.17	16.823	2.883	0.458
1144	1	24.0	25.8	27.9	29.8	35.7	40.7	.	13.635	3.406	0.421
1158	1	23.4	24.3	25.4	28.4	29.8	39.6	44.65	14.519	2.638	0.457
1172	1	23.1	24.0	27.0	28.8	35.1	43.4	44.52	19.290	2.992	0.432
1174	1	26.7	25.4	29.7	31.6	36.3	44.4	50.10	13.849	3.440	0.593
1204	0	23.1	23.6	25.7	26.6	24.8	25.3	24.90	0.095	1.552	0.343
1232	1	30.2	30.6	32.5	34.5	40.1	49.4	57.25	19.185	3.403	0.521
1236	1	25.3	29.0	30.6	32.8	40.8	48.9	58.50	19.939	3.692	0.529
1241	1	29.4	27.8	28.7	30.9	38.2	44.5	52.55	18.301	3.064	0.494
1246	1	24.6	25.4	28.0	30.4	37.6	45.9	55.99	20.585	3.280	0.467
1255	1	31.6	30.7	33.8	36.4	40.7	48.8	55.65	16.832	3.408	0.570
1259	1	23.5	24.8	27.3	28.8	33.8	42.3	49.71	18.079	2.968	0.449
1263	1	26.2	24.9	25.8	27.3	32.7	38.9	46.21	14.009	3.035	0.448
1286	1	23.9	24.0	25.2	27.2	31.9	38.5	43.28	13.510	2.790	0.331
1292	1	28.1	27.2	31.4	33.2	40.5	48.4	57.57	18.513	3.284	0.502
1297	1	25.9	25.8	27.6	30.6	35.5	44.5	51.66	18.686	3.172	0.531
1330	1	24.5	24.9	28.8	31.0	35.4	41.8	31.46	10.386	2.889	3.341

SAS

Acetone Mouse Teratology Study: Raw Fetal Data

---------- 0 ppm Acetone ----------

Matno	Site	Status	Fetal Wt(g)	Sex	Head or Visceral	ABN1	ABN2	ABN3
1006	1	1	0.848	2	V			
1006	2	1	1.295	2	H			
1006	3	4	.	.				
1006	4	1	1.243	2	V			
1006	5	1	0.785	2	H			
1006	6	1	1.306	1	V			
1006	7	1	1.389	1	H			
1006	8	2	.	.				
1006	9	1	1.369	1	V			
1010	1	1	1.391	2	V			
1010	2	1	1.388	2	H			
1010	3	2	.	.				
1010	4	1	1.439	1	V			
1010	5	1	1.334	1	H			
1010	6	1	1.330	2	V			
1010	7	1	1.447	1	H			
1010	8	1	1.469	1	V			
1010	9	1	1.365	1	H			
1010	10	1	1.301	2	V			
1010	11	1	1.311	1	H			
1010	12	1	1.394	2	V			
1015	1	1	1.469	2	H			
1015	2	1	1.443	2	V			
1015	3	1	1.437	2	H			
1015	4	1	1.422	1	V			
1015	5	1	1.467	1	H			
1015	6	1	1.387	2	V			
1015	7	1	1.398	1	H			
1015	8	1	1.380	2	V			
1015	9	1	1.408	1	H			
1015	10	1	1.393	2	V			
1045	1	1	1.297	2	H			
1045	2	1	1.255	2	V			
1045	3	1	1.346	1	H			
1045	4	1	1.330	2	V			
1045	5	1	1.277	2	H			
1045	6	1	1.248	2	V			
1045	7	1	1.333	2	H			
1045	8	1	1.382	2	V			
1045	9	4	.	.				
1045	10	1	1.356	1	H			
1045	11	1	1.344	1	V			
1052	1	1	1.232	2	H			
1052	2	1	1.258	2	V	SURB		
1052	3	1	1.330	2	H			
1052	4	1	1.328	1	V			
1052	5	1	1.281	1	H			

Status: 1 = Live; 2 = Early Resorption; 4 = Late Resorption
Sex: Male = 1; Female = 2; See Code Sheet 33 for Identification of abnormalities [ABNn]

Acetone Mouse Teratology Study: Raw Fetal Data

------------------------------------ 0 ppm Acetone ------------------------------------

Matno	Site	Status	Fetal Wt(g)	Sex	Head or Visceral	ABN1	ABN2	ABN3
1052	6	1	1.366	1	V			
1052	7	1	1.348	2	H			
1052	8	1	1.331	1	V			
1052	9	1	1.391	1	H			
1052	10	1	1.406	1	V			
1052	11	4	.	.				
1052	12	1	1.319	2	H			
1052	13	1	1.509	1	V			
1052	14	1	1.404	2	H			
1064	1	1	1.377	1	V			
1064	2	1	1.308	1	H	LMFL		
1064	3	1	1.331	2	V			
1064	4	1	1.413	1	H			
1064	5	1	1.486	1	V	SURB		
1064	6	1	1.430	1	H			
1064	7	1	1.289	2	V			
1064	8	4	.	.				
1064	9	1	1.424	1	H			
1064	10	1	1.353	2	V	LMFL		
1064	11	1	1.200	2	H			
1064	12	1	1.250	2	V			
1064	13	1	1.411	1	H			
1078	1	1	1.364	1	V			
1078	2	1	1.462	1	H			
1078	3	1	1.365	1	V			
1078	4	1	1.414	1	H	SURB		
1078	5	1	1.337	2	V			
1078	6	1	1.329	2	H			
1078	7	1	1.407	2	V	SURB		
1078	8	1	1.248	2	H	SURB		
1078	9	1	1.271	2	V			
1078	10	1	1.342	1	H	SURB		
1078	11	1	1.466	2	V			
1078	12	1	1.414	1	H	SURB		
1080	1	1	1.182	2	V	SURB		
1080	2	1	1.207	1	H	SURB		
1080	3	1	1.331	1	V			
1080	4	1	1.372	2	H			
1080	5	1	1.235	1	V			
1080	6	1	1.013	2	H	SURB		
1080	7	1	1.163	2	V	SURB		
1080	8	1	1.319	2	H	SURB	FRET	
1080	9	1	1.235	2	V	SURB		
1080	10	1	1.346	1	H	SURB		
1080	11	1	1.251	2	V	SURB		
1080	12	1	1.400	1	H	SURB		
1123	1	1	1.378	2	H			

Status: 1 = Live; 2 = Early Resorption; 4 = Late Resorption
Sex: Male = 1; Female = 2; See Code Sheet 33 for Identification of abnormalities [ABNn]

Acetone Mouse Teratology Study: Raw Fetal Data

------ Ø ppm Acetone ------

Matno	Site	Status	Fetal Wt(g)	Sex	Head or Visceral	ABN1	ABN2	ABN3
1123	2	1	1.422	2	V			
1123	3	1	1.463	2	H			
1123	4	1	1.477	1	V			
1123	5	1	1.344	1	H			
1123	6	2	.	.				
1123	7	1	1.420	2	V			
1123	8	1	1.406	2	H	SURB		
1123	9	1	1.444	1	V			
1125	1	1	1.515	2	H			
1125	2	1	1.369	2	V			
1125	3	1	1.444	1	H			
1125	4	4	.	.				
1125	5	1	1.511	2	V			
1125	6	1	1.603	1	H			
1125	7	1	1.508	1	V			
1125	8	1	1.449	2	H			
1125	9	1	1.479	2	V			
1125	10	1	1.293	1	H			
1125	11	1	1.314	2	V			
1125	12	2	.	.				
1125	13	1	1.495	1	H	SURB		
1131	1	1	1.359	1	V	SURB		
1131	2	1	1.416	1	H	SURB		
1131	3	2	.	.				
1131	4	1	1.324	2	V	SURB		
1131	5	1	1.404	1	H	SURB		
1131	6	1	1.257	2	V	SURB		
1131	7	1	1.309	2	H			
1131	8	1	1.419	2	V			
1131	9	1	1.355	1	H	SURB		
1164	1	1	1.405	1	V	MAST		
1164	2	2	.	.				
1164	3	1	1.449	2	H	SURB		
1164	4	1	1.415	1	V	LMFL	SURB	
1164	5	1	1.371	1	H			
1164	6	1	1.367	2	V			
1164	7	1	1.499	2	H	SURB		
1164	8	1	1.382	1	V			
1164	9	1	1.361	2	V			
1164	10	1	1.506	1	H			
1164	11	1	1.391	2	V			
1164	12	1	1.435	2	H			
1176	1	1	1.409	2	H			
1176	2	1	1.374	1	V			
1176	3	1	1.390	2	H			
1176	4	1	1.367	1	V			
1176	5	1	1.297	2	H			

Status: 1 = Live; 2 = Early Resorption; 4 = Late Resorption
Sex: Male = 1; Female = 2; See Code Sheet 33 for Identification of abnormalities [ABNn]

Acetone Mouse Teratology Study: Raw Fetal Data

---------- 0 ppm Acetone ----------

Matno	Site	Status	Fetal Wt(g)	Sex	Head or Visceral	ABN1	ABN2	ABN3
1176	6	1	1.291	1	V			
1176	7	1	1.311	2	H			
1176	8	1	1.298	2	V			
1176	9	1	1.288	2	H			
1176	10	1	1.341	2	V			
1176	11	1	1.279	2	H	SURB		
1185	1	1	1.325	2	V			
1185	2	1	1.291	2	H			
1185	3	1	1.336	1	V			
1185	4	1	1.313	1	H			
1185	5	1	1.351	1	V			
1185	6	1	1.206	2	H			
1185	7	1	1.331	2	V	MAST	ROST	
1185	8	1	1.378	2	H			
1185	9	1	1.367	2	V			
1185	10	4	.	.				
1185	11	1	1.229	2	H			
1185	12	1	1.322	1	V			
1185	13	1	1.242	1	H			
1185	14	1	1.242	1	V			
1185	15	1	1.318	1	H			
1193	1	1	1.263	2	H	SURB		
1193	2	1	1.290	1	V	SURB		
1193	3	1	1.284	2	H	SURB		
1193	4	1	1.196	1	V	SURB		
1193	5	1	1.244	1	H	SURB		
1193	6	1	1.245	1	V	SURB		
1193	7	4	.	.				
1193	8	1	1.276	2	H	SURB		
1193	9	1	1.186	2	V	SURB		
1193	10	2	.	.				
1193	11	1	1.047	2	H	SURB		
1193	12	1	1.216	1	V			
1202	1	1	1.350	2	V			
1202	2	1	1.328	2	H			
1202	3	1	1.311	2	V			
1202	4	1	1.423	2	H			
1202	5	1	1.366	2	V			
1202	6	1	1.390	2	H			
1202	7	1	1.362	1	V			
1202	8	1	1.367	1	H			
1202	9	1	1.301	2	V			
1202	10	1	1.355	2	H			
1202	11	1	1.467	1	V			
1202	12	1	1.369	1	H			
1209	1	2	.	.				
1209	2	1	1.576	1	H			

Status: 1 = Live; 2 = Early Resorption; 4 = Late Resorption
Sex: Male = 1; Female = 2; See Code Sheet 33 for Identification of abnormalities [ABNn]

Acetone Mouse Teratology Study: Raw Fetal Data

0 ppm Acetone

Matno	Site	Status	Fetal Wt(g)	Sex	Head or Visceral	ABN1	ABN2	ABN3
1209	3	1	1.628	1	V	SURB		
1209	4	1	1.518	1	H	SURB		
1209	5	1	1.474	1	V			
1209	6	1	1.385	2	H	SURB		
1209	7	1	1.489	1	V			
1209	8	1	1.489	1	H	SURB		
1209	9	1	1.527	2	V			
1209	10	1	1.540	2	H			
1209	11	1	1.454	1	V	SURB		
1212	1	1	1.418	2	V			
1212	2	1	1.335	2	H	MAST		
1212	3	1	1.375	1	V			
1212	4	1	1.328	2	H			
1212	5	1	1.325	1	V	SURB		
1212	6	1	1.324	1	H	MAST	ROST	
1212	7	4	.	.				
1212	8	4	.	.				
1212	9	1	1.264	2	V	SURB		
1212	10	2	.	.				
1212	11	1	1.278	1	H	SURB		
1212	12	1	1.358	1	V	ROST		
1212	13	1	1.389	2	H	SURB		
1212	14	1	1.258	2	V	SURB		
1212	15	1	1.384	1	H	SURB		
1213	1	1	1.581	1	V			
1218	2	1	1.489	1	H			
1213	3	1	1.405	2	V			
1213	4	1	1.355	1	H			
1213	5	1	1.382	1	V			
1213	6	1	1.435	1	H			
1213	7	1	1.417	1	V			
1213	8	1	1.418	1	H			
1213	9	1	1.450	1	V			
1213	10	1	1.335	2	H	LMFL		
1213	11	1	1.328	2	V			
1213	12	1	1.358	2	H	MAST	ROST	
1213	13	2	.	.				
1213	14	1	1.397	1	V			
1225	1	1	1.385	2	V	SURB		
1225	2	1	1.418	2	H	MAST		
1225	3	1	1.409	1	V			
1225	4	1	1.389	2	H			
1225	5	1	1.393	1	V			
1225	6	1	1.415	2	H			
1225	7	1	1.389	2	V			
1225	8	1	1.404	2	H	SURB		
1225	9	1	1.370	2	V			

Status: 1 = Live; 2 = Early Resorption; 4 = Late Resorption
Sex: Male = 1; Female = 2; See Code Sheet 33 for Identification of abnormalities [ABNn]

Acetone Mouse Teratology Study: Raw Fetal Data

---------- 0 ppm Acetone ----------

Matno	Site	Status	Fetal Wt(g)	Sex	Head or Visceral	ABN1	ABN2	ABN3
1239	1	1	1.417	2	H			
1239	2	1	1.153	2	V	SURB		
1239	3	1	1.390	1	H			
1239	4	1	1.401	2	V	SURB		
1239	5	1	1.391	2	H	SURB		
1239	6	1	1.203	2	V			
1239	7	1	1.301	2	H	MAST		
1239	8	1	1.301	2	V	SURB		
1239	9	1	1.381	1	H	MAST	SURB	
1239	10	1	1.280	2	V	SURB		
1239	11	1	1.376	2	H			
1239	12	1	1.355	2	V	SURB		
1239	13	1	1.340	2	H	SURB		
1249	1	1	1.433	2	H			
1249	2	1	1.389	1	V	OSST	SURB	
1249	3	1	1.349	2	H			
1249	4	1	1.031	1	V			
1249	5	2	.	.				
1249	6	1	1.401	1	H			
1249	7	2	.	.				
1249	8	2	.	.				
1249	9	1	1.419	1	V			
1249	10	1	1.346	1	H			
1249	11	1	1.382	1	V			
1249	12	1	1.372	1	H			
1249	13	1	1.356	2	V			
1254	1	1	1.308	1	V			
1254	2	1	1.355	1	H			
1254	3	1	1.286	2	V			
1254	4	1	1.242	2	H			
1254	5	1	1.310	1	V			
1254	6	1	1.197	1	H			
1254	7	1	1.285	1	V			
1254	8	1	1.148	2	H	SURB		
1254	9	1	1.169	2	V	SURB		
1254	10	1	1.230	1	H			
1254	11	1	1.204	1	V			
1254	12	1	1.221	2	H			
1254	13	1	1.242	1	V			
1254	14	1	1.190	2	H			
1289	1	1	1.391	2	H			
1289	2	1	1.122	2	V	SURB		
1289	3	1	1.206	1	H			
1289	4	2	.	.				
1289	5	1	1.227	2	V	SURB		
1289	6	1	1.237	1	H			
1289	7	1	1.116	2	V			

Status: 1 = Live; 2 = Early Resorption; 4 = Late Resorption
Sex: Male = 1; Female = 2; See Code Sheet 33 for Identification of abnormalities [ABNn]

Acetone Mouse Teratology Study: Raw Fetal Data

-- Ø ppm Acetone --

Matno	Site	Status	Fetal Wt(g)	Sex	Head or Visceral	ABN1	ABN2	ABN3
1289	8	1	1.161	2	H	SURB		
1289	9	1	1.213	1	V	SURB		
1289	10	1	1.111	2	H			
1289	11	1	1.127	2	V			
1289	12	1	1.095	1	H			
1289	13	1	1.129	1	V			
1289	14	1	1.247	1	H			
1289	15	1	1.217	1	V			
1289	16	1	1.137	2	H			
1293	1	1	1.366	1	H			
1293	2	1	1.362	2	V			
1293	3	4	.	.				
1293	4	1	1.387	1	H			
1293	5	1	1.242	2	V	MAST		
1293	6	4	.	.				
1293	7	1	1.295	2	H			
1293	8	1	1.375	2	V			
1293	9	1	1.277	2	H			
1293	10	1	1.364	1	V	MAST		
1293	11	1	1.340	1	H			
1293	12	2	.	.				
1293	13	1	1.370	1	V	MAST		
1293	14	1	1.318	2	H			
1293	15	1	1.441	1	V			
1306	1	1	1.228	2	H			
1306	2	1	1.252	2	V			
1306	3	1	1.300	2	H	MAST		
1306	4	1	1.264	2	V	MAST	SURB	ROST
1306	5	1	1.272	2	H	MAST		
1306	6	1	1.341	2	V	SURB		
1306	7	1	1.377	1	H			
1306	8	1	1.393	1	V	MAST		
1306	9	1	1.423	1	H			
1306	10	1	1.305	1	V			
1306	11	1	1.330	1	H			
1306	12	1	1.308	1	V	MAST		

Status: 1 = Live; 2 = Early Resorption; 4 = Late Resorption
Sex: Male = 1; Female = 2; See Code Sheet 33 for Identification of abnormalities [ABNn]

Acetone Mouse Teratology Study: Raw Fetal Data

440 ppm Acetone

Matno	Site	Status	Fetal Wt(g)	Sex	Head or Visceral	ABN1	ABN2	ABN3
1001	1	1	1.477	1	H			
1001	2	1	1.364	2	V			
1001	3	1	1.523	2	H			
1001	4	1	1.419	2	V			
1001	5	2	.	.				
1001	6	1	1.533	2	H	SURB		
1001	7	1	1.541	1	V	SURB		
1001	8	2	.	.				
1001	9	2	.	.				
1002	1	1	1.448	1	H			
1002	2	1	1.201	2	V			
1002	3	1	1.453	1	H			
1002	4	1	1.391	1	V	SURB		
1002	5	1	1.380	2	H			
1002	6	1	1.382	1	V			
1002	7	1	1.265	1	H			
1002	8	1	1.303	2	V			
1002	9	1	1.292	2	H			
1002	10	1	1.285	2	V			
1002	11	1	1.295	1	H			
1002	12	1	1.473	2	V			
1029	1	1	1.377	1	H			
1029	2	1	1.474	1	V			
1029	3	1	1.413	1	H			
1029	4	1	1.338	1	V	SURB		
1029	5	1	1.351	2	H	SURB		
1029	6	1	1.292	1	V			
1029	7	1	1.406	2	H			
1029	8	1	1.859	2	V	SURB		
1029	9	1	1.311	2	H	LMFL	SURB	
1029	10	1	1.218	2	V			
1029	11	1	1.339	2	H	LMFL		
1032	1	1	1.337	1	H			
1032	2	1	1.340	2	V			
1032	3	1	1.340	2	H	SURB		
1032	4	1	1.347	2	V			
1032	5	1	1.340	2	H			
1032	6	1	1.337	1	V			
1032	7	1	1.338	1	H			
1032	8	1	1.359	1	V	SURB		
1032	9	1	1.364	1	H			
1032	10	1	1.441	1	V			
1033	1	1	1.457	2	H			
1033	2	1	1.514	1	V			
1033	3	1	1.461	2	H			
1033	4	1	1.461	2	V			
1033	5	1	1.573	1	H	SURB		

Status: 1 = Live; 2 = Early Resorption; 4 = Late Resorption
Sex: Male = 1; Female = 2; See Code Sheet 33 for Identification of abnormalities [ABNn]

Acetone Mouse Teratology Study: Raw Fetal Data

440 ppm Acetone

Matno	Site	Status	Fetal Wt(g)	Sex	Head or Visceral	ABN1	ABN2	ABN3
1033	6	1	1.432	2	V			
1033	7	1	1.520	1	H			
1033	8	1	1.560	2	V			
1033	9	1	1.558	1	H			
1033	10	1	1.445	2	V			
1033	11	1	1.598	1	H			
1033	12	1	1.257	2	V			
1033	13	2	.	.				
1034	1	1	1.365	2	V			
1034	2	1	1.265	1	H			
1034	3	1	1.235	2	V			
1034	4	1	1.284	2	H			
1034	5	1	1.331	1	V			
1034	6	1	1.045	2	H			
1034	7	1	1.231	1	V			
1034	8	1	1.278	1	H			
1034	9	1	1.205	2	V			
1034	10	1	1.507	1	H			
1034	11	1	1.334	1	V			
1034	12	1	1.324	1	H			
1066	1	1	1.408	2	H			
1066	2	1	1.379	1	V			
1066	3	1	1.457	2	H			
1066	4	1	1.350	2	V			
1066	5	1	1.528	2	H	SURB		
1066	6	1	1.409	1	V	SURB		
1066	7	1	1.368	2	H			
1066	8	1	1.316	1	V			
1066	9	1	1.401	1	H			
1066	10	1	1.468	2	V			
1066	11	1	1.518	2	H			
1066	12	1	1.309	2	V			
1066	13	1	1.529	1	H			
1069	1	1	1.391	1	V	SURB		
1069	2	1	1.313	1	H	SURB		
1069	3	1	1.404	1	V			
1069	4	4	.	.				
1069	5	1	1.337	2	H	SURB		
1069	6	1	1.344	1	V			
1069	7	1	1.189	2	H			
1069	8	1	1.347	1	V	SURB		
1069	9	1	1.271	2	H			
1069	10	1	1.436	2	V			
1069	11	1	1.308	1	H			
1104	1	1	1.463	1	V			
1104	2	1	1.453	1	H			
1104	3	1	1.440	2	V			

Status: 1 = Live; 2 = Early Resorption; 4 = Late Resorption
Sex: Male = 1; Female = 2; See Code Sheet 33 for Identification of abnormalities [ABNn]

Acetone Mouse Teratology Study: Raw Fetal Data

440 ppm Acetone

Matno	Site	Status	Fetal Wt(g)	Sex	Head or Visceral	ABN1	ABN2	ABN3
1104	4	4	.	.				
1104	5	1	1.451	2	H			
1104	6	1	1.464	1	V			
1104	7	1	1.318	2	H	MAST		
1104	8	1	1.482	2	V			
1104	9	1	1.502	1	H	MAST		
1104	10	1	1.618	2	V			
1128	1	1	1.661	2	H			
1128	2	1	1.472	1	V			
1128	3	1	1.479	1	H			
1128	4	1	1.422	1	V			
1128	5	1	1.358	2	H			
1128	6	1	1.406	1	V			
1128	7	1	1.609	2	H			
1132	1	1	1.336	1	H			
1132	2	1	1.291	1	V	SURB		
1132	3	1	1.236	2	H	SURB		
1132	4	1	1.304	2	V	SURB		
1132	5	1	1.342	1	H			
1132	6	1	1.342	2	V			
1132	7	1	1.394	1	H	SURB		
1132	8	1	1.414	1	V			
1132	9	1	1.357	2	H			
1132	10	1	1.400	2	V			
1147	1	1	1.551	2	H	SURB		
1147	2	4	.	.				
1147	3	1	1.609	1	V	OSST	SURB	
1147	4	1	1.566	1	H	OSST		
1147	5	1	1.495	2	V	OSST	SURB	
1147	6	1	1.577	1	H	OSST	SURB	
1147	7	1	1.623	2	V	OSST		
1147	8	1	1.581	2	V	OSST	SURB	
1147	9	2	.	.				
1147	10	1	1.650	1	H	OSST		
1147	11	1	1.589	1	V	OSST		
1156	1	1	1.319	2	H	KITA		
1156	2	1	1.235	2	V	SURB		
1156	3	1	1.191	2	H	SURB		
1156	4	1	1.318	2	V	SURB		
1156	5	2	.	.				
1156	6	1	1.379	1	H			
1156	7	1	1.270	2	V			
1156	8	1	1.432	1	H	SURB		
1156	9	1	1.378	1	V	SURB		
1156	10	1	1.287	2	H	SURB		
1156	11	1	1.144	2	V			
1156	12	1	1.241	1	H	SURB		

Status: 1 = Live; 2 = Early Resorption; 4 = Late Resorption
Sex: Male = 1; Female = 2; See Code Sheet 33 for Identification of abnormalities [ABNn]

Acetone Mouse Teratology Study: Raw Fetal Data

440 ppm Acetone

Matno	Site	Status	Fetal Wt(g)	Sex	Head or Visceral	ABN1	ABN2	ABN3
1156	13	1	1.369	1	V			
1156	14	1	1.226	1	H			
1161	1	1	1.181	2	V	MAST		
1161	2	1	1.210	1	H			
1161	3	1	1.274	1	V			
1161	4	4	.	.				
1161	5	4	.	.				
1161	6	1	1.276	2	H	ROST		
1161	7	1	1.243	1	V	SURB		
1161	8	2	.	.				
1161	9	4	.	.				
1161	10	1	1.171	2	H	MAST		
1161	11	1	1.125	1	V			
1161	12	1	1.194	1	H	SURB		
1161	13	1	1.162	2	V			
1161	14	1	1.240	2	H	MAST		
1161	15	1	1.049	1	V	ROST		
1161	16	1	1.180	2	H			
1161	17	1	1.292	2	V			
1171	1	1	1.377	2	H			
1171	2	1	1.368	2	V	SURB		
1171	3	2	.	.				
1171	4	1	1.265	2	H			
1171	5	1	1.436	1	V	SURB		
1171	6	1	1.164	2	H			
1171	7	1	1.466	1	V			
1171	8	1	1.379	2	H	SURB		
1171	9	1	1.452	1	V			
1171	10	1	1.422	1	H			
1171	11	1	1.454	2	V			
1171	12	1	1.378	2	H	SURB		
1182	1	1	1.326	1	V			
1182	2	1	1.390	2	H			
1182	3	2	.	.				
1182	4	1	1.331	1	V	SURB		
1182	5	1	1.387	1	H			
1182	6	1	1.437	2	V			
1182	7	1	1.336	2	H			
1182	8	1	1.421	1	V			
1182	9	1	1.148	1	H			
1182	10	1	1.290	1	V			
1182	11	2	.	.				
1199	1	1	1.244	2	V			
1199	2	1	1.380	1	H	SURB		
1199	3	1	1.353	2	V			
1199	4	1	1.264	2	H	SURB		
1199	5	1	1.307	2	V			

Status: 1 = Live; 2 = Early Resorption; 4 = Late Resorption
Sex: Male = 1; Female = 2; See Code Sheet 33 for Identification of abnormalities [ABNn]

SAS

Acetone Mouse Teratology Study: Raw Fetal Data

-- 440 ppm Acetone --

Matno	Site	Status	Fetal Wt(g)	Sex	Head or Visceral	ABN1	ABN2	ABN3
1199	6	1	1.366	1	H			
1199	7	1	1.346	1	V	SURB		
1199	8	1	1.329	2	H			
1199	9	1	1.419	1	V	SURB		
1199	10	1	1.455	1	H			
1238	1	1	1.279	2	V			
1238	2	1	1.138	2	H			
1238	3	4	.	.				
1238	4	1	1.235	2	V			
1238	5	1	1.262	1	H			
1238	6	1	1.215	2	V			
1238	7	1	1.219	1	H			
1238	8	1	1.101	1	V			
1238	9	1	1.165	2	H			
1238	10	1	1.243	2	V			
1238	11	1	1.269	1	H			
1238	12	1	1.200	2	V			
1238	13	1	1.214	2	H			
1238	14	1	1.097	2	V			
1251	1	1	1.313	2	H			
1251	2	1	1.326	1	V	SURB		
1251	3	1	1.333	1	H	SURB		
1251	4	1	1.433	1	V			
1251	5	1	1.373	2	H			
1251	6	2	.	.				
1251	7	1	1.252	1	V	SURB		
1251	8	1	1.347	2	H	SURB		
1251	9	2	.	.				
1251	10	2	.	.				
1251	11	1	1.377	1	V	SURB		
1251	12	1	1.376	2	H	SURB		
1251	13	2	.	.				
1261	1	1	1.322	1	H			
1261	2	1	1.333	2	V			
1261	3	2	.	.				
1261	4	2	.	.				
1261	5	1	1.350	2	H			
1261	6	1	1.212	2	V			
1261	7	2	.	.				
1261	8	1	0.985	2	H			
1261	9	1	1.370	1	V			
1261	10	1	1.236	2	H			
1261	11	1	1.348	2	V			
1261	12	1	1.290	2	H			
1261	13	1	1.373	2	V			
1261	14	1	1.229	1	H			
1270	1	1	1.332	2	H	SURB		

Status: 1 = Live; 2 = Early Resorption; 4 = Late Resorption
Sex: Male = 1; Female = 2; See Code Sheet 33 for Identification of abnormalities [ABNn]

Acetone Mouse Teratology Study: Raw Fetal Data

--- 440 ppm Acetone ---

Matno	Site	Status	Fetal Wt(g)	Sex	Head or Visceral	ABN1	ABN2	ABN3
1270	2	1	1.326	2	V			
1270	3	4	.	.				
1270	4	1	1.268	2	V			
1270	5	1	1.316	2	H			
1270	6	1	1.362	2	V	MAST		
1270	7	1	1.387	2	H			
1270	8	1	1.419	1	V	MAST	ROST	
1270	9	1	1.337	2	H			
1270	10	1	1.522	1	V			
1271	1	1	1.489	1	V			
1271	2	1	1.495	2	H	MAST	SURB	
1271	3	1	1.405	1	V	SURB		
1271	4	1	1.349	2	H	MAST		
1271	5	1	1.467	2	V			
1271	6	1	1.600	1	H			
1271	7	1	1.473	1	V	SURB		
1271	8	1	1.469	2	H	SURB		
1271	9	1	1.453	1	V			
1271	10	1	1.278	2	H			
1271	11	1	1.409	1	V	SURB		
1271	12	1	1.515	1	H	SURB		
1271	13	1	1.522	1	V			
1271	14	1	1.387	1	H	SURB		
1271	15	1	1.347	2	V			
1274	1	1	1.158	2	V			
1274	2	1	1.145	2	H			
1274	3	1	1.232	2	V			
1274	4	1	1.294	1	H			
1274	5	1	1.276	1	V			
1274	6	1	1.317	1	H			
1274	7	1	1.314	1	V			
1274	8	1	1.353	1	H			
1274	9	1	1.391	1	V	MAST		
1274	10	2	.	.				
1274	11	1	1.295	2	V			
1274	12	1	1.361	2	H	MAST		
1274	13	1	1.274	2	V	MAST		
1279	1	1	1.407	2	V	SURB		
1279	2	2	.	.				
1279	3	1	1.354	1	H	SURB		
1279	4	1	1.307	2	V	SURB		
1279	5	1	1.282	2	H	SURB		
1279	6	1	1.321	2	V	SURB		
1279	7	1	1.257	2	H	MAST	SURB	
1279	8	2	.	.				
1279	9	1	1.319	2	V	MAST	SURB	
1279	10	1	1.299	2	H	SURB		

Status: 1 = Live; 2 = Early Resorption; 4 = Late Resorption
Sex: Male = 1; Female = 2; See Code Sheet 33 for Identification of abnormalities [ABNn]

