

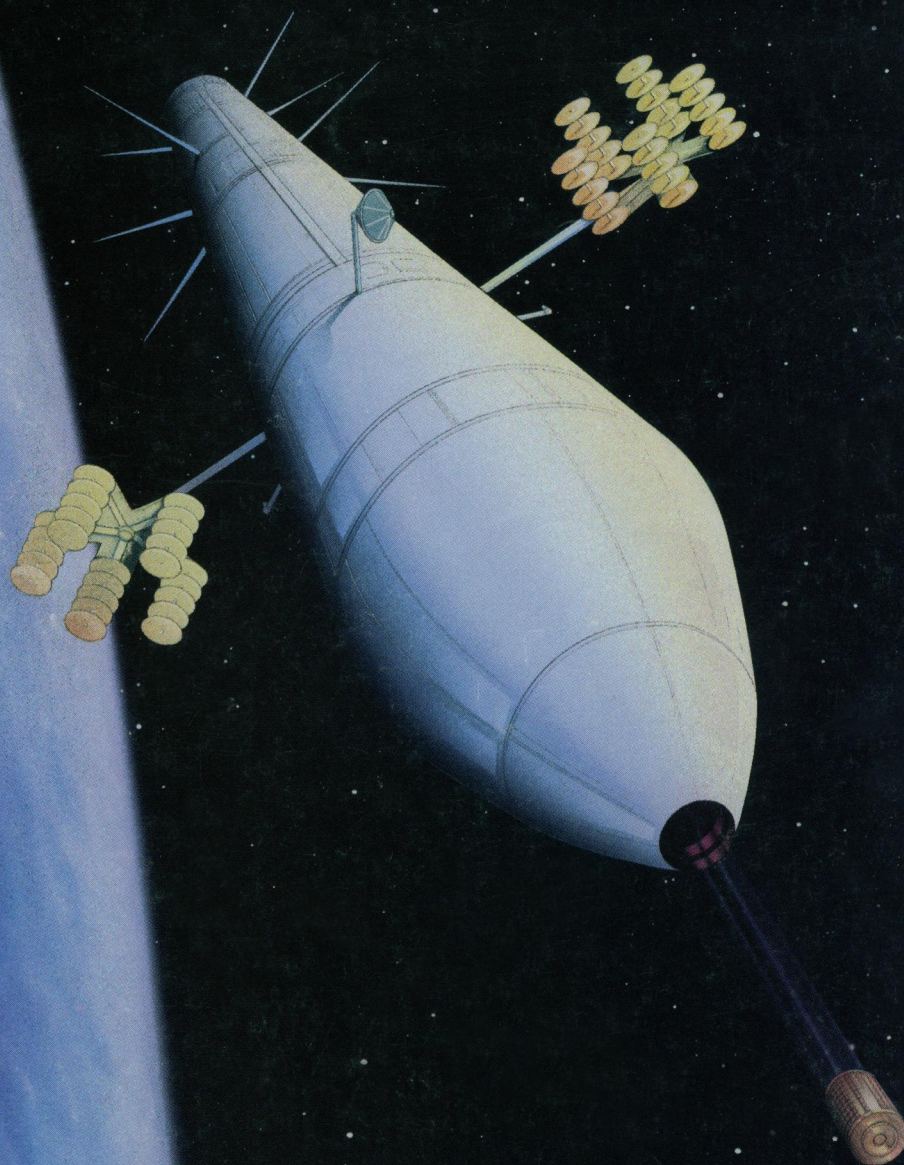
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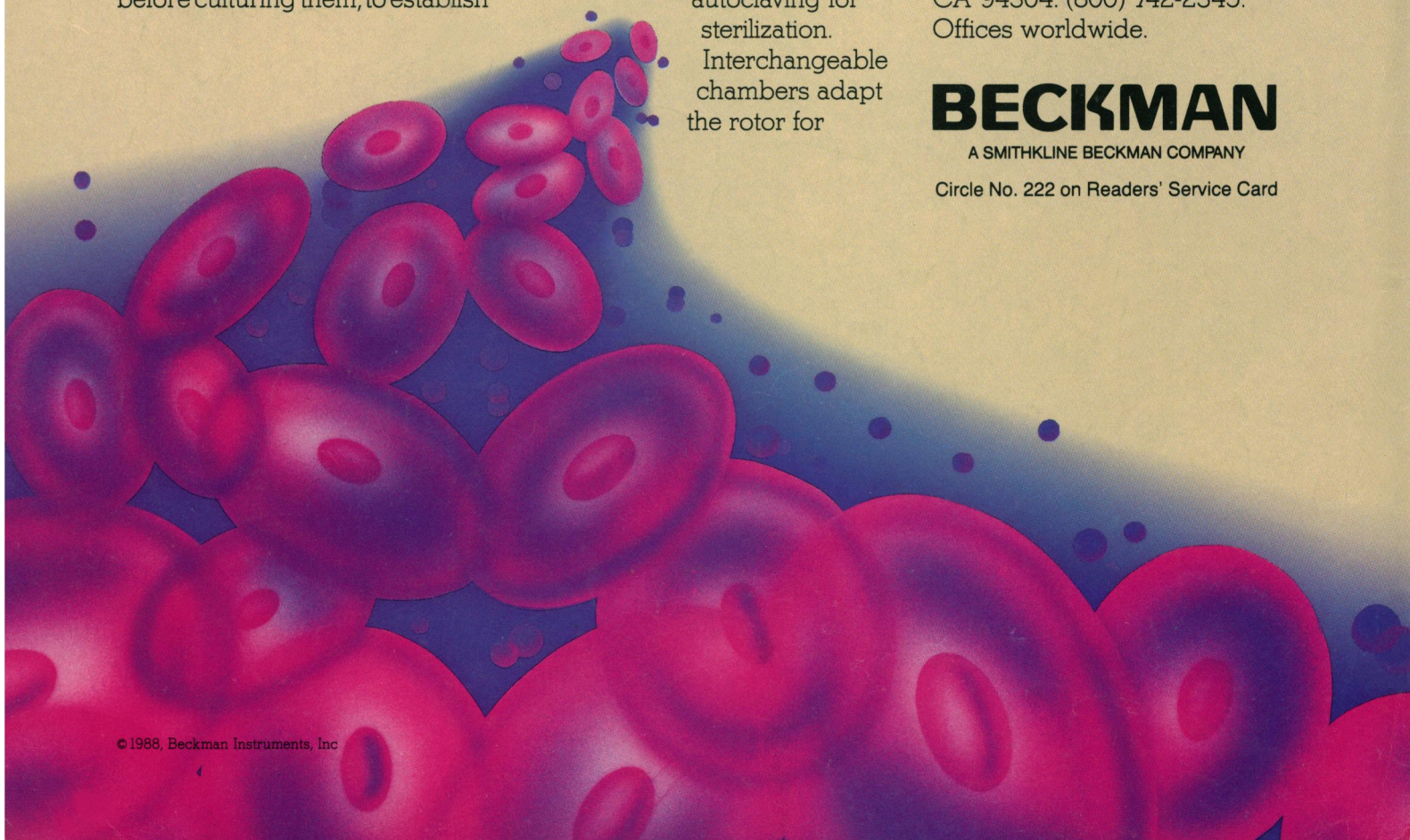
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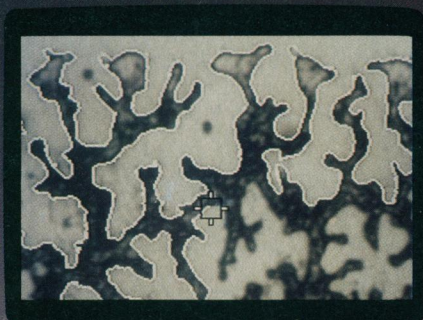
