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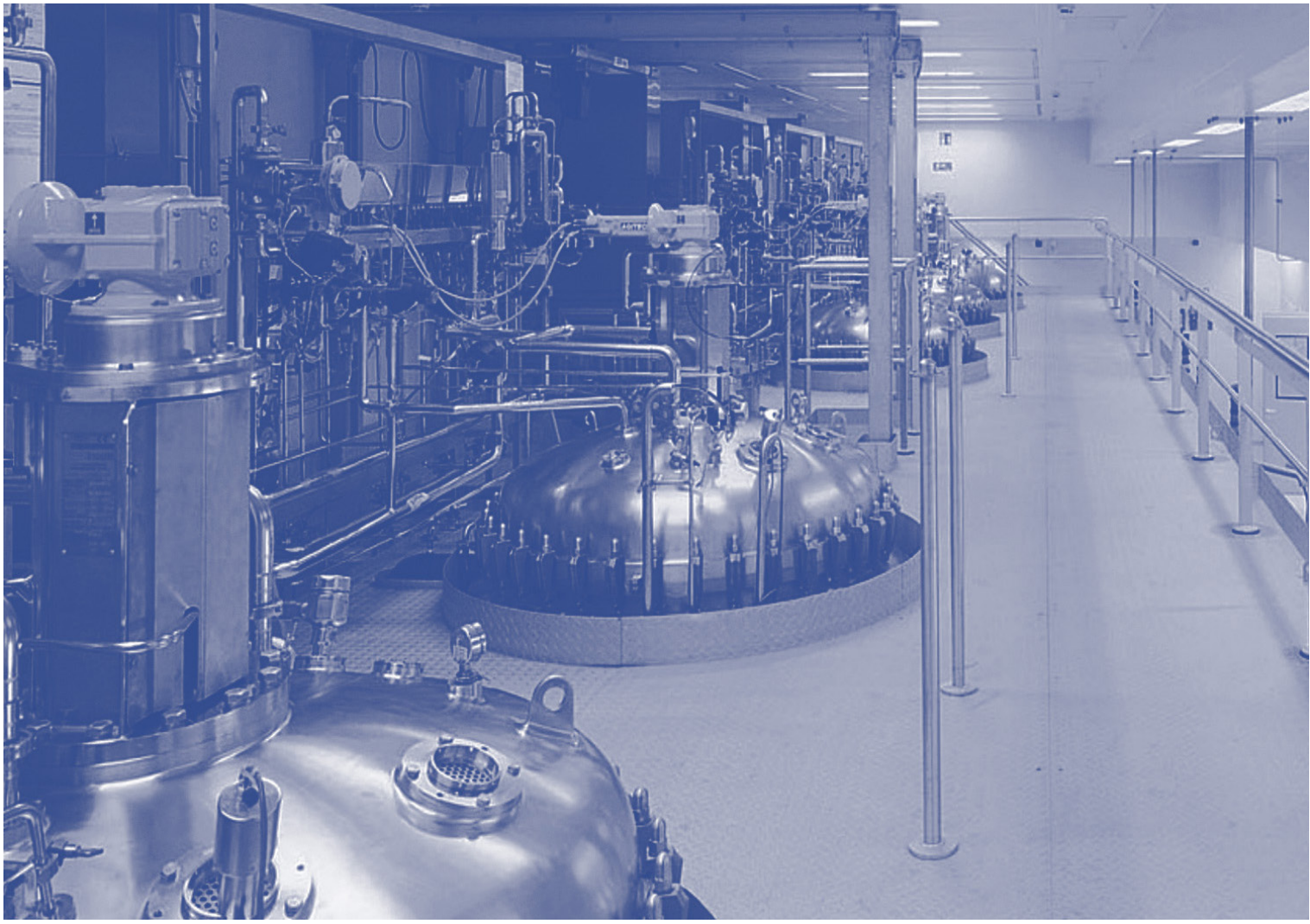
COMPLIANCE SOLUTIONS



Assessing Risk in Seed & Cell Bank Practices

Avoid Costly Disruptions in Vaccine Manufacturing

A major global manufacturer of biologics and vaccines, planning to ramp up production of its current products and introduce new ones, wanted to identify potential operational and compliance risks that could disrupt its supply of seed and cell banks needed to manufacture its vaccine products - potentially costing the company millions of dollars per day of disruption. For a comprehensive risk assessment, the company turned to Tunnell.