Acetone Mouse Teratology Study: Raw Fetal Data

---------- 440 ppm Acetone ----------

Matno	Site	Status	Fetal Wt(g)	Sex	Head or Visceral	ABN1	ABN2	ABN3
1279	11	1	1.220	2	V	MAST	SURB	
1279	12	1	1.289	2	H	MAST	SURB	
1279	13	1	1.362	1	V	SURB		
1279	14	1	1.405	1	H	SURB		
1287	1	1	1.563	2	V	SURB		
1287	2	1	1.493	2	H	SURB		
1287	3	1	1.579	2	V			
1287	4	1	1.573	1	H	SURB		
1287	5	1	1.536	1	V	SURB		
1287	6	1	1.457	2	H	SURB		
1287	7	1	1.433	1	V	SURB		
1287	8	2	.	.				
1287	9	1	1.393	2	H	SURB		
1287	10	1	1.504	1	V	ROST		
1287	11	1	1.459	2	H	MAST		
1287	12	1	1.446	1	V	SURB		
1287	13	1	1.492	1	H	SURB		
1287	14	1	1.441	1	V	SURB		
1287	15	1	1.433	1	H	SURB		
1294	1	1	1.426	1	V	SURB		
1294	2	1	1.328	2	H	SURB		
1294	3	1	1.348	1	V	MAST	ROST	
1294	4	1	1.407	1	H	MAST		
1294	5	1	1.382	1	V	SURB		
1294	6	1	1.373	2	H			
1294	7	1	1.342	2	V	MAST		
1294	8	1	1.246	2	H			
1294	9	1	1.343	1	V			
1294	10	1	1.355	1	H	SURB		
1294	11	1	1.305	2	V	MAST	SURB	
1294	12	1	1.289	1	H	SURB		
1294	13	1	1.246	2	V			
1294	14	1	1.224	2	H	MAST	ROST	
1308	1	1	1.266	2	V			
1308	2	1	1.191	1	H	SURB		
1308	3	1	1.300	1	V			
1308	4	4	.	.				
1308	5	1	1.248	1	H	MAST	ROST	
1308	6	1	1.154	2	V			
1308	7	1	1.258	1	H	MAST	SURB	
1308	8	1	1.144	2	V			
1308	9	1	1.287	1	H	SURB		
1308	10	1	1.157	2	V	MAST		
1308	11	1	1.220	1	H			
1308	12	1	1.142	2	V	SURB		
1317	1	1	1.559	1	V	SURB		
1317	2	1	1.579	1	H	SURB		

Status: 1 = Live; 2 = Early Resorption; 4 = Late Resorption
Sex: Male = 1; Female = 2; See Code Sheet 33 for Identification of abnormalities [ABNn]

SAS

Acetone Mouse Teratology Study: Raw Fetal Data

-- 440 ppm Acetone --

Matno	Site	Status	Fetal Wt(g)	Sex	Head or Visceral	ABN1	ABN2	ABN3
1317	3	1	1.490	2	V	MAST		
1317	4	1	1.451	1	H			
1317	5	1	1.418	2	V			
1317	6	1	1.618	1	H			
1317	7	1	1.477	2	V	SURB		
1317	8	1	1.466	1	H			
1317	9	1	1.055	2	V	MAST	ROST	
1317	10	1	1.488	2	H			

C.79

Status: 1 = Live; 2 = Early Resorption; 4 = Late Resorption
Sex: Male = 1; Female = 2; See Code Sheet 33 for Identification of abnormalities [ABNn]

Acetone Mouse Teratology Study: Raw Fetal Data

------ 2200 ppm Acetone ------

Matno	Site	Status	Fetal Wt(g)	Sex	Head or Visceral	ABN1	ABN2	ABN3
1017	1	1	1.404	1	H			
1017	2	2	.	.				
1017	3	1	1.332	1	V			
1017	4	1	1.138	1	H			
1017	5	1	1.358	1	V			
1017	6	1	1.253	1	H			
1017	7	1	1.276	2	V			
1017	8	1	1.325	2	H			
1017	9	1	1.238	2	V			
1017	10	1	1.212	1	H			
1017	11	1	1.312	2	V			
1017	12	1	1.374	1	H			
1017	13	4	.	.				
1017	14	1	1.445	1	V			
1037	1	1	1.376	2	H			
1037	2	1	1.293	1	V			
1037	3	1	1.234	2	H	SURB		
1037	4	1	1.267	2	V			
1037	5	1	1.240	2	H			
1037	6	1	1.278	1	V	SURB		
1037	7	4	.	.				
1037	8	1	1.223	2	H			
1037	9	2	.	.				
1037	10	1	1.214	2	V			
1037	11	1	1.280	2	H			
1037	12	1	1.295	1	V			
1049	1	1	1.420	2	V			
1049	2	1	1.542	1	H	SURB		
1049	3	1	1.414	2	V			
1049	4	1	1.375	2	H			
1049	5	1	1.479	1	V			
1049	6	1	1.469	1	H			
1049	7	1	1.469	2	V			
1049	8	1	1.331	2	H			
1049	9	1	1.420	2	V			
1049	10	1	1.439	1	H			
1049	11	1	1.524	1	V			
1050	1	1	1.424	2	V	SURB		
1050	2	1	1.196	2	H			
1050	3	1	1.461	1	V			
1050	4	1	1.365	1	H			
1050	5	1	1.342	2	V			
1050	6	1	1.393	2	H			
1050	7	1	1.415	2	V			
1050	8	4	.	.				
1050	9	1	1.469	1	H			
1050	10	1	1.433	1	V			

Status: 1 = Live; 2 = Early Resorption; 4 = Late Resorption
Sex: Male = 1; Female = 2; See Code Sheet 33 for Identification of abnormalities [ABNn]

Acetone Mouse Teratology Study: Raw Fetal Data

--- 2200 ppm Acetone ---

Matno	Site	Status	Fetal Wt(g)	Sex	Head or Visceral	ABN1	ABN2	ABN3
1050	11	1	1.339	2	H			
1063	1	1	1.362	2	V			
1063	2	1	1.322	1	H			
1063	3	1	1.357	1	V			
1063	4	1	1.339	2	H			
1063	5	1	1.362	2	V			
1063	6	1	1.357	1	H			
1063	7	1	1.319	1	V			
1063	8	1	1.431	1	H			
1063	9	1	1.277	2	V			
1063	10	1	1.299	2	H			
1063	11	1	1.263	2	V			
1063	12	1	1.322	1	H			
1086	1	1	1.424	1	V	SURB		
1086	2	1	1.260	2	H	SURB		
1086	3	1	1.410	2	V			
1086	4	1	1.277	1	H	SURB		
1086	5	1	1.357	2	V			
1086	6	1	1.380	2	H			
1086	7	1	1.316	2	V			
1086	8	1	1.482	1	H	SURB		
1086	9	1	1.303	2	V	SURB		
1086	10	1	1.340	2	H	SURB		
1086	11	1	1.297	2	V			
1086	12	1	1.299	1	H	SURB		
1086	13	1	1.288	2	V	SURB		
1086	14	1	1.347	2	H	SURB		
1088	1	1	1.263	1	H			
1088	2	1	1.289	1	V			
1088	3	1	1.184	2	H			
1088	4	1	1.262	2	V	SURB		
1088	5	1	1.303	1	H			
1088	6	1	1.210	2	V			
1088	7	1	1.189	1	H			
1088	8	1	1.150	1	V			
1088	9	1	1.128	2	H			
1088	10	1	1.263	2	V	LMFL		
1088	11	1	1.162	1	H	LMFL		
1088	12	1	1.286	2	V			
1088	13	1	1.221	2	H			
1088	14	1	1.170	1	V			
1094	1	1	1.410	1	V			
1094	2	2	.	.				
1094	3	1	1.277	2	H			
1094	4	1	1.276	2	V			
1094	5	1	1.332	1	H			
1094	6	1	1.380	1	V			

Status: 1 = Live; 2 = Early Resorption; 4 = Late Resorption
Sex: Male = 1; Female = 2; See Code Sheet 33 for Identification of abnormalities [ABNn]

Acetone Mouse Teratology Study: Raw Fetal Data

2200 ppm Acetone

Matno	Site	Status	Fetal Wt(g)	Sex	Head or Visceral	ABN1	ABN2	ABN3
1094	7	1	1.313	1	H			
1094	8	1	1.317	1	V			
1094	9	1	1.165	2	H	FURB		
1094	10	1	1.198	1	V			
1094	11	1	1.213	1	H			
1094	12	2	.	.				
1119	1	1	1.428	2	V			
1119	2	1	1.494	1	H			
1119	3	2	.	.				
1119	4	1	0.959	1	V			
1119	5	1	1.335	1	H			
1119	6	5	.	.				
1119	7	1	1.367	1	V	MAST		
1119	8	1	1.316	1	H			
1119	9	1	1.383	1	V			
1119	10	1	1.307	2	H	MAST		
1119	11	1	1.313	1	V			
1136	1	1	1.461	2	H			
1136	2	1	1.366	2	V	SURB		
1136	3	1	1.408	2	H	SURB		
1136	4	1	1.368	2	V	SURB		
1136	5	1	1.442	1	H	SURB		
1136	6	1	1.359	1	V			
1136	7	1	1.429	1	H	SURB		
1136	8	1	1.468	1	V	SURB		
1136	9	1	1.488	1	H			
1136	10	1	1.338	2	V			
1136	11	1	1.350	2	H			
1138	1	1	1.284	2	H	SURB		
1138	2	2	.	.				
1138	3	2	.	.				
1138	4	1	1.434	1	V	SURB		
1138	5	1	1.446	2	H	SURB		
1138	6	1	1.344	1	V	ROST		
1138	7	1	1.265	2	H			
1150	1	1	1.547	1	V			
1150	2	4	.	.				
1150	3	1	1.494	1	H			
1150	4	1	1.470	1	V	SURB		
1150	5	1	1.386	1	H			
1150	6	1	1.411	2	V			
1150	7	1	1.448	1	H			
1150	8	1	1.462	2	V			
1155	1	1	1.329	2	H	SURB		
1155	2	1	1.203	1	V			
1155	3	1	1.295	1	H	SURB		
1155	4	1	1.294	2	V			

Status: 1 = Live; 2 = Early Resorption; 4 = Late Resorption
Sex: Male = 1; Female = 2; See Code Sheet 33 for Identification of abnormalities [ABNn]

Acetone Mouse Teratology Study: Raw Fetal Data

2200 ppm Acetone

Matno	Site	Status	Fetal Wt(g)	Sex	Head or Visceral	ABN1	ABN2	ABN3
1155	5	1	1.327	1	H	SURB		
1155	6	1	1.280	2	V	SURB		
1155	7	1	1.387	1	H			
1155	8	1	1.264	2	V			
1155	9	1	1.304	1	H	SURB		
1155	10	1	1.240	1	V	SURB		
1155	11	1	1.290	2	H	SURB		
1155	12	1	1.338	2	V	SURB		
1165	1	1	1.423	1	H	MAST		
1165	2	1	1.421	1	V	SURB		
1165	3	1	1.271	1	H			
1165	4	1	1.189	2	V			
1165	5	1	1.349	1	H			
1165	6	1	1.228	2	V			
1165	7	1	1.274	1	H			
1165	8	1	1.343	1	V	FUST		
1165	9	1	1.293	1	H	SURB		
1165	10	1	1.250	2	V	MAST	ROST	
1165	11	1	1.308	1	H	MAST		
1165	12	1	1.313	1	V			
1178	1	1	1.425	2	H			
1178	2	1	1.359	2	V			
1178	3	1	1.389	2	H			
1178	4	1	1.450	1	V			
1178	5	1	1.546	1	H			
1178	6	1	1.303	2	V			
1178	7	1	1.441	1	H			
1178	8	2	.	.				
1178	9	4	.	.				
1178	10	1	1.393	2	V			
1178	11	1	1.368	2	H			
1178	12	1	1.446	2	V			
1178	13	1	1.398	1	H			
1181	1	1	1.415	1	H			
1181	2	1	1.354	2	V			
1181	3	2	.	.				
1181	4	1	1.340	2	H			
1181	5	1	1.359	2	V			
1181	6	1	1.337	2	H			
1181	7	1	1.218	1	V			
1181	8	1	1.368	2	H			
1181	9	1	1.414	1	V			
1181	10	1	1.329	1	H			
1181	11	1	1.318	2	V			
1181	12	1	1.491	1	H			
1181	13	1	1.403	1	V			
1187	1	1	1.232	1	V	SURB		

Status: 1 = Live; 2 = Early Resorption; 4 = Late Resorption
Sex: Male = 1; Female = 2; See Code Sheet 33 for Identification of abnormalities [ABNn]

Acetone Mouse Teratology Study: Raw Fetal Data

-- 2200 ppm Acetone --

Matno	Site	Status	Fetal Wt(g)	Sex	Head or Visceral	ABN1	ABN2	ABN3
1187	2	4	.	.				
1187	3	1	1.231	2	H	SURB		
1187	4	1	1.144	2	V			
1187	5	1	1.247	2	H			
1187	6	1	1.219	2	V	SURB		
1187	7	1	1.088	2	H	ROST		
1187	8	1	1.095	2	V	MAST	ROST	
1187	9	1	1.161	2	H			
1187	10	1	1.198	2	V	SURB		
1187	11	1	1.247	2	H			
1201	1	1	1.482	2	H			
1201	2	1	1.514	1	V			
1201	3	4	.	.				
1201	4	1	1.339	2	H	SURB		
1201	5	2	.	.				
1201	6	1	1.435	1	V			
1201	7	1	1.420	2	H			
1201	8	1	1.486	2	V			
1201	9	1	1.402	2	H			
1208	1	1	1.254	1	V	SURB		
1208	2	4	.	.				
1208	3	1	1.198	1	H	SURB		
1208	4	1	1.062	2	V	ROST		
1208	5	1	1.051	2	H	MAST	ROST	
1208	6	1	1.172	2	V	SURB		
1208	7	1	1.180	1	H			
1208	8	1	1.139	2	V			
1208	9	1	1.178	1	H			
1208	10	1	1.135	2	V	SURB		
1208	11	4	.	.				
1220	1	1	1.155	1	H			
1220	2	1	1.187	1	V			
1220	3	1	1.201	1	H			
1220	4	2	.	.				
1220	5	1	1.123	1	V			
1220	6	1	1.203	1	H			
1220	7	1	1.135	2	V			
1220	8	1	1.167	2	H			
1220	9	1	1.067	2	V	SURB		
1220	10	1	1.158	1	H			
1220	11	1	1.228	1	V			
1233	1	1	1.369	1	H			
1233	2	1	1.304	1	V			
1233	3	1	1.206	2	H			
1233	4	1	1.186	2	V			
1233	5	1	1.073	2	H			
1233	6	1	1.160	1	V			

Status: 1 = Live; 2 = Early Resorption; 4 = Late Resorption
Sex: Male = 1; Female = 2; See Code Sheet 33 for Identification of abnormalities [ABNn]

SAS

Acetone Mouse Teratology Study: Raw Fetal Data

--- 2200 ppm Acetone ---

Matno	Site	Status	Fetal Wt(g)	Sex	Head or Visceral	ABN1	ABN2	ABN3
1233	7	1	1.136	2	H			
1233	8	1	1.Ø99	2	V			
1233	9	1	1.189	2	H			
1233	1Ø	1	1.2Ø6	1	V			
1233	11	1	1.317	1	H			
1233	12	1	1.25Ø	1	V			
1233	13	1	1.312	1	H			
1244	1	1	1.341	1	V	SURB		
1244	2	1	1.54Ø	1	H			
1244	3	1	1.364	2	V			
1244	4	1	1.396	1	H			
1244	5	1	1.372	2	V	SURB		
1244	6	1	1.345	2	H			
1244	7	1	1.366	2	V	SURB		
1244	8	1	1.263	2	H			
1244	9	1	1.378	1	V			
1244	1Ø	1	1.297	2	H	SURB		
1244	11	1	1.39Ø	2	V	SURB		
1244	12	2	.	.				
1244	13	1	1.368	2	H			
1244	14	1	1.476	1	V			
126Ø	1	1	1.354	1	V			
126Ø	2	1	1.29Ø	2	H			
126Ø	3	1	1.196	2	V			
126Ø	4	2	.	.				
126Ø	5	1	1.255	1	H	SURB		
126Ø	6	2	.	.				
126Ø	7	1	1.141	2	V			
126Ø	8	1	1.296	2	H			
126Ø	9	1	1.342	2	V	MAST		
126Ø	1Ø	1	1.313	2	H			
126Ø	11	1	1.349	1	V			
126Ø	12	1	1.339	2	H			
126Ø	13	1	1.359	1	V	SURB		
126Ø	14	1	1.292	1	H			
1263	1	1	1.375	1	H			
1263	2	1	1.426	1	V			
1263	3	1	1.335	2	H	MAST		
1263	4	1	1.372	2	V			
1263	5	1	1.397	1	H	SURB		
1263	6	1	1.284	2	V	SURB		
1263	7	1	1.369	1	H			
1263	8	1	1.366	2	V			
1263	9	1	1.349	1	H			
1263	1Ø	1	1.345	1	V			
1263	11	1	1.4Ø5	1	H	SURB		
1263	12	1	1.357	2	V			

Status: 1 = Live; 2 = Early Resorption; 4 = Late Resorption
Sex: Male = 1; Female = 2; See Code Sheet 33 for Identification of abnormalities [ABNn]

Acetone Mouse Teratology Study: Raw Fetal Data

--- 2200 ppm Acetone ---

Matno	Site	Status	Fetal Wt(g)	Sex	Head or Visceral	ABN1	ABN2	ABN3
1283	13	1	1.355	2	H	MAST	SURB	
1284	1	1	1.493	2	H			
1284	2	1	1.380	1	V			
1284	3	1	1.327	1	H			
1284	4	1	1.408	1	V			
1284	5	1	1.342	2	H			
1284	6	1	1.390	1	V			
1284	7	1	1.468	1	H			
1284	8	1	1.537	1	V			
1284	9	1	1.401	2	H			
1284	10	1	1.502	1	V			
1284	11	1	1.311	2	H	MAST		
1291	1	1	1.589	1	H			
1291	2	1	1.449	2	V			
1291	3	1	1.505	2	H	MAST	SURB	
1291	4	1	1.499	2	V			
1291	5	1	1.381	2	H			
1291	6	1	1.400	2	V			
1291	7	1	1.425	2	H			
1291	8	1	1.420	2	V	MAST	OSST	
1291	9	1	1.517	1	H			
1291	10	1	1.410	2	V			
1291	11	1	1.480	2	H			
1291	12	1	1.470	1	V			
1291	13	1	1.323	2	H			
1291	14	1	1.448	1	V			
1296	1	1	1.311	2	V			
1296	2	1	1.381	1	H			
1296	3	1	1.356	2	V	SURB		
1296	4	1	1.346	2	H			
1296	5	1	1.261	2	V	SURB		
1296	6	1	1.332	2	H	SURB		
1296	7	1	1.340	2	V	SURB		
1296	8	1	1.401	1	H			
1296	9	1	1.312	2	V			
1296	10	1	1.406	1	H			
1296	11	1	1.293	2	V	SURB		
1296	12	1	1.365	2	H			
1312	1	1	1.419	1	H	SURB		
1312	2	1	1.375	2	V	SURB		
1312	3	1	1.299	2	H			
1312	4	2	.	.				
1312	5	1	1.187	2	V			
1312	6	1	1.369	1	H			
1312	7	1	1.313	1	V			
1312	8	1	1.212	2	H	MAST	SURB	
1312	9	1	1.457	1	V			

Status: 1 = Live; 2 = Early Resorption; 4 = Late Resorption
Sex: Male = 1; Female = 2; See Code Sheet 33 for Identification of abnormalities [ABNn]

SAS

Acetone Mouse Teratology Study: Raw Fetal Data

-- 2200 ppm Acetone --

Matno	Site	Status	Fetal Wt(g)	Sex	Head or Visceral	ABN1	ABN2	ABN3
1312	10	1	1.360	1	H			
1328	1	1	1.243	2	H			
1328	2	1	1.070	1	V	ROST		
1328	3	1	1.321	1	H			
1328	4	1	1.307	2	V	MAST		
1328	5	1	1.318	1	H			
1328	6	1	1.201	2	V			
1328	7	4	.	.				
1328	8	1	1.160	1	H			
1328	9	1	1.112	2	V			
1328	10	1	1.110	2	H			
1328	11	1	1.214	1	V			
1328	12	1	1.287	1	H	MAST		

Status: 1 = Live; 2 = Early Resorption; 4 = Late Resorption
Sex: Male = 1; Female = 2; See Code Sheet 33 for Identification of abnormalities [ABNn]

Acetone Mouse Teratology Study: Raw Fetal Data

--- 6600 ppm Acetone ---

Matno	Site	Status	Fetal Wt(g)	Sex	Head or Visceral	ABN1	ABN2	ABN3
1009	1	1	1.175	2	V	SURB		
1009	2	1	1.211	1	H			
1009	3	1	1.209	2	V			
1009	4	1	1.230	2	H			
1009	5	1	1.120	2	V			
1009	6	1	1.155	2	H			
1009	7	1	1.125	1	V			
1009	8	1	1.157	1	H	SURB		
1009	9	1	1.104	2	V			
1009	10	2	.	.				
1009	11	2	.	.				
1009	12	1	1.282	1	H			
1009	13	1	1.129	2	V			
1009	14	1	1.159	2	H			
1009	15	1	1.211	1	V			
1011	1	1	1.184	2	V			
1011	2	2	.	.				
1011	3	1	1.114	2	H			
1011	4	1	1.209	2	V			
1011	5	1	1.208	1	H			
1011	6	1	0.811	1	V			
1011	7	1	1.327	2	H			
1011	8	1	0.983	1	V			
1011	9	4	.	.				
1011	10	1	1.237	1	H			
1011	11	1	1.165	1	V			
1011	12	1	1.053	2	H			
1011	13	1	1.160	1	V			
1011	14	1	1.087	2	H			
1014	1	1	1.265	1	H			
1014	2	1	1.193	1	V			
1014	3	1	1.167	1	H			
1014	4	1	1.306	1	V			
1014	5	1	1.168	2	H	SURB		
1014	6	1	1.074	2	V			
1014	7	1	1.273	1	H			
1014	8	1	1.128	2	V			
1014	9	1	1.140	1	H			
1019	1	1	1.088	2	H			
1019	2	1	1.116	2	V			
1019	3	1	1.051	2	H			
1019	4	1	1.041	2	V			
1019	5	1	1.201	1	H			
1019	6	1	1.188	1	V			
1019	7	1	1.079	1	H			
1019	8	1	1.165	1	V			
1019	9	1	1.286	1	H			

Status: 1 = Live; 2 = Early Resorption; 4 = Late Resorption
Sex: Male = 1; Female = 2; See Code Sheet 33 for Identification of abnormalities [ABNn]

Acetone Mouse Teratology Study: Raw Fetal Data

---------- 6600 ppm Acetone ----------

Matno	Site	Status	Fetal Wt(g)	Sex	Head or Visceral	ABN1	ABN2	ABN3
1019	10	1	1.155	1	V			
1019	11	1	1.103	2	H			
1019	12	1	1.132	2	V			
1019	13	1	0.952	2	H			
1019	14	1	1.065	2	V			
1019	15	1	1.082	2	H			
1019	16	1	1.146	2	V			
1022	1	1	1.140	2	V			
1022	2	1	1.050	2	H			
1022	3	1	1.181	1	V			
1022	4	1	1.158	1	H			
1022	5	1	1.200	1	V			
1022	6	1	1.212	1	H			
1022	7	2	.	.				
1022	8	1	1.275	1	V			
1022	9	1	1.238	2	H			
1022	10	1	1.174	2	V			
1022	11	1	1.203	1	H			
1022	12	1	1.112	1	V			
1022	13	1	1.280	1	H			
1022	14	1	1.181	1	V			
1022	15	1	1.236	1	H			
1023	1	1	1.115	2	V			
1023	2	1	1.125	2	H			
1023	3	1	1.076	2	V			
1023	4	1	1.130	2	H			
1023	5	1	1.110	2	V			
1023	6	4	.	.				
1023	7	1	1.016	2	H			
1023	8	1	1.082	2	V	SURB	LMFL	
1023	9	4	.	.				
1023	10	1	1.078	2	H			
1023	11	1	1.043	1	V			
1023	12	1	1.166	1	H			
1023	13	1	1.158	2	V			
1023	14	1	1.152	1	H			
1023	15	1	1.070	1	V			
1024	1	1	1.361	2	V			
1024	2	1	1.296	2	H			
1024	3	1	1.349	1	V			
1024	4	1	1.298	2	H			
1024	5	1	1.319	2	V			
1024	6	1	1.341	2	H			
1024	7	1	1.368	1	V			
1024	8	1	1.285	2	H			
1024	9	1	1.304	2	V			
1024	10	1	1.309	1	H	SURB		

Status: 1 = Live; 2 = Early Resorption; 4 = Late Resorption
Sex: Male = 1; Female = 2; See Code Sheet 33 for Identification of abnormalities [ABNn]

Acetone Mouse Teratology Study: Raw Fetal Data

-- 6600 ppm Acetone --

Matno	Site	Status	Fetal Wt(g)	Sex	Head or Visceral	ABN1	ABN2	ABN3
1024	11	1	1.300	1	V			
1025	1	1	1.113	2	V			
1025	2	1	1.173	2	H			
1025	3	1	1.277	1	V			
1025	4	1	1.262	1	H			
1025	5	1	1.188	2	V	SURB		
1025	6	1	1.238	1	H			
1025	7	1	1.249	1	V			
1025	8	1	1.061	2	H			
1025	9	1	1.223	1	V			
1025	10	1	1.166	2	H			
1025	11	1	1.234	1	V			
1025	12	1	1.198	2	H			
1025	13	1	1.236	1	V			
1026	1	1	1.343	2	H			
1026	2	1	1.215	1	V			
1026	3	1	1.114	2	H			
1026	4	1	1.231	1	V			
1026	5	1	1.301	1	H			
1026	6	4	.	.				
1026	7	1	1.260	1	V			
1026	8	1	1.276	1	H			
1026	9	1	1.355	1	V			
1026	10	1	1.406	1	H			
1026	11	1	1.389	2	V			
1026	12	1	1.428	1	H			
1048	1	1	1.048	1	V	DIUR		
1048	2	1	1.012	2	H	ROST	MAST	
1048	3	1	0.989	2	V			
1048	4	1	0.826	1	H	ROST		
1048	5	1	0.942	2	V			
1048	6	1	1.011	1	H	ROST		
1048	7	1	1.031	1	V	MAST	SURB	
1048	8	1	0.914	2	H	ROST		
1048	9	1	1.017	1	V	MAST	ROST	
1048	10	2	.	.				
1048	11	1	1.061	2	H			
1048	12	1	0.956	2	V	MAST	ROST	
1048	13	1	0.562	1	H	MAST	ROST	SURB
1048	14	4	.	.				
1060	1	1	1.423	1	H			
1060	2	2	.	.				
1060	3	1	1.303	2	V			
1060	4	1	1.363	1	H			
1060	5	1	1.258	2	V			
1060	6	1	1.127	1	H	SURB		
1060	7	1	1.320	2	V	SURB		

Status: 1 = Live; 2 = Early Resorption; 4 = Late Resorption
Sex: Male = 1; Female = 2; See Code Sheet 33 for Identification of abnormalities [ABNn]

Acetone Mouse Teratology Study: Raw Fetal Data

6600 ppm Acetone

Matno	Site	Status	Fetal Wt(g)	Sex	Head or Visceral	ABN1	ABN2	ABN3
1060	8	1	1.290	2	H			
1060	9	1	1.209	2	V	SURB		
1060	10	1	1.257	1	H			
1060	11	2	.	.				
1060	12	1	1.294	1	V			
1060	13	1	1.137	2	H			
1060	14	1	1.244	2	V			
1060	15	1	1.257	1	H			
1060	16	2	.	.				
1061	1	1	1.332	1	H			
1061	2	1	1.306	2	V			
1061	3	1	1.211	2	H			
1061	4	1	1.296	2	V			
1061	5	1	1.144	2	H			
1061	6	1	1.160	2	V			
1061	7	1	1.298	2	H			
1061	8	1	1.201	2	V			
1061	9	1	1.275	2	H			
1061	10	4	.	.				
1061	11	1	1.233	1	V			
1061	12	1	1.375	1	H			
1061	13	1	1.157	2	V			
1073	1	1	1.319	1	H			
1073	2	1	1.416	1	V			
1073	3	1	1.229	1	H			
1073	4	1	1.294	2	V			
1073	5	4	.	.				
1073	6	1	1.314	2	H			
1073	7	4	.	.				
1073	8	1	1.298	1	V			
1073	9	1	1.359	2	H			
1073	10	1	1.297	1	V			
1073	11	2	.	.				
1073	12	1	1.238	2	H			
1073	13	1	1.333	1	V			
1099	1	1	1.308	1	H			
1099	2	1	1.230	2	V			
1099	3	1	1.257	2	H			
1099	4	1	1.174	2	V			
1099	5	1	1.311	2	H			
1099	6	1	1.286	1	V	DIUR	ROST	SURB
1099	7	1	1.219	2	H			
1099	8	4	.	.				
1099	9	1	1.175	2	V			
1099	10	1	1.146	1	H			
1099	11	1	1.267	1	V			
1099	12	1	1.342	2	H			

Status: 1 = Live; 2 = Early Resorption; 4 = Late Resorption
Sex: Male = 1; Female = 2; See Code Sheet 33 for Identification of abnormalities [ABNn]

Acetone Mouse Teratology Study: Raw Fetal Data

-- 6600 ppm Acetone --

Matno	Site	Status	Fetal Wt(g)	Sex	Head or Visceral	ABN1	ABN2	ABN3
1118	1	4	.	.				
1118	2	1	1.166	2	H			
1118	3	1	1.208	1	V	MAST		
1118	4	4	.	.				
1118	5	1	1.180	1	H	ROST		
1118	6	1	1.132	2	V			
1118	7	1	1.115	1	H	ROST		
1118	8	1	1.182	1	V	MAST		
1118	9	1	1.183	2	H			
1118	10	4	.	.				
1118	11	1	1.156	1	V			
1118	12	4	.	.				
1118	13	1	1.105	2	H			
1142	1	1	1.192	1	H			
1142	2	1	1.210	1	V			
1142	3	1	1.248	1	H			
1142	4	1	1.314	1	V			
1142	5	1	1.224	2	H			
1142	6	1	1.274	1	V			
1142	7	1	1.295	1	H			
1142	8	1	1.282	2	V			
1142	9	1	1.165	1	H			
1142	10	4	.	.				
1142	11	1	1.206	1	V			
1144	1	1	1.103	2	V	ROST		
1144	2	1	1.229	2	H	MAST		
1144	3	1	1.262	2	V			
1144	4	1	1.219	1	H	MAST	ROST	
1144	5	1	1.264	1	V			
1144	6	1	1.190	2	H	MAST	ROST	
1144	7	1	1.330	1	V	ROST	MAST	
1144	8	2	.	.				
1144	9	1	1.124	2	V	ROST	SURB	
1144	10	1	1.095	1	H	ROST		
1158	1	1	1.288	1	V			
1158	2	1	1.236	1	H			
1158	3	1	1.207	2	V			
1158	4	1	1.225	2	H			
1158	5	1	1.245	1	V			
1158	6	1	1.261	2	H			
1158	7	1	1.211	1	V	SURB		
1158	8	4	.	.				
1158	9	4	.	.				
1158	10	1	1.187	2	H			
1172	1	1	1.237	1	V			
1172	2	1	1.229	1	H			
1172	3	1	1.162	1	V			

Status: 1 = Live; 2 = Early Resorption; 4 = Late Resorption
Sex: Male = 1; Female = 2; See Code Sheet 33 for Identification of abnormalities [ABNn]