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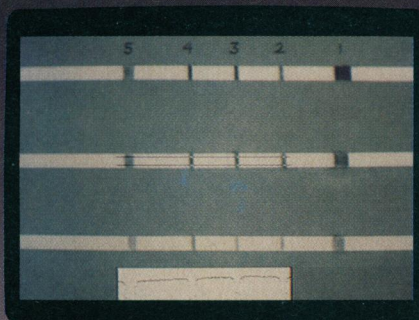
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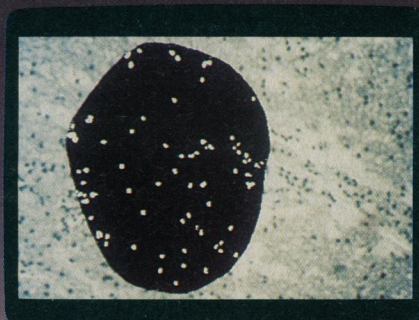
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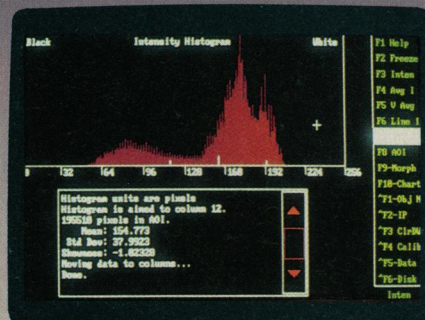
Density along a strip