The Result:

- A comprehensive view of potential risks to its seed and cell banks, ranked in order of potential impact on the company's vaccines business
- Recommendations for short, medium, and long term risk mitigation
- A regulatory gap analysis
- A path forward to an enhanced vaccine seed and cell banks program.

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Tunnell was engaged to conduct a current state risk assessment and recommend an enhanced seed and cell banks program

In preparing to ramp up manufacturing, the company recognized that its vaccine seed and cell banks (S&CB) practices had over time been developed independently for some products and might therefore lack the uniformity and rigor required to ensure a robust and compliant S&CB program to supply vaccines to the market. The company had also experienced some close calls that could have disrupted its supply of seed and cell banks. As a result, it wanted to identify potential S&CB risks in two critical categories:

- The catastrophic loss of seed or cell banks as a result of natural or man-made disasters, accidents, or similar calamaties
- Disruption of vaccine supply to market as a result of adverse regulatory agency action.

The company asked Tunnell to conduct an in-depth risk assessment that included an evaluation of current S&CB processes and procedures, storage units (CTUs), and storage facilities. We also assessed the currency and compliance of the company's S&CB quality systems and SOPs. To provide a regulatory gap analysis, we reviewed Quality Control release tests performed for the company's S&CB against regulatory agency expectations and industry best practices. In addition, we assessed the currency and compliance status of the S&CB quality systems and SOPs.

Tunnell's collaborative approach ensured a comprehensive assessment.

Proactively identifying and mitigating major risks to vaccine seed and cell banks substantially reduced the business risk of a catastrophic interruption to the continuous supply of vaccine products to the market – and the impact that interruption would have on the company, its employees, and customers. In identifying the potential impact of risks across three major areas – operational risks, compliance and regulatory risks, and business risks – Tunnell works closely with clients to ensure that what looks like a comprehensive assessment on paper will be comprehensive in practice.

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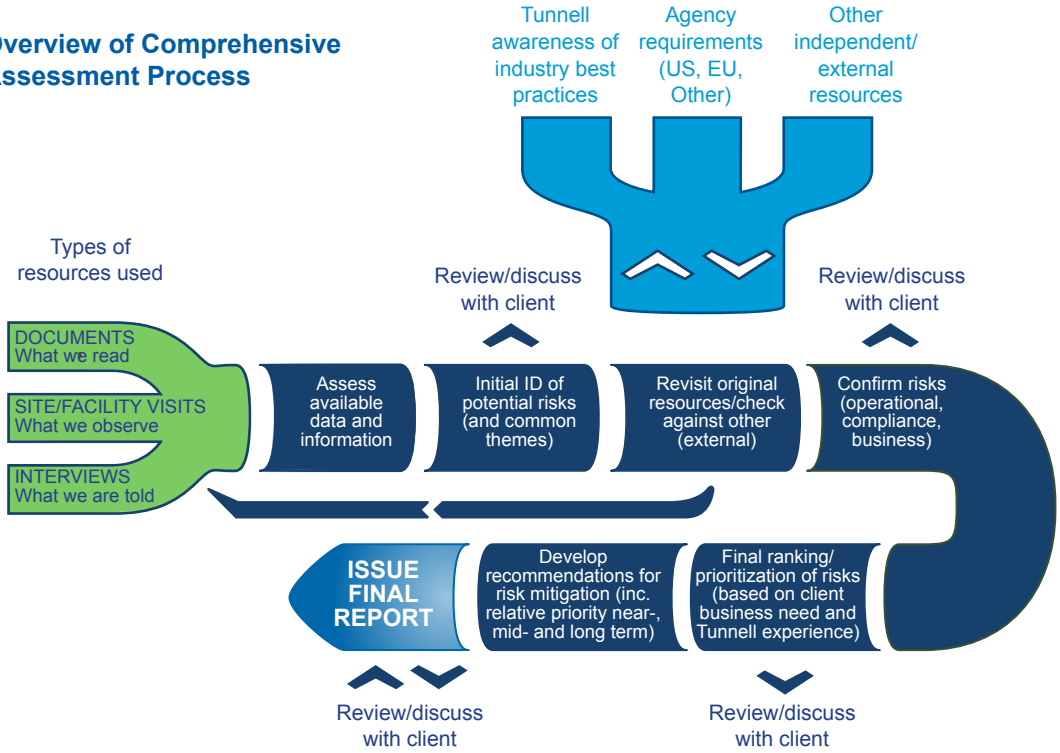
Overview of Comprehensive Assessment Process