SAS

Acetone Mouse Teratology Study: Raw Fetal Data

-- 6600 ppm Acetone --

Matno	Site	Status	Fetal Wt(g)	Sex	Head or Visceral	ABN1	ABN2	ABN3
1172	4	1	1.284	1	H			
1172	5	1	1.185	1	V			
1172	6	1	1.210	1	H			
1172	7	1	1.067	2	V			
1172	8	1	1.154	1	H	SURB		
1172	9	1	1.288	2	V			
1172	10	1	1.168	2	H			
1172	11	1	1.220	2	V			
1172	12	1	1.306	2	H			
1172	13	1	1.231	1	V			
1174	1	1	1.395	2	H			
1174	2	4	.	.				
1174	3	1	1.282	1	V			
1174	4	4	.	.				
1174	5	2	.	.				
1174	6	1	1.310	2	H			
1174	7	4	.	.				
1174	8	1	1.349	1	V	SURB		
1174	9	1	1.334	1	H	SURB		
1174	10	1	1.255	1	V			
1174	11	1	1.290	2	H	SURB		
1232	1	1	1.256	1	H	MAST	ROST	
1232	2	1	1.291	1	V			
1232	3	1	1.283	1	H			
1232	4	4	.	.				
1232	5	1	1.254	1	V			
1232	6	1	1.235	2	H	FRET		
1232	7	1	1.256	2	V			
1232	8	1	1.248	1	H			
1232	9	1	1.293	1	V			
1232	10	1	1.191	1	H	ROST		
1232	11	1	1.118	1	V			
1232	12	1	1.227	1	H			
1232	13	1	1.251	1	V			
1236	1	1	1.192	1	V			
1236	2	1	1.102	2	H			
1236	3	1	1.242	1	V			
1236	4	1	1.163	1	H	SURB		
1236	5	1	1.212	1	V	SURB		
1236	6	2	.	.				
1236	7	1	1.299	1	H			
1236	8	1	1.070	2	V	SURB	ROST	MAST
1236	9	1	1.176	2	H			
1236	10	1	1.145	2	V	SURB		
1236	11	4	.	.				
1236	12	1	1.020	2	H	SURB		
1236	13	1	1.021	1	V	SURB		

Status: 1 = Live; 2 = Early Resorption; 4 = Late Resorption
Sex: Male = 1; Female = 2; See Code Sheet 33 for Identification of abnormalities [ABNn]

Acetone Mouse Teratology Study: Raw Fetal Data

-- 6600 ppm Acetone --

Matno	Site	Status	Fetal Wt(g)	Sex	Head or Visceral	ABN1	ABN2	ABN3
1236	14	4	.	.				
1236	15	1	1.109	2	H	SURB		
1236	16	1	1.179	1	V			
1241	1	1	1.256	2	V	SURB		
1241	2	1	1.230	1	H			
1241	3	1	1.248	2	V	ROST		
1241	4	2	.	.				
1241	5	1	1.130	2	H	ROST		
1241	6	1	1.157	2	V	MAST		
1241	7	1	1.117	2	H	ROST		
1241	8	1	3.694	2	V	MAST		
1241	9	1	1.259	1	H	SURB		
1241	10	1	1.212	1	V	MAST	SURB	
1241	11	1	1.257	1	H	ROST		
1241	12	1	1.246	2	V	ROST		
1241	13	1	1.205	2	H	SURB		
1248	1	1	1.193	2	V			
1248	2	4	.	.				
1248	3	1	1.138	2	H			
1248	4	1	1.207	1	V			
1248	5	1	1.203	1	H			
1248	6	1	1.219	1	V			
1248	7	1	1.233	1	H	SURB		
1248	8	1	1.168	2	V			
1248	9	1	1.198	1	H			
1248	10	1	1.302	1	V			
1248	11	1	1.083	1	H			
1248	12	1	1.223	1	V			
1248	13	1	1.235	1	H			
1248	14	1	1.156	2	V			
1255	1	1	1.382	1	V			
1255	2	4	.	.				
1255	3	2	.	.				
1255	4	1	1.298	2	H			
1255	5	1	1.426	1	V			
1255	6	2	.	.				
1255	7	1	1.415	1	H			
1255	8	1	1.186	2	V	ROST	SURB	
1255	9	1	1.340	1	H			
1255	10	1	1.372	2	V	MAST	ROST	
1255	11	1	1.309	1	H	MAST		
1255	12	1	1.348	2	V	ROST		
1259	1	1	1.176	2	H	SURB		
1259	2	1	1.181	2	V	SURB		
1259	3	1	1.213	2	H	SURB		
1259	4	1	1.254	1	V			
1259	5	1	1.158	1	H	SURB		

Status: 1 = Live; 2 = Early Resorption; 4 = Late Resorption
Sex: Male = 1; Female = 2; See Code Sheet 33 for Identification of abnormalities [ABNn]

SAS

Acetone Mouse Teratology Study: Raw Fetal Data

--- 6600 ppm Acetone ---

Matno	Site	Status	Fetal Wt(g)	Sex	Head or Visceral	ABN1	ABN2	ABN3
1259	6	2	.	.				
1259	7	4	.	.				
1259	8	1	1.204	2	V	MAST	ROST	
1259	9	1	1.156	1	H	SURB		
1259	10	1	1.299	1	V	SURB		
1259	11	1	1.402	1	H			
1259	12	1	1.118	2	V	SURB		
1259	13	1	1.156	2	H	SURB		
1263	1	1	1.258	1	H			
1263	2	1	1.151	1	V			
1263	3	1	1.190	2	H			
1263	4	2	.	.				
1263	5	1	1.063	2	V	EXCE	MAST	ROST
1263	6	1	1.146	2	H	MAST		
1263	7	4	.	.				
1263	8	1	1.104	1	V			
1263	9	1	1.229	2	H	MAST		
1263	10	1	1.194	1	V			
1286	1	1	1.244	1	H	MAST		
1286	2	1	1.192	2	V	SURB		
1286	3	1	1.168	2	H			
1286	4	1	1.215	1	V			
1286	5	1	1.127	2	H			
1286	6	1	1.196	1	V			
1286	7	1	1.277	1	H			
1286	8	4	.	.				
1286	9	1	1.177	2	V			
1286	10	1	1.044	2				
1292	1	1	1.313	2	V			
1292	2	1	1.290	1	H			
1292	3	1	1.382	1	V			
1292	4	1	1.384	1	H			
1292	5	1	1.336	2	V			
1292	6	1	1.336	1	H			
1292	7	1	1.337	2	V			
1292	8	1	1.313	2	H			
1292	9	1	1.296	2	V			
1292	10	1	1.425	2	H			
1292	11	1	1.360	2	V			
1297	1	1	1.038	1	V	SURB		
1297	2	1	1.168	2	H			
1297	3	1	1.179	1	V			
1297	4	1	1.123	1	H			
1297	5	1	1.131	2	V	MAST	ROST	
1297	6	1	1.129	1	H	SURB		
1297	7	1	1.011	2	V	SURB		
1297	8	1	1.072	2	H			

Status: 1 = Live; 2 = Early Resorption; 4 = Late Resorption
Sex: Male = 1; Female = 2; See Code Sheet 33 for Identification of abnormalities [ABNn]

Acetone Mouse Teratology Study: Raw Fetal Data

--- 6600 ppm Acetone ---

Matno	Site	Status	Fetal Wt(g)	Sex	Head or Visceral	ABN1	ABN2	ABN3
1297	9	4	.	.				
1297	10	1	1.085	1	V			
1297	11	1	1.040	2	H	MAST		
1297	12	4	.	.				
1297	13	1	0.892	2	V			
1297	14	1	1.025	2	H	MAST	ROST	
1330	1	1	1.348	2	V			
1330	2	1	1.356	2	H			
1330	3	1	1.444	1	V			
1330	4	1	1.283	2	H			
1330	5	1	1.235	2	V	MAST		
1330	6	4	.	.				
1330	7	1	1.269	2	H	MAST	ROST	
1330	8	1	1.231	2	V	MAST	SURB	
1330	9	1	1.522	1	H			
1330	10	2	.	.				

Status: 1 = Live; 2 = Early Resorption; 4 = Late Resorption
Sex: Male = 1; Female = 2; See Code Sheet 33 for Identification of abnormalities [ABNn]

Acetone Mouse Teratology Study: Raw Fetal Data

Code Sheet for Identification of Fetal Abnormalities

DIUR	Dilated Ureter
EXCE	Exencephaly
FRET	Folded Retina
FURB	Fused Ribs
FUST	Fused Sternebrae
KITA	Kinked Tail
LMFL	Limb Flexure
MAST	Misaligned Sternebra
OSST	Ossification Site Between Sternebra
ROST	Reduced Ossification Sternebra
SURB	Supernumerary Rib

Acetone Mouse Teratology Study: Calendar of Events

Exposure levels; Treatment 1-4 *grp 4 A and 4 virgin; 11,000 ppm on exposure day 1	0, 440, 2200, 6600 (11000*) ppm
Ordered mice	10-7-87
Received male mice (ARS# 870016)	11-2-87
Received female mice (ARS #870017)	11-3-87
Eartagged and weighed	11-18-87
Virgins selected	11-18-87
Initial health screen; 10 males, 10 females	11-23-87
Placed virgins into individual caging	11-25-87
Additional health screen; 5 males, 5 females	11-30-87
Virgins weighed and randomized	11-30-87
Detection of copulation (0dg), weighed, randomized, individually caged	(A) 11-26-87 (20) (B) 11-27-87 (24) (C) 11-28-87 (37/53) (D) 11-29-87 (23) (E) 11-30-87 (28)
Study mice moved to exposure room	11-30-87
Mice released for study	12-2-87
Exposure (6 hours/day; 6-17 dg)	(A) 12-2 to 12-13-87 (B) 12-3 to 12-14-87 (C) 12-4 to 12-15-87 (D) 12-5 to 12-16-87 (E) 12-6 to 12-17-87
Weighed (6dg) started exposure	(A-E) 12-2-87 to 12-6-87
Weighed (9dg)	(A-E) 12-5-87 to 12-9-87
Weighed (12dg)	(A-E) 12-8-87 to 12-12-87
Weighed (15dg)	(A-E) 12-11-87 to 12-15-87
Sacrifice (18dg)	(A) 12-14-87 terminal serology (B) 12-15-87 (C) 12-16-87 (D) 12-17-87 (E) 12-18-87
Virgins exposed for 12 days concurrent with grp A	
Weighed exposure day1	12-2-87
Weighed exposure day5	12-6-87
Weighed exposure day10	12-11-87
Sacrifice one day post-exposure	12-14-87
Fetal exams completed	2-5-88

ACETONE MOUSE TERATOLOGY STUDY DISPOSITION

Exposure Group	Treatment	Virgins	Plug-Positive Teratology Mice: On Study(a)	Removed From Study	Sacrifice	Litters Examined
Control (0 ppm)	1	10	33	2(c)	31	26
440 ppm	2	10	33	0	33	28
2200 ppm	3	10	33	0	33	29
6600 ppm(b)	4	10	33	0	33	31

(a) The study protocol required a minimum of 33 plug-positive females (to obtain 20 pregnant females).

(b) Breeding group 4 A and virgin mice were exposed at 11000 ppm on exposure day 1. Due to narcosis, the exposure level was thereafter reduced to 6600 ppm.

(c) Premature delivery of litter; not treatment related.

APPENDIX D

ANIMAL HEALTH SCREEN

ARC RODENT HEALTH SCREEN REPORT

Investigator: Mast
Study: IRT-Teratology
Acetone
Building: LSL II
Room: 433
Date initiated: 10/12/87

Lab no: P-153
Animal/Shipment no: 870074/ 870075
Date rc'd: 9/22/87
Source: CR Raleigh
870074 - RO4
870075 - RO1
Species/Strain: Rat/CD
Sex: 870074 - M
870075 - F
Age: BD 7/23/87

Status: Received ten rats (5 males, #1-5; 5 females, #6-10) for pre-exposure health screen

Gross Necropsy

No significant lesions

Nasopharyngeal culture

1/10 *	Beta hemolytic Streptococcus, Group G(#6)
0/10	*Bordetella bronchiseptica*
0/10	*Citrobacter freundii*
6/10	Coagulase positive Staphylococcus(#1,2,7,8,9,10)
0/10	*Klebsiella oxytoca*
0/10	*Klebsiella pneumoniae*
0/10	*Pasturella multocida*
0/10	*Pseudomonas aeruginosa*
0/10	*Streptococcus pneumoniae*

*Number of positive cultures/number cultured

Serology: Rat

0/10 *	*Mycoplasma pulmonis*
0/10	Sendai virus
0/10	Pneumonia virus of mice
0/10	RCV/SDAV
0/10	KRV/H1

*Number of positive tests/number tested

Histopathology

1/10 *	Liver	Rare to occasional small focus of inflammation in hepatic parenchyma(#1)
1/10	Heart	Moderate focus of myocarditis(#3)

ENW 52777 p.7

1/10	Lung	Focal area with perivascular cuffing with PMN's(#4)
1/10	Lung	Occasional paravascular aggregate of mixed inflammatory cells(#5)
3/10	Liver	Rare tiny focus of inflammation in hepatic parenchyma(#5,7,10)

*Number affected/number examined

Correlation/Summary

The Group G Streptococcus has been found previously in rats from R01. We have reported this to Charles River. They have seen no evidence of significant infection associated with this organism nor have we. The microscopic lesions are of no particular concern but since some focal inflammation was seen, ten additional rats will be evaluated to assure that there has been no progression of lesions. The follow-up will include culture and serology. Rats are not to be released from quarantine until the follow-up is completed.

Released for Study on 10/16/87.

A E Daniel 10/23/87
Technologist

[signature] 10/23/87
Veterinarian

ARC RODENT HEALTH SCREEN REPORT

Investigator: Mast
Study: IRT-Acetone
Building: LSL II
Room: 433
Date initiated: 10/26/87

Lab no: P-160
Animal/Shipment no: 870074/870075
Date rc'd: 9/22/87
Source: CR Raleigh
870074 - R04
870075 - R01
Species/Strain: Rat/CD
Sex: 870074 - M
870075 - F
Age: BD 7/23/87

Status: Received ten rats (#1-5, males; #6-10, females) for follow-up health screen of P-153

Serology: Rat

0/10 *	*Mycoplasma pulmonis*
0/10	Sendai virus
0/10	Pneumonia virus of mice
0/10	RCV/SDAV
0/10	KRV/H1

*Number of positive tests/number tested

Nasopharyngeal culture

2/10 *	Beta hemolytic Streptococcus, Group Gy (#8,9)
0/10	*Bordetella bronchiseptica*
0/10	*Citrobacter freundii*
8/10	Coagulase positive Staphylococcus (#1,2,3,5,7,8,9,10)
0/10	*Klebsiella oxytoca*
0/10	*Klebsiella pneumoniae*
0/10	*Pasturella multocida*
0/10	*Pseudomonas aeruginosa*
0/10	*Streptococcus pneumoniae*

*Number of positive cultures/number cultured

Histopathology

2/10 *	Hard. gl. Rare tiny focus of inflammation (#1,6)

5/10	Liver	Rare to occasional tiny focus of inflammation in hepatic parenchyma (#1,2,3,5,6)
1/10	Heart	Rare tiny focus of inflammation in myocardium (#1)
3/10	Lung	Occasional tiny subpleural focus of inflammation (#2,4,10)
2/10	Kidney	Rare tiny focus of inflammation in interstitium (#2,5)
1/10	Subman. Lymph node	Slight to moderate hyperplasia (#6)

*Number affected/number examined

Correlation/Summary

A few incidental microscopic lesions were seen in these rats. The distribution and severity are similar to that found in the first rats examined from this group (P-153). Since there has been no significant progression of the lesions seen previously and since serologic tests for antibodies to common pathogens remain negative, these lesions are not considered to be an indication of significant infection or disease.

On the same day that this health screen was initiated (10/26/87), a few female rats assigned to this study were noted to be making poor weight gains (or to have weight losses). S.E.Rowe examined these animals on 10/27 p.m. and again on 10/28 a.m. Some of those with the poor weight gains resisted handling while the normal weight gain rats were easy to handle. Except for being underweight and having somewhat roughened hair coats, no physical abnormalities were found in the poor weight gain rats. A pathological evaluation will be made of a few of these animals at terminal sacrifice.

Dr. Tom Davis from Charles River was contacted about the weight/handling problem as well as the incidental lesions. He reported no knowledge of any disease or behavioral problem in either Raleigh R01 or R04 but is to check further and call back.

These animals will be held in quarantine status for the duration of the study. This is a precautionary measure which should not impact on the cost of running the study.

D.E.Garrell 11/2/87
Technologist

[signature] 11/2/87
Veterinarian

BNW 52447 p 15

ARC RODENT HEALTH SCREEN REPORT

Investigator: Mast
Study: IRT-Acetone
Building: LSL II
Room: 433
Date initiated: 10/29/87

Lab no: P-165
Animal/Shipment no: 870074/ 870075
Date rc'd: 9/22/87
Source: CR Raleigh
870074 - R04
870075 - R01
Species/Strain: Rat/CD
Sex: 870074 - M
870075 - F
Age: BD 7/23/87

Status: Seven anal tape preps were taken from rats in the 440 ppm chamber and three from the control chamber to examine for pinworm ova.

Endoparasite/Ectoparasite exam

0/10 * Anal tape preps for pinworm ova

*Number positive/number examined

Comments/Summary

No ova were found. If any pinworms are present in these animals, they are sexually immature. It is considered unlikely that there has been any exposure to or infection by pinworms in this group of rats.

AE Jarrett 10/30/87
Technologist

11/3/87
Veterinarian

ARC RODENT HEALTH SCREEN REPORT

Investigator: Mast
Study: IRT-Acetone
Building: LSL II
Room: 433
Date initiated: 11/9/87

Lab no: P-168
Animal/Shipment no: 870074/870075
Date rc'd: 9/22/87
Source: CR Raleigh R01
Species/Strain: Rat/CD
Sex: F Age: BD 7/23/87

Status: Received eight rats (Animal #'s 728, 747, 771, 776, 809, 820, 684, and 773) from gestation group A which had shown weight loss prior to exposure. Blood was obtained from all rats with the exception of #728 and 747.

Gross Necropsy

8/8*	Fresh smears of small intestine from the rats were examined and found to contain pear shaped protozoan organisms

*Number positive/number examined

Serology: Rat

0/6 *	*Mycoplasma pulmonis*
0/6	Sendai virus
0/6	Pneumonia virus of mice
0/6	RCV/SDAV
0/6	KRV/H1

*Number of positive tests/number tested

Histopathology

2/8*	Ileum	Severe autolysis
1/8	Salivary gland	Rare small focus of inflammation
2/8	Ileum	Slight to moderate autolysis
2/8	Jejunum	Slight to moderate autolysis
1/8	Ocular muscles	Severe subchronic myositis
2/8	Hard.gl.	Subchronic inflammation in large focal area of gland on side where ocular myositis is present

1/8	Ocular muscles	Slight to moderate focal hemorrhage and inflammation
1/8	Liver	Slight fatty change having perilobular distribution; some tinctorial change (darker staining hepatocytes) primarily in perilobular areas
1/8	Kidney	Slight autolysis in focal areas of medulla

*Number affected/number examined

Correlation/summary

There was no significant evidence of infectious disease in any of the animals examined nor were there any findings which would explain an earlier weight loss. Some unidentified protozoan organisms (possibly Tritrichomonas muris) were found on direct smears from small intestines but these were not associated with any lesions. There was evidence of trauma to the ocular muscles and Harderian gland in the two rats of the group which were retro-orbitally bled (#684, 773). Rat #773 had slight focal hepatocellular fatty changes which were presumably caused by exposure to acetone. These rats were not evaluated critically for lesions caused by acetone toxicity.

A E Carsell 12/1/87
Technologist

Stephen E Brown 12/1/87
Veterinarian

Mast
Brown

BNW 52447 p.33

ARC RODENT HEALTH SCREEN REPORT

Investigator: Mast
Study: IRT-Acetone
Building: LSL II
Room: 433
Date initiated: 11/11/87

Lab no: P-170
Animal/Shipment no: 870074/ 870075
Date rc'd: 9/22/87
Source: CR Raleigh R01
Species/Strain: Rat/CD
Sex: F Age: BD 7/23/87

<u>Status</u>: Received five rat blood specimens for terminal sacrifice serology (Animal #694, 697, 706, 738, and 818)

<u>Serology</u>: Rat

0/5 *	*Mycoplasma pulmonis*
0/5	Sendai virus
0/5	Pneumonia virus of mice
0/5	RCV/SDAV
0/5	KRV/H1

*Number of positive tests/number tested

<u>Correlation/Summary</u>

There was no serological evidence of infection by any of the above named organisms in any of the five rats tested.

A E Ganell 11/30/87
Technologist

[signature] 11/20/87
Veterinarian

ARC RODENT HEALTH SCREEN REPORT

Investigator: Mast
Study: IRT - Acetone
Building: LSL II
Room: 433
Date initiated: 11/12/87

Lab no: P-171
Animal/Shipment no: 870075
Date rc'd: 9/22/87
Source: CR Raleigh R01
Species/Strain: Rat/CD
Sex: F Age: BD 7/23/87

Status: Received five rat carcasses and blood specimens from gestation group D, a group that appeared to have normal weight gain, for comparison with P-168

Gross Necropsy
No significant lesions

Endoparasite/Ectoparasite exam

5/5 *	Intestinal protozoans

*Number positive/number examined

Serology: Rat

0/5 *	*Mycoplasma pulmonis*
0/5	Sendai virus
0/5	Pneumonia virus of mice
0/5	RCV/SDAV
0/5	KRV/H1

*Number of positive tests/number tested

Histopathology

5/5 *	Ileum	Slight to moderate autolysis
4/5	Colon	Slight to moderate autolysis
3/5	Jejunum	Slight to moderate autolysis
1/5	Jejunum	Severe autolysis

*Number affected/number examined

Correlation/Summary

No significant lesions or other significant evidence of infectious disease were found in these rats. The intestinal protozoans seen were not identified (possibly _Tritrichomonas muris_). Although evaluation of their significance was obscured by the autolysis present in intestinal sections from these rats, no lesions or evidence of invasion of the mucosa were seen in other Acetone Study rats with the same organisms. Tissues from these rats were not evaluated critically for acetone toxicity.

12/1/87
Technologist

12/1/87
Veterinarian

Mast
Brown

ARC RODENT HEALTH SCREEN REPORT

Investigator: Mast
Study: IRT-Acetone
Building: LSL II
Room: 433
Date initiated: 11/12/87

Lab no: P-172
Animal/Shipment no: 870074/870075
Date rc'd: 9/22/87
Source: CR Raleigh R01
Species/Strain: Rat/CD
Sex: F Age: BD 7/23/87

Status: Received five rat blood specimens for terminal sacrifice serology (Animal #742, 782, 661, 703, 701)

Serology: Rat

0/5	*	Mycoplasma pulmonis
0/5		Sendai virus
0/5		Pneumonia virus of mice
0/5		RCV/SDAV
0/5		KRV/H1

*Number of positive tests/number tested

Correlation/Summary

There was no serological evidence of infection by any of the above named organisms in any of the five rats tested.

[signature] 11/20/87
Technologist

[signature] 11/20/87
Veterinarian

ARC RODENT HEALTH SCREEN REPORT

Investigator: Mast
Study: IRT Acetone
Building: LSL II
Room: 433
Date initiated: 11/30/87

Lab no: P-183
Animal/Shipment: 880016 (880013 corrected: typographical error 2/22/88)
880017
Date rc'd: 880016-11/2/87
880017-11/3/87
Source: CR R03(880016) & CR P08(880017)
Species/Strain: Mouse/CD1
Sex: M(880016), F(880017)
Age: BD 9/10/87

Status: Received ten mice (5 male.#1-5; 5F, #6-10) for follow up health screen on P-180

Gross Necropsy

1/10*	Abdominal viscera	Pale yellow 3mm diameter thick walled mass; contains caseous material in center; located 6cm anterior to ileal-cecal junction; fibrous adhesions in the area connecting the mass to the median lobe of liver and duodenum; culture done (#10)

*Number affected/number examined

Histopathology

1/10*	Liver	Occasional small focus of inflammation adjacent to central veins and other blood vessels within the hepatic parenchyma (#7)
1/10	Liver	Rare tiny paravascular focus of inflammation (#9)
1/10	Kidney	Small focus of slight inflammation in kidney capsule (#10)
1/10	Spleen	Diffuse increase in number of PMN's present (#10)
1/10	Liver	There is focal inflammation in the liver capsule in one of 4 sections presented on slide #10. There is also inflammation around main bile ducts attached to this section of liver (#10). These are presumably related to the lesion described below.
1/10	Lesion	The abscess described grossly is firmly adhered to a wide area of the wall of the

duodenum on one side and extends into liver on the other. There is slight to moderate inflammation in the submucosa of duodenum adjacent to the abscess.

*Number affectei/number examined

Culture results:

Abscess culture

Direct smear: NOS

Culture: Beta hemolytic coagulase positive Staphyococcus sp. from broth subculture only

Liver cultures

1/10* No growth on direct plating. Growth of a gram positive rod (probable lactobacillus sp.) from the broth subculture of mouse #9.

*Number cultured/number of positive cultures

Serology: Mouse

0/10*	Sendai virus
0/10	Pneumonia virus of mice
0/10	Mouse hepatitis virus
0/10	GD VII virus

*Number of positive tests/number tested

Correlation/Summary

One mouse had liver lesions similar to those described in P-180. Another had a small abscess which involved but probably did not originate in liver. Staphylococcus aureus, recovered from the abscess, is an opportunistic organism commonly found in barrier reared rodents. Neither its presence nor that of the isolate recovered from the liver of #9 are considered to be of significance to the health of the group. Although the etiology of the liver lesions was not determined, they are not of the type or severity which would be expected to significantly impact the results of this study.

Released for Study on 12/2/87 .

A E Cancel 12/15/87
Technologist

Stephen E [signature] 12/15/87
Veterinarian

Mast
Everett
Brown

ARC RODENT HEALTH SCREEN REPORT

Investigator: Mast
Study: IRT Acetone
Building: LSL II
Room: 436
Date initiated: 12/14/87

Lab no: P-194
Animal/Shipment: 880017
Date rc'd: 11/3/87
Source: CR P08
Species/Strain: Mouse/CD1
Sex: F Age: BD 9/10/87

<u>Status</u>: Ten mouse blood samples submitted for terminal sacrifice serology (#1011, 1123, 1131, 1118, 1158, 1070, 1006, 1157, 1064, 1048)

<u>Serology</u>: Mouse

0/10 *	*Mycoplasma pulmonis*
0/10	Sendai virus
0/10	Pneumonia virus of mice
0/10	Mouse hepatitis virus
0/10	GD VII virus

*Number of positive tests/number tested

<u>Correlation/Summary</u>

The 10 sera submitted were negative for antibodies to those common rodent pathogens listed above. This is good evidence that no study animals were infected by any of these pathogens.

ACConnell 12/16/87
Technologist

[signature] 12/16/87
Veterinarian

Mast
Evanoff
Brown

APPENDIX E

QUALITY ASSURANCE STATEMENT

TERATOLOGY STUDY OF ACETONE IN MICE AND RATS

Quality Assurance Statement

Listed below are the phases and/or procedures included in the study described in this report which were reviewed by the Quality Assurance Unit during the period, 9/15/87 - 1/30/88, or specifically for this study and the dates the reviews were performed and findings reported to management. (All findings were reported to the study director or his designee at the time of the review.)

Phase/Procedure Reviewed	Review Date	Date Findings Submitted in Writing to Study Director/Management
Animal Receipt	9/22/87*	9/22/87
Animal Identification	10/06/87	10/06/87
Health Screen	10/12/87*	10/13/87
Body Weights	10/19 & 22/87	10/24/87
Animal Receipt	11/03/87*	11/06/87
Dosing	11/05/87*	11/09/87
Data	12/07/87*	1/05/88
Plasma Analysis	11/04/87*	1/11/88
Necropsy	11/13 & 12/16/87*	1/12/88
Health Screen	11/23/87*	1/12/88
Dosing	12/13/87*	1/12/88
Data	1/13 & 5/31/88*	6/20/88
Data	1/15/88*	5/03/88
Data	1/20-21/88*	3/08/88
Data	3/15-17/88*	3/29/88
Final Report	11/15-18/88*	11/21/88

*Reviewed specifically for this study.

R. L. Gelman
Quality Assurance Specialist

11/22/88
Date

APPENDIX F

PROTOCOL AND CAGE MAPS

STUDY PROTOCOL

Inhalation Teratology Study of Acetone

in Mice and Rats

Submitted to:

Dr. Bernard Schwetz
Dr. Richard Morrissey
National Toxicology Program
National Institute Environmental Health Sciences
Research Triangle Park, NC

Submitted by:

Dr. Terryl J. Mast
Battelle - Pacific Northwest Laboratory
Richland, WA 99352

September 14, 1987

October 15, 1987 - Revision A

[&A] Changed 10/15/87 by Revision A.
[+A] Added 10/15/87 by Revision A.

INHALATION REPRODUCTIVE TOXICOLOGY STUDY PROTOCOL

ACETONE

I. TITLE: Teratology Study of Acetone in Mice and Rats

II. INTRODUCTION

Acetone, an aliphatic ketone, is a ubiquitous industrial solvent and chemical intermediate, consequently, the opportunity for human exposure is high. Acetone production in the United States alone reached nearly one million metric tons in 1974 and world manufacturing capacity was predicted to be greater than 3 million metric tons per year by 1980 (Nelson and Webb 1978). The primary use for acetone is in the synthesis of methacrylates, followed by use as a multi-purpose solvent and chemical intermediate. The combination of its high volatility (bp 56.2 °C) and extensive use creates a significant possibility for human exposure to acetone via inhalation, especially in the industrial environment. Acetone is also present in many hazardous waste sites and may reach the groundwater.

The National Institute of Occupational Safety and Health (NIOSH 1978) recommends an exposure limit of 250 ppm (590 mg/m^3) for acetone. The OSHA standard for acetone is 1000 ppm averaged over an 8-h work shift. The American Conference of Governmental Industrial Hygienists (ACGIH 1980) recommends a threshold limit value time-weighted average (TLV-TWA) of 750 ppm (1,780 mg/m^3) over each 8-h period of a 40-h work week, and a short term exposure limit (STEL) of 1000 ppm (2,375 mg/m^3) for 15 minutes. The odor threshold is reported to be between 200 and 400 ppm.

Acetone is considered to be one of the least toxic organic solvents used in industry, both in terms of acute and of chronic toxicity. The inhaled vapor is absorbed into the blood stream, and is present in expired air and urine, as the parent compound and/or metabolites. Although no permanent effects have been observed from short-term exposures to low concentrations of acetone vapors (≈1000 ppm), subjects exposed to these levels have complained of slight eye, nose, and throat irritation. Inhalation of vapors at higher concentrations (in excess of 10,000 ppm) is likely to produce central nervous system depression and narcosis (Clayton and Clayton 1982). Prolonged or repeated skin contact with the liquid may cause dryness or defatting of the skin followed by erythema and dermatitis. It has been reported that only a small amount of acetone is absorbed through the intact skin (Reynolds and Prasad 1982). However, these results are in contrast to those of another study where Fukabori et al. (1979) applied acetone to the skin and subsequently detected elevated concentrations of acetone in the blood, alveolar air and urine. The skin penetration of acetone was rapid and absorption of acetone increased directly with the frequency and the extent of exposure. No chronic toxicity has been reported for acetone in the literature, although exposure to acetone coincident with chlorinated hydrocarbons has been shown to potentiate the hepatotoxicity of the latter (Traiger and Plaa 1972; and others).