Automatic object counting

	1	2	3	4
1	6.95982	4.47528	4.11594	3.55845
2	6.95985	4.45535	4.09487	3.55845
3	6.98812	4.45842	4.07480	3.55845
4	7.00101	4.41549	4.02111	3.55845
5	7.00101	4.39556	4.03104	3.55845
6	7.00101	4.37563	4.00957	3.55845
7	7.02207	4.35570	3.98990	3.55845
8	7.02207	4.33577	3.96721	3.55845
9	7.02207	4.31583	3.94644	3.55845
10	7.04394	4.29590	3.92587	3.55845
11	7.04394	4.27597	3.90480	3.55845
12	7.04394	4.25604	3.88324	3.55845
13	7.04394	4.23611	3.86125	3.55845
14	7.06581	4.21618	3.84018	3.55845
15	7.06581	4.19625	3.81911	3.55845
	X	Y	Distance	Area
	cm	cm	undefd	undefd
				degrees

16k x 64k data worksheet



Intensity histogram

	1	2	3	4
1	6.95982	4.47528	4.11594	3.55845
2	6.95985	4.45535	4.09487	3.55845
3	6.98812	4.45842	4.07480	3.55845
4	7.00101	4.41549	4.02111	3.55845
5	7.00101	4.39556	4.03104	3.55845
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15	7.06581	4.19625	3.81911	3.55845
	X	Y	Distance	Area
	cm	cm	undefd	undefd
				degrees

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COVER Artist's rendering of a Soviet Radar Ocean Reconnaissance Satellite, or RORSAT, which is used by the Soviet military to follow U.S. naval fleet movements. The electrons, positrons, and gamma rays produced by the RORSAT's nuclear power reactor have interfered with the efforts of astronomers to measure gamma-ray sources such as the sun and supernovae. The reactor core, shown being ejected, is designed to be boosted into a storage orbit at the end of the RORSAT's useful life. See Perspective, page 407, and Reports, pages 441 to 451. [Artwork by Paul Roberts/Bill Burrows and Associates, based on information provided by Charles P. Vick]

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This Week in **SCIENCE**

Cold fusion

THE hottest topic in physics today is cold fusion. If recent claims are true, a limitless, cheap, and easily generated source of power would become available. It was on 23 March at a press conference that the announcement was made of the possibility that cold nuclear fusion had been achieved in a beaker of heavy water; this is not the standard method by which new scientific findings are generally reported. Why was this done? Pool assesses the story behind the story, the politics of this unconventional approach to reporting scientific findings, and the roles played by commercial and patent considerations and the "old-boy's network" in fast-tracking an incomplete, unexplained, but potentially dynamite experimental observation (page 420).

Hydrogen sulfide on Jupiter's moon

HYDROGEN sulfide (H_2S) has been found outside the earth for the first time. It appears to be present on the surface and in the atmosphere of Io, one of Jupiter's moons (page 454). Ground-based infrared spectra of Io show a band at 3.915 micrometers. The band's intensity is variable in different spectra; this suggests that it might represent a volatile substance. Nash and Howell carried out laboratory experiments in which the infrared reflectance properties of different mixtures of H_2S frost and SO_2 frost (a known constituent of the surface) were recorded. A thin layer of H_2S frost evaporating off a thick layer of SO_2 frost provided the best band match to the telescopic band at 3.915 micrometers; the concurrence of telescopic and laboratory spectral bands is taken as diagnostic of H_2S deposited on or condensed with SO_2 on Io. A survey of Io spectra shows that H_2S frost is widespread. Where this frost emanates from—internally from the volcanoes on Io or externally from the magnetosphere of Jupiter—is unclear. The ephemeral nature of the H_2S frost prob-

ably reflects the ever-changing thermal conditions that pertain at the surface of Io.

