



The Economics of Research Compounds

by Bonnie L. Robeson

During these times of economic downturns and uncertainty, biotechnology companies and pharmaceutical corporations must make some tough decisions regarding budgets. One budget category that may not receive the attention it deserves is the area of research compound handling and storage. Research companies have several areas that differentiate themselves from the manufacturing area and service companies. One difference is that all types of research companies value and protect their intellectual property. Proprietary information includes research compounds, processes, assays, etc. In addition, research companies often hold archives of research samples and synthetic procedures, dating back decades to projects that have either reached completion or were dropped. For established companies, inventories can be very large, numbering in the hundreds of thousands and even millions of research samples. Granted, research samples imply that the amounts maintained are small, but expenses in this endeavor can be quite steep. In order to reduce costs, companies need to consider the following:

Outsourcing

Companies should consider reducing costs while still maintaining control and the highest standards in compound processing. The maintenance of the compound repository is essential. In most circumstances, the compounds are maintained in automated stores, retrieved, weighed, and plated in multiple-well plates as needed for high-throughput screening. When two or more companies merge, or one organization buys out another, research compounds often have to be relocated and combined. Access to these resources should be considered early, and steps should be taken to make the new resources accessible to all branches of the organization. Also, building new compound repositories requires moving all of the samples. The smallest amount of downtime is essential for a smooth transition. The tasks of physically moving, organizing, and preparing research samples in ready-to-use formats may be most economically handled through outsourcing. The time taken by internal staff to reorganize the samples may take several months to a year. Outsourcing this task

can reduce time and cost; it keeps the internal staff available to continue their present activities in an undistruptive manner.

As already stated, these research samples are extremely valuable; the following are factors to consider when outsourcing:

- the history of the proposed company
- the technical level of the staff to be working with the samples
- references from companies where past projects were completed
- details about specific procedures
- a tour of the facility to be used if the project is being conducted at the contractor's site.

The company to conduct the compound handling should be asked to supply detailed procedures as to 1) maintenance of the robotic instruments; 2) variance or tolerance of the robotic instruments; 3) policy on either the use of new pipet tips for each transfer, or the procedure and data regarding contamination for reusing rinsed pipet tips; and 4) tracking of all procedures so that mistakes cannot be made when transferring samples from one vial to another. Although each compound handling activity in itself appears quite simple, there are numerous places where mistakes can occur in a complex series of transfers. An experienced company will have computer software that tracks each movement and does not allow compounds to be placed into either untared or the wrong bottles. The software prompts each motion with the use of bar codes. If decision makers know and understand the procedures for working with research compounds, then better decisions can be made. It must never be forgotten that the least expensive quote is not always the most economical in the long term. Research compounds are an irreplaceable resource. If one calculates the true value of each sample being transferred, the value would include starting chemicals and, often, expensive metal catalysis, salary of the organic synthetic chemists, overhead, and analytical techniques used to confirm the chemical structure. The sample is not just some grains of a pretty color compound or liquid in the bottom of a bottle. Therefore,



the lowest quote for compound handling projects may be jeopardizing the integrity of a very valuable resource.

Do not make the mistake of attempting to conduct the compound handling internally, having staff members take turns at weighing and transferring compounds. The management may attempt to argue that this incurs no extra cost to the company. This is very far from true, for several reasons. It is not a wise use of a Ph.D. degree-holding chemist's time to be doing a laboratory technician's job. His or her salary and the overhead are not being wisely spent. In addition, the "each take his or her turn" solution means that no one is sincerely vested in the procedure, and that he or she might simply perceive it as something that has to be done. Furthermore, there is usually no tracking procedure to address where mistakes may have been made and who may be responsible. If a compound transfer is one off somewhere in the procedure, then everything else is wrong. Again, research compounds are extremely valuable and hasty decisions can lead to devastating results in the future.

On the other side of the coin, decisions about compound handling projects should not be shelved and postponed time and again. This compound archive only has value if it is usable. Remember, compound handling projects will occur if companies merge, one company is bought by another, and/or new platforms become available for retesting the archival samples. New technologies require much less sample since assays are conducted in 96-well or 384-well plates. If unusable compounds are literally taking up space and cannot perform, then companies are losing opportunities and time. Remember that taking up space adds to inventory costs. Airplanes are only making money when they are flying, and compounds are only useful if they are in a format to be assayed in high-throughput screens.

Know what you have

There are situations in which large and established companies have stored a variety of sizes of bottles containing long-forgotten compounds. It is important that the compounds be inventoried, checked for quality, and structures confirmed. Companies may be investing in synthesizing and ordering compounds that might be stored in a back corner already. The compounds may yield a material of unimagined value when characterized. With the continuing identification of new molecular targets, these dormant compounds may have value once they are organized and formatted for testing in new assays. Again, time-consuming tasks such as these may be best outsourced and handled by experienced hands.

Centralize compound storage

With the merging of large pharmaceutical companies and the purchasing of smaller biotechnology companies by established research organizations, inventories of research compounds are now located at various sites. Management should consider how to make the best use of these resources. By not having one consolidated database of research compounds stored at one site, enabling access by all of the researchers, the following can occur: Compounds already stored at one site, and unknown to other researchers, are reordered, maybe numerous times, at other locations for a cost; valuable compounds cannot be fully utilized in various assays that are conducted in the different locations; and maintaining more than one repository is costly.