Studies in experimental animals have shown that exposure to an acetone concentration of 52,200 ppm for 1 h produced narcosis in rats, and that exposure to 126,000 ppm for 1 h was fatal (Rowe 1963). The minimum lethal concentration for rats exposed to acetone vapors has been reported as 16,000 ppm for a 4 h exposure (Smyth et al. 1962), and 46,000 ppm for mice exposed for 1 h (Flury and Wirth 1934). Another report gave the minimum lethal concentration for rats as 126,000 ppm following a 2-h exposure period (Verschueren 1977). Rats exposed to 3,000, 6,000, 12,000, and 16,000 ppm of acetone, 4 h/day for 10 days, showed some behavioral changes, particularly at the higher levels, e.g., the inability to climb a pole within 2 seconds of receiving a stimulus (Goldberg et al. 1964). Tolerance developed after additional exposures. Rats exposed to 19,000 ppm of acetone 3 h/day, 5 days/week for 8 weeks, and sacrificed at 2, 4, 8, 10 weeks of exposure exhibited no evidence of toxic effects (Bruckner and Peterson 1981b). The 3-h LC_{50} in rats was determined to be 55,700 ppm, approximately 6.5 times that of toluene (Bruckner et al. 1981a).

Male volunteers exposed to either 300 or 500 ppm acetone under various regimens of exercise and rest demonstrated that about 45% of the acetone administered was absorbed regardless of state of exercise or exposure concentration (Wigeaus et al. 1981). There was no sign of attainment of an equilibrium between blood, alveolar air, and inspired air. The half-life of acetone in alveolar air, arterial blood, and venous blood in the human was 4.3 ± 1.1 h, 3.9 ± 0.7 h, and 6.1 ± 0.7 h, respectively.

In another study, male volunteers were exposed to 100 or 500 ppm acetone vapor for 2- or 4-h periods (DiVincenzo et al. 1973). Exposure to the vapor caused no untoward effects, nor any changes in clinical chemistry or hematological values in the human subjects. Not surprisingly, exercise during exposure increased the amount of acetone absorbed and retained by the subject. Body burdens of acetone in this, as in the previously mentioned study, were not observed to approach steady state concentrations. Disappearance of acetone from blood appears to follow zero-order kinetics, i.e. the decline rate is not concentration dependent.

Subchronic exposure of rats to 19,000 ppm acetone, 3 h/day, 5 day/wk, 8 weeks did not result in any statistically significant changes in the clinical chemistry parameters monitored, in gross pathology or histopathology, or in body weight gain over the course of the study (Bruckner and Peterson, 1981b . There was a slight elevation in serum glutamic-oxaloacetic transaminase (SGOT) levels in acetone-exposed animals at 2, 4, and 8 weeks; however, lactate dehydrogenase (LDH) and blood urea nitrogen (BUN) levels were not significantly affected at any time during the study. Liver specimens showed little sign of lipid vacuolation and liver triglyceride levels were not different from controls. Body weight gain in acetone-exposed rats was slightly reduced as compared to controls, but the difference was not statistically significant. Brain and kidney weights were also reduced in animals with lowered body weights, however, liver weights remained comparable to controls. This finding is consistent with the known ability of acetone to induce the hepatic mixed-function oxidase system. [No female animals were included in this study.]

The metabolism of acetone was well-characterized by the late 1950's with several groups making significant contributions to the developing body of knowledge (Mourkides et al. 1959; Sakami et al. 1950; Price and Rittenberg 1950; and Rudney 1950). Acetone was shown to be eliminated in expired air, mostly as carbon dioxide, but also as the parent compound if the initial dose exceeded the metabolic capability of the test animal. Excretion of parent and metabolites into the urine was also determined to be a significant route of elimination. Acetone was found to be converted to acetate, formate, and a three-carbon intermediate which entered the glycolytic cycle (later identified as the 1,2-diol), acetoacetic acid, and B-hydroxybutyrate *in vivo*. Administration of ^{14}C-1-acetone in the intact rat demonstrated the utilization of the methyl group in the synthesis of cholesterol and several amino acids, i.e. serine and the methyl groups of choline and methionine (Sakami 1950). Since this author had previously shown the same compounds to contain a methyl group derived from administered formate (Sakami, 1948) it is presumed that at least one metabolic pathway of acetone proceeds via formic acid.

Acetone administered to male rats in drinking water (1% v/v for 5 days) increased plasma free fatty acid concentrations from 408.0 ± 40.9 ueq/l to 473 ± 37.3 ueq/l (Furner et al. 1972). Measurements of hepatic MFO activity demonstrated no difference in the ability of microsomal preparations from treated animals to N-demethylate ethylmorphine; however, the ability of preparations from treated animals to p-hydroxylate aniline or to O-deethylate p-nitroanisole was significantly increased as compared to controls. These changes were similar to MFO activity changes found following starvation and physical stress.

When male Sprague-Dawley rats were exposed to 19,000 ppm acetone for a 3-h period whole brain, liver and blood were found to contain, 2.7 mg/g, 2.5 mg/g, and 3.3 mg/ml, respectively (Bruckner and Peterson 1981b). Although this exposure is higher than would be used in a developmental toxicity study the results demonstrate that acetone is distributed more or less homogeneously in the tissues examined and that blood levels are significant. Since acetone is one of the "ketone bodies" normally found in the blood, levels of this magnitude could result in ketosis and the symptoms concurrent with that metabolic disorder. This is of significant impact where developmental studies are concerned as ketosis is a condition present in *Diabetes mellitus*, a disease suspected of having adverse effects on pregnancy.

The interactions of maternal metabolic disturbances with fetal development are extremely complex as evidenced by the fact that ketonemia during the embryonic period may result in retarded development of the embryo while the same disturbance in late pregnancy results in excessive fetal growth, macrosomia (Freinkel 1985). The latter may be due in part to elevated insulin levels acting through growth factor receptors. Infusion of insulin into fetal baboons *in utero* recreates the metabolic and growth abnormalities typical of infants with diabetic mothers. Ketonemia during pregnancy may also result in alterations in normal development of the central nervous system and causes such abnormalities as open neural tube, faulty neural tube fusion, microcephaly, and pericardial edema. Offspring of diabetic mothers are at an increased risk for all of these defects. Other abnormalities, all associated with the early organogenic period, are also linked to diabetic pregnancies and include transposition of the great vessels and sacral dysgenesis (Gabbe 1977).

Fasting has been shown to produce ketosis in rats during late pregnancy faster than it does in nonpregnant animals and, furthermore, that primiparous rats developed a more severe ketosis after 1 day of fasting than did multiparous dams (Cheng and Yang 1970). Adrenal corticoid secretions were also involved in the metabolic changes which increased the susceptibility to ketosis during pregnancy. Additionally, increased levels of progesterone or estrogen contributed to these changes.

Several *in vitro* studies have been conducted in attempts to determine the teratogenic potential of acetone and have yielded negative results. No evidence of teratogenicity was found when 39 or 78 mg of acetone was injected into the yolk sacs of fertile chick eggs prior to incubation (McLaughlin et al. 1964). DiPaolo et al. (1969) added 0.2 percent acetone to the growth medium of cultured Syrian hamster embryonic cells and detected no evidence of cellular transformation. Guntakatta et al. (1984) assayed acetone for teratogenic potential in an *in vitro* mouse embryo limb bud cell culture system designed to detect perturbations in the synthesis of extracellular matrix components and found no effects attributable to acetone. Acetone was not mutagenic in the Salmonella/microsome test (McCann et al. 1975).

Although these *in vitro* studies did not indicate a significant teratogenic potential for acetone, such studies conducted on another ketone body, β-hydroxybutyrate (β-HB), indicated an involvement in fetal abnormalities. Horton and Sadler (1983) exposed mouse embryos *in vitro* to β-HB, the most common ketone body, at either the 3-4 or 4-5 somite stage. The concentrations of β-HB employed encompassed ketone body levels in blood reported in severe ketosis in the human and ranged from 1-4 mg/ml. Embryos cultured in the presence of β-HB exhibited neural tube defects whose incidence was age- and dose-related with the younger embryos being the more sensitive. The abnormalities were characterized by inhibition or delay of neural tube closure primarily involving the cranial region.

Acetone is listed as causing birth defects (Schardein 1985; Table 21-2, pp. 572-572), however, no reference source for this information is given nor is any specific abnormality mentioned. At a later point (p.650) the same author states that "reports of acetone testing in teratogenesis or reproductive toxicology apparently have not been published." However, this author does refer to a report (Kucera 1968) in which sacral agenesis was associated with a history of exposure of women to fat solvents during pregnancy. The solvents to which these women were exposed included xylene, trichloroethylene, methyl chloride, acetone, and petrol. Another report, by the same author (Kucera and Benasova 1962) was mentioned "in which a case of camptomelic syndrome [*sic*] in an infant was associated with close contact with acetone (and other chemicals) during the fifth to eight gestational weeks of pregnancy."

The only other mention found in the published literature regarding the occupational hazard of acetone exposure to women of child-bearing age was an article translated from the Russian (Nizyayeva 1982 [translator unknown]). The intent of this study was to statistically characterize the reproductive function of female factory workers chronically exposed to acetone at, or slightly above, their equivalent of the TLV, 200 mg/m^3 (85 ppm). They report a statistically significant increase in pregnancies among these workers including an increased threat of abortion ($p<0.001$), toxicoses [*sic*] during the second half of pregnancy ($p<0.02$), and diminished hemoglobin level and hypotension ($p<0.001$). A significant reduction in the birth weight and size of infants of the chemical fiber-factory workers relative to a control group was also reported ($p<0.001$). They viewed these complications of pregnancy as being secondary to changes in general body function, notably "acidosis, disturbed carbohydrate and fat metabolism, and disturbed neuroendocrine regulation." Furthermore, they associated these pathologic conditions directly with exposure to relatively low levels of acetone.

In addition to the human epidemiological data presented by Nizyayeva (1982), an inhalation teratology study was performed in [*rats?*]. Animals were exposed to 30 and 300 mg/m^3 acetone for either 1-13 days of gestation (dg) or 1-20 dg. [Details of the daily duration of exposure were not given.] A statistically significant, but not concentration-related, reduction in the percentage of live embryos was reported for both exposure concentrations in animals exposed from 1-20 dg. Percent embryonal deaths for the control and 30 and 300 mg/m^3 groups were 11.3 ± 1.3, 28.44 ± 5.92, and 23.04 ± 3.8, respectively. Fetal weights were not given. They also reported "disorders of the placental barrier", apparently discerned from morphological changes. This reviewer believes that caution is required when considering the data and results presented in the report of Nizyayeva (1982); however, the toxic effects referred to are consistent with those which could be predicted following exposure to a volatile ketone during pregnancy.

In summary:

- Acetone is a relatively non-toxic solvent whose only established hazard at relatively low exposure levels is its ability to potentiate chlorinated hydrocarbon hepatotoxicity.

- Exposure to relatively high levels of acetone results in an increase in blood ketones and may therefore mimic deleterious effects on pregnancy known to be caused by metabolic ketosis resulting from starvation or *Diabetes mellitus*.

- Acetone has not been shown to exhibit a teratogenic effect *in vitro*; however, other ketone bodies, especially β-hydroxybutyrate have exhibited such a potential.

- Acetone has been indirectly linked to several cases of human teratogenesis and one report presents human epidemiological evidence, as well as experimental evidence, that acetone exposure may have deleterious effects on pregnancy and the offspring (Nizyayeva, 1982).

RECOMMENDATIONS

In light of the known ability of acetone vapors to cause ketosis, the strongly suspected effects of maternal ketosis during pregnancy on the affected offspring, and the ubiquitous nature of acetone, it is recommended that a two-species teratology study be performed on acetone vapors. It is further recommended that maternal organ to body weight ratios for liver, kidney and adrenals be obtained and that maternal urine be monitored for evidence of metabolic imbalance(s) with respect to controls at the time of sacrifice. Results obtained from these studies would aid in establishing hazard of exposure of women of child-bearing age to acetone vapors.

III. SPONSOR AND SPONSOR'S REPRESENTATIVE

A. Sponsor:
National Institute of Environmental Health Sciences
National Toxicology Program (NTP)
P.O. Box 12233;
Research Triangle Park, N.C. 27709

B. Sponsor's Representatives:
Dr. Bernard Schwetz
Dr. Richard Morrissey

IV. TESTING LABORATORY

A. Facility
Battelle - Pacific Northwest Laboratory (PNL)
P.O.Box 999; Richland, Washington 99352

B. Study Director:
Dr. Terryl J. Mast

V. PROPOSED SCHEDULE OF EVENTS **(This proposed schedule may be altered. All changes will be appended to the protocol.)**

	Rats	Mice
A. Animals arrive week of:	9/21/87	11/4/87
B. Identification of females:	10/5/87	11/18/87
C. Health screen :	10/12/87	11/25/87
D. Prestart audit for GLP compliance:	[10/~~12~~16/87]&A	11/25/87
E. Initiate breeding procedures:	[10/~~12~~19/87]&A	11/25/87
F. Initiate exposure :	[10/~~19~~26/87]&A	12/2/87
G. Initiate necropsy:	[11/~~2~~9/87]&A	12/14/87
H. Evaluate fetal specimens:	[11/~~9~~16/87]&A - 1/25/87	

	Combined
I. Submit draft report:	2/15/88
J. Submit final report:	3/28/88

&A Changed 10/15/87 by Revision A.

VI. TEST SYSTEM

A. Species: mouse and rats

B. Strain: Mice: CrI:CD-1(ICR)BR; rats: Sprague-Dawley [CrI:CD(SD)BR]

C. Number of Animals and Supplier: Charles River Breeding Laboratories, Raleigh, NC.

Mice:	85 males
	310 females
Rats:	55 males
	245 females

D. Age of Animals Upon Arrival:

Mice:	7-8 weeks
Rats:	8-9 weeks

E. Experimental Animals (Females): 40 virgin female mice or rats will be randomly selected and assigned to four dose groups (10/group) from the total female pool (ØB-DT-3BØB). The remaining females will be mated by placing at least two females with one male overnight in a breeding cage (ØB-DT-3BØD). Nine AM of the day that copulation is established will be designated as 0 dg (ØB-DT-3BØD).

F. Number of Animals in Study: A minimum of 33 plug-positive female mice or [~~30~~37][&A] sperm-positive rats (to obtain [~~20~~25][&A] pregnant [~~females~~ rats and 20 pregnant mice][&A]) will comprise each of the four treatment groups; the minimum number of mated females to be exposed will be 132 mice or [~~120~~148][&A] rats. There will also be 10 virgins (females) of each species per exposure level.

VII. EXPERIMENTAL DESIGN AND DOSE LEVELS

A. Experimental Design: Four groups of mated female mice will be exposed to the test chemical on 12 consecutive days (6 dg - 17 dg). The animals will be necropsied on 18 dg for maternal and fetal evaluations.

Four groups of mated female rats will be exposed to the test chemical on 14 consecutive days (6-19 dg). The rats will be necropsied on 20 dg for maternal and fetal evaluations.

In addition, 10 virgin females of each species will be added to each exposure group for the purpose of obtaining ovaries to be used for quantitative ovarian follicle counts. These animals will be exposed concurrently with the mated females and sacrificed immediately after the last exposure period.

[&A] Changed 10/15/87 by Revision A.

B. Exposure Regimen: Chamber atmospheric concentrations of acetone will be 0 (filtered air), 440, 2200, and 11,000 ppm. Plug-positive and virgin mice will be exposed for 6 hrs/day for 12 consecutive days (6 dg - 17 dg); sperm-positive and virgin rats for 14 consecutive days (6 dg - 19 dg), 6 hr/day. The exposure chamber doors will be closed throughout the exposure and non-exposure periods, except during animal care procedures. Exposure chamber temperatures will be maintained at 75 ± 3°F and relative humidities at 55 ± 15%. Air flow will be maintained at 15±3 cfm and the chamber pressure at approximately 1" water negative with respect to room pressure.

C. Selection of Atmospheric Concentrations: Exposure chamber concentrations are based partly on information obtained from previously published reports on inhalation toxicology studies of acetone and partly on safety considerations. Safety considerations limit the maximum exposure concentration to 50% of the lower explosion limit (≈22,000 ppm) which is 11,000 ppm.

[D. Measurement of Ketone Body Levels in Plasma: Ketone body levels in rat plasma (acetone, acetoacetate, and β-hydroxybutyrate) will be monitored three times during gestation--7, 14, and 19 dg. Seven of the 35 sperm-positive rats in each exposure group will be selected for this task. These animals will not be used in the teratology evaluations due to the added stress of blood collection during pregnancy.][+A]

VIII. TEST SYSTEM HOUSING, HANDLING AND ENVIRONMENTAL CONDITIONS

A. Quarantine and Acclimatization (ØB-AR-3FØ3)

1. Animal shipping crates will be examined upon arrival for evidence of conditions likely to permit exposure to pathogens (soiled, wet or otherwise damaged).

2. The uncrating will be conducted at the door of the quarantine room. While being removed from the crates the animals will be examined for evidence of shipping stress.

3. The animals will be quarantined and acclimatized in the LSL-II Building for 3-4 weeks prior to the start of the study.

4. During part of the quarantine/acclimatization period the animals will be housed by sex, approximately 10 mice or 5 rats per cage in wire cages on flush racks. The cage space will meet the requirements stated in the NIH "Guide for Care and Use of Laboratory Animals".

5. During the breeding period the animals will be housed in the quarantine room.

6. Plug-positive mice or sperm-positive rats will be acclimated from 0 dg in individual compartments of wire-mesh cages within exposure chambers (with chamber doors open). Virgin females will be acclimated for approximately 1 week prior to exposure under the same conditions.

[+A] Added 10/15/87 by Revision A.

7. Room temperature during the acclimatization and exposure periods will be maintained at 72±3° F and relative humidity at 50±15%. These measurements will be recorded at least twice daily.

8. Twelve hours light and twelve hours dark will be maintained with light starting at 0600.

9. Five male and five female animals will be randomly selected for pre-exposure health screening (ØB-AR-3FØ2). They will be examined by gross necropsy, histopathology and nasopharyngeal culture for evidence of disease and the presence of potentially pathogenic organisms.

10. The clinical veterinarian will make a visual inspection of the animals to be used in the study just prior to their release for the study (documented on the last quarantine/ acclimatization record).

11. As an added screen for viral infection, 5 animals from the control group and 5 animals from the highest dose group will be tested promptly after sacrifice at BNW for viral pathogens (ØB-AR-3B1R).

12. Females not selected for the study or health screen will be discarded during the first exposure week. The disposition of these females will be recorded on the Animal Disposition Record and retained in the study files (ØB-AR-3FØ3). Males, (they are not individually identified) will also be discarded.

B. Feed (ØB-AR-3FØ5)

1. NTP pre-approved NIH-07 Open Formula Diet (pellets) from Ziegler Bros., Inc., Gardner, PA will be used during the quarantine/acclimatization periods and throughout the duration of the experiment.

2. Feed will be provided ad libitum in slot feeders during the experiment, except during exposure hours.

C. Water

1. Fresh softened water (ion exchange softener, Illinois Water Treatment Company, Model 2R-2240, Rockford, IL) will be supplied ad libitum at all times. The hardness of the water will be checked approximately once every week. Records will be retained in the LSL-II Building Engineer's office.

2. The automatic watering system (Edstrom Industries, Waterford, WI) will be used for the quarantine/acclimatization period and throughout the duration of the study.

3. A representative sample of animal drinking water from one of the NTP study rooms will be analyzed for contaminants at least once each calendar year.

D. Randomization: Virgin females will be randomly chosen from the pool of female animals based on the first body weight (taken at the time of eartagging). During the week prior to the start of exposure virgins will be weighed and randomly assigned to a treatment group by means of a computer-assisted randomization program which is based on a single blocking factor, body weight (ØB-DT-3BØB).

[~~On the day of plug or sperm detection (0 dg), the mated animals will be weighed and assigned to dose groups as described above.~~ On the day of plug or sperm detection (0 dg), the mated animals will be weighed. Seven animals will be randomaly selected, designated for blood collection, and assigned to a specific exposure group (For example, animals from the first day of breeding, Ges Grp A, will be assigned to Exposure Group 1, etc.). The remaining sperm-positive animals in each gestation group will be randomly assigned to exposure groups as described above.]&A

&A Changed 10/15/87 by Revision A.

E. Identification:

1. All female animals will be individually identified by metal ear tags during the first weighing session (ØB-DT-3FØC)

2. Cage maps (ØB-DT-3BØ3) showing placement of individual animals in each cage unit of the exposure chamber will be prepared and updated as needed. Each exposure chamber will be identified by chamber number and exposure level. The proposed arrangement of the exposure chambers is included in Figure 1.

IX. TEST ARTICLE

A. Chemical name: acetone

B. Formula: C_3H_6O

C. CAS No.: 67-64-1

D. Manufacturer: Ashland Chemical Co.
P.O. Box 2219
Columbus, OH 43216

E. BNW LOT No.: 52446-6-(1 - 10)
RTI No.: 5597-66-23; Manufactures Lot No: 061887E (Additional test material from this lot will be received during the study in 55-gallon drums.

F. The vehicle control will be filtered air.

G. Storage conditions: A ready reserve is maintained in a flammable storage cabinet at room temperature in the LSL-II Building. The remaining inventory is stored at or below 75°F in a chemical storage facility adjacent to the LSL-II. The bulk test material is maintained in 55-gallon metal drums with a nitrogen headspace.

BNW Lot No. 52466-6-(1 - 10) consisted of 10 one-gallon glass bottles. This shipment will be used for test generation purposes.

H. Analytical Chemistry

1. Upon receipt, identity and gross purity analyses of the bulk chemical will be performed by infrared spectroscopy. Bulk purity is periodically determined using gas chromatography.

2. Acetone concentrations within the exposure chambers will be monitored using an HP-5840 gas chromatographic system. Details of the calibration method are given in Attachment 2.

I. Analysis Schedule

1. Purity analysis will be performed on the bulk chemical upon receipt, and will be performed once between mice and rat studies.

X. DESCRIPTION OF INHALATION EXPOSURE SYSTEM

The inhalation chambers will be located in room 436 of the LSL-II building. A detailed description of the inhalation exposure system to be used in this study is included in Attachment 2 of this protocol. The location of the exposure room and chamber layout are shown in Figure 1.

A. Environmental Monitoring

1. Air filtration: HEPA and charcoal filters will be used for intake air, and a HEPA filter will be used for exhaust air.

2. Temperatures will be monitored by RTDs multiplexed to a digital thermometer with computer data acquisition at approximately 4-hour cycles for 24 hours per day. The control range is 75±3° F with critical limits, <70 or >80° F. Any chamber temperature excursion beyond the critical limits will be recorded and alarmed automatically.

3. Relative humidity will be monitored by a single dew point hygrometer in conjunction with a multiplexed sampling system with computer data acquisition at approximately 4-hour cycles, 24 hours per day. The control range is 55±15% with critical limits of <35% or >75%. Any relative humidity excursion beyond the critical limits will be recorded and alarmed automatically.

4. Chamber air flow will be monitored at an exhaust orifice using a multiplexed Validyne pressure transducer system with computer data acquisition at approximately 4-hour cycles, 24 hours per day. The control range is 15±3 air changes/hour (=15±3 CFM) with critical limits of <10 CFM or >20 CFM. Any chamber flow excursion beyond critical limits will be recorded and alarmed automatically. A critically low flow will result in automatic termination of the exposure. Acetone concentrations in the chambers will be controlled primarily by the adjustment of chamber air flow.

5. Chamber vacuum will be monitored using a multiplexed Validyne pressure transducer system with computer data acquisition at approximately 4-hour cycles, 24 hours per day. The control range is -0.2 to -2.0 inches of water pressure with critical limits set at the same values. Any chamber vacuum excursion beyond the critical limits will be recorded and alarmed automatically. If chamber vacuum exceeds the limits of -0.2 inch of water, the exposure will be automatically terminated.

6. Uniformity of the concentration of the test chemical in each of the chambers will be determined during the development of exposure generation without animals. Chamber uniformity will be verified within the first week of the rat teratology study and again within the first week of the mouse study. A between port and within port variability of ≤ 5% RSD will be considered acceptable.

7. The exposure chambers test chemical buildup and decay time will be determined prior to start of the study to determine the T_{90} value.

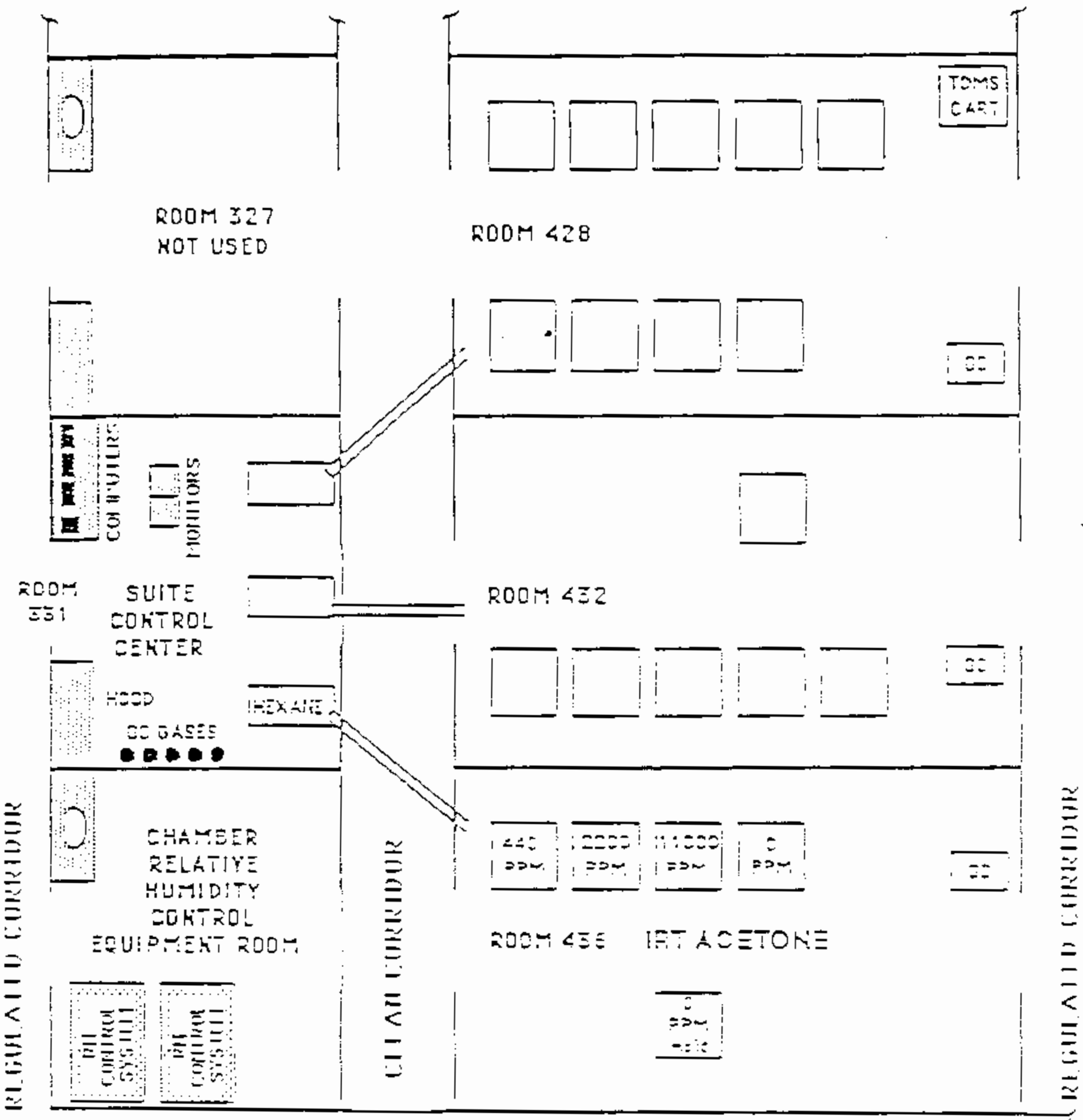


Figure 1. Layout of exposure room and exposure chambers for Acetone.

These curves will be verified within the first week of the rat study and again within the first week of the mouse study.

8. Prior to the start of the study and once in the high level chamber during the rat study, samples will be taken from all chambers using a Gardner condensation nuclei counter to assure that the vapor generation does not produce an aerosol of acetone.

9. A study of test material stability in the exposure chambers and in the generator reservoir will conducted during the developmental work without animals in the chambers and once during the first week of the mouse exposures. The chamber samples will be taken from the high and low dose chambers during the last hour of exposure. A generator reservoir sample will be taken at the end of an exposure day.

B. Effluent Treatment

Chamber exhaust will be diluted to comply with applicable State and Federal Regulations prior to release from the building exhaust stack.

XI. EXPERIMENTAL OBSERVATIONS

A. Clinical Observations: The animals will be observed daily for mortality, morbidity, and signs of toxicity (ØB-DT-3BØ3). The date and time of death or euthanasia of moribund animals will be recorded and the animals will be necropsied according to (ØB-DT-3BØF).

B. Body Weights: All females will be weighed prior to mating. Plug-positive mice will be weighed on 0, 6, 9, 12, 15, and 18 dg (ØB-DT-3BØC). Sperm-positive rats will be weighed on 0, 6, 10, 14, 17, and 20 dg. Virgin females will be weighed on the 1st, 5th, 10th day of exposure and at sacrifice.

C. Scheduled Necropsy: The mice are scheduled to be euthanized with CO_2 on 18 dg and the rats on 20 dg. At necropsy (ØB-DT-3BØG) maternal animals will be weighed and examined for gross tissue abnormalities. Maternal liver, adrenal, and kidney weights will be obtained at the time of sacrifice. A maternal urine sample will be applied to a urine dip-stick and values for pH, protein, glucose, ketones, bilirubin, blood, and urobilinogen and compared to the test color chart on the dip-stick container and recorded. In order to document the presence of lesions which may be due to chemical exposure, any organs or tissues with lesions will be preserved in neutral buffered formalin (NBF); in this case, comparable organs or tissues from approximately 20% of the control animals will be preserved in NBF; all other tissues will be discarded.

The uterus will be removed and weighed, and the number, position and status of implants will be recorded. The placentas will be examined. Any apparently non-gravid uteri will be stained with 10% ammonium sulfide to detect implantation sites. The identity of live fetuses (by study, dam number and uterine position) will be retained throughout all examinations and archiving. Live fetuses will be examined for gross defects and weighed. A complete visceral examination will be performed on 50% of all fetuses and on any fetuses with gross abnormalities. (ØB-DT-3BØG) Sex will be determined on all fetuses by internal examination. All skeletons will be double-stained and examined for cartilage formation and centers of ossification (ØB-DT-3BØG); however, ≈50% of these will have had their heads removed. These fetal heads will be examined by razor-blade sectioning fixation in Bouin's fluid (Wilson, 1965; [ØB-DT-3BØI]). Records of morphologic lesions observed in gross and visceral examinations will include photographs (ØB-DT-3BØJ) of representative lesions.

Both ovaries from the virgin females and one ovary from each of the pregnant females will be collected at the time of sacrifice. (ØB-DT-3BØG). Collected ovaries will be fixed for 24 hr in Bouin's fluid then transferred to 70% ethanol and sent to Dr. Donald Mattison at the National Center for Toxicological Research for sectioning and quantitative follicle counts.

[Ca. <u>Measurement of Ketone Bodies in Rat Plasma</u>: Plasma will be collected from seven animals in each of the four exposure groups on the 7, 14, and 19^{th} day of gestation and analyzed for ketone body levels (acetone, acetoacetate, and β-hydroxybutyrate). The same seven animals in each exposure group will be used for this purpose throughout the study. At the time of sacrifice these animals will be weighed, their gestational status recorded, uterine and fetal weights obtained and the status of the fetuses recorded. These fetuses will not be subject to a teratological evaluation except for a gross examination.