Malignant hibernomas and metastatic tumors

AN animal model for studying primary tumors of brown fat tissue and for studying metastatic tumors that arise in the liver, lungs, spleen, heart, and adrenals has been discovered somewhat serendipitously. Mice that had received a hybrid gene (a promoter of α -amylase fused with the SV40 tumor antigen gene) developed malignant tumors—hibernomas—in brown adipose tissue (page 460). Depots for fat storage were unexpected sites for tumor development; it had been anticipated that tumors would develop in the liver, parotid, and pancreas, because the promoter normally regulates gene expression in these tissues. (Two liver tumors but no parotid or pancreatic tumors developed.) Fox *et al.* then found, however, that the α -amylase gene is, in fact, expressed in normal fat tissue, and thus the expression of the transgene in such tissue was appropriate. Thus, it should be possible to target other genes to the fat tissue by fusing them to the α -amylase promoter and to study how they affect various aspects of fat metabolism and tumor development in fat tissues.

Developmental genes

WHAT genes are turned on during embryonic development and where in the embryo are they activated? An experimental approach to answering these questions is described by Gossler *et al.* who developed two types of vectors for introducing "reporter genes" into embryonic stem cells (page 463). Clones of cells in which the reporter genes were active could be detected by a staining procedure. Clones were injected into mouse blastocysts; as embryos developed and genes that were near the reporter were activated, the reporter gene was also

expressed, because it was under the control of the host regulatory elements. Temporal and spatial patterns of reporter gene expression could be followed by staining. One reporter gene construct has been passed through the germ line to progeny embryos; staining patterns in the embryos were the same as those of the chimeric parent. These vector constructs should simplify the process of cloning developmental genes that are contiguous with the reporter genes. Comparisons can be made of normal and mutant genes, their expression and regulation, and their protein products.

HTLV-II in drug abusers

ONE-FIFTH of the intravenous drug abusers surveyed in New Orleans are infected with a virus of the human T cell leukemia family, HTLV-II (page 471). This virus has, in the past, only rarely been linked to disease: two of the four associations were with unusual T cell malignancies. HTLV-II is related to the more frequently seen virus HTLV-I that is associated with adult T cell leukemia, tropical spastic paraparesis, and other malignancies and that is endemic in certain parts of Japan, Africa, and the Caribbean. The two viruses are difficult to distinguish serologically. Lee *et al.* screened blood samples for antibodies to "generic HTLV" and then used a molecular method—a modification of the polymerase chain reaction that amplifies DNA—to assess whether cells in the antibody-positive individuals had genetic material characteristic of HTLV-I or HTLV-II. The DNA evaluations were performed on blood mononuclear cells. Most of the infected individuals—23 out of 25—were infected with HTLV-II and not HTLV-I. It is likely that cells carrying the virus are passed from person to person through needle-sharing. The infected individuals are asymptomatic; follow-up studies may, however, show that HTLV-II, like HTLV-I, has a long latency period and that its presence is associated with diseases that affect the immune, circulatory, or nervous systems.



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Low Probability—High Consequence Accidents

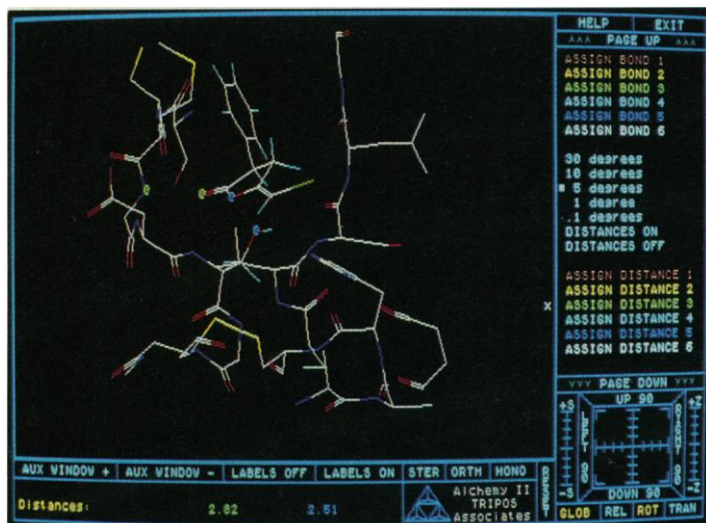
The Valdez oil disaster fits into a class of low probability—high consequence dangers that are among the most difficult to predict and handle. As in the case of earthquakes, dam collapses, or nuclear accidents, disaster plans and appropriate machinery must be kept in readiness as part of the response to the unlikely but potentially catastrophic event. To say that an event is complex is not sufficient to absolve those who fail in meeting their responsibility. In fact, assigning responsibility and authority in advance may be one of the major ways in which future disasters can be averted.