The expense and logistics of maintaining more than one research compound repository should be calculated versus the cost of having one centralized research compound repository. Having one facility should reduce the costs of overhead, as it relates to maintaining proper safety and security for the research compounds when organized effectively and efficiently. The centralized repository would receive lists of selected compounds and the formats for receipt from the various research sites, and then retrieve and prepare the compounds for shipment back to the screening laboratory ready for assaying. Evaluate the contract organizations that conduct this service, and again, compare outsourcing costs to internal overhead costs.

Backup of resources

Routinely, data and correspondence files are backed up, and companies cross-train employees to be able to conduct other employees' tasks. Furthermore, management grooms and mentors colleagues to take over executive positions. But how many companies have a backup for research compounds? As many as 50 or 60+ years of synthesis may have gone into the compilation of these research samples. Like the rainforest, if these resources are destroyed or damaged, they may never be able to be assembled again. And if the compounds were to be synthesized again, the cost and time would be prohibitive. Therefore, the care and insurance of these assets are essential. Yet, in a flash, research compounds can be destroyed by fire or natural disaster.

All businesses, research companies in particular, need to be aware of a potential crisis in the insurance industry. Huge losses due to strong storms, earthquakes, and, most recently, terrorism have been incurred by the insurance industry in recent years.

continued



Questions that need to be asked include:

- Are the research samples covered at a reasonable value?
- Are the compounds stored in a secure place?
- Is there a backup set of research compounds?

Everyone is paying for claims that have been filed. Insurance premiums have doubled in many instances. Some companies are maintaining costs by underinsuring property and inventory. Other cost-containing measures include self-insuring assets. Both of these options are based on the probability of having to file a claim in the future. Self-insuring is also usually underinsuring the assets.

As stated above, research compounds are irreplaceable. A monetary reward from an insurance claim cannot replace the compounds. Does a life insurance policy replace the spouse of a wife or husband? Most likely, the response would be in the negative; only a token amount of money helps in the short term. To actually replace tens

of thousands of compounds would be cost prohibitive, and even more so, time prohibitive.

Summary

In these times of mergers of pharmaceutical and biotechnology research companies, strategic decision making needs careful and long-term consideration to reduce operating costs and to make the best use of resources. As stated above, outsourcing compound handling, maintaining complete and updated inventories of research compounds, centralizing the compound repository, and having a backup set of these irreplaceable resources should be taken under serious consideration.

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Industry Stock Table

	Jun. 16	Jul. 15	Aug. 15	Sept. 15	Oct. 15
	2003 (\$)	2003 (\$)	2003 (\$)	2003 (\$)	2003 (\$)
Abbott Labs (ABT)	46.22	43.15	39.68	43.74	41.93
Aclara Biosciences (ACLA)	4.32	4.35	3.47	3.55	3.91
Affymetrix (AFFX)	22.66	22.32	22.49	24.20	21.85
Agilent Technologies (A)	19.24	22.23	21.78	24.50	24.24
Applera Applied Biosystems (ABI)	20.71	20.28	21.02	20.81	23.43
Argonaut Technologies (AGNT)	1.16	1.33	1.17	1.43	1.35
Beckman Coulter (BEC)	41.68	41.86	44.04	46.79	47.98
Becton Dickinson (BDX)	40.21	38.23	39.45	36.95	37.49
Bio-Rad Labs (BIO)	59.90	58.51	51.63	51.17	52.85
Bioanalytical (BASI)	2.90	4.38	3.95	4.60	4.60
Caliper Technologies (CALP)	4.25	5.25	5.22	5.63	5.86
Cepheid (CPHD)	5.20	5.29	4.20	5.15	5.15
Corning (GLW)	7.76	8.44	7.99	8.72	10.95
Dionex Corp. (DNEX)	40.40	39.81	40.48	40.10	42.11
Fisher Scientific Inst. (FSH)	33.50	38.64	36.81	39.40	41.17
Hewlett-Packard Co. (HPQ)	21.38	22.90	21.40	19.83	21.92
Isco (ISKO)	7.74	8.40	7.48	7.75	9.25
Large Scale Biology Corp. (LSBC)	1.24	1.21	1.06	1.07	1.28
Luminex Corp. (LMNX)	5.21	5.24	5.26	6.94	8.30
Mettler-Toledo (MTD)	36.87	37.45	36.46	38.50	38.55
Millipore Corp. (MIL)	45.93	45.73	42.62	46.04	47.92
Misonix (MSON)	3.60	3.71	3.83	4.34	4.81
National Instruments (NATI)	39.11	40.95	37.96	41.11	42.54
OI Analytical (OICO)	4.93	6.10	5.12	5.67	6.00
Orchid BioSciences (ORCH)	1.48	1.36	1.14	1.38	1.48
Pall Corp. (PLL)	24.07	22.86	23.07	22.62	23.70
PerkinElmer (PKI)	13.50	14.76	15.35	16.05	16.98
Proterion Corp. (PRC)	0.45	0.70	0.98	0.60	0.66
SciQuest (SQST)	3.90	4.05	4.39	4.65	4.78
Sigma-Aldrich (SIAL)	56.03	55.91	54.74	53.88	56.37
Thermo Electron (TMO)	22.31	21.30	21.70	22.73	22.95
Varian Inc. (VARI)	34.20	33.71	32.00	33.74	35.17
Waters Corp. (WAT)	29.34	29.87	30.90	29.80	29.34