Blood will be collected from specified animals into heparinized vacuum tubes 30 minutes post-exposure on each of the designated gestation days and again one hour prior to the start of exposure on the following day. Plasma will be collected following centrifugation at 4°F. Three 125-ul will be placed in each of three headspace-analysis vials, one for each of the three ketone bodies. Plasma samples will be subjected to headspace analysis by gas chromatography according to the methods of Lopez-Soriano and Argiles (1985). Briefly, free acetone will be determined after the addition of 0.025 ml of 4N sodium hydroxide to one of the 125-ul aliquots to prevent spontaneous decarboxylation of acetoacetate. The second aliquot will be treated with 0.025 ml of 0.6M perchloric acid to enhance quantitative decarboxylation of acetoacetate to acetone and the third plasma aliquot will be treated with 0.025 ml of an oxidative reagent (0.2M $K_2Cr_2O_7$ in 5M phosphoric acid). The second and third samples will be kept in a 100°C water bath for 90 minutes. The oxidative treatment of the third sample converts all ketone bodies to acetone; thus, β-hydroxybutyrate will be determined by subtracting the amount of acetone and acetoacetate from the value obtained for the total ketone body level. All samples will be quantified by headspace gas chromatographic analysis on a 1/8" o.d. x 10' nickel column loaded with 3% Carbowax 1500 on Chromosorb WAW, 60/80 mesh, operated isothermally at 45°C. The retention time of acetone on this system is ≈1.5 minutes (ØB-AC-3A1M-ØØ).]$^{-A}$

$^{+A}$ Added 10/15/87 by Revision A.

D. Indices of Effects: The following parameters, expressed as mean ± STD, when appropriate, will be computed from data for inseminated animals and their litters and will be presented in the Final Report for each treatment group:

- Number of dead maternal animals, animals removed from the study and reason for removal
- Summary of maternal toxicity, including incidence of changes detected during clinical observations
- Number and percent pregnant
- Maternal body weights:

  Mice on 0, 6, 9, 12, 15 and 18 dg
  Rats on 0, 6, 10, 14, 17, and 20 dg

- Weight of gravid uterus
- Maternal liver, adrenal, and kidney weights
- Maternal urine parameters (dg 20): pH, protein, glucose, ketone, bilirubin, blood, and urobilinogen
- Extragestational weight and weight gain
- Number of implantation sites/litter
- Number of litters with live fetuses
- Number and percent of live fetuses/litter
- Body weight of live fetuses/litter
- Body weight of male and female fetuses/litter
- Sex ratio of fetuses/litter
- Number and percent of early and late resorptions/litter

- Number and percent of non-live/litter (early and late resorptions and dead fetuses)

- Listing of malformations and variations observed in fetuses/litters

- Number and percent of malformed fetuses

- Number and percent of litters with malformed fetuses

[• Ketone body levels in plasma][+A]

XII. PROPOSED STATISTICAL METHODS

The methods proposed for the statistical analyses of representative maternal, reproductive and fetal indices of effects are: summary statistics, N, mean, standard deviation, with accompanying ANOVA based on multiple comparisons where appropriate. Arc sin transformations will be performed on data presented as percent incidence. Further statistical analyses may be performed at discretion of sponsor.

XIII. RECORDS RETENTION

Records that accumulate during the study will be retained at BNW until requested and shipped to NTP archives. Some of these records may be presented as part of the protocol or reports. These will include but not be limited to the following records:

A. Personnel Records

1. List of BNW personnel participating in the study.

2. Name, address, and function of any outside consultant(s)

3. Record of removal of any individual from direct contact of the test system due to illness.

B. Health and Safety Records (original records and five copies of microfiche will be submitted to NTP within approximately two months after the end of each fiscal year). Chemical specific records will be submitted with the study. Facility specific records will be submitted annually.

1. Medical records of all personnel participating in the study. These records will be retained by Hanford Environmental Health Foundation (HEHF), P.O. Box 100, Richland, WA 99352 for a minimum of 40 years. A letter verifying this arrangement will be retained for each test material file.

2. Records and results of any biological monitoring on laboratory personnel (if applicable).

[+A] Added 10/15/87 by Revision A.

3. NTP Health and Safety package for acetone.
4. BNW biohazard protocols and BNW Health and Safety Plan.
5. Chemical specific health and safety training records.

6. Waste disposal records.

7. Respiratory protection program with documentation of user training (specific fit testing if needed) for each type of respirator.

8. Building ventilation system, hoods and exhausting system monitoring records (pertinent to NTP studies).

9. Health and Safety Section of the Monthly Progress Reports.

10. Accident/injury reports for personnel involved in this study.

11. NTP site visit reports, attention items and related correspondence on health and safety.

C. <u>Protocols</u>

1. Approved and dated BNW study protocol.

2. Protocol amendments including NTP technical contract modifications which affect the study.

3. Documentation of any deviation from the protocol.

4. Documenting any unforeseen circumstances that may affect the integrity of the study and corrective actions taken.

D. <u>Test Material Records</u>

1. Test material identity records including manufacturer, quantity, lot number(s), purity grade and date(s), etc.

2. NTP analytical contractor characterization reports.

3. NTP analytical contractor bulk stability reports.

4. NTP analytical contractor shipment records (if available).

5. BNW test chemical receipt records.

6. BNW storage records including storage conditions.

7. BNW bulk analysis and degradation records.

8. BNW method development records.

9. Chemical exposure generation system description and procedures.

10. Chamber concentration monitoring records, including GC tracings.

11. Uniformity (chamber balance) records.

12. Gas chromatograph calibration records.

13. Generation and chamber degradation study records.

14. BNW test material inventory and usage records.

15. Records of shipment to NTP repository of any unused test material.

16. Gas chromatograph maintenance records.

17. Aerosol determination records.

18. Chamber concentration buildup, decay, and overnight monitoring records.

19. Exposure generation operating parameter records.

E. <u>Animal Records - Pretest</u>

1. Animal receiving records including supplier, species, strain, birth week, sex, number of animals for each sex, receiving date and receiving conditions (photocopy of a representative animal shipping crate label).

2. Quarantine and acclimatization records.

3. Pretest health screening records and animal health notebook.

4. Randomization records.

5. Animal identification records.

6. Written release records from clinical veterinarian.

7. Disposal of excess animals.

8. Bedding type.

F. <u>Animal Records - On Test</u>

1. Exposure room location and chamber layout records.

2. Chamber cage map.

3. Cage type, rack type and the rotation scheme during study.

4. Cageboard type.

5. Type of watering system.

6. Body weight records.

7. Daily observation records

8. Clinical signs of toxicity records.

9. Serology data and reports.

10. Pathological specimen inventory records.

G. <u>Feed</u>

1. Feed tags with manufacturer, lot numbers and milling dates.

2. Feed analysis records as provided by NTP analytical contract laboratory.

H. Water

1. Annual water analysis.

2. Weekly water hardness check (records will be maintained in building engineer and/or building manager's office).

I. Quarantine Room, Exposure Room, and Inhalation Exposure Chamber Records

1. Exposure chamber description.

2. Exposure suite control center description.

3. Temperature raw data and daily and monthly summation reports.

4. Relative humidity raw data and daily and monthly summation reports.

5. Air flow raw data and daily and monthly summation reports.

6. Chamber vacuum raw data and daily and monthly summation reports.

7. Exposure system monitors calibration and maintenance records.

8. Description of the lighting system and light/dark regimen.

9. Sanitation procedures and pest control program.

J. All Relevant Correspondence

K. Reports

1. Monthly Progress Report.

2. Special study reports if any:

3. Incident reports (if applicable).

4. Final Teratology Report.

L. Internal Computer Generated Forms and Tables

1. Teratology results and statistical analyses.

2. Analytical chemistry results.

3. Exposure suite control center computer printouts.

4. XYBION printouts (if any).

XIV. OTHER SPECIFICATIONS

A. This study will be performed in compliance with the FDA Good Laboratory Practice Regulations for Non-Clinical Laboratory Studies (21 CFR 58) except where deviations are required by the NTP January, 1984 General Statement of Work and subsequent modifications.

B. This Protocol will be the controlling document in case of discrepancies between the Protocol and SOPs. If this occurs the Study Director is to be notified immediately for clarification.

C. A list of all relevant Standard Operating Procedures (SOPs) for this study are present in Attachment 1.

XV. HEALTH AND SAFETY

BNW's Health and Safety Plan (ØB-HS-3S1C) has been approved by NTP. In addition, a respiratory program is instituted. This is supplemented by using supplied-air respirators (ØB-HS-3S19) which will be worn by personnel during periods of animal care while the chambers are open and by having available self-contained breathing apparatus for use when entering a room under emergency conditions following a leak.

XVI. APPROVAL BY PNL

[signature: TJ Mast] ______________________
Study Director

Date: 9/18/87

[signature: RA Gelman] ______________________
Quality Assurance Auditor

Date: 9/18/87

XVII. APPROVAL BY NTP

[signature: R.E. Morrissey] ______________________
Co-Study Officer

Date: 28 Sept. 87

[signature: BA Schwetz] ______________________
Co-Study Officer

Date: 28 Sept 87

XVIII. REFERENCES

American Conference of Governmental Industrial Hygienists. Documentation of the Threshold Limit Values, 4th Edition. Cincinnati: ACGIH, 1980.

Bruckner, JV and RG Peterson. Evaluation of toluene and acetone inhalant abuse: pharmacology and pharmacodynamics. Toxicol. Appl. Pharmacol. 61:27-38, 1981a.

Bruckner, JV and RG Peterson. Evaluation of toluene and acetone inhalant abuse: model development and toxicology. Toxicol. Appl. Pharmacol. 61:302-312, 1981b.

Cheng, KK and MP Yang. Study of pregnancy ketosis in the rat. Q. J. Experim. Physiol. 55:83-92, 1970.

Clayton, GD and FE Clayton. Patty's Industrial Hygiene and Toxicology, 3rd Rev'sd Edition. Vol. 2C. pp 4720-4727, 1982.

DiPaolo, JA, P Donovan, and R Nelson. Quantitative studies of *in vitro* transformation by chemical carcinogens. J. Natl. Cancer Int. 42:867-874, 1969.

DiVincenzo, GD, FJ Yanno and BD Astill. Exposure of man and dog to low concentrations of acetone vapor. Am. Ind. Hyg. Assoc. J. 34:329-336, 1973.

Flury, F and W Wirth. Arch. Gewerbepathol. Gewerbehyg. 5:1, 1934.

Freinkel, N. Metabolic Changes in Pregnancy. In: Textbook of Endocrinology 7thEd, JD Wilson and DW Foster, Eds. WB Saunders Co., Philadelphia, pp. 438-451, 1985.

Fukabori, S, K Nakaaki, and O Taga. Cutaneous absorption of acetone. Rodo Kagaku 55:525-532, 1979.

Furner, RL, ED Neville, KS Talarico, and DB Feller. A common modality of action of simulated space stresses on the oxidative metabolism of ethylmorphine, aniline and p-nitroanisole by male rat liver. Toxicol. Appl. Pharmacol. 21:569-581, 1972.

Gabbe, SG. Congenital malformations in infants of diabetic mothers. Obstet. Gynecol. Surv. 32:125-132, 1977.

Goldberg, ME, HE Johnson, UC Pozzani, and HF Smyth. Effect of repeated inhalation vapors of industrial solvents on animal behavior. Am. Ind. Hyg. Assoc. J. 25:369-375, 1964.

Guntakatta, M, EJ Matthews, and JO Rundell. Development of a mouse embryo limb bud cell culture system for the estimation of chemical teratogenic potential. Teratog. Carcinog. Mutagen. 4:349-364, 1984.

Horton, WE and TW Sadler. Effects of maternal diabetes on early embryogenesis: alteration in morphogenesis produced by the ketone body, β-hydroxybutyrate. Diabetes 32:610-616, 1983.

Kucera, J. Exposure to fat solvents: a possible cause of sacral agenesis in man. J. Pediatr. 72:857-859, 1968.

Kucera, J and D Benasova. Poruchy nitrodelozniho vyvoje cloveka zpusobene pokusem o potrat. Cesk. Pediatr. 17:483-489, 1962.

[Lopez-Soriano, FJ, and JM Argiles. Simultaneous determination of ketone bodies in biological samples by gas chromatographic headspace analysis. J. Chromatog. Sci. 23:120-123, 1985.]$^{+A}$

McCann, J, E Choi, E Yamasaki, and BN Ames. "Detection of Carcinogens as mutagens in the Salmonella/microsome test: Assay of 300 chemicals., Proc. Natl. Acad. Sci. 72:5135-5139, 1975.

McLaughlin, J, JP Marliac, MJ Verrett, MK Mutchler and OG Fitzhugh. Toxicity of 14 volatile chemicals as measured by the chick embryo method. Am. Ind. Hyg. Assoc. J. 25:282-284, 1964.

$^{+A}$ Added 10/15/87 by Revision A.

Mourkides, GA, DC Hobbs, and RE Koeppe. The metabolism of acetone-2-C^{14} by intact rats. J. Biol. Chem. 234:27-30, 1959.
Nelson, DL, and BP Webb. Acetone. In: Kirk-Othmer Encyclopedia of Chemical Technology, 3rd Ed. HF Mark, DF Othmer, CG Overberger and GT Seaborg, Eds. Wiley and Sons, NY, pp 1:179-191, 1978.

NIOSH, Criteria for a recommended standard for occupational exposure to ketones. US Dept of Health, Education and Welfare, National Institute for Occupational Safety and Health DHEW (NIOSH) Publication No. 78-173, 1978.

Nizyayeva, IV. On hygienic assessment of acetone. Gig. truda i. prof. zabol. (Russian) June, pp 24-28, 1982.

Price, TD and D Rittenberg. The metabolism of acetone: I. Gross aspects of catabolism and excretion. J. Biol. Chem. 185:449-459, 1950.

Reynolds, JEF and AB Prasad, Eds. Martindale: The Extra Pharmacopeia, 28th Edition. The Pharmaceutical Press, London, 1982.

Rowe, VK. Industrial Hygiene and Toxicology, 2nd Ed, Vol II, Interscience, NY, 1963.

Rudney, H. The metabolism of 1,2-propanediol. Arch. Biochem., 29:231-232, 1950.

Sakami, W and JM Lasaye. Formation of formate and labile methyl groups from acetone in the intact rat. J. Biol. Chem. 187:369-378, 1950.

Sakami, WJ. Biol. Chem. 176:995, 1948.

Schardein, JL. Chemically Induced Birth Defects, Marcel Dekker, 1985.

Smyth, HF, CP Carpenter, CS Weil, and UC Pozzani. Range finding toxicity data: list VI. Am. Ind. Hyg. Assoc. J., 23:95-107, 1962.

Traiger, GJ and GL Plaa. Relationship of alcohol metabolism to the potentiation of CCl_4 hepatotoxicity induced by aliphatic alcohols. J. Pharmacol. Exp. Ther. 183:481-488, 1972.

Verschueren, K. Handbook of Environmental Data on Organic Chemicals, Van Nostrand Reinhold, New York, 1977.

Wigeaus, E, S Holm, and I Åstrand. Exposure to acetone: uptake and elimination in man. Scand. J. Work. Environ. Health 7:84-94, 1981.

XVIX. CHANGES AND/OR REVISIONS TO THE PROTOCOL

Revision A: Page i

Corrected erroneous page number references in Table of Contents. Added page number reference to Section XVIIa.

Reason: Rectify Table of Contents.

Page 6. V. Proposed Schedule of Events.

Initiation of breeding and health screen delayed one week.

Reason: Late arrival of test material.

Page 7. VI. Test System.

Number of sperm-positive rats on study increased.

Reason: Addition of task to measure ketone body levels in plasma.

Page 8. VII. Experimental Design and Dose Level.

Addition of Part D. Measurement of Ketone Body Levels in Plasma.

Reason: Addition of this task at request of Project Officers.

Page 9. VIII. Test System....

Change in Part D. Randomization. Changed to accommodate additional animals required for blood collection.

Reason: Addition of task at request of Project Officers.

Page 14. XI. Experimental Observations.

Addition of Part Ca. Measurement of Ketone Bodies in Rat Plasma.

Reason: Addition of task at request of Project Officers.

Page 15. XI. Experimental Observations.

Addition of effect.

Reason: Addition of task at request of Project Officers.

Page 20. XVIIa. Changes and/or Revisions to the Protocol.

Addition of section.

Reason: To accommodate protocol revisions.

Page 21. XVIII. References.

Addition of reference.

Reason: Addition of task at request of Project Officers.

Attachment 1. Standard Operating Procedures (SOP).

Addition of two SOP's.

Reason: Addition of task at request of Project Officers.

XVX. <u>ORIGINAL PAGES THAT HAVE BEEN REVISED</u>

III. SPONSOR AND SPONSOR'S REPRESENTATIVE

A. Sponsor:
National Institute of Environmental Health Sciences
National Toxicology Program (NTP)
P.O. Box 12233;
Research Triangle Park, N.C. 27709

B. Sponsor's Representatives:
Dr. Bernard Schwetz
Dr. Richard Morrissey

IV. TESTING LABORATORY

A. Facility
Battelle - Pacific Northwest Laboratory (PNL)
P.O.Box 999; Richland, Washington 99352

B. Study Director:
Dr. Terryl J. Mast

V. PROPOSED SCHEDULE OF EVENTS (This proposed schedule may be altered. All changes will be appended to the protocol.)

	Rats	Mice
A. Animals arrive week of:	9/21/87	11/4/87
B. Identification of females:	10/5/87	11/18/87
C. Health screen :	10/12/87	11/25/87
D. Prestart audit for GLP compliance:	10/12/87	11/25/87
E. Initiate breeding procedures:	10/12/87	11/25/87
F. Initiate exposure :	10/19/87	12/2/87
G. Initiate necropsy:	11/2/87	12/14/87
H. Evaluate fetal specimens:	11/9/87 - 1/25/87	

	Combined
I. Submit draft report:	2/15/88
J. Submit final report:	3/28/88

VI. TEST SYSTEM

A. Species: mouse and rats

B. Strain: Mice: CrI:CD-1(ICR)BR; rats: Sprague-Dawley [CrI:CD(SD)BR]

C. Number of Animals and Supplier: Charles River Breeding Laboratories, Raleigh, NC.

Mice: 85 males
310 females
Rats: 55 males
245 females

D. Age of Animals Upon Arrival:

Mice: 7-8 weeks
Rats: 8-9 weeks

E. Experimental Animals (Females): 40 virgin female mice or rats will be randomly selected and assigned to four dose groups (10/group) from the total female pool (ØB-DT-3BØB). The remaining females will be mated by placing at least two females with one male overnight in a breeding cage (ØB-DT-3BØD). Nine AM of the day that copulation is established will be designated as 0 dg (ØB-DT-3BØD).

F. Number of Animals in Study: A minimum of 33 plug-positive female mice or 30 sperm-positive rats (to obtain 20 pregnant females) will comprise each of the four treatment groups; the minimum number of mated females to be exposed will be 132 mice or 120 rats. There will also be 10 virgins (females) of each species per exposure level.

VII. EXPERIMENTAL DESIGN AND DOSE LEVELS

A. Experimental Design: Four groups of mated female mice will be exposed to the test chemical on 12 consecutive days (6 dg - 17 dg). The animals will be necropsied on 18 dg for maternal and fetal evaluations.

Four groups of mated female rats will be exposed to the test chemical on 14 consecutive days (6-19 dg). The rats will be necropsied on 20 dg for maternal and fetal evaluations.

In addition, 10 virgin females of each species will be added to each exposure group for the purpose of obtaining ovaries to be used for quantitative ovarian follicle counts. These animals will be exposed concurrently with the mated females and sacrificed immediately after the last exposure period.

B. Exposure Regimen: Chamber atmospheric concentrations of acetone will be 0 (filtered air), 440, 2200, and 11,000 ppm. Plug-positive and virgin mice will be exposed for 6 hrs/day for 12 consecutive days (6 dg - 17 dg); sperm-positive and virgin rats for 14 consecutive days (6 dg - 19 dg), 6 hr/day. The exposure chamber doors will be closed throughout the exposure and non-exposure periods, except during animal care procedures. Exposure chamber temperatures will be maintained at 75 ± 3°F and relative humidities at 55 ± 15%. Air flow will be maintained at 15±3 cfm and the chamber pressure at approximately 1" water negative with respect to room pressure.

C. Selection of Atmospheric Concentrations: Exposure chamber concentrations are based partly on information obtained from previously published reports on inhalation toxicology studies of acetone and partly on safety considerations. Safety considerations limit the maximum exposure concentration to 50% of the lower explosion limit (≈22,000 ppm) which is 11,000 ppm.

VIII. TEST SYSTEM HOUSING, HANDLING AND ENVIRONMENTAL CONDITIONS

A. Quarantine and Acclimatization (ØB-AR-3FØ3)

1. Animal shipping crates will be examined upon arrival for evidence of conditions likely to permit exposure to pathogens (soiled, wet or otherwise damaged).

2. The uncrating will be conducted at the door of the quarantine room. While being removed from the crates the animals will be examined for evidence of shipping stress.

3. The animals will be quarantined and acclimatized in the LSL-II Building for 3-4 weeks prior to the start of the study.

4. During part of the quarantine/acclimatization period the animals will be housed by sex, approximately 10 mice or 5 rats per cage in wire cages on flush racks. The cage space will meet the requirements stated in the NIH "Guide for Care and Use of Laboratory Animals".

5. During the breeding period the animals will be housed in the quarantine room.

6. Plug-positive mice or sperm-positive rats will be acclimated from 0 dg in individual compartments of wire-mesh cages within exposure chambers (with chamber doors open). Virgin females will be acclimated for approximately 1 week prior to exposure under the same conditions.

7. Room temperature during the acclimatization and exposure periods will be maintained at 72±3° F and relative humidity at 50±15%. These measurements will be recorded at least twice daily.

8. Twelve hours light and twelve hours dark will be maintained with light starting at 0600.

9. Five male and five female animals will be randomly selected for pre-exposure health screening (ØB-AR-3FØ2). They will be examined by gross necropsy, histopathology and nasopharyngeal culture for evidence of disease and the presence of potentially pathogenic organisms.

10. The clinical veterinarian will make a visual inspection of the animals to be used in the study just prior to their release for the study (documented on the last quarantine/ acclimatization record).

11. As an added screen for viral infection, 5 animals from the control group and 5 animals from the highest dose group will be tested promptly after sacrifice at BNW for viral pathogens (ØB-AR-3B1R).

12. Females not selected for the study or health screen will be discarded during the first exposure week. The disposition of these females will be recorded on the Animal Disposition Record and retained in the study files (ØB-AR-3FØ3). Males, (they are not individually identified) will also be discarded.

B. Feed (ØB-AR-3FØ5)

1. NTP pre-approved NIH-07 Open Formula Diet (pellets) from Ziegler Bros., Inc., Gardner, PA will be used during the quarantine/acclimatization periods and throughout the duration of the experiment.

2. Feed will be provided ad libitum in slot feeders during the experiment, except during exposure hours.

C. Water

1. Fresh softened water (ion exchange softener, Illinois Water Treatment Company, Model 2R-2240, Rockford, IL) will be supplied ad libitum at all times. The hardness of the water will be checked approximately once every week. Records will be retained in the LSL-II Building Engineer's office.

2. The automatic watering system (Edstrom Industries, Waterford, WI) will be used for the quarantine/acclimatization period and throughout the duration of the study.

3. A representative sample of animal drinking water from one of the NTP study rooms will be analyzed for contaminants at least once each calendar year.

D. Randomization: Virgin females will be randomly chosen from the pool of female animals based on the first body weight (taken at the time of eartagging). During the week prior to the start of exposure virgins will be weighed and randomly assigned to a treatment group by means of a computer-assisted randomization program which is based on a single blocking factor, body weight (ØB-DT-3BØB).

On the day of plug or sperm detection (0 dg), the mated animals will be weighed and assigned to dose groups as described above.

fetuses with gross abnormalities. (ØB-DT-3BØG) Sex will be determined on all fetuses by internal examination. All skeletons will be double-stained and examined for cartilage formation and centers of ossification (ØB-DT-3BØG); however, ≈50% of these will have had their heads removed. These fetal heads will be examined by razor-blade sectioning fixation in Bouin's fluid (Wilson, 1965; [ØB-DT-3BØI]). Records of morphologic lesions observed in gross and visceral examinations will include photographs (ØB-DT-3BØJ) of representative lesions.

Both ovaries from the virgin females and one ovary from each of the pregnant females will be collected at the time of sacrifice. (ØB-DT-3BØG). Collected ovaries will be fixed for 24 hr in Bouin's fluid then transferred to 70% ethanol and sent to Dr. Donald Mattison at the National Center for Toxicological Research for sectioning and quantitative follicle counts.

D. <u>Indices of Effects</u>: The following parameters, expressed as mean ± STD, when appropriate, will be computed from data for inseminated animals and their litters and will be presented in the Final Report for each treatment group:

- Number of dead maternal animals, animals removed from the study and reason for removal
- Summary of maternal toxicity, including incidence of changes detected during clinical observations
- Number and percent pregnant
- Maternal body weights:

  Mice on 0, 6, 9, 12, 15 and 18 dg
  Rats on 0, 6, 10, 14, 17, and 20 dg

- Weight of gravid uterus
- Maternal liver, adrenal, and kidney weights
- Maternal urine parameters (dg 20): pH, protein, glucose, ketone, bilirubin, blood, and urobilinogen
- Extragestational weight and weight gain
- Number of implantation sites/litter
- Number of litters with live fetuses
- Number and percent of live fetuses/litter
- Body weight of live fetuses/litter
- Body weight of male and female fetuses/litter
- Sex ratio of fetuses/litter
- Number and percent of early and late resorptions/litter

- Number and percent of non-live/litter (early and late resorptions and dead fetuses)
- Listing of malformations and variations observed in fetuses/litters
- Number and percent of malformed fetuses
- Number and percent of litters with malformed fetuses

XII. PROPOSED STATISTICAL METHODS

The methods proposed for the statistical analyses of representative maternal, reproductive and fetal indices of effects are: summary statistics, N, mean, standard deviation, with accompanying ANOVA based on multiple comparisons where appropriate. Arc sin transformations will be performed on data presented as percent incidence. Further statistical analyses may be performed at discretion of sponsor.

XIII. RECORDS RETENTION

Records that accumulate during the study will be retained at BNW until requested and shipped to NTP archives. Some of these records may be presented as part of the protocol or reports. These will include but not be limited to the following records:

A. Personnel Records

1. List of BNW personnel participating in the study.
2. Name, address, and function of any outside consultant(s)
3. Record of removal of any individual from direct contact of the test system due to illness.

B. Health and Safety Records (original records and five copies of microfiche will be submitted to NTP within approximately two months after the end of each fiscal year). Chemical specific records will be submitted with the study. Facility specific records will be submitted annually.

1. Medical records of all personnel participating in the study. These records will be retained by Hanford Environmental Health Foundation (HEHF), P.O. Box 100, Richland, WA 99352 for a minimum of 40 years. A letter verifying this arrangement will be retained for each test material file.
2. Records and results of any biological monitoring on laboratory personnel (if applicable).
3. NTP Health and Safety package for acetone.
4. BNW biohazard protocols and BNW Health and Safety Plan.
5. Chemical specific health and safety training records.

XVIII. REFERENCES

American Conference of Governmental Industrial Hygienists. Documentation of the Threshold Limit Values. 4th Edition. Cincinnati: ACGIH, 1980.

Bruckner, JV and RG Peterson. Evaluation of toluene and acetone inhalant abuse: pharmacology and pharmacodynamics. Toxicol. Appl. Pharmacol. 61:27-38, 1981a.

Bruckner, JV and RG Peterson. Evaluation of toluene and acetone inhalant abuse: model development and toxicology. Toxicol. Appl. Pharmacol. 61:302-312, 1981b.

Cheng, KK and MP Yang. Study of pregnancy ketosis in the rat. Q. J. Experim. Physiol. 55:83-92, 1970.

Clayton, GD and FE Clayton. Patty's Industrial Hygiene and Toxicology, 3rd Rev'sd Edition. Vol. 2C. pp 4720-4727, 1982.

DiPaolo, JA, P Donovan, and R Nelson. Quantitative studies of *in vitro* transformation by chemical carcinogens. J. Natl. Cancer Int. 42:867-874, 1969.

DiVincenzo, GD, FJ Yanno and BD Astill. Exposure of man and dog to low concentrations of acetone vapor. Am. Ind. Hyg. Assoc. J. 34:329-336, 1973.

Flury, F and W Wirth. Arch. Gewerbepathol. Gewerbehyg. 5:1, 1934.

Freinkel, N. Metabolic Changes in Pregnancy. In: Textbook of Endocrinology 7thEd, JD Wilson and DW Foster, Eds. WB Saunders Co., Philadelphia, pp. 438-451, 1985.

Fukabori, S, K Nakaaki, and O Taga. Cutaneous absorption of acetone. Rodo Kagaku 55:525-532, 1979.

Furner, RL, ED Neville, KS Talarico, and DB Feller. A common modality of action of simulated space stresses on the oxidative metabolism of ethylmorphine, aniline and p-nitroanisole by male rat liver. Toxicol. Appl. Pharmacol. 21:569-581, 1972.

Gabbe, SG. Congenital malformations in infants of diabetic mothers. Obstet. Gynecol. Surv. 32:125-132, 1977.

Goldberg, ME, HE Johnson, UC Pozzani, and HF Smyth. Effect of repeated inhalation vapors of industrial solvents on animal behavior. Am. Ind. Hyg. Assoc. J. 25:369-375, 1964.

Guntakatta, M, EJ Matthews, and JO Rundell. Development of a mouse embryo limb bud cell culture system for the estimation of chemical teratogenic potential. Teratog. Carcinog. Mutagen. 4:349-364, 1984.

Horton, WE and TW Sadler. Effects of maternal diabetes on early embryogenesis: alteration in morphogenesis produced by the ketone body, β-hydroxybutyrate. Diabetes 32:610-616, 1983.

Kucera, J. Exposure to fat solvents: a possible cause of sacral agenesis in man. J. Pediatr. 72:857-859, 1968.

Kucera, J and D Benasova. Poruchy nitrodeloznino vyvoje cloveka zpuschene pokusem o potrat. Cesk. Pediatr. 17:483-489, 1962.

McCann, J, E Choi, E Yamasaki, and BN Ames. "Detection of Carcinogens as mutagens in the Salmonella/microsome test: Assay of 300 chemicals., Proc. Natl. Acad. Sci. 72:5135-5139, 1975.

McLaughlin, J, JP Marliac, MJ Verrett, MK Mutchler and OG Fitzhugh. Toxicity of 14 volatile chemicals as measured by the chick embryo method. Am. Ind. Hyg. Assoc. J. 25:282-284, 1964.

Mourkides, GA, DC Hobbs, and RE Koeppe. The metabolism of acetone-2-C^{14} by intact rats. J. Biol. Chem. 234:27-30, 1959.

Nelson, DL, and BP Webb. Acetone. In: Kirk-Othmer Encyclopedia of Chemical Technology. 3rd Ed. HF Mark, DF Othmer, CG Overberger and GT Seaborg, Eds. Wiley and Sons, NY, pp 1:179-191, 1978.