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We began by meeting with the appropriate client leadership and technical, quality, compliance and regulatory subject matter experts (SMEs) to align our understanding with the company's needs and objectives and to identify key client support personnel. Working with the company's manager for the project and key SMEs, we scheduled interviews and facility visits and developed the list of resources that Tunnell would need to access, including:

- Processes/ Procedures (SOPs, work instructions, etc.)
- Product filings and supplements
- Batch records
- Process flow diagrams
- Stability data/ reports
- QC tests performed
- Regulatory agency guidance documents/expectations (US, EU, other in-scope markets)
- Inventory planning and management system
- Emergency preparedness and disaster recovery plan.

Guided by a project plan, including major milestones, dependencies, and deliverables, and by a clear understanding of roles, responsibilities, reporting structures, and governance, the assessment was initiated and completed on time and within budget.

Tunnell assessed each risk identified and evaluated its degree of potential impact.

The Tunnell team identified the operational, compliance, and business risks in all areas of the company's S&CB program: processes and procedures, storage areas, storage units, containers and closures, and manage ment systems. Most importantly, we developed a risk matrix in which we assigned to each of our observations a relative level of risk based on our extensive industry experience regarding the potential impact a risk or gap may ultimately have on the client's ability to provide an uninterrupted supply of vaccine to the market.

Typically, such assessments uncover 15-20 potential risks overall, of which 4-7 usually rank as major, imminent, potential risks. Often, clients are surprised to find they are at risk in areas which they believe they have already addressed. For example, we find that many companies lack comprehensive emergency preparedness. Because they have some back-up storage units in another building at the manufacturing site, they may believe they have satisfied regulatory requirements and that they are covered in the event of unforeseen events like power outages. In fact, those arrangements may not be in compliance. And they are certainly inadequate in the case of large-scale catastrophes, when the absence of formal, standardized procedures and priority planning during emergencies can put high-value S&CB assets at great risk.

Tunnell provided a clear picture of current risks and recommendations for mitigation.

At the conclusion of the project, we prepared a comprehensive Risk Assessment Report and Gap Analysis designed to identify risks, highlight major imminent risks, and compare actual performance to industry best practices and regulatory expectations.

The Risk Assessment detailed risks we uncovered in CTU equipment and facilities - challenges with which many companies struggle. These included risks of varying magnitudes in access and security, monitors and alarms, and CTU capacity - including emergency back-up storage. We identified risks related to inventory/ logbooks, locations, data/inventory back-ups, and emergency preparedness plans. In processes, we uncovered risks including S&CB inventory management and tracking, inventory planning, and two-tiered banking.

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In addition, we found organizational risks such as lack of centralized ownership and oversight and lack of clarity in roles and responsibilities. For each of these risks, we made recommendations for mitigation, including “quick hits” such as movement of inventory into back-up CTUs, and further recommendations for the short, medium, and long terms.

The Gap Analysis included our analysis of the company’s current QC assays performed for licensed vaccine products and other S&CB practices and procedures and compared those to industry best practices and to our expert understanding of regulatory agency expectations in the client’s major markets. We identified several potential regulatory gaps and recommended actions to improve compliance. In addition, we helped the company enhance the uniformity and comprehensiveness of its site-wide SOPs.

The company gained risk assurance and better visibility into processes for all its products.

The comprehensive S&CB Risk Assessment and Gap Analysis, along with our recommendations for risk mitigation, provided maximal assurance to the company that it need not experience a disruption in the supply of seed and cell banks for the manufacture of its licensed, marketed products. The client also gained a single-source document that provides up-to-date visibility, in one place, to the S&CB inventory over all licensed products - a document that can also form the basis of a real-time visibility tool and be integrated with the company’s ERP system, if desired. From an even wider perspective, the detailed understanding that Tunnell consultants developed of the client’s S&CB processes provides the company with similar up-to-date visibility to processes for all of its licensed products - enabling it to operate with more confidence than ever that it can supply the needs of the market without costly disruptions.

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For over 60 years, Tunnell has provided both expert talent and consulting services to clients including Biopharmas, CDMOs, the US Government, incubators, investors and NGOs. We have experience across multiple platforms – including large molecule, vaccines, cell and gene therapy and small molecule – and our subject matter expertise focuses on regulatory, quality, GxP, pre-clinical/clinical, supply chain, manufacturing, CMC and product launch. To learn more, visit us online at http://www.tunnellconsulting.com.

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