Although the entire story is not yet known, it seems apparent that the oil company in this case was cavalier in regard to its responsibility. Failure of other agencies—the Coast Guard, Alyeska, and local authorities—does not obscure the primary role of the provider of service in the Valdez case. This accident suggests that a complacency can be generated by allowing a multiplicity of agencies to be involved, inviting a multiplicity of accusations in the wake of a disaster. The oil company should have the responsibility not only to develop a coherent emergency plan, to direct practice drills, and to have adequate clean-up equipment available, but also to provide continuous monitoring of operations to avert a disaster in the first place. Although detailed plans cannot be devised for all situations, certainly they can be developed for a busy port like Valdez, and more general plans for any area through which oil tankers travel. The plan, developed in consultation with environmental, legal, and various government authorities, would then be subject to evaluation and approval by the appropriate legal agencies. The line of authority in case of an accident must be spelled out and the individuals delegated sufficient power to be able to act rapidly to implement the plan.

In addition to assigning responsibility, much can be done to improve procedures. Some experts in this type of risk management suggest that too much attention has been placed on mechanics and too little on human factors. Research and procedures directed at counteracting the inevitable lapses of attention that occur in jobs with long periods of high boredom are indicated. Automated tracking of ships may be unnecessary on the high seas, but in coastal waters the expense may be justified. Because too much reliance on automation can be harmful, more extensive studies are required on the adverse consequences of automatic pilots as well as the management of employee frailties such as drinking and drug abuse. A financial structure should be developed that puts heavy premiums on prevention. Punitive damages for delinquent plans, coupled with actuarially devised rates of assessment that reward companies with superior prevention procedures, would help. One device to accomplish this would be an international consortium that maintained bases for emergency action at strategic locations around the world and provided advice on detailed plans. Oil companies would pay dues based on the volume of their tanker business, the quality of their plans, and their “good driver” record. Ports could then demand membership in this organization as a condition for entry.

The advance approval of contingency plans seems to be essential to ensure swift action. For example, the use of dispersants, although controversial, may be indicated when factors such as weather, local terrain, local fauna and flora, and size of spill are considered. A well-developed plan would eliminate the delays caused by ill-informed or obstructive officials and the temptation to blame them when the true problem was the lack of available equipment. By having everyone on record ahead of time, one can improve the quality of first guesses and undermine the authority of the second guessers.

The management of low probability—high consequence calamities is a new area which needs extensive research and new ideas. However, the immediate hazards we face today do not allow delay until ideal plans are realized. Existing knowledge is sufficient to implement plans that provide powerful incentives for prevention and better operational direction after an accident. Those plans and incentives can then be upgraded as new research and new experience become available.—DANIEL E. KOSHLAND, JR.



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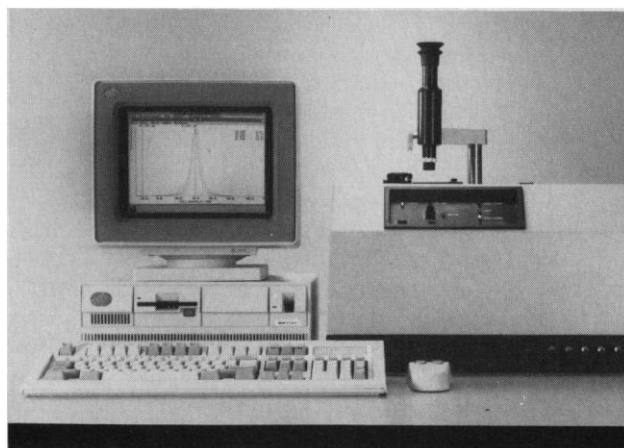
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