ATTACHMENT 1

STANDARD OPERATING PROCEDURES FOR INHALATION REPRODUCTIVE TOXICOLOGY STUDIES

REPRODUCTIVE AND DEVELOPMENTAL TOXICOLOGY

ØB-DT-3BØ3	Cage Location Maps and Daily Observations
ØB-DT-3BØB	Randomization of Animals
ØB-DT-3BØC	Animal Body Weights
ØB-DT-3BØD	Rodent Mating Procedures
ØB-DT-3BØF	Necropsies for Health Evaluation and of Dead or Moribund Animals
ØB-DT-3BØG	Developmental Evaluations for Teratology Studies
ØB-DT-3BØI	Examination of Fetal Heads Fixed in Bouin's Solution
ØB-DT-3BØJ	Photography
ØB-DT-3BØL	Data Handling and Storage
ØB-DT-3BØM	Sample Storage/Shipment
ØB-DT-3BØY	Examination of Double-stained Fetal Rat and Mouse Skeletons.
ØB-DT-3B1J	Preparation of the Reproductive System for Histologic Evaluation
ØS-SI-3EØ1	Macintosh Data Collection System using Arbor Balance for Teratology and Dominant Lethal Sacrifice.
ØS-SI-3EØ3	Data Transfer from Macintosh to VAX using MacTerminal

ANIMAL FACILITIES

ØB-AR-3BØG	Barrier Procedures for LSL-II Animal Facility
ØB-AR-3GØ1	Pre-Cleaning Equipment and Operation of Cage - Bottle and Rack Washers
ØB-AR-3GØH	Rodent Weighing using Toledo 8142 Automatic System
ØB-AR-3BØ3	Handling and Changing Out Exposure Chambers and Cage Units
ØB-AR-3BØ8	Handling Escaped Small Animals
ØB-AR-3FØ2	Pre-Exposure Health Screening of Rodents
ØB-AR-3FØ3	Quarantine of Animals

ØB-AR-3FØC	Rodent Identification with Ear Tags
ØB-AR-3FØ5	Management of Animal Feed
ØB-AR-3FØB	Selection and Notification Procedures, Moribund Sacrifice Animals and Animals Found Dead
ØB-AR-3B1R	Pathogen Monitoring
ØB-AR-3FØA	Daily Care of Bioassay Animals and Cleaning of Exposure Rooms

INHALATION EXPOSURE AND BIOENGINEERING

ØB-BE-3B3H	Buildup and Decay and Overnight Concentration Monitoring
ØB-BE-3B24	Inhalation Exposure Chamber Balance
ØB-BE-3CØL	RTD Thermometer Calibration
ØB-BE-3DØE	Exposure Suite QC, Maintenance, and Calibration
ØB-BE-3EØ9	Study Protocol Entry Into Exposure Suite Computers
ØB-BE-3GØ4	Exposure Suite Routine Computer Operation
ØB-BE-3EØB	Exposure Suite Data Analysis Program Operation
ØB-BE-3CØJ	EG&G Hygrometer: Operation, Maintenance, and Calibration
ØB-BE-3CØV	Calibration and Check of Chamber Airflow Using Digital Anemometer
ØB-BE-3B1X	Relative Humidity Determination via Use of Dewpoint Hygrometer
ØB-BE-3GØ3	Operating Procedures for the Gardner Type CN Small-Particle Detector
ØB-BE-3C13	General FGD Calibration-Exposure Chamber and Generator Cabinets
ØB-BE-3DØ6	Chamber Leak Test
ØB-BE-3B3I	Acetone Exposure System Daily Operating Procedure
ØB-BE-3DØR	Acetone Exposure System QC, Maintenance, and Calibration

ANALYTICAL CHEMISTRY

ØB-AC-3A1H	Bulk Analysis of Acetone
ØB-AC-3A1I	Analysis of Building Exhaust for Acetone
ØB-AC-3B26	Operation of HP5840 GC for Monitoring Acetone
ØB-AC-3DØ2	Routine Maintenance of the HP 5840

ATTACHMENT 1

STANDARD OPERATING PROCEDURES FOR INHALATION REPRODUCTIVE TOXICOLOGY STUDIES

REPRODUCTIVE AND DEVELOPMENTAL TOXICOLOGY

ØB-DT-3BØ3	Cage Location Maps and Daily Observations
ØB-DT-3BØB	Randomization of Animals
ØB-DT-3BØC	Animal Body Weights
ØB-DT-3BØD	Rodent Mating Procedures
ØB-DT-3BØF	Necropsies for Health Evaluation and of Dead or Moribund Animals
ØB-DT-3BØG	Developmental Evaluations for Teratology Studies
ØB-DT-3BØI	Examination of Fetal Heads Fixed in Bouin's Solution
ØB-DT-3BØJ	Photography
ØB-DT-3BØL	Data Handling and Storage
ØB-DT-3BØM	Sample Storage/Shipment
ØB-DT-3BØY	Examination of Double-stained Fetal Rat and Mouse Skeletons.
ØB-DT-3B1J	Preparation of the Reproductive System for Histologic Evaluation
ØS-SI-3EØ1	Macintosh Data Collection System using Arbor Balance for Teratology and Dominant Lethal Sacrifice.
ØS-SI-3EØ3	Data Transfer from Macintosh to VAX using MacTerminal

ANIMAL FACILITIES

ØB-AR-3BØG	Barrier Procedures for LSL-II Animal Facility
ØB-AR-3GØ1	Pre-Cleaning Equipment and Operation of Cage - Bottle and Rack Washers
ØB-AR-3GØH	Rodent Weighing using Toledo 8142 Automatic System
ØB-AR-3BØ3	Handling and Changing Out Exposure Chambers and Cage Units
ØB-AR-3BØ8	Handling Escaped Small Animals
ØB-AR-3FØ2	Pre-Exposure Health Screening of Rodents
ØB-AR-3FØ3	Quarantine of Animals

ØB-CP-3EØ1 Daily Operating Procedure—Specimen Handling

ØB-AR-3FØC	Rodent Identification with Ear Tags
ØB-AR-3FØ5	Management of Animal Feed
ØB-AR-3FØB	Selection and Notification Procedures, Moribund Sacrifice Animals and Animals Found Dead
ØB-AR-3B1R	Pathogen Monitoring
ØB-AR-3FØA	Daily Care of Bioassay Animals and Cleaning of Exposure Rooms

INHALATION EXPOSURE AND BIOENGINEERING

ØB-BE-3B3H	Buildup and Decay and Overnight Concentration Monitoring
ØB-BE-3B24	Inhalation Exposure Chamber Balance
ØB-BE-3CØL	RTD Thermometer Calibration
ØB-BE-3DØE	Exposure Suite QC, Maintenance, and Calibration
ØB-BE-3EØ9	Study Protocol Entry Into Exposure Suite Computers
ØB-BE-3GØ4	Exposure Suite Routine Computer Operation
ØB-BE-3EØB	Exposure Suite Data Analysis Program Operation
ØB-BE-3CØJ	EG&G Hygrometer: Operation, Maintenance, and Calibration
ØB-BE-3CØV	Calibration and Check of Chamber Airflow Using Digital Anemometer
ØB-BE-3B1X	Relative Humidity Determination via Use of Dewpoint Hygrometer
ØB-BE-3GØ3	Operating Procedures for the Gardner Type CN Small-Particle Detector
ØB-BE-3C13	General FGD Calibration-Exposure Chamber and Generator Cabinets
ØB-BE-3DØ6	Chamber Leak Test
ØB-BE-3B3I	Acetone Exposure System Daily Operating Procedure
ØB-BE-3DØR	Acetone Exposure System QC, Maintenance, and Calibration

ANALYTICAL CHEMISTRY

ØB-AC-3A1H	Bulk Analysis of Acetone
ØB-AC-3A1I	Analysis of Building Exhaust for Acetone
ØB-AC-3B26	Operation of HP5840 GC for Monitoring Acetone

ØB-AC-3A1M Determination of Ketone Bodies in Rat Plasma by Headspace Analysis

ØB-AC-3C1Z	Calibration of the Acetone Chamber Monitor

SAFETY

ØB-HS-3S19	The 3M Brand W-2860 Hardcap, Continuous-Flow Air Line Respirator
ØB-HS-3S1C	Bioassay Studies: Health and Safety Plan
ØB-HS-3S1A	Scott Presur-Pak II Self-contained Breathing Apparatus
ØB-HS-3S1B	Bioassay Studies: Respiratory Protection Program
ØB-HS-3S2D	Biohazard Protocol - Acetone

NTP PROJECT OFFICE

ØB-9A-3EØ6	Data Handling and Storage of NTP Study Documents and Materials
ØB-QA-3EØA	Filling Out Data Sheets

INHALATION EXPOSURE SYSTEM DESCRIPTION

I. ANIMAL EXPOSURE CHAMBER

The animals will be exposed and maintained in inhalation exposure chambers developed at Battelle-Northwest by O.R. Moss and M.G. Brown (U.S. Patent No. 4,261,741, August 12, 1980; Moss, 1980; Brown and Moss, 1981; Moss et al., 1982), and now commercially produced by Harford Division of Lab Products, Inc., Aberdeen, MD. The chamber (Figure 1A) facilitates multiple-tier exposures of various laboratory rodent species to aerosols and vapors. The design permits the use of excreta-collecting pans under each tier of animal cages during exposures, yet keeps variability of exposure concentrations at the different tier levels as low as, or lower than that usually experienced in conventional single-tier exposure chambers. The total volume of the chamber is 2.3 m^3 with an active mixing volume of 1.7 m^3, the remainder being the inlet and exhaust volumes where animals are not placed. There are three levels of caging, each level split into two tiers which are offset from each other and from the chamber walls (Figure 1B). Drawer-like stainless-steel cage units composed of individual animal cages are suspended in the space above each tier. Stainless-steel catch pans for the collection of urine and feces are suspended below each cage unit. Catch pans are left in position during each exposure period. Cageboard is added to these catchpans during non-exposure periods to reduce ammonia levels.

The chamber was designed so that uniform aerosol or vapor concentrations can be maintained throughout the chamber when the catch pans are left in position. Incoming air containing a uniform mixture of test material is diverted so that it flows vertically along the inner surfaces of the chamber. Eddies are formed (Figure 1B) at each tier as the aerosol or vapor flows past the catch pans. Stagnant zones that would normally exist above each pair of catch pans are cleared by exhaust flow through the space between the tiers. Aerosol or vapor reaching the lowest level is deflected across the bottom tiers by metal strips in the space between the catch pan and wall. Tests have shown that aerosol or vapor concentrations uniform to within 8% throughout the chamber can be obtained repeatedly, provided the aerosol or vapor is uniformly mixed before passing through the chamber inlet (Griffis, et. al., 1981).

Animals are exposed in individual cages having pelleted food feeders and automatic watering. During exposure the feeders will be removed from each cage unit. Up to six cage units can fit in a chamber. Each cage unit will individually house up to 24 rats or 60 mice. Cage dimensions meet AIAS requirements for each species.

Procedures for entry into an exposure chamber on study is detailed in SOP #ØB-AR-3B23.

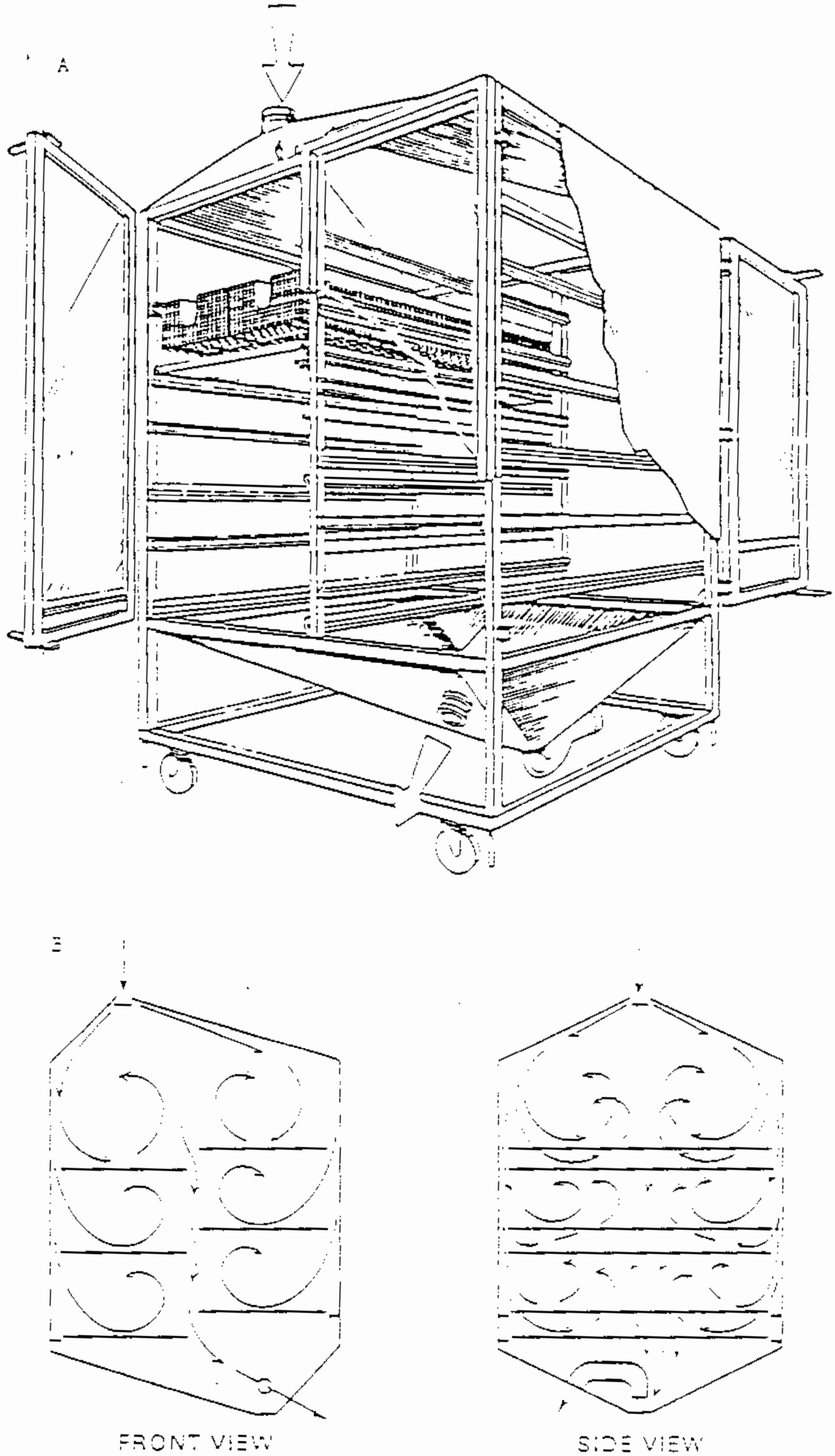


Figure 1. Inhalation Exposure Chamber Designed at BNW
(A. Oblique cutaway view of the chamber;
B. Airflow patterns)

II. EXPOSURE SUITE CONTROL CENTER

A computer located in the Suite Control Center interfaces with system monitors and controls the basic functions of chamber air flow, test chemical concentration, vacuum, temperature and relative humidity in each of three exposure rooms (Figure 2). The arrangement of computer control and interface instrumentation is shown in Figure 3. The executive computer is an Hewlett Packard Model 9816. All data acquisition and automated system control originates from this computer.

All experimental protocols related to the data acquisition and control system (such as data channel assignments, monitoring frequencies, and alarm settings) reside in the executive computer and are entered into tables accessed by menus.

Data input to the executive computer is accomplished through several interface instruments. All chemical monitor data is collected and preconditioned by Hewlett Packard Model 85B computers, one for each of the exposure rooms. Conditioned data is transferred to the executive computer for analysis, storage, printing and concentration control.

System control is provided from the computer by means of control relays in the CDS Intelligent Interface System. These relays control such devices as valves, drive motors, audible alarms, indicator lamps, etc.

A complete description of the software for this system is contained in document ØB-BE-5EØ1 and ØB-BE-5EØ2. Maintenance of the system is detailed in SOP# ØB-BE-3DØE. Entry of protocol data into the computer is detailed in SOP# ØB-BE-3EØ9. Routine operation of the computer system is detailed in SOP# ØB-BE-3GØ4. Routine daily operation of the system hardware is detailed in SOP# ØB-BE-3B3G.

III. TEST ARTICLE GENERATION AND MONITORING

A. Acetone Vapor Generation and Distribution System

A schematic diagram of the acetone vapor generation and delivery system is shown in Figure 4. The acetone generator is housed in a vented cabinet located in the Suite Control Center.

The acetone to be vaporized will be transferred from the original container in which it was shipped to a 19 liter stainless steel reservoir. The reservoir will be refilled every other exposure day. The filling procedure is designed to prevent explosion. All oxygen in the reservoir is displaced with nitrogen through a purge port. Nitrogen under low pressure is then applied to the shipping container to force the acetone through a filter and into the reservoir. The reservoir is placed on an electronic scale during filling so that the correct level can be readily obtained. All metal containers are grounded during the fill procedure. The filled reservoir is transferred and installed into the generator cabinet.

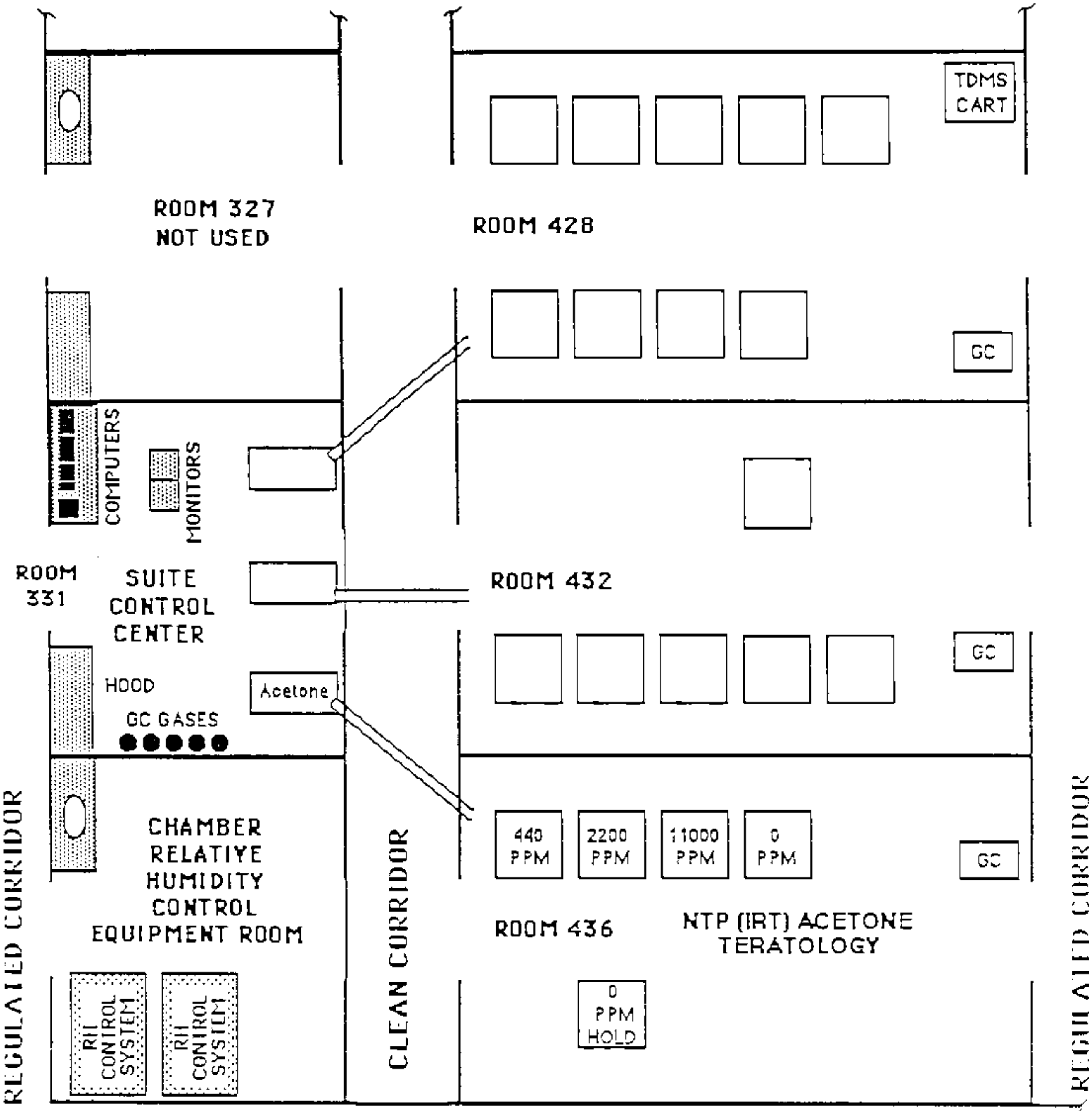
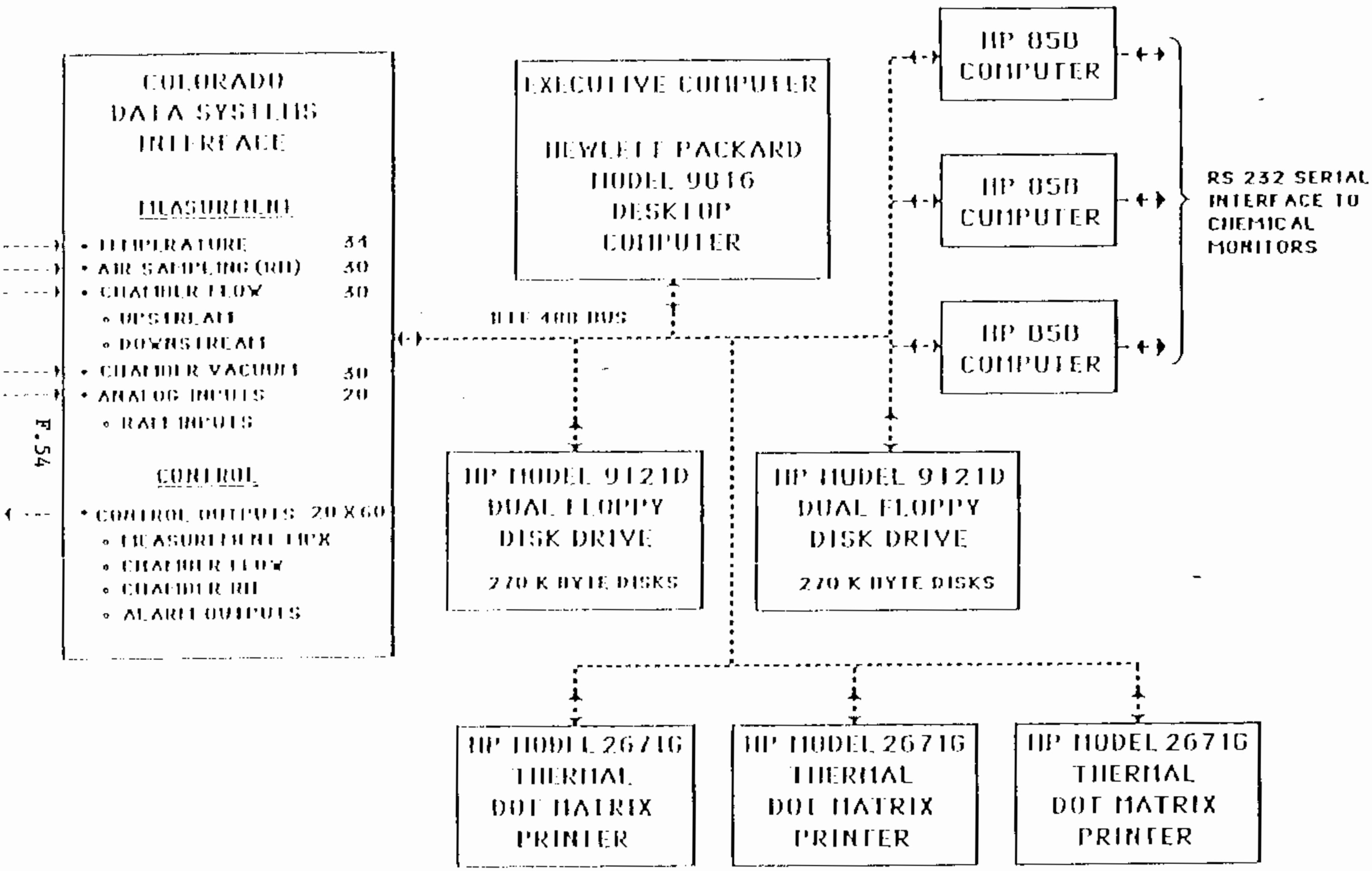


Figure 2. Arrangement of Exposure Rooms for Acetone Study

COMPUTER SYSTEM



F.54

Figure 3. Block Diagram of Exposure Suite Automated Data Acquisition and Control Computer System and Interface

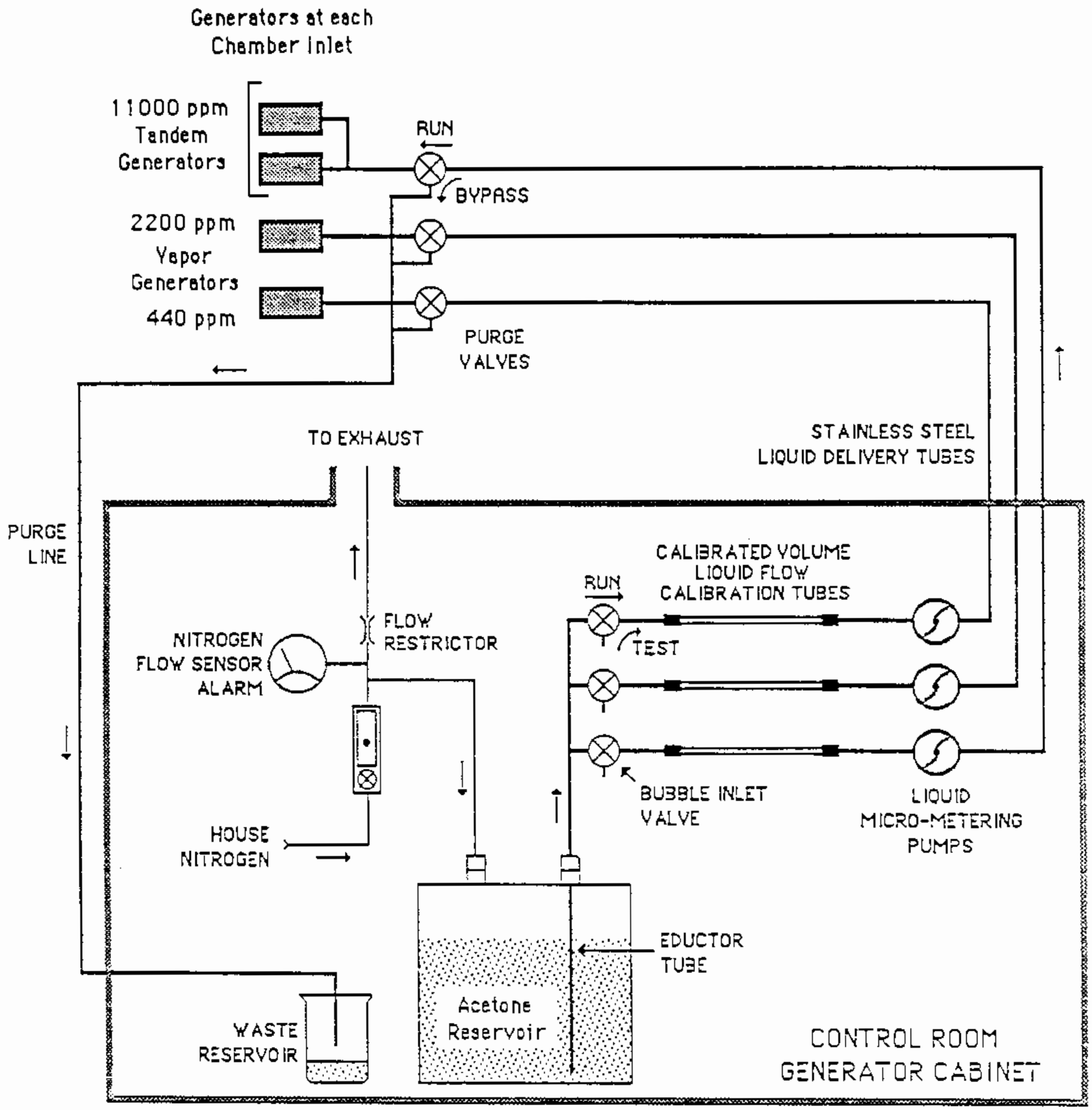


Figure 4. Schematic of the Acetone Generation and Delivery System

During exposure the acetone is pumped from the stainless steel reservoir through an eductor tube and delivery tubes to vaporizers located at the fresh air inlet of each animal exposure chamber. The high concentration chamber will require two vaporizers since the required rate of delivery exceeds the vaporization capacity of a single vaporizer. Stable micrometering pumps with adjustable drift-free pump rates will be used.

Each vaporizer (Figure 5) comprises a stainless steel cylinder covered with a glass fiber wick from which the liquid is vaporized. The wick can be easily and inexpensively replaced if residue buildup occurs. An 80-watt heater and a temperature sensing element are incorporated within the cylinder and connected to a remotely located temperature controller. A second temperature monitor is incorporated in the vaporizer allowing the operating temperature to be recorded by the automated data acquisition system. The operating temperature of the vaporizer is maintained below 50°C (the boiling point of acetone is about 56°C). The cylindrical vaporizer is positioned in the fresh air duct leading directly to the inlet of the exposure chamber.

A clear Teflon® tube of measured volume, preceded by a three-way valve is attached downstream of the pump to facilitate measurement of the flow rate of the vapor generator. Measurement is accomplished by momentarily switching the three-way valve from the run position to the test position. A small bubble of air is pulled by the pump from the cabinet through the valve and into the clear tube. The progress of this bubble from one end to the other of the tube (calibrated volume) is timed with a stop watch. Flow rate is calculated by dividing the volume by the time. The concentration in the exposure chamber can be calculated from the flow measurements of liquid and dilution air and is used as a check on chamber concentrations in addition to GC measurements.

All generation equipment which comes in contact with the acetone is stainless-steel, glass, Teflon® or Viton®. All equipemnt contained in the vented generator cabinet is explosion proof.

Detailed operating instructions for this system are contained in SOP #ØB-BE-3B3I and ØB-BE-3DØR.

B. Acetone Vapor Concentration Monitoring

A single gas chromatograph (GC) with a flame ionization detector will be used to monitor the 3 exposure chambers, the control chamber, the room, a certified standard vapor of acetone in nitrogen, and a nitrogen blank. Sampling from the multiple positions will be accomplished by means of an automated, multiplexed 8-port stream select valve. The sampling system (Figure 6) is incorporated into the relative humidity (RH) sampling system. Samples from each location are continuously drawn by a vacuum pump through polytetrafluoroethylene-lined stainless steel tubes to a location near the input of the stream select valve. This assures fresh sample at the monitor. The sample lines which

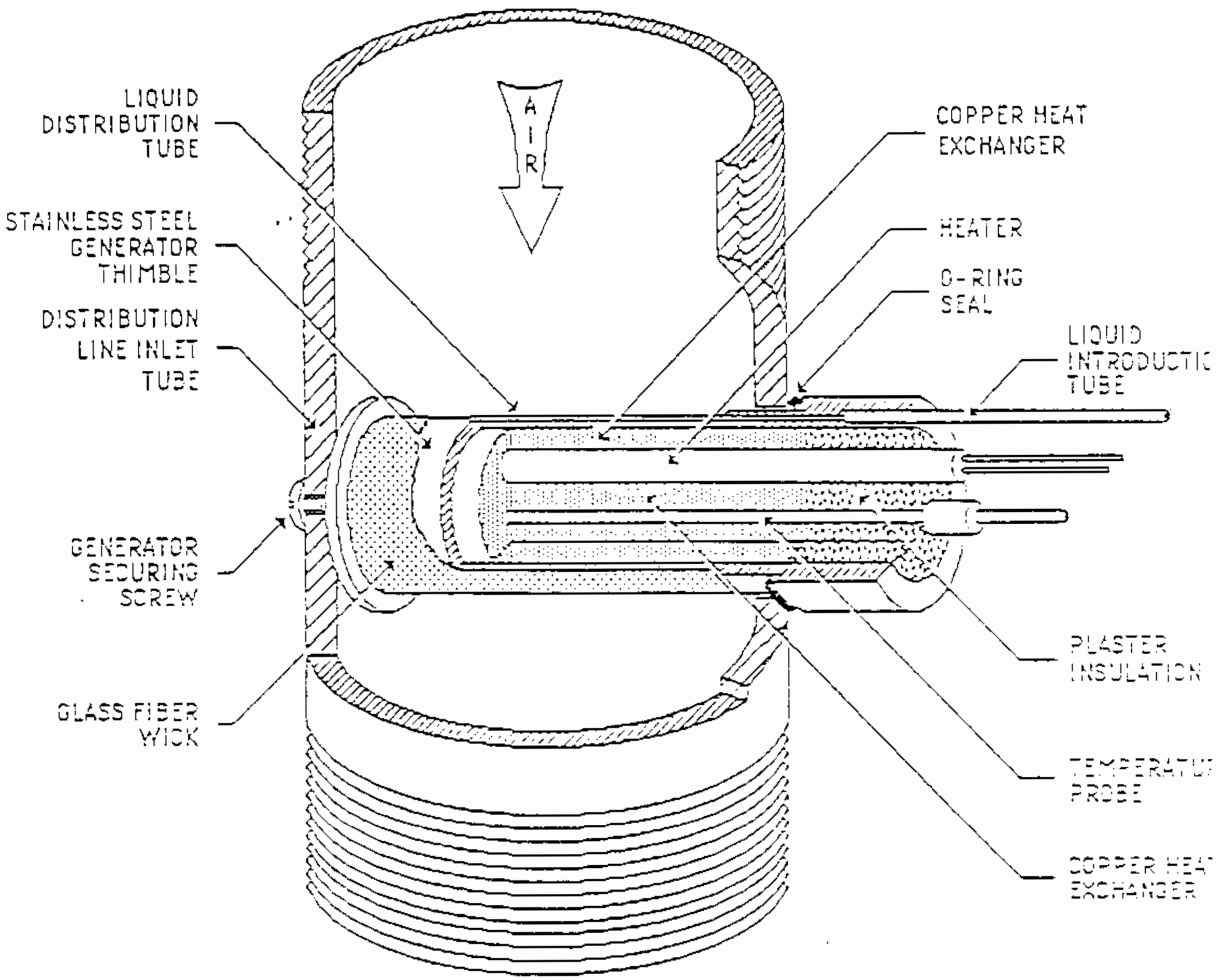


Figure 5. Cutaway Drawing of the Liquid Vapor Generator

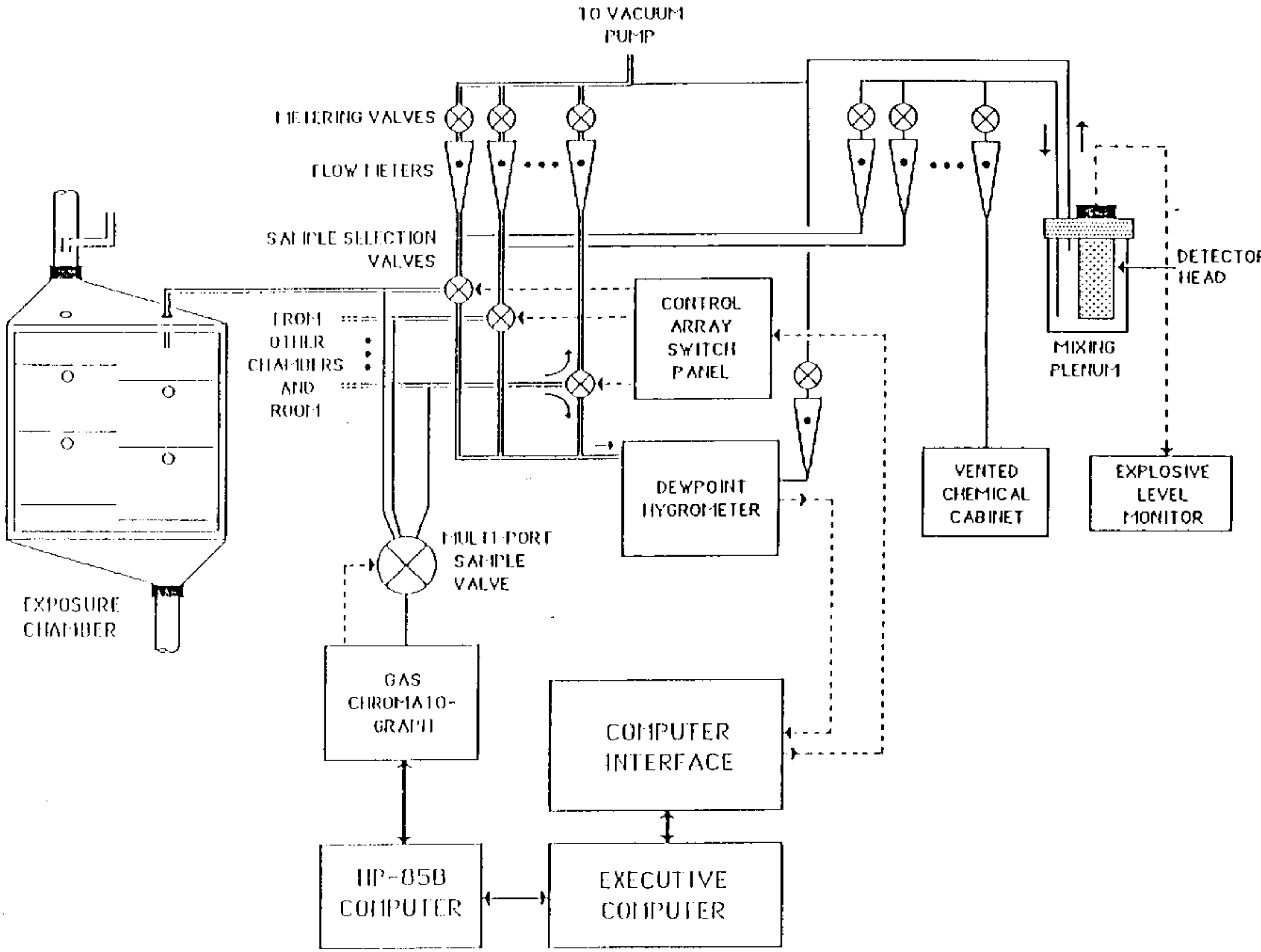


Figure 6. Schematic Diagram of the Dewpoint, Chemical Concentration, and Explosive Level Monitoring Systems

continue from the point where they T-off to the stream select vavle to the dewpoint monitor are polytetrafluoroethylene. The sample time per port will be less than 3 minutes assuring rhat all ports are sampled at least once per hour.

Sample values are accumulated from the GC and printed by an HP Model 85B computer until samples for all twelve ports of the stream select valve have been measured. These values are then sent to the executive computer for printing and storage. As each value is sent to the HP 85B from the GC, it is compared with limit values for that particular location. If the value is beyond the control limits, the HP 85B will immediately send the information to the executive computer which will then take the appropriate action as follows:

- Concentration ≥ non-critical low limit and ≤ non-critical high limit:

  No action.

- Concentration < non-critical low limit but ≥ critical low limit:

  Indicate on daily computer log that concentration is beyond limits.

- Concentration < critical low limit:

  Indicate on daily computer log that concentration is beyond limits. Activate audible alarm.

- Concentration > non-critical high limit but ≤ critical high limit:

  Indicate on daily computer log that concentration is beyond limits.

- Concentration > critical high limit:

  Indicate on daily computer log that concentration is beyond limits. Activate audible alarm. Turn off generation system.

The calibration of the monitor will be confirmed and corrected by periodic assay of grab samples from the chambers. Generally, duplicate grab samples will be obtained from each chamber, using bubblers. Samples will be drawn through the bubblers using a vacuum pump at a flow-rate maintained constant by a calibrated orifice. Samples will be drawn for a specific period, depending on the chamber concentration. The bubbler contents will then be analyzed using a calibrated analytical gas chromatograph located in the Analytical Chemistry Laboratory.

Additionally, the operation of the chamber-monitoring gas chromatograph will be checked daily against an on-line standard. This check provides a measure of day-to-day instrument drift. When an unacceptable level of drift of the on-line standard response factor is detected, the GC calibration will be checked by taking bubbler samples.

Daily operating procedures for the concentration monitoring system are contained in SOP #ØB-AC-3B1K. Routine maintenance and calibration of the GC is covered in SOP #ØB-AC-3CØS.

IV. ENVIRONMENTAL MONITORING

A. Temperature Measurements

Temperatures of the exposure chambers, exposure rooms and, if necessary, test chemical generators are measured by Resistance Temperature Devices (RTDs). The RTDs will be placed in a representative location in each chamber (a top sample port on the back side). Each RTD can be connected to an Omega Model 412B Digital Thermometer by a manual select switch or by computer controlled scanner relays in the CDS interface system (Figure 7). This allows temperature to be read manually or to be recorded automatically. All temperature measurement equipment except the RTDs will be located in the Suite Control Center. Temperatures will be automatically recorded at regular periods during each 24 hour day.

RTDs will be calibrated at least once every two months (ØB-BE-3CØD and ØB-BE-3CØL and ØB-BE-3DØ7). Calibration will generate values for offset and slope which will be entered into the computer for each RTD. Calibration data will be included as part of the study archive.

B. Relative Humidity Measurements

Relative humidity (RH) will be measured using a EG&G Model 910 chilled-mirror dewpoint hygrometer located in the Suite Control Center. Samples of the air from each measurement location will be pulled through individual polytetrafluoroethylene sample lines to a central location in the Suite Control Center (Figure 6). This assures a fresh sample of the air at the point of measurement. Air from exposure chambers will be sampled from a representative location (a top port on the back side). Sample air from a particular location passes through a three-way valve to the system exhaust. When the RH is to be measured at that location, the three-way valve is switched to divert the flow to the dewpoint hygrometer. The valve can be controlled by either a manual switch or by a computer controlled relay in the CDS interface. This allows RH to be measured manually or automatically. Once the dewpoint has been determined by the hygrometer, the RH is automatically calculated by the executive computer using the dewpoint value (T_1) and the drybulb temperature (T_2), measured simultaneously at that measurement location.

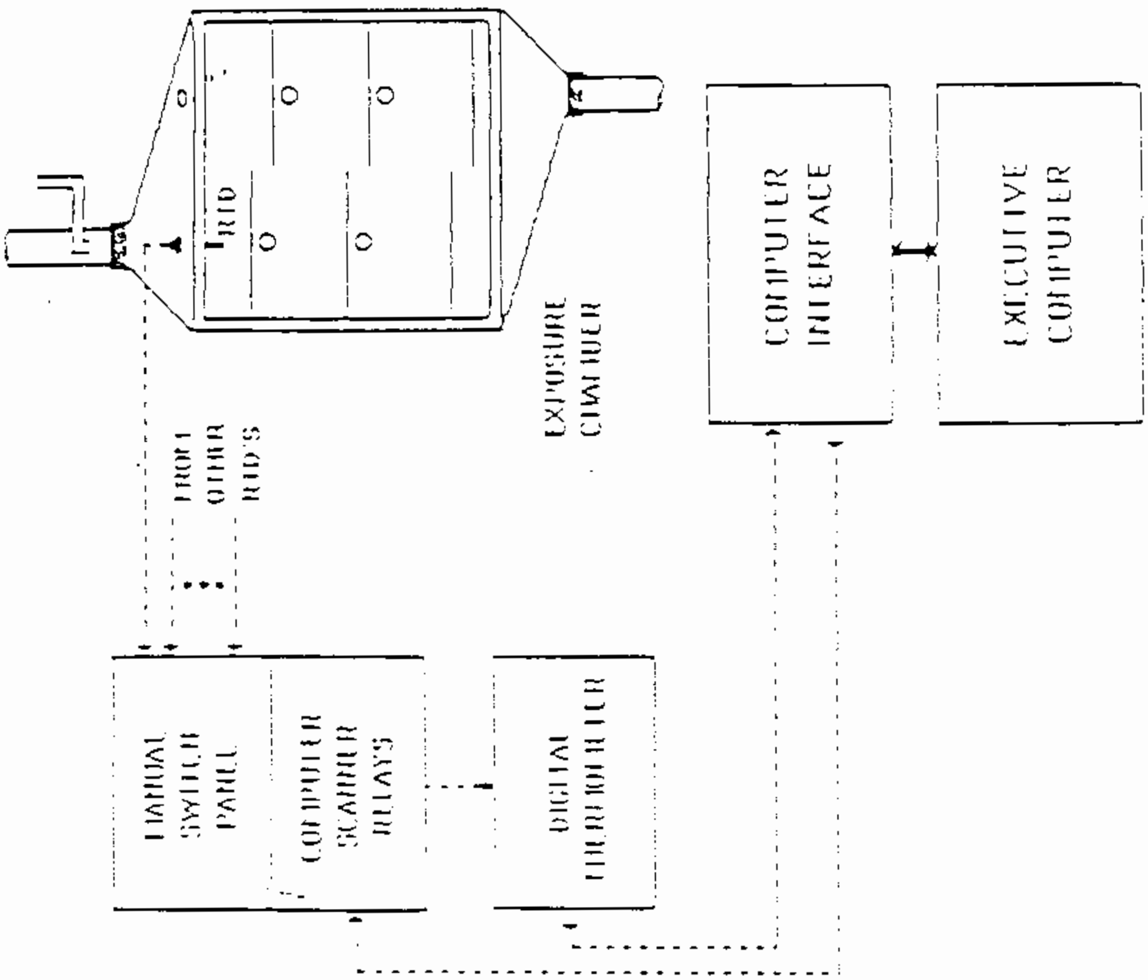


Figure 7. Schematic Diagram of Temperature Monitoring System

The following equation is used for this calculation:

$$\% \text{ RH} = \frac{10^{\left[9.91 - \frac{2714.55}{(5/9)(T_1-32)+293.3}\right]}}{10^{\left[9.91 - \frac{2714.55}{(5/9)(T_2-32)+293.3}\right]}} \times 100$$

where: T_1 = dewpoint temperature, °F
T_2 = drybulb temperature, °F

Calibration of the dewpoint hygrometer will be checked at least once every two months (ØB-BE-3CØJ and ØB-BE-3B1X). The procedure requires comparison of the RH calculated by the system monitor to measurements made by calibrated dewpoint hygrometer at the sample location. Calibration of the system monitor can be accomplished by inserting a value for offset and slope in the computer for each measurement location. Calibration data will be included as part of the study archive. Relative humidity will be recorded at regular periods during each 24 hour day.

C. Chamber Air Flow Measurements

Chamber air flow is measured by a multiplexed orifice-meter system (Figure 8). Calibrated flow orifices are installed at the inlet and exhaust of each chamber. The desired flow orifice is attached to a Validyne Model DP-45 pressure transducer and CD-18 carrier demodulator pressure-measurement system through Tygon® tubes by means of solenoid valves. The valves can be operated either by a manual switch or by computer activated relays in the CDS interface. This allows flow to be measured either manually or automatically. Pressure is read manually on a Validyne Model PM-12 voltmeter. Usually chamber flow will be measured using the exhaust flow orifice; however, following closing of the chamber doors, both inlet and exhaust flow measurements will be made and compared to determine if there are leaks in the chamber. If leaks are present, the executive computer will notify the operator and will not allow exposures to proceed until the leak is repaired.

All flow measurement equipment, except the multiplexed solenoid valves, is located in the Suite Control Center. Flow will be automatically recorded at regular intervals during the 24 hour day. The Validyne pressure transducer will be calibrated once each week (ØB-BE-3CØW, ØB-BE-3CØX and ØB-BE-3CØT). Calibration of the flow orifices will be checked once every two months (ØB-BE-3CØS and ØB-BE-3CØV). Calibration of each orifice will generate coefficients that will be inserted into the computer flow equation for each orifice.

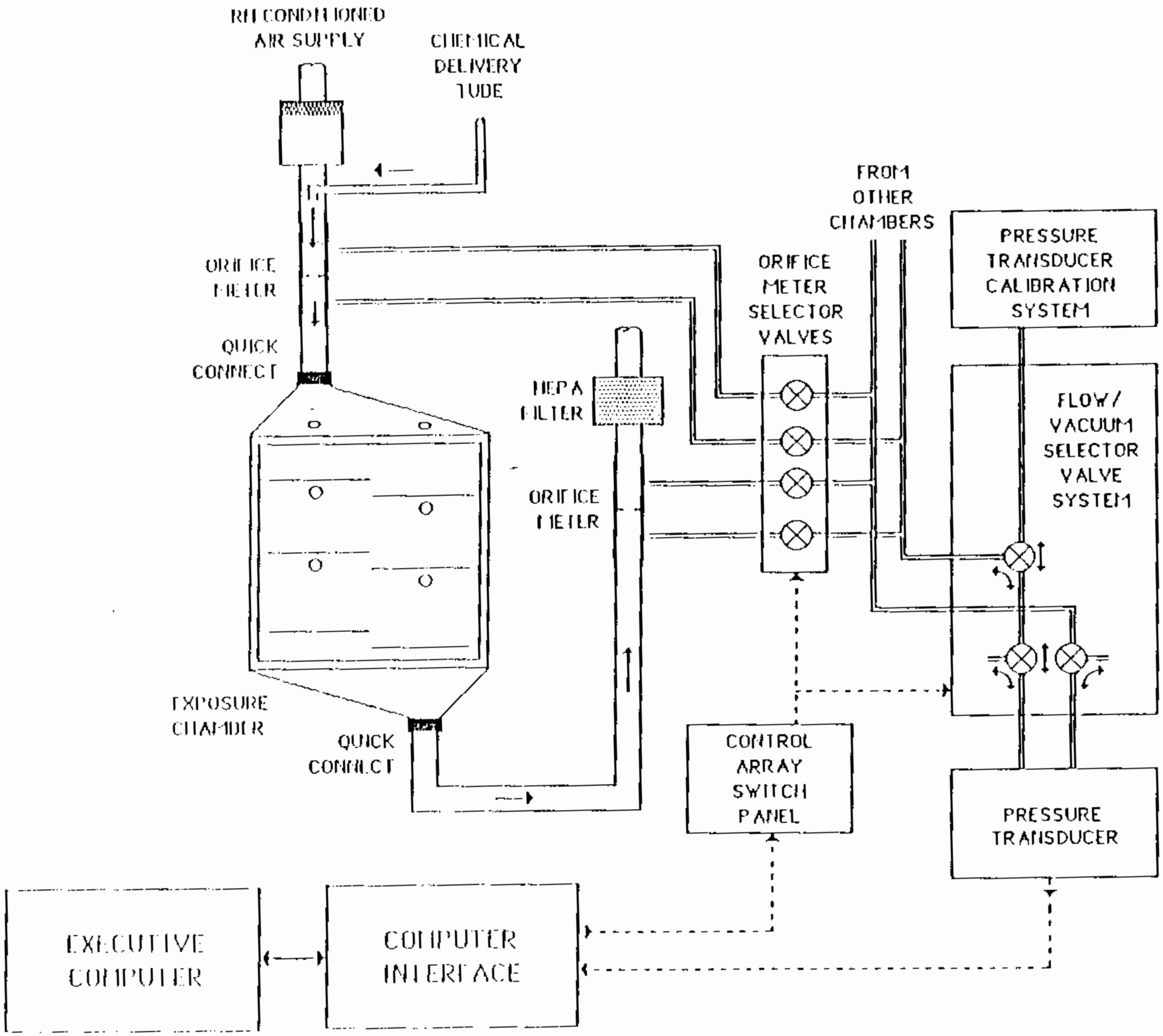


Figure 8. Schematic Diagram of the Chamber Flow and Vacuum Monitoring System

D. Chamber Vacuum Measurements

The same Validyne pressure transducer system used to measure chamber flows will be used to measure chamber vacuum (Figure 8). Vacuum in the chamber will be measured relative to atmospheric pressure in the Suite Control Room. Vacuum will be automatically recorded at regular intervals during the 24 hour day.

Vacuum will also be continuously monitored by a pressure switch mounted near each chamber. If the chamber should develop a leak (for example, a door inadvertently opened or a sample port stopper jarred loose), the pressure switch will immediately shut off the flow of compound to the chamber and alert the executive computer of the condition. The computer will activate an audio alarm and print and display a comment for the operator.

V. ENVIRONMENTAL CONTROLS

A. Animal Facility Air Handling System

Supply air enters the building through two identical parallel air handling systems (Figure 9). Each system consists of a pre-heat coil, a filter system, a heating coil, a chilling coil, and a supply fan. The pre-heat coil heats the air to a minimum of 45°F. The filter system - which includes a roll filter, pre-filter, and a bag filter - rids the air of most particles. The heating and chilling coils maintain the temperature of the air exiting the air conditioning system at about 53°F. The chilling coils also dry the air to a dewpoint not greater than 53°F.

B. Animal Room Air Handling System

The air from the two building air handling systems is then mixed together by an air mixing unit and is divided into two ducts which feed the rooms on East and West sides of the animal quarters. If necessary, steam is injected into the air in these ducts to maintain the relative humidity of the room.

C. Chamber Relative Humidity Control

Figure 10 shows a schematic diagram of the system used to control the relative humidity in the exposure chambers. Equipment located in the RH Control Equipment Room (Room 335) provides separate ducts of dry and moist air to each exposure chamber. A mixing valve, controlled by the computer, mixes the proper proportions of the moist and dry air to maintain the proper RH in each chamber.

Filtered air with a maximum dewpoint of about 53°F is supplied to the RH control equipment by the building air handling system. This air is evenly delivered to two ducts. Air from the first duct passes into a plenum where steam is injected to bring the air to a dewpoint of about 65°F. This provides moist air to the mixing valves. Steam is generated from city tap water with no additional additives. The air from the

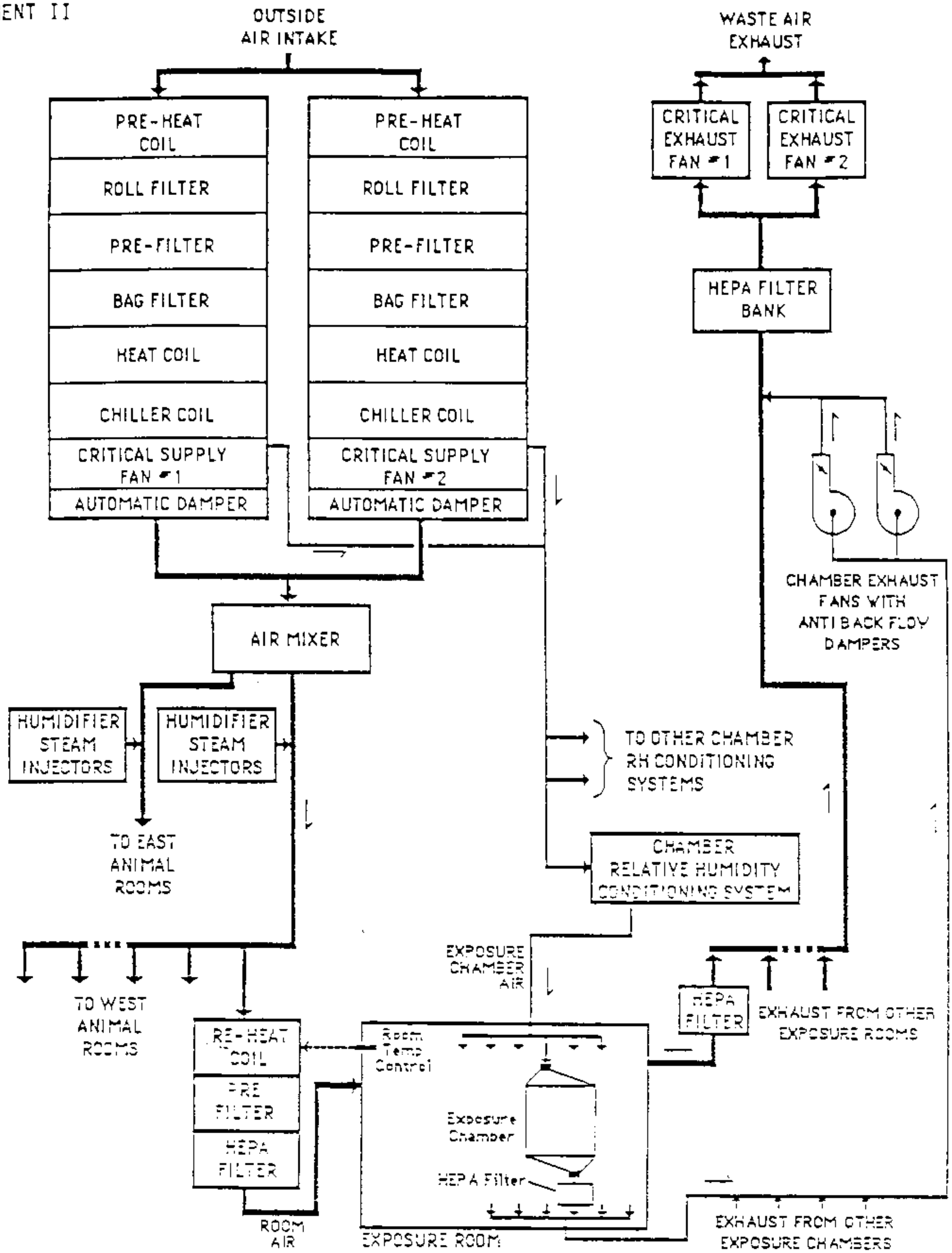


Figure 9. Air Handling System for Animal Rooms of Life Sciences II Building.

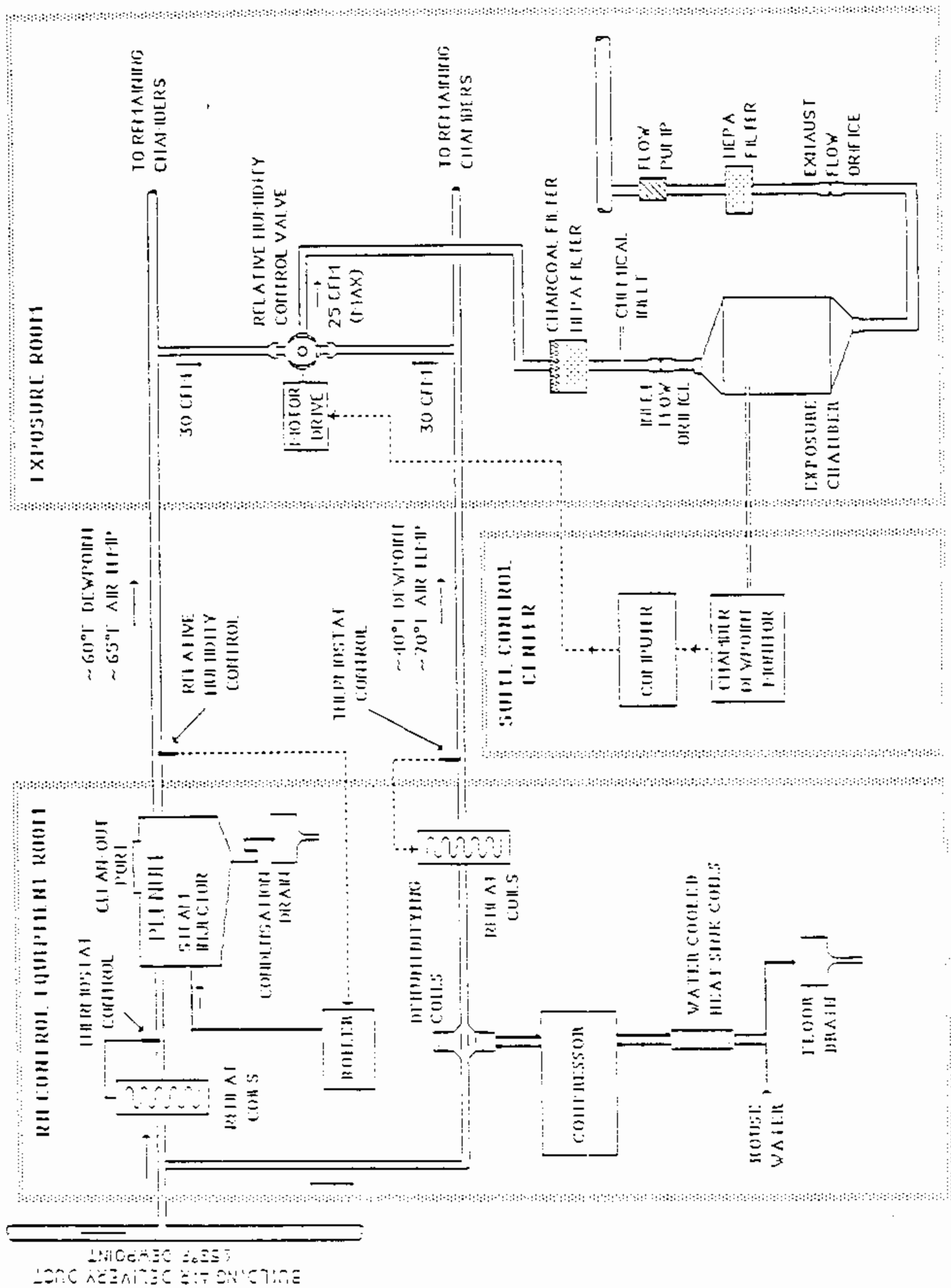


Figure 10. Schematic Diagram of Chamber Relative Humidity Control System

second duct passes through a refrigeration coil which reduces the moisture content of the air to a dewpoint of about 38°F. This provides "dry" air to the mixing valves.

Chamber RH is measured by the multiplexed dewpoint hygrometer. If the RH is found to be beyond the RH control range, the computer will calculate and make the appropriate adjustment to the mixing valve to bring the chamber RH to the desired target value.

D. Chamber Air Flow Control

Flow of air through the chambers is maintained by the vacuum in the central chamber exhaust duct (Figure 11). This vacuum is created by the chamber exhaust flow fans located in the South Equipment Room of the LSL-II Building. There are two parallel chamber exhaust fans. Only one fan is operational with the second acting as an automatic backup. Both fans operate from emergency power. Flow is controlled by a gate valve in the chamber exhaust duct. A drive motor, attached to the stem of this valve, allows the control of chamber flow either by computer or manually from the Exposure Control Center. The exhaust from the chambers is HEPA filtered to remove all particles which may impede the function of this valve. Fine control of exposure concentration can be accomplished by automatically or manually adjusting the valve position to control chamber flow within the allowable flow limits. Gross adjustment of concentration must be done by manual adjustment of the generation system.

Exhaust from all chambers is collected into a central chamber exhaust duct within the exposure room. The vacuum level in the central duct is automatically regulated by a motor driven feedback damper to prevent downstream pressure variations in building exhaust pressure from affecting chamber air flow rate.

The vacuum level in the central chamber exhaust duct is continuously monitored and alarmed. If the vacuum level in this duct falls 20% below normal, the monitor trips the alarm which immediately shuts off the test compound generator system. Maintenance and calibration of the exhaust duct monitor is covered in SOP# ØB-3E-3DØE.

E. Chamber Temperature Control

Nearly all of the heat load contributed to the exposure chamber by the animals is dissipated from the chamber by radiation through the chamber walls. Consequently, temperature of the air supplied to the chamber has little effect on the temperature of the chamber while, on the other hand, the temperature of the room housing the chamber has a great deal of effect. For this reason, the major method of chamber temperature will be control of the room temperature.

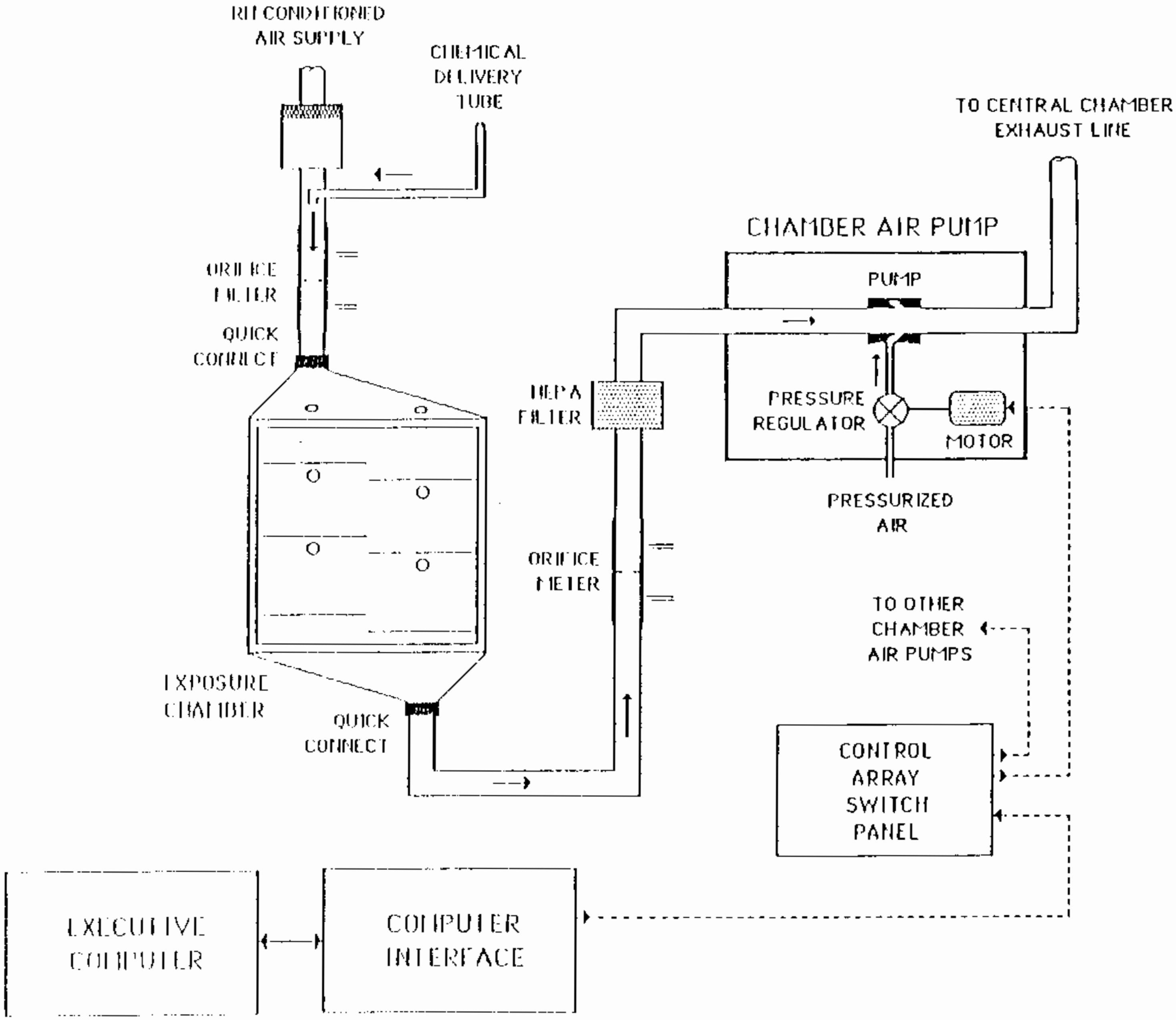


Figure II. Schematic Diagram of the Chamber Air Flow Pump and Air Flow Control System

VI. CHAMBER EXHAUST WASTE TREATMENT

The exhaust from the central chamber exhaust duct is mixed with the exhaust from the entire animal facility (75,000 cfm) prior to being exhausted from the building stack. Dilution of chamber exhaust with building exhaust results in an acceptable stack concentration of less than 1% of the ACGIH TWA TLV of 40 ppm.

VII. DATA HANDLING

Data from each exposure room are stored in the Exposure Suite Control Center on separate magnetic diskettes by Hewlett Packard Model 9121 micro-floppy disk drives. Data and comments from each exposure room are printed on separate thermal dot-matrix printers (Hewlett Packard Model 2671G). Data are printed and stored immediately upon completion of the measurement to a Daily Log (example, Figure 12). At the end of the day (24-hour-period), the daily data are analyzed and three summaries are printed. The first (Figure 13) includes the mean, standard deviation, maximum, minimum target values for each set of data for the 24-hour period. The second (Figure 14) provides a list of outliers; that is, all data points which were beyond the defined critical operating limits. This printout allows quick review of problem areas during exposure. The final summary (Figure 15) is a printout of all comments made by the computer and Exposure Specialist and Operator during the 24-hour period. This includes comments on startup time, exposure termination, new calibration factors entered and other information which allows a quick review of events that occurred during the day.

Data handling and analysis procedures are described in the following SOPs ØB-9A-3EØ6, ØB-BE-3EØB, and ØB-BE-3EØE.

VIII. EQUIPMENT OR POWER FAILURE PROTECTION SYSTEMS

In the event of equipment failure, or of a short-term power failure, two parameters must be considered most important to the well-being of the animals - temperature and air flow. To understand the factors protecting against either of these two parameters becoming life-threatening to the animals, one must understand both the emergency power system and the emergency air handling equipment.

Power is provided to the Battelle complex from two separate city substations through an automatic switching device. This significantly reduces the possibility of losing city power. Power from the city is routed to equipment in LSL-II through two types of motor control centers. One type can switch power to the equipment from either city power or emergency power from the LSL-II diesel generator. The other has access only to city power. The emergency-power-type motor control center has a low voltage detector on each leg of the three-phase input power. If the city-supplied power should fail or "brown out", these detectors automatically start the emergency power diesel generator, and route the emergency power to the equipment supplied by the motor control center.

Time	Data Origin	Function	Data	
	HCCP- 200 ppm-R	-T90 Time Expired-Including Conc Data		
	HCCP- 50 ppm-M	-T90 Time Expired-Including Conc Data		
	HCCP- 50 ppm-R	-T90 Time Expired-Including Conc Data		
	HCCP- 10 ppm-M	-T90 Time Expired-Including Conc Data		
09:54	Hewlett Packard 9816 (Access Level: Programmer)			
	HCCP- 10 ppm-R	-T90 Time Expired-Including Conc Data		
09:53	Hewlett Packard 856 (Access Level: Specialist)			
	HCCP- 10 ppm-R-GC Data Excluded-Data Time<T90 Time & Data<Target			
	Low Limit Exceeded.	(Data not stored to disk)		
09:59	HCCP- 50 ppm-R	GC#18-809555	(OK) 4.449E+1 ppm	89%
	High Limit Exceeded.	(Data not stored to disk)		
10:02	HCCP- 50 ppm-M	GC#18-809555	)OK) 5.649E+1 ppm	113%
	High Limit Exceeded.	(Data not stored to disk)		
10:09	HCCP- 200 ppm-M	GC#18-809555	)OK) 2.220E+2 ppm	111%
09:40	HCCP- Room	GC#18-809555	OK 0.000E+0 ppm	0%
09:43	HCCP- 0 ppm-M-SE	GC#18-809555	OK 0.000E+0 ppm	0%
09:45	HCCP- 0 ppm-R	GC#18-809555	OK 0.000E+0 ppm	0%
09:50	HCCP- 0 ppm-M	GC#18-809555	OK 0.000E+0 ppm	0%
09:53	Hewlett Packard 856 (Access Level: Specialist)			
	HCCP- 10 ppm-R-GC Data Excluded-Data Time<T90 Time & Data<Target			
09:53	HCCP- 10 ppm-R	GC#18-809555	OK [illegible] ppm	[illegible]
09:55	HCCP- 10 ppm-M	GC#18-809555	OK 9.110E+0 ppm	[illegible]
09:59	HCCP- 50 ppm-R	GC#18-809555	(OK 4.449E+1 ppm	89%
10:02	HCCP- 50 ppm-M	GC#18-809555	)OK 5.649E+1 ppm	113%
10:05	HCCP- 200 ppm-R	GC#18-809555	OK 2.041E+2 ppm	102%
10:09	HCCP- 200 ppm-M	GC#18-809555	)OK 2.220E+2 ppm	111%
10:12	HCCP- Standard Gas	GC#18-809555	OK [illegible] ppm	[illegible]
10:21	HCCP- Room	GC#18-809555	OK 0.000E+0 ppm	0%
10:24	HCCP- 0 ppm-M-SE	GC#18-809555	OK 0.000E+0 ppm	0%
10:28	HCCP- 0 ppm-R	GC#18-809555	OK 0.000E+0 ppm	0%
10:31	HCCP- 0 ppm-M	GC#18-809555	OK 0.000E+0 ppm	0%
[illegible]	HCCP- 10 ppm-[illegible]	GC#18-809555	OK [illegible] ppm	[illegible]
10:37	HCCP- 10 ppm-M	GC#18-809555	OK [illegible] ppm	[illegible]
10:40	HCCP- 50 ppm-R	GC#18-809555	OK [illegible] ppm	[illegible]
10:44	HCCP- 50 ppm-M	GC#18-809555	OK [illegible] ppm	105%
10:47	HCCP- 200 ppm-R	GC#18-809555	OK [illegible] ppm	[illegible]
[illegible]	HCCP- 200 ppm-M	GC#18-809555	OK [illegible] ppm	[illegible]
10:55	HCCP- Standard Gas	GC#18-809555	OK [illegible] ppm	[illegible]
11:12	HCCP- Vaporizer	Temperature	OK 180.1 F	100%
11:14	HCCP- Room	Temperature	(OK [illegible] F	[illegible]
11:32	HCCP- 200 ppm-M	Relative Humidity	OK [illegible] %	[illegible]
[illegible]	HCCP- 200 ppm-[illegible]	Relative Humidity	OK [illegible]	[illegible]

Figure 12. Example of "Daily Log" Printout from Data Acquisition and Control Computer. See following page for explanation of columns

Figure 12, (continued)

DESCRIPTION COMPUTER "LOG BOOK" OUTPUT

The exposure number, exposure name, program version and exposure date will be printed at the top of every report page.

Time--This is the far left column. This is the time that the measurement was taken.

Location--This identifies where the data came from. Also referred to in the menus as "Location". This column allows for 20 characters.

Function--This identifies which function was used to take the reading. This column allows for 20 characters.

Data--This is the raw data. This column includes an alarm code, a status code, the data value and a units label.

Alarm code-- "(" means that the data has exceeded non-critical alarm limits.
"<" means that the data has exceeded critical alarm limits.

Status code-- OKI - Okay and calibrated. Data is included in summary.
OKE - Okay and calibrated. Data is not included in summary.
BSI - Beyond service time*. Data is included in summary.
BSE - Beyond service time*. Data is not included in summary

*"Beyond Service Time" indicates that the "Function" used to measure the data has not been serviced as scheduled. It does not necessarily mean that the data is not valid.

Data format-- Data will be expressed as four significant digits with non significant zeros suppressed. Number of decimal points is specified in the Function Assignments Menu.
Examples: DDDD.
DDD.D
DD.DD
D.DDD
.DDDD
D.DDDESI

Units label-- This column allows 9 characters. Examples: ppm, °F, °C, HOH.

NOTE: At almost any time during the exposure day, a comment can be entered from the keyboard. The first line of the comment will show the time and the operator's full name. The following lines will contain the body of the comment.

Summation for the File: jun_11_87   Exposure: hexaChloroCycloPentaDiene

Exhaust Air Flow	Mean	% Target	Std Dev	% RSD	Maximum	Minimum	Num X's
HCCP- 200 ppb-M	14.7	98%	.14	1%	14.8	14.4	8.
HCCP- 200 ppb-R	14.9	99%	.07	0%	15.0	14.8	8.
HCCP- 50 ppb-M	14.8	99%	.05	0%	14.9	14.7	8.
HCCP- 50 ppb-R	14.8	99%	.12	1%	15.0	14.7	8.
HCCP- 10 ppb-M	14.9	100%	.05	0%	15.0	14.8	8.
HCCP- 10 ppb-R	15.0	100%	.07	0%	15.1	14.9	8.
HCCP- 0 ppb-M	14.8	99%	.19	1%	15.0	14.3	8.
HCCP- 0 ppb-R	14.2	95%	.53	5%	15.1	13.5	8.
HCCP- 0 ppb-M-SE	15.0	100%	.04	0%	15.0	14.9	8.

Vacuum	Mean	% Target	Std Dev	% RSD	Maximum	Minimum	Num X's
HCCP- 200 ppb-M	.8	78%	.02	2%	.8	.8	8.
HCCP- 200 ppb-R	1.0	95%	.01	1%	1.0	.9	8.
HCCP- 50 ppb-M	.9	93%	.02	2%	1.0	.9	8.
HCCP- 50 ppb-R	.8	84%	.01	1%	.8	.8	8.
HCCP- 10 ppb-M	1.3	125%	.01	1%	1.3	1.2	8.
HCCP- 10 ppb-R	1.0	95%	.01	1%	1.0	.9	8.
HCCP- 0 ppb-M	1.0	104%	.02	2%	1.1	1.0	8.
HCCP- 0 ppb-R	1.1	108%	.10	9%	1.2	1.0	8.
HCCP- 0 ppb-M-SE	1.1	105%	.01	1%	1.1	1.0	8.

Relative Humidity	Mean	% Target	Std Dev	% RSD	Maximum	Minimum	Num X's
HCCP- 200 ppb-M	56.1	102%	4.45	8%	64.0	49.0	8.
HCCP- 200 ppb-R	54.2	99%	5.57	10%	61.0	47.0	8.
HCCP- 50 ppb-M	54.8	99%	4.47	8%	58.0	47.0	8.
HCCP- 50 ppb-R	54.9	100%	9.09	17%	65.0	43.0	8.
HCCP- 10 ppb-M	55.5	101%	5.10	9%	61.0	46.0	8.
HCCP- 10 ppb-R	58.5	107%	7.23	12%	67.0	46.0	8.
HCCP- 0 ppb-M	55.5	101%	4.24	8%	62.0	49.0	8.
HCCP- 0 ppb-R	58.5	107%	6.98	12%	66.0	46.0	8.
HCCP- 0 ppb-M-SE	58.1	107%	5.31	9%	67.0	50.0	8.

Temperature	Mean	% Target	Std Dev	% RSD	Maximum	Minimum	Num X's
HCCP- Vaporizer	180.2	100%	.13	0%	180.4	180.0	8.
HCCP- Room	68.8	97%	.55	1%	70.5	68.0	8.
HCCP- 200 ppb-M	74.7	100%	.35	1%	75.2	73.8	8.
HCCP- 200 ppb-R	74.5	99%	.48	1%	[illegible]	73.8	8.
HCCP- 50 ppb-M	72.5	97%	.25	[illegible]	[illegible]	[illegible]	8.
HCCP- 50 ppb-R	75.5	101%	.74	1%	76.5	74.2	8.
HCCP- 10 ppb-M	74.3	99%	.35	1%	[illegible]	73.[illegible]	8.
HCCP- 10 ppb-R	75.2	100%	.41	1%	75.8	74.5	8.
HCCP- 0 ppb-M	74.8	100%	.73	1%	75.5	74.1	8.
HCCP- 0 ppb-R	74.[illegible]	99%	.32	0%	74.6	73.5	8.
HCCP- 0 ppb-M-SE	73.2	98%	.84	1%	75.0	72.1	8.

[illegible]	Mean	% Target	Std Dev	% RSD	Maximum	Minimum	Num X's
HCCP- 200 ppb-M	2.09E+2	104%	5.65E+0	3%	2.22E+2	1.98E+2	8.
HCCP- 200 ppb-R	2.06E+2	103%	5.23E+0	3%	2.12E+2	1.94E+2	8.

Figure 13. Example of 24-Hour Data "Summation" Printout from Data Acquisition and Control Computer. Data are organized by data type.

Outlier Table for the File: Jun_11_87 Exposure: HexaChloroCycloPentaDiene

Origin	Instrument	Time	Data	Lower	Target	Higher
No Outlier (Critical Limits exceeded) data points found.						

Figure 14. Example of 24-Hour Data "Outlier Table" Printout from Data Acquisition and Control Computer. Table shows data which were beyond the defined operating limits.

Daily Comments HexaChloroCycloPentaDiene File: jun_11_87

Time	Operator	Comment
09:14	David J. Bailey	Chamber Leak Check for HCCP- 10 ppm-M
09:14	David J. Bailey	Exhaust Flow=14.9 Inlet Flow=14.5 (2.7% leak) [Acceptable]
09:15	David J. Bailey	Chamber Leak Check for HCCP- 10 ppm-R
09:15	David J. Bailey	Exhaust Flow=15 Inlet Flow=14.9 (.7% leak) [Acceptable]
09:16	David J. Bailey	Chamber Leak Check for HCCP- 0 ppm-M
09:16	David J. Bailey	Exhaust Flow=14.5 Inlet Flow=14.5 (0% leak) [Acceptable]
09:16	David J. Bailey	Chamber Leak Check for HCCP- 0 ppm-R
09:16	David J. Bailey	Exhaust Flow=14.9 Inlet Flow=14.9 (0% leak) [Acceptable]
09:17	David J. Bailey	Chamber Leak Check for HCCP- 0 ppm-M-SE
09:17	David J. Bailey	Exhaust Flow=15 Inlet Flow=15.3 (-2% leak) [Acceptable]
09:17	David J. Bailey	All Chambers have been found ACCEPTABLE.
09:28	Hewlett Packard 858	HCCP- Standard Gas-GC Data Excluded-No Exposure at Data Time
09:32	Hewlett Packard 858	HP858 found Parameters Okay & Ready for Exposure Start.
09:33	Hewlett Packard 9816	Exposure Timing started. [Time=T(0)]
09:33	Hewlett Packard 9816	Generator ON
09:34	Hewlett Packard 9816	HCCP- 200 ppm-M -ON Exposure-Enable Environ Data Collection
09:34	Hewlett Packard 9816	HCCP- 200 ppm-R -ON Exposure-Enable Environ Data Collection
09:34	Hewlett Packard 9816	HCCP- 50 ppm-M -ON Exposure-Enable Environ Data Collection
09:34	Hewlett Packard 9816	HCCP- 50 ppm-R -ON Exposure-Enable Environ Data Collection
09:34	Hewlett Packard 9816	HCCP- 10 ppm-M -ON Exposure-Enable Environ Data Collection
09:34	Hewlett Packard 9816	HCCP- 10 ppm-R -ON Exposure-Enable Environ Data Collection
09:54	Hewlett Packard 9816	HCCP- 200 ppm-M -T90 Time Expired-Including Conc Data
09:54	Hewlett Packard 9816	HCCP- 200 ppm-R -T90 Time Expired-Including Conc Data
09:54	Hewlett Packard 9816	HCCP- 50 ppm-M -T90 Time Expired-Including Conc Data
09:54	Hewlett Packard 9816	HCCP- 50 ppm-R -T90 Time Expired-Including Conc Data
09:54	Hewlett Packard 9816	HCCP- 10 ppm-M -T90 Time Expired-Including Conc Data
09:54	Hewlett Packard 9816	HCCP- 10 ppm-R -T90 Time Expired-Including Conc Data
09:53	Hewlett Packard 858	HCCP- 10 ppm-M-GC Data Excluded-Data Time<T90 Time & Data<Target
09:53	Hewlett Packard 858	HCCP- 10 ppm-R-GC Data Excluded-Data Time<T90 Time & Data<Target
15:54	Hewlett Packard 9816	Exposure Terminated. Exposure timers stopped.
15:54	Hewlett Packard 9816	Generator OFF
15:54	Hewlett Packard 9816	HCCP- 200 ppm-M -OFF Exposure-Enable Environ Data Collection
15:54	Hewlett Packard 9816	HCCP- 200 ppm-M Total Exposure Time=06:00:09
15:54	Hewlett Packard 9816	HCCP- 200 ppm-R -OFF Exposure-Enable Environ Data Collection
15:54	Hewlett Packard 9816	HCCP- 200 ppm-R Total Exposure Time=06:00:11
15:54	Hewlett Packard 9816	HCCP- 50 ppm-M -OFF Exposure-Enable Environ Data Collection
15:54	Hewlett Packard 9816	HCCP- 50 ppm-M Total Exposure Time=06:00:12
15:54	Hewlett Packard 9816	HCCP- 50 ppm-R -OFF Exposure-Enable Environ Data Collection
15:54	Hewlett Packard 9816	HCCP- 50 ppm-R Total Exposure Time=06:00:14
15:54	Hewlett Packard 9816	HCCP- 10 ppm-M -OFF Exposure-Enable Environ Data Collection
15:54	Hewlett Packard 9816	HCCP- 10 ppm-M Total Exposure Time=06:00:16
15:54	Hewlett Packard 9816	HCCP- 10 ppm-R -OFF Exposure-Enable Environ Data Collection
15:54	Hewlett Packard 9816	HCCP- 10 ppm-R Total Exposure Time=06:00:17
16:13	Hewlett Packard 9816	Environmental Data from Chambers 'Off-line' not monitored.
16:13	Hewlett Packard 9816	HCCP- 200 ppm-M -OFF Exposure-Disable Environ Data Collection
16:13	Hewlett Packard 9816	HCCP- 200 ppm-R -OFF Exposure-Disable Environ Data Collection
16:13	Hewlett Packard 9816	HCCP- 50 ppm-M -OFF Exposure-Disable Environ Data Collection
16:13	Hewlett Packard 9816	HCCP- 50 ppm-R -OFF Exposure-Disable Environ Data Collection
16:13	Hewlett Packard 9816	HCCP- 10 ppm-M -OFF Exposure-Disable Environ Data Collection
16:13	Hewlett Packard 9816	HCCP- 10 ppm-R -OFF Exposure-Disable Environ Data Collection

Figure 15. Example of 24-Hour "Comment" Printout from Data Acquisition and Control Computer

All equipment critical to the well-being of the animals is connected to the emergency-power-type motor control centers. A list of this equipment is as follows:

- Emergency lighting and electrical outlets
- Chillers #1 and #2
- Boiler and feedwater pump systems #1 and #2
- Air compressors #1 and #2
- Air supply fans #1 and #2
- Air exhaust fans #1 and #2

It should be noted that there are two identical units of all of the equipment that are vital to the well-being of the animals (heating, cooling, supply air, exhaust air, and compressed air). Either of the two units has sufficient capacity to maintain the animal environment within a safe range. In all cases, the emergency power system will operate one of the two identical units. If, during a power outage, the unit of equipment that is on emergency power should happen to fail, the other unit of identical equipment can be manually switched to run on emergency power.

All building or chamber systems which are essential to the survival of the animals are alarmed. If a system malfunctions, an alarm is tripped in the power operator's office. A power operator is on duty 24 hours/day, 7 days/week. If the power operator is not authorized to correct the problem that caused the alarm, he immediately calls the appropriate personnel, including the Task Leader(s) or the Principal Investigator(s) of the program(s) affected.

References

Griffis, L.C., R.K. Wolff, R.L. Beethe, et. al. (1981). Evaluation of a multi-tiered inhalation exposure chamber. Fund. Appl. Toxicol. 1:8-12.

Bernstein, D.M. and R.T. Drew. 1980. The major parameters affecting temperature inside inhalation chambers. AIHAJ, (41) 6/80, pp. 420-426.

PROJECT: NTP-IRT

STUDY: RAT TERATOLOGY

ROOM: 436

CHEMICAL: ACETONE

CHAMBER: 1 [illegible]

DATE: 10 / 30 / 87 To 11 / 3 / 87 FJB

LEVEL 2

CAGE			CAGE
12			24
11			23
10	809		22
9	810		21
8	707		20
7	797		19
6	764	772	18
5	746	706	17
4	741	694	16
3	716	GRP C ↑	15
2	668	890	14
1	660	730	13
	GRP A ↑	GRP B ↑	

LEVEL 3

CAGE			CAGE
12			24
11			23
10	992		22
9	874		21
8	813		20
7	805		19
6	778		18
5	749		17
4	731	896	16
3	703	923	15
2	701	732	14
1	661	652	13
	GRP D ↑	GRP E ↑	

LEVEL 4

CAGE			CAGE
12			24
11			23
10		856	22
9		852	21
8		851	20
7	824	855	19
6	806	753	18
5	773	775	17
4	729	770	16
3	699	753	15
2	684	740	14
1	658	670	13
	GRP A - KETONE	VIRGINS ↑	

LEVEL 5

CAGE			CAGE
12			24
11			23
10			22
9			21
8			20
7			19
6			18
5			17
4			16
3			15
2			14
1			13

COMMENTS

PROJECT: NTP-IRT

STUDY: RAT TERATOLOGY

ROOM: 436

CHEMICAL: ACETONE

CHAMBER: 2 440 PPM

DATE: 10 / 20 / 87

#2 RJB

11/8/87

LEVEL 2

CAGE			CAGE
12			24
11			23
10	804		22
9	761		21
8	758		20
7	756	855	19
6	747	814	18
5	728	631	17
4	723	GRP C↑	16
3	720	877	15
2	675	726	14
1	662	664	13
	GRP A ↑	GRP B ↑	

LEVEL 3

CAGE			CAGE
12			24
11			23
10	870		22
9	849		21
8	846		20
7	829		19
6	819		18
5	801	913	17
4	792	912	16
3	763	881	15
2	748	864	14
1	663	832	13
	GRP D ↑	GRP E ↑	

LEVEL 4

CAGE			CAGE
12			24
11			23
10	905		22
9	882		21
8	861		20
7	838	894	19
6	937	879	18
5	810	839	17
4	803	794	16
3	790	799	15
2	744	735	14
1	669	710	13
	VIRGINS ↑	GRP B-KETONE↑	

LEVEL 5

CAGE			CAGE
12			24
11			23
10			22
9			21
8			20
7			19
6			18
5			17
4			16
3			15
2			14
1			13

COMMENTS

PROJECT: NTP-IRT
STUDY: RAT TERATOLOGY
ROOM: 436

CHEMICAL: ACETONE
CHAMBER: 3 2200 PPM
DATE: 10 / 20 /87 TO 11 / 8 /87 PJB

LEVEL 2

CAGE			CAGE
12			24
11	822		23
10	791		22
9	769		21
8	745		20
7	735	908	19
6	727	704	18
5	719	679	17
4	712	651	16
3	705	GRP C ↑	15
2	666	891	14
1	655	889	13
	GRP A ↑	GRP B ↑	

LEVEL 3

CAGE			CAGE
12			24
11			23
10	910		22
9	888		21
8	879		20
7	868		19
6	834		18
5	823		17
4	799	873	16
3	780	867	15
2	736	865	14
1	734	863	13
	GRP D ↑	GRP E ↑	

LEVEL 4

CAGE			CAGE
12			24
11			23
10	916		22
9	909		21
8	841		20
7	840	900	19
6	826	887	18
5	796	872	17
4	768	871	16
3	754	783	15
2	737	718	14
1	724	677	13
	VIRGINS ↑	GRP C-KETONE ↑	

LEVEL 5

CAGE			CAGE
12			24
11			23
10			22
9			21
8			20
7			19
6			18
5			17
4			16
3			15
2			14
1			13

COMMENTS

PROJECT: NTP-IRT

STUDY: RAT TERATOLOGY

ROOM: 430

CHEMICAL: ACETONE

CHAMBER: 4 11 DOC DAM

DATE: 10 / 30 / 87
11 / 8 / 87 PJB

LEVEL 2

CAGE			CAGE
12			24
11	920		23
10	917		22
9	781		21
8	776		20
7	771		19
6	765	818	18
5	722	732	17
4	711	697	16
3	698	GRP C ↑	15
2	679	884	14
1	654	842	13
	GRP A ↑	GRP B ↑	

LEVEL 3

CAGE			CAGE
12			24
11			23
10	911		22
9	904		21
8	876		20
7	860		19
6	843		18
5	831		17
4	828	906	16
3	782	901	15
2	742	869	14
1	657	693	13
	GRP D ↑	GRP E ↑	

LEVEL 4

CAGE			CAGE
12			24
11			23
10	915		22
9	883		21
8	762		20
7	759	897	19
6	743	859	18
5	733	858	17
4	713	717	16
3	702	714	15
2	692	696	14
1	667	656	13
	VIRGINS ↑	GRP D-KETONE ↑	

LEVEL 5

CAGE			CAGE
12			24
11			23
10			22
9			21
8			20
7			19
6			18
5			17
4			16
3			15
2			14
1			13

COMMENTS

PROJECT: NTP-IRT
STUDY: MOUSE TERATOLOGY
ROOM: 436

CHEMICAL: ACETONE
CHAMBER: 1 Ø ppm
DATE: 12-6-87
HWH

LEVEL 3

		1272	
		1249	
		1135	
	1213	1179	1212
1131	1180	1092	1209
1123	1176	1080	1202
1079	1164	1052	1193
1064	1125	1015	1162
1006	1036	1010	1045
GRP A	GRP B	GRP C	GRP D

LEVEL 4

		1325	
		1323	
		1319	
1306		1295	
1293		1288	
1289		1231	
1254		1199	
1239		1157	
1225		1121	
1078		1057	
GRP E		VIRGINS	

COMMENTS

PROJECT: NTP-IRT

STUDY: MOUSE TERATOLOGY

ROOM: 436

CHEMICAL: ACETONE

CHAMBER: 2 440 ppm

DATE: 12-6-87
HWH

LEVEL 3

		1321	
		1317	
		1274	
		1270	
	1182	1261	
1132	1161	1251	1238
1104	1128	1171	1199
1042	1034	1156	1147
1032	1029	1066	1093
1001	1002	1033	1069
GRP A	GRP B	GRP C	GRP D

LEVEL 4

		1324	
		1301	
		1234	
1308		1222	
1294		1219	
1287		1183	
1279		1151	
1271		1107	
1215		1103	
1149		1071	
GRP E		VIRGINS	

COMMENTS

PROJECT: NTP-IRT
STUDY: MOUSE TERATOLOGY
ROOM: 436

CHEMICAL: ACETONE
CHAMBER: 3 2200 ppm
DATE: 12-6-87 HWH

LEVEL 3

		1312	
		1284	
		1253	
	1208	1165	1201
1187	1181	1155	1178
1167	1169	1086	1138
1150	1137	1063	1094
1136	1088	1049	1050
1119	1037	1017	1035
GRP A	GRP B	GRP C	GRP D

LEVEL 4

		1278	
		1256	
		1210	
1328		1168	
1296		1148	
1291		1124	
1260		1095	
1244		1072	
1233		1062	
1220		1041	
GRP E		VIRGINS	

COMMENTS

PROJECT: NTP-IRT

STUDY: MOUSE TERATOLOGY

ROOM: 436

CHEMICAL: ACETONE

CHAMBER: 4 ~~4000~~ 3000 ppm ①

DATE: 12-6-87 to 12-13-87

NWH

① Dose level change 12-~~5~~3-87

RLR

recording error RBK 12-3-

LEVEL 3

		1330	
		1259	
		1232	
	1174	1172	1297
1158	1142	1144	1256
1118	1073	1099	1204
1045	1023	1026	1061
1019	1022	1025	1060
1011	1009	1014	1030
GRP A	GRP B	GRP C	GRP D

LEVEL 4

		1322	
		1314	
		1264	
1292		1207	
1263		1192	
1255		1189	
1248		1186	
1241		1154	
1236		1070	
1024		1031	
GRP E		VIRGINS	

COMMENTS

DISTRIBUTION

No. of
Copies

OFFSITE

2 DOE/Office of Scientific
and Technical Information

D. Smith
U.S. Department of Energy
ER-72, GTN
Washington, D.C. 20545

10 R.E. Morrissey and
B.A. Schwetz
National Toxicology Program - NIEHS
Alexander Drive
Bldg. 101, Room D440
Research Triangle Park, NC 27709

E.B. Ford
National Institute of Environmental Health Sciences
Contracts Management Office, OAM
79 Alexander Drive, Bldg. 4401
P.O. Box 12874
Research Triangle Park, NC 27709

ONSITE

DOE Richland Operations Office

E.C. Norman/D.L. Sours

20 Pacific Northwest Laboratory

E.M. Crow (2)
R.A. Gelman
T.J. Mast (11)
Publishing Coordination
Technical Report Files